Q4 2018 Earnings Call

Company Participants

- Mark H. Henninger, Vice President-Finance & Director-Investor Relations
- Navin Shenoy, Executive Vice President & General Manager-Data Center Group
- Robert Holmes Swan, Interim Chief Executive Officer, Executive Vice President & Chief Financial Officer
- Venkata M. Renduchintala, Group President-Technology, Systems Architecture & Client Group & Chief Engineering Officer

Other Participants

- Ambrish Srivastava, Analyst
- Chris Caso, Analyst
- Christopher Brett Danely, Analyst
- Harlan Sur, Analyst
- John William Pitzer, Analyst
- Pierre C. Ferragu, Global Team Head
- Ross Seymore, Analyst
- Stacy Aaron Rasgon, Analyst
- Timothy Arcuri, Analyst
- Vivek Arya, Analyst

MANAGEMENT DISCUSSION SECTION

Operator

Good day, ladies and gentlemen, and welcome to the Q4 2018 Intel Corporation Earnings Conference Call. At this time, all participants are in a listen-only mode. Later, we will conduct a question-and-answer session, and instructions will follow at that time. As a reminder, this conference call is being recorded.

I would now like to introduce your host for today's conference, Mr. Mark Henninger, Head of Investor Relations. Sir, you may begin.

Mark H. Henninger {BIO 17653227 <GO>}

Thank you, operator, and welcome, everyone, to Intel's fourth-quarter and full-year 2018 earnings conference call.

By now, you should have received a copy of our earnings release and earnings presentation. If you've not received both documents, they're available on our Investor website, intc.com. The earnings presentation is also available in the webcast window for those joining us online.

I'm joined today by Bob Swan, Intel's Chief Financial Officer and Interim CEO; Murthy Renduchintala, Group President of the Technology, Systems Architecture & Client Group and Chief Engineering Officer; as well as Navin Shenoy, Executive Vice President & General Manager of the Data Center Group. In a moment, we'll hear brief remarks from Bob, followed by Q&A.

Before we begin, let me remind everyone that today's discussion contains forward-looking statements based on the environment as we currently see it and, as such, does include risks and uncertainties. Please refer to our press release for more information on the specific risk factors that could cause actual results to differ materially.

A brief reminder that this quarter we have provided both GAAP and non-GAAP financial measures. Today, we will be speaking to the non-GAAP financial measures when describing our consolidated results. The earnings presentation and earnings release, available on intc.com, include the full GAAP and non-GAAP reconciliations.

With that, let me hand it over to Bob.

Robert Holmes Swan {BIO 1972621 <GO>}

Thanks, Mark. And thanks to Navin and Murthy who will participate in the Q&A later in the call.

Before I get into the results, I'll take a minute to address what I expect is a top of mind question, the status of Intel's CEO search. The board continues to evaluate candidates for what I believe is the biggest and best open job on the planet. They are proceeding with a sense of urgency while also ensuring that they make the right choice for this great company. Meanwhile, Murthy, Navin, the entire management team and 107,000 employees have come together as a team to continue driving Intel's transformation to a data-centric company.

Our 2018 results demonstrate the progress we've made, and I'd like to share those results with you now. 2018 marked Intel's golden anniversary. It was a truly remarkable year for a remarkable company. Full-year revenue grew 13% and crossed the $70 billion mark for the first time, setting an all-time revenue record for the third consecutive year. Our Data Center, Internet of Things, Programmable Solutions, memory, Mobileye and modem businesses each set all-time full-year revenue records.

2018 was also a pivotal year in Intel's transformation to become a data-centric company, pursuing an expanded greater than $300 billion market opportunity. Intel's collection of data-centric businesses grew 20% in 2018 after adjusting for McAfee.

The largest of our data-centric businesses, the Data Center Group, delivered record annual revenue of $23 billion, up 21% year-over-year on strong cloud demand and growing share with communication service provider customers.

Our PC-centric business achieved 9% growth in 2018, as the PC market stabilized and we gained share in modems.

While 2018 was a record year, we expected a stronger finish. Fourth-quarter revenue of $18.7 billion was up 9%, but short of our expectations as a result of a dramatically weakening modem demand, lower overall growth in China, cloud service providers absorbing capacity, and a weakening NAND pricing environment. While revenue fell short, we exceeded our EPS outlook by $0.06 or about 5%.

We continue to deliver outstanding new products for our customers and preview new innovations that position Intel to compete and win for years to come. And we also made significant progress in growth areas like AI, autonomous driving and 5G. I'll take a few minutes to give some specifics before we dive into the financial results.

Over the course of the quarter and culminating at CES, we highlighted breakthrough innovations that will be central to our product leadership for years to come. We outlined our product design philosophy which combines six pillars of innovation, process technology, architecture, memory, interconnect, security features, and software, to consistently and reliably deliver leadership products that solve our customers' most challenging problems.

One example of this design philosophy in action is our unique Foveros 3D packaging technology. Foveros enables active stacking of logic chiplets for the first time in the industry's history, and lets us mix and match process technologies and architectures to deliver breakthrough products.

The first such product, Lakefield, is slated for production in 2019. Lakefield features a 10-nanometer hybrid CPU architecture combining a Sunny Cove CPU core, four low-power Atom CPU cores, Gen11 graphics and more in a dime-sized product that enables the smallest PC motherboard ever possible.

Foveros gives us tremendous design flexibility and paves the way for a myriