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MTSI - Q1 2018 MACOM Technology Solutions Holdings Inc Earnings Call

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PRESENTATION

Operator

Good afternoon, and welcome to MACOM's Fiscal First Quarter 2018 Financial Results Conference Call. (Operator Instructions) As a reminder, this conference call is being recorded today, Tuesday, February 6, 2018.

I will now turn the call over to Steve Ferranti, Vice President of Investor Relations at MACOM. Steve, please go ahead.

Stephen Ferranti - *MACOM Technology Solutions Holdings, Inc. - VP Investor Relations*

Thanks, Brian. Good afternoon, everyone, and welcome to MACOM's fiscal first quarter 2018 earnings conference call. Joining me today are MACOM's President and Chief Executive Officer, John Croteau; and Senior Vice President and Chief Financial Officer, Bob McMullan.

If you have not yet received a copy of the earnings press release, you can obtain a copy on MACOM's website at www.macom.com under the Investor Relations section.

Before I turn the call over to John, I would like to remind everyone that management's prepared remarks and answers to your questions contain forward-looking statements which are subject to certain risks and uncertainties. Because actual results may differ materially from those discussed today, MACOM claims the protection of the safe harbor for forward-looking statements contained in the Private Securities Litigation Reform Act of 1995. For a more detailed discussion of the risks and uncertainties that could result in those differences, we refer you to MACOM's filings with the SEC, including its current report on Form 8-K filed today and its annual report on Form 10-K filed on November 15, 2017. Any forward-looking statements represent management's views only as of today, February 6, 2018, and MACOM assumes no obligation to update these statements in the future.

The company's press release and management statements during this conference call will include discussions of certain adjusted non-GAAP measures and financial information, including all income statement amounts and percentages other than revenue, unless otherwise noted. These financial measures and a reconciliation of GAAP to adjusted non-GAAP results are provided in the company's press release and its related Form 8-K, which was filed with the SEC today and can be found at the Investor Relations section of MACOM's website.

And for those of you unable to listen to the entire call at this time, a recording will be made available via webcast for at least 30 days in the Investor Relations section of MACOM's website.



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And with that, I'll turn over the call to John for his comments on the quarter.

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Thank you, Steve. Welcome, everyone, and thanks for joining us today. I'll begin today's call with an overview of our first quarter results for fiscal 2018, followed by a review of our current end-market conditions and near-term business trends. I'll then turn the call over to Bob McMullan, our CFO, who will review our financial performance in further detail. I'll conclude our prepared comments by providing an update on key business developments related to our long-term secular growth drivers before wrapping up with guidance for the fiscal second quarter of 2018.

Jumping right into the numbers. Revenue for the fiscal first quarter was \$131 million, coming in at the lower end of our guidance. Overall, Q1 demand was mostly in line with the expectations that we had factored into our guidance. Looking back, Q1 was obviously a challenging quarter across the board as we dealt with the full impact of the geopolitical downturn in China. Perhaps more importantly, we believe that December was indeed the bottom of the cycle, at least for our particular mix of businesses in China.

Our Q2 revenue guidance reflects an expected recovery of demand within certain end markets in China. While it's still too early to call the exact slope of this recovery, we do expect that demand will progressively strengthen through the remainder of FY '18.

Looking at some of the moving parts. First, in telecom. Telecom revenue was down quarter-on-quarter and declined 39% year-on-year, driven by softness in China network infrastructure spending across our served markets. We believe that recovery is underway in our telecom business in Q2. Most prominently, thus far, in Q2, we have already seen recovery in orders and backlog in PON and fiber backhaul, which were among the hardest-hit during the depths of the recent downturn. This, combined with lean channel inventories, has led to a point where we are now supply-constrained for the March quarter across all of our laser product lines.

In the near term, our priority will be on maximizing short-term returns. Looking forward, we expect output to increase throughout 2018, with capacity expansion and supply chain improvements across all of our laser product lines.

In Metro/Long-haul, we have also seen some recovery off the bottom, albeit modestly, at transceiver customers in China who serve as domestic and global demand. We believe customers are burning through remaining pockets of inventory, placing orders for first half delivery and are forecasting 15% growth in port count in 2018.

While we clearly see improvement in China, we are also seeing a shift in carrier spending that we believe will moderate the slope of Metro/Long-haul recovery through 2018. First, in our coherent driver and TIA portfolio, there's a shift in demand from Long Haul form factors to lower-cost Metro CFP products as carriers push 100G out toward the edges of their networks. Customer forecasts for these Metro products show higher unit volumes but significantly lower ASPs, thereby softening projected recovery of our Metro/Long-haul business this year.

Second, in our telecom OSA products, we're seeing a transition from LR4 to lower-cost CWDM4 as carriers shift focus to 5G. While we expect this will be favorable for MACOM in the medium to long term, in the short term, it too will moderate recovery of our Metro/Long-haul business this year.

The net effect is that we expect our core business in Metro/Long-haul networks to recover, but with a different mix and at a more gradual pace through 2018 than we had previously anticipated.

Moving to data centers. Data center revenue was down sequentially but up 107% year-over-year. As most of you know, there are 2 major elements to our data center business. The first comprised of legacy OTN framers and mappers, the second being our 100G portfolio of high-performance analog components, lasers, photonic chips and PHYs for cloud data centers.

Looking at each of these separately. Our legacy portfolio declined sequentially in Q1, driven by a combination of the pause in China as well as sluggishness in other regions where telecom-upgrade OTN routers are being displaced by enterprise-grade switches. Looking ahead, we anticipate

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recovery in this business, driven by new OTN deployments in Asia Pacific. Overall, we expect this legacy data center business will remain lumpy and see gradual recovery from the Q1 baseline.

In our cloud data center portfolio, demand for 100-gig connectivity remains robust, and we expect 2018 to be another strong year for 100G port growth. CWDM is becoming the technology of choice in DCI and campus networks for reaches ranging from 500 meters to 10 kilometers. Below 10 kilometers, CWDM4 is displacing higher-priced LR4 modules, similar to what is happening in the telecom market. On top of this, the market is rapidly undergoing a sea change as cloud service providers begin to consolidate their supply chains around certain high-volume manufacturers enabled by silicon photonic solutions. While we expect both of these factors to be unequivocally positive for us in the medium to long term, in the near term, the resulting ASP declines are expected to moderate overall SAM growth for our components business, which has been at the heart of our 100-gig data center revenue to date. We expect this scenario to improve as we ramp our own CWDM silicon photonics platform through the course of this year.

I'll talk more about that later in the call when I address longer-term growth prospects.

Finally, industrial and defense was \$40.7 million for the quarter. This part of the business played out largely as expected, with Q1 revenue being down sequentially off an exceptionally strong Q4.

With that, let me turn it over to Bob to review our fiscal first quarter financials in further detail.

Robert J. McMullan - *MACOM Technology Solutions Holdings, Inc. - Senior VP & CFO*

Thank you, John, and good afternoon, everyone. I will review MACOM's fiscal first quarter results and financial position. Revenue in the first fiscal quarter was \$131 million, declining 14% year-over-year and down 21% sequentially. Revenue by end markets in fiscal Q1: telecom, \$55 million and 42% of revenues, down 39% year-over-year; data center, \$35 million, 27% of revenues, up 107% year-over-year; industrial and defense, \$41 million and 31% of revenue, down 6% year-over-year.

Non-GAAP gross margin and gross profit in the fiscal first quarter was \$70 million and 54% of revenue respectively compared to \$87 million and 57% of revenue respectively year-over-year and \$97 million and 58% respectively on a sequential basis.

Gross margin is highly influenced by product mix and the associated gross profits. As our telecom and data center product revenues decline, our gross margins were negatively affected.

In terms of operating expenses. Total non-GAAP operating expenses were \$57 million compared to \$46 million year-over-year and \$59 million sequentially. Adjusted operating expenses were up 24% year-over-year and down 3% sequentially as we aggressively managed through expense controls. Adjusted R&D and SG&A expenses were \$36 million and \$21 million respectively in the fiscal first quarter. Non-GAAP income from operations and operating margins were \$13 million and 10% of revenues, down 67% in dollars and 62% on a percentage basis respectively year-over-year and down 65% in dollars and down 55% or 1,310 basis points respectively on a sequential basis.

Net interest expense was \$6 million flat with fiscal Q4. Our normalized non-GAAP income tax rate in the fiscal first quarter was 8%, in line with guidance. As to cash taxes in our fiscal first quarter, we had cash payments of \$4 million associated with our Japan operations, where we're working to minimize future tax exposures.

Briefly, on the new U.S. tax law. Our significant net loss carryforwards will reduce our accumulated foreign earnings and profits to 0, negating any tax liability in payments. Going forward, the new law allows for full deductibility of capital expenditures in the year paid, which we expect to decrease MACOM's U.S. taxable income.

Our fiscal first quarter non-GAAP net income and EPS were \$7 million and \$0.10 per fully diluted share respectively, decreasing from \$32 million and \$0.57 year-over-year and \$30 million and \$0.46 sequentially. Non-GAAP net income decreased 79% year-over-year and 78% sequentially. Non-GAAP EPS decreased 82% year-over-year and 78% sequentially.



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Adjusted EBITDA or earnings before interest, taxes, depreciation and amortization was \$21 million, down 57% from \$48 million in our fiscal 2017 first quarter and down 56% from \$47 million sequentially. GAAP cash flow from operations was \$0.5 million, including acquisition-related cash payments of approximately \$4 million.

After deducting capital expenditures and excluding acquisition-related payments, adjusted non-GAAP free cash flow was negative \$9 million and negative 140% of non-GAAP net income in the fiscal first quarter compared to \$15 million and 49% of non-GAAP net income in the fiscal first quarter of 2017 and \$7 million and 25% of non-GAAP net income sequentially, also after excluding acquisition-related payments.

Now to MACOM's balance sheet. At fiscal first quarter end, our cash, cash equivalents and short-term investments were \$197 million, down from \$214 million last quarter. Accounts receivable were \$97 million, down from \$136 million sequentially. Days sales outstanding improved to 68 days compared to 74 days. Inventories were \$143 million, up 5% from \$136 million sequentially. Inventory turns declined to 1.7x compared to 2.1x. Long-term debt was \$680 million, inclusive of capital leases. We also have \$160 million of availability in an undrawn credit line.

Capital expenditures in the fiscal first quarter were \$14 million or 11% of revenue compared to \$8 million or 5% of revenues sequentially. Our capital expenditures are directed to increasing capacity to fulfill expected custom -- demand for our GaN on silicon and silicon photonic products.

Depreciation expense was approximately \$7 million as compared to \$7 million sequentially. Our investments in capital expenditures exceeded our current level of depreciation, reducing our free cash flow by \$7 million.

Back to you, John.

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Thanks, Bob. Turning to the longer-term secular drivers for our business. As mentioned in my earlier remarks, coming out of the downturn in China, we do see a shifting market landscape and product mix for our telecom and data center businesses in 2018 and beyond. I'd like to spend a few minutes discussing these trends in more depth. I'd like to start by sharing a conversation I recently had with the founder of one of our large network customers. He shared with me his vision of data center connectivity and his view of the current lay of the land. In his words, he thought the industry is just now entering a golden age of optical connectivity. I found that comment fascinating, especially now at the bottom of this cycle, amidst the geopolitical pause and associated inventory correction. But I get it. His vision mirrors what we outlined in our Cloud Data Center Forms back in May. He then shared with me his industry forecast model, which shows port count increasing in a 30% compound annual growth rate. Bandwidth through those ports is increasing at 100% compound rate or doubling each year. In other words, moving right into our wheelhouses.

MACOM is poised to be a major beneficiary of the corresponding upgrade from 10- and 40-gig to 100-gig CWDM and single-lambda PAM4. That's why we still firmly believe that the opportunity for our company in cloud data centers will be transformative over the next several years.

We're facing unprecedented growth in port count in both concentrated cloud data centers and soon, distributed-edge computing architectures for 5G telecom. I'll talk about that next.

There's tangible economic demand behind those buildouts in new services like IoT, virtual reality, augmented reality and artificial intelligence. These services and buildouts will fuel industry growth for the next decade to come. Optical is a key enabling technology in this future, and there are firm technical requirements underpinning that demand that are rooted in reduced latency, increased bandwidth and improved quality of service. That brings me to the reason why I'm so passionate about MACOM's long-term prospects in cloud data centers and 5G telecom against the backdrop of the current optical environment.

We're building a semiconductor-caliber supply chain with wafer-scale laser manufacturing, silicon photonics with automated assembly and the supporting high-performance analog and mixed-signal portfolio that can support the cost structure and scale to enable these new optical mass markets. In fact, every cloud service provider in every major network OEM we work with resonates with that vision. And it's those customers that inform and fuel my passion behind MACOM's long-term prospects in this area.



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Ultimately, the pace at which we scale data center revenues in 2018 will be determined by how quickly we and our transceiver customers ramp production. Today, that ramp is limited by conventional discrete transceiver designs. Our proprietary silicon photonics L-PIC technology is poised to accelerate that ramp, with the potential to dramatically reduce transceiver production times and increase manufacturing output.

To that end, this quarter, we successfully expanded our partner engagements for CWDM and PAM4 solutions, adding both new networks OEM customers as well as additional low-cost manufacturing partners.

Now over to the telecom side of the business. Telecom carriers are clearly shifting capital investment this year to building out 5G networks, both optical and wireless, creating what we expect will be a long-term breakout in our telecom business, much akin to cloud data centers. To handle the massive increase in network data traffic ahead, some say by as much as 100x, emerging 5G network architectures are relying more heavily on high-speed optical interconnects from the network backbone, through the baseband processing, all the way to the antenna. Some call this fiber-to-the-antenna. In these fronthaul applications, copper cabling running from the base stations to the antennas will be upgraded to optical, and existing 100-gig transceivers will be upgraded to higher speeds. And for backhaul, new fiber deployments will be pushed deeper into the network, with the majority that ranges below 10 kilometers, well within the capability of our L-PIC technology.

We anticipate that our same CWDM and PAM4 L-PIC solutions that we've developed for cloud data centers have an equally large opportunity in 5G networks, with distributed-edge computing. In this way, 5G telecom networks are evolving to look more like cloud data centers, which are built extensively on a high-speed, low-latency optical framework.

Telecom operators see tremendous benefit as it allows more efficient sharing and pooling of network processing resources, much like server racks inside a hyperscale data center. That's why we expect 5G to be a strong secular growth driver for our telecom business moving forward.

At the same time, we can't overlook the wireless side of 5G, which is also moving into our wheelhouse. New antenna designs and the corresponding migration from 4 to 4.5, 4.9 and ultimately, 5G, plays to all of our strengths as a company and is expected to expand our SAM geometrically over the next 5- to 10-year cycle of network buildouts. Everything from active beamforming techniques and massive MIMO arrays, to GaN on Silicon power amplifiers and Mimix, to our ability to embed optical connectivity directly in the antenna.

Let me close on 5G by clarifying our expectations as to the time line. Carriers and our OEM customers are working on deterministic schedules, making technology, product and vendor selections today. Field trials are expected this year, and field deployments will begin next year. Our planned rollout and ramp of highly differentiated proprietary products and technologies, like L-PICs and GaN on Silicon, will ride this wave for many years to come.

Before wrapping up, as many of you saw today, we announced an agreement with ST for the manufacture and supply of GaN on Silicon wafers. This addresses the third and final leg of our GaN growth strategy, installing the requisite supply chain to bring GaN mainstream across all parts of the wireless base station market, 4G LTE as well as 5G.

To date, we've worked diligently to validate and improve GaN on Silicon technology in base stations, first, in amplifier performance and most recently, in reliability, to support the requisite decades of operating life in the fields. That yeoman's work is effectively complete in the eyes of our customers. Our collaboration with ST is expected to add the scale, cost structure and front-end wafer supply chain, which we believe will uniquely position MACOM to become a top-tier supplier, servicing the roughly billion-dollar market for 4G LTE power amplifiers.

Better yet, we expect the ST collaboration to unlock the biggest commercial opportunity yet, massive MIMO antennas for 5G. As antennas transition from 2 or 4 MIMO channels to 64 element massive MIMO arrays, the cost per channel of power amplification must undergo radical improvements over conventional GaN on Silicon Carbide technology. Otherwise, 5G antennas will not be commercially viable in volume.

Based on conversations I've had recently with some of the biggest customers, I believe they view the MACOM-ST collaboration as solving a major supply challenge that they're facing for GaN and for 5G. Like our L-PIC technology, we believe GaN on Silicon's source from ST will play a key industry-enabling role in realizing the potential of 5G networks and that MACOM will be the exclusive supplier, with a fundamental intellectual property position.

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In summary, we're encouraged to see the early signs of market recovery, albeit modest, following last year's industry-wide downturn. We expect that recovery to progress through the better part of fiscal 2018. For that reason, we view FY '18 as being a transitional year in our served markets. As demand comes back, the technology landscape is shifting in anticipation of the next major wave of infrastructure investments in both cloud data centers and 5G telecom. While near term, these shifts will likely moderate the pace of recovery, they're leading to much, much bigger breakout opportunities that play directly to our strengths.

Looking ahead, we will continue to invest aggressively this year in bringing L-PIC and GaN programs to fruition, programs that are today backed by industry-leading customers. We expect these investments over the course of FY '18 to usher in the next phase of MACOM, in which we monetize what previously were strategic investments anticipating future technology disruptions. We believe these technologies are now poised to enable major industry transitions that are now clearly underway. Simply put, MACOM will be an active participant, not a casualty, in these targeted areas of secular industry growth.

Now let's talk about next quarter guidance. For the fiscal second quarter ending March 30, 2018, we expect revenue to be in the range of \$142 million to \$150 million. Adjusted gross margin is expected to be between 50% and 54% and adjusted earnings per share between \$0.10 and \$0.16 on an anticipated 66 million fully diluted shares outstanding.

It's worth spending a moment to provide additional color on the March guide. In the December quarter, we believe we saw the bottom in terms of market demand and revenue. Entering the March quarter, we expect Q2 will be the bottom for gross margin mix as we anticipate, in coming quarters, progressive recovery and growth in the higher-margin parts of our portfolio. Longer-term, we are still committed to our target of delivering 60% adjusted gross margins.

Operator, you can now open the call to questions.

QUESTIONS AND ANSWERS

Operator

(Operator Instructions) And our first question will come from the line of Blayne Curtis with Barclays.

Blayne Peter Curtis - *Barclays PLC, Research Division - Director and Senior Research Analyst*

Maybe we can start in with gross margin. I just want to understand the mixes of the moving pieces here. Obviously, mix has a little impact, but it didn't shift that much. And then, John, you talked about some issues in terms of mix within products that kind of lower margin. And I'm just trying to understand, is that just getting started, or kind of how do you think about -- I know you expect gross margins will recover, I'm just trying to understand that slope. Are those transitions just starting? Or does that all kind of happen and that you can grow from the space? I'm just trying to understand all those moving pieces.

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes, good question. So there was part of the gross margin mix which was fully expected and then at development within the quarter which was unexpected. So the part that was expected is, hey, at the bottom of its cycle, it's never uglier than that point. So the part that was expected was the hardest-hit in the downturn was among our highest-margin part of our portfolio. The thing that happened that we didn't anticipate was the transition from LR4 to CWDM, which impacted 2 things. One is SAM compression. So there's simply business that was lost from our customers to CWDM solutions. So there's SAM compression. The second is ASP erosion. So CWDM is much lower-priced than LR4. So -- and we had a very nice business in LR4, which has suffered within the quarter, and we expect that to bottom out in the second quarter. That was my last comment about being the bottom. We absolutely see everything being up from that point. This is really the bottom point for that LR4 impact. But the growth that we're anticipating is all in the high-margin stuff.

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Blayne Peter Curtis - *Barclays PLC, Research Division - Director and Senior Research Analyst*

And then, John, just on that CWDM4, just you've been looking to win some big projects. Maybe just give us an update. But then more importantly, as pricing gets -- that market gets more competitive, even if you do win it, would that be accretive or dilutive to gross margin going forward?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes, believe it or not, it's all rooted in our laser position and specifically the silicon photonics. So the current generation at CWDM4 is largely discrete TOSA designs, optical subassemblies. So you have discrete lasers and then separate Mux/Demux-type functions on the TOSA/ROSA. What's happening right now is specifically silicon photonics base solutions are both driving price compression on CWDM4. Secondly, they're getting up to 10 kilometers reach. At 10 kilometers, that's where LR4 thrived. And what we see is, in the telecom side of things, not just from the data center side, CWDM coming in and it's really kind of a precursor to what's developing, where CWDM4 looks to be central figure for 5G. So that's why my commentary about our L-PIC ramp is so critical because a couple of reasons. One is cost in margin. We've got a fantastic cost structure for that product, but I think, more importantly, the ability to scale volume because the manufacturing throughput and manufacturing output goes way up when you talk about that automated assembly. That's always been our L-game, and that's exactly -- we're in the process of ramping right now in this year.

Blayne Peter Curtis - *Barclays PLC, Research Division - Director and Senior Research Analyst*

Got you. And then just a quick one for Bob. The inventory levels are of large amounts on date but even on absolute dollar amount is, I think, the highest you've had. So if you could just talk about why the inventories are so high and how you're going to manage them back down.

Robert J. McMullan - *MACOM Technology Solutions Holdings, Inc. - Senior VP & CFO*

Well, again, even to the extent of lower revenues, we still shift a large quantity of products, over 2,000 units, in the different product numbers. And most of our inventory that increases in -- is in raw materials like wafers and sub assemblies that are ready to go as things turn around. Some of those commitments have long lead times, therefore, we cannot cut them back as quickly as one would expect on -- they're not necessarily tied to the same vision of a revenue forecast. And I think we've hit the top here at this level of inventory that we'll see probably kick -- stay even next quarter and down for the rest of the year. But it is really difficult to match the cycle times required to be in a position to shift the products that are ordered by the customers.

Operator

And our next question will come from the line of Quinn Bolton with Needham & Company.

Nathaniel Quinn Bolton - *Needham & Company, LLC, Research Division - Senior Analyst*

I wanted just to follow up on Blayne's question on gross margin. Are you guys seeing any impact from under-absorption? When your revenues have been cut by 40%, 50% over a couple of quarters, I would think that under-absorption may be a factor here.

Robert J. McMullan - *MACOM Technology Solutions Holdings, Inc. - Senior VP & CFO*

Quinn, certainly, some of the absorption is higher now with lower revenues, but it's not a function of revenue per se, it's a function of build. And some of that is reflected in the inventory levels as well. So it's not necessarily falling through to the gross margin today, and it's absorbed in some of the inventory levels. But it's really -- absorption is not critical or really material to our overall gross profit, it's really product mix that drives gross margins.

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Nathaniel Quinn Bolton - *Needham & Company, LLC, Research Division - Senior Analyst*

Got it. Okay. And then for John, you had mentioned capacity constraints on the laser side. I know, probably the background datacom sessions, you say you are taking a lot of the PON laser capacity, switching it over to 25-gig data center laser capacity. So can you just give us an update, when you talk about laser constraints, is it just that you shifted a lot of the laser capacity over to data center and therefore you're short on PON? Can you bring that laser production back to the PON space? Just what's going on, on the laser production side of the business?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes. I mean, what we started seeing developing in November was totally unanticipated recovery in PON. And as we had originally planned, we're kind of one of the last guys standing. So as the PON market recovers, that's actually very, very nice cash flow business for us. So where we had empty capacity before that we could focus solely on ramping data center product, we're moving back to a more balanced supply at this point, frankly fixated on gross revenue per wafer, so maximizing short-term returns and also focusing to make sure we're sustaining the customers that are important for our strategy moving forward. And there are some, believe it or not, there are some crossover. As you talk about 5G entering CWDM and PAM4 over in China, some of the customers that we have, high-volume PON customers, are actually becoming data center 5G customers. So it's not a simple answer, but the 2 things are optimizing short-term returns and then ramping capacity as quickly as we can to supply both. I mean, we're going to have a breakout in data centers this year that we have to feed as well as supplying the PON market.

Nathaniel Quinn Bolton - *Needham & Company, LLC, Research Division - Senior Analyst*

So we shouldn't think that the laser production in PON is going back to that peak level you hit in 2016, it's something like 5 million to 8 million units a month, you're not anticipating that kind of recovery in the PON side? You're going to keep a fair amount of capacity on the 25-gig laser to support the data center business?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Actually, it is. It's snapping back to similar volumes as you thought. The ASPs are slightly down compared to what they were, but the demand has actually snapped back to the previous run rates to our surprise. So between the 2.5-gig lasers, the 10-gig lasers, now the 25-gig lasers, we're pretty much constrained in all parts of the portfolio. And like I said, step 1, when we saw the upturn in November, it was not an instantaneous supply situation because you have materials you got to get in and order. So we didn't see the full impact on the March quarter guide. But as you get into the June quarter and beyond, we'll have -- we'll be clipping in terms of supply, but at the same time, we're doing everything we can to ramp capacity in that time frame and beyond.

Operator

And our next question will come from the line of Mark Kelleher with D. A. Davidson.

Mark Daniel Kelleher - *D.A. Davidson & Co., Research Division - VP & Senior Research Analyst*

I just wanted to look at the R&D. You made some comments that you're going to be investing more this year, kind of took a step-up sequentially. Is this the new baseline? Should we be looking for a build from here? Was there anything unusual in the quarter? What should we be looking for, for operating leverage in R&D?



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John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes, I wouldn't say it is definitely the new baseline. We have an interesting problem here. When I talked about the L-PIC programs and the GaN programs, we have a premier set of customer commitments that we're ramping and for ramps, so we don't have the luxury of cutting back OpEx in those things. Actually, we're doubling down. We've made a lot of portfolio decisions internally to focus our investments very heavily in those 2 areas, well, I should say, including 5G front-end modules, so between 5G, both on the transmit side with the GaN side as well as 4G LTE. As well as the L-PICs for both cloud data centers and 5G telecom, 5G optical, we're burning rich on OpEx, and now is not the time to leave customers high and dry on that. It's kind of unfortunate timing that at the bottom of the cycle, that we've got that demand. But the good news is these were all customer programs. I think the big difference at our R&D this year is we're focused on monetizing what previously could be called more speculative investments in technology transitions. Those are now turning into customer programs where revenue ramps through 2018 and '19.

Mark Daniel Kelleher - *D.A. Davidson & Co., Research Division - VP & Senior Research Analyst*

Okay. And just a quick second question. Some of your partner programs that you're ramping with CWDM, I think you may have addressed this earlier and I missed it, but what's the gross margin profile? Does that help? Is that higher or lower than your average gross margin?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

So the L-PICs will be at/above our corporate target.

Operator

And our next question will come from the line of C.J. Muse with Evercore.

Christopher James Muse - *Evercore ISI, Research Division - Senior MD, Head of Global Semiconductor Research & Senior Equity Research Analyst*

I guess, first question, trying to get a holistic view of what you're seeing in China. I would love to get an update on where we are in terms of excess inventory, demand. And I guess as part of that, in terms of sort of the pressure we're seeing today, how much of that pressure is just working through inventory versus ASP pressure?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Well, I'd say in terms of the recovery, from a unit standpoint, it's upon us. I used the example, we had a substantial laser business in PON and backhaul and fronthaul, and that's back. I mean, that's back on strong, as I mentioned. So that's why I emphasized, for our particular mix of businesses, we hit the bottom and we're seeing recovery. It's too early to call the pace of that recovery, but this, unquestionably going to be progressively stronger as we go through the year. On the Metro/Long-haul stuff in terms of the China, the infamous China pause, I want to emphasize, we sell analog components, modulator drivers, TIAs to Chinese transceiver customers. That demand, they have burned through much of the inventory, there's a little pocket of inventory left that they're burning through. We have seen recovery there. We have seen lifts in that business. We anticipate 15%. All of our customers have said use the same number, 15% port count growth. The moderating factors are important though. There's a big shift, stronger than what we had anticipated, from Long Haul form factors to Metro, so these are CFP, and there's a very substantial difference in ASPs. Gross margin percentage is still quite good, in fact, very good. But the ASPs are profoundly different. So that produces an element, a little bit of a SAM compression in that traditional part of our business. And with the reason why I said it's a transitional year is now we see the lift on the 5G side, the transition from LR4 to CWDM, which is placed right to our -- the same products, CWDM4 and PAM4, 100-gig PAM 4, showing promise, to begin ramping in 5G over in China. So again, selling analog components, photonic components, lasers to Chinese manufacturers, servicing that local demand and quite likely global data center demand as well.



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Christopher James Muse - *Evercore ISI, Research Division - Senior MD, Head of Global Semiconductor Research & Senior Equity Research Analyst*

That's helpful. As my follow-up, Bob, could you talk a bit about, given the call for fiscal '18 to be more of a transitional year, how you plan to manage your cost structure over the near to medium term?

Robert J. McMullan - *MACOM Technology Solutions Holdings, Inc. - Senior VP & CFO*

So if we look to define the term as fiscal '18, we are seeing -- feel good about a recovery in revenue. As the mix improves and new products come in, we will see a recovery in our gross margin, not -- we do not forecast longer than the forward quarter, but I don't think, as we see the visibility today, that we get to 60% in fiscal '18. But we have critical programs that are underway that we're spending, one, to increase capacity, to finalize quals, to get product in the customers' hands, all of which is increasing our expenses over the year in that backdrop. So I anticipate, for the forward fiscal 2Q, a modest increase in R&D and operating expenses here in the fiscal second quarter.

Operator

(Operator Instructions) And our next question will come from the line of Tore Svanberg with Stifel, Nicolaus.

Tore Svanberg - *Stifel, Nicolaus & Company, Incorporated, Research Division - MD*

John, I was hoping you could insert in a little bit more on the LR4 and CWDM4. When exactly will we go from these lower ASP partnerships to L-PIC because I know you're really ramping the capacity, but if you could give a little bit of a time line, that will be really helpful.

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes. So the LR4, we've had a very nice business globally outside of China and Japan and North America for LR4, actually largely subassemblies, which have suffered some loss. Our customers suffered lost business, and that they lost business to CWDM4 modules specifically. Silicon photonics enabled, the silicon photonics enabled a 10-kilometer reach, which was not anticipated. So that's what the downside impact is. On the ramp of the L-PICs, we are ramping our production, our capacity, as Bob said. I mean, this is transformed out of the unit volumes but just for cloud data centers, and the number is now shapen up for 5G telecom and pulling in low-cost Chinese manufacturers for those solutions. And each quarter through this calendar year, you'll see a progression of that coming to fruition. Obviously, much stronger with the knee of the curve as you get into the second half of the calendar year. And it will continue to ramp, I believe, very aggressively as we ramp silicon photonics wafer supply. I think in terms of our product availability, that's going to gate what our products can do, we can -- we'll have enough laser capacity to populate those with flip-chip lasers. But it's really going to be the PIC wafers that will be gating our production ramp. But we have customers piling on right now. As bizarre as it sounds, in this environment, at the bottom of the cycle, whether it's laser supply or these L-PICs, we have kind of a feeding frenzy right now, people trying to get hands on product to be able to begin sampling their cloud customers in 5G over in China. So from a demand standpoint, not an issue, but we're doing the best we can to ramp production on those products sequentially and progressively each quarter.

Tore Svanberg - *Stifel, Nicolaus & Company, Incorporated, Research Division - MD*

That's really helpful. And as my follow-up, could you also elaborate a little bit more on the ST partnership? When would we start to see some revenue production from that partnership? And I assume there's no issues here with the IP litigation rights of the business. Is this something that's going to materialize regardless of the outcome of that litigation?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes, actually, it's not unrelated. It's a very insightful question. Thanks for asking. So we've been working with ST for the past few years. That's who I was referring to over time. Very, very, very exciting partnership, I can tell you, given my background. I know the scale of manufacturing that's



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required to service base stations, with an emphasis on required. We've been using modest compound semi factories, like our Lowell factory, to improve the technology and performance and field reliability. But now ramping at ST delivers the required capacity, surge capacity, cost structure, that frankly is second to none. From a timing standpoint, I had hoped to be able to announce it sooner. The reason why we were holding off was we were in the midst of litigation. And on January 29, the Federal Circuit Court affirmed the ruling in Los Angeles District Court, confirming that our contract is fully valid and fully in place, which grants us not just exclusive rights in our field of use but also grants us some license rights. So the relationship with ST involves a sublicense, enabling them to go off and develop the markets they care to develop. They will be driving very high volumes in automotive, consumer, mobile applications and so on. They will be benefiting from our volumes in wireless infrastructure, where we reserve exclusivity. And I can tell you, right now, the cost structure in that supply chain is a fraction of the cost of the most mature LDMOS technology. So the brilliant thing is we have the performance of GaN validated, field reliability-proven and now the supply chain that where we -- where we can drive the transition. I'll finish by saying we have wafers in line of the first high-volume products that we believe will be delivering revenue. So this isn't speculative, this is tape-outs of proven products, with proven customer demand servicing all the right guys. So it's -- this -- like the L-PIC stuff, this year, GaN is turning on, moving from speculative technology transition, to monetizing those investments. So it's an exciting time.

Operator

And our next question will come from the line of Richard Shannon with Craig-Hallum.

Richard Cutts Shannon - *Craig-Hallum Capital Group LLC, Research Division - Senior Research Analyst*

Maybe I'll ask a question on GaN. John, you had some interesting comments in your prepared remarks around using that technology not only for power amplifiers but also in the antenna arrays. Is the antenna array part of the opportunity here? Is it anywhere near the size of the power amps?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

It's integer-multiples bigger. So I was over in China 2, 3 weeks ago. I met with the top sourcing guys at our customers. They quantify the number of antennas that they will be shipping, and I should emphasize, these are sub-6 gigahertz, these are not the millimeter-wave, small cell-type devices. And if you do the number of antennas that they, the base stations, they anticipate deploying in China alone, times the number of elements, it's integer-multiples times bigger. So we view the GaN space, 4G LTE going to 5G, as a growth market, SAM expansion, not a decline.

Richard Cutts Shannon - *Craig-Hallum Capital Group LLC, Research Division - Senior Research Analyst*

Okay. That's helpful. Second thing, just a follow-up on the previous questions about data center. You're talking about a breakout happening this year, and it sounds like it's constrained by -- if I gathered your response to that question, John, some internal things like wafer supply or something like -- I wonder if you could detail a little bit more and give maybe a little bit more precise time frame by which those constraints will be relieved?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Well, I would say it's a hockey stick ramp quarter to quarter to quarter to quarter to quarter. When you say constrained by the -- I mean, everything has hit finite ability. I mean, this is hardware, not software. And so I would say, silicon photonics wafers, if you look at where silicon photonics is applied, has been applied so far, and you look at the unit volume and wafer consumption, frankly, it pales by comparison to where we're now applying it, which is inside of data centers, inside these 5G networks and so on. I mean, it's a much larger market for wafers than what has materialized to date. So we've been working with the top executives at our PIC wafer supplier, one of the known global foundries in the world, and quarter-by-quarter, through this year, this calendar year and especially into '19, there is a very material ramp. Again, the exact shape of it, we're being very cautious not to, frankly, guide more than a quarter at a time. But there's not a demand issue whatsoever. We've got customers and cloud customers who are chomping at the bit, and it's just a matter of getting that capacity in place and the wafers flowing and so on.



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Richard Cutts Shannon - *Craig-Hallum Capital Group LLC, Research Division - Senior Research Analyst*

Okay. Helpful. That's helpful as well. John, last quick question for me on PAM4. Where do you sit in terms of qualifying your single-lambda as a product here? What's your view on the ramp of that product line?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Yes. So it's all gated by our lead customers. And I'm at a disadvantage because we're dealing with customers that we -- that don't appreciate us talking to the public about the status of their programs. But we have qualifications in process, and we see fabulous opportunities at 100-gig. I would describe this as another area where we can monetize what were previously were strategic investments. That's the way we view that area this year as well. I was very pleased. I had great -- I referred to the meeting I had with a customer, I was talking about his vision of the data center market. And the comment he had was he expected a 10-year life in 100-gig single-lambda. He is passionate about that and so on. So that's encouraging, and it's a matter of monetizing into the different configurations and products and market segments for that product portfolio. That's what this year is going to be about in that space.

Operator

And I'm showing no further questions at this time. So it's my pleasure to hand the conference back over to Mr. John Croteau, President and Chief Executive Officer, for some closing comments and remarks. Sir?

John Croteau - *MACOM Technology Solutions Holdings, Inc. - President, CEO & Director*

Sure. So before closing out today's call, I want to mention the investor events and trade shows that we'll be attending in the coming months, which includes the Goldman Sachs Technology and Internet Conference on February 14 in San Francisco, Mobile World Congress in Barcelona on February 26 and 27 and OFC in San Diego on March 13 and 14. If you'd like to arrange a meeting at one of these events, please email us at ir@macom.com. That concludes today's remarks. Operator, you may now disconnect the call.

Operator

Thank you, sir. Ladies and gentlemen, thank you for your participation on today's conference. This does conclude our program, and we may all disconnect. Everybody, have a wonderful day.

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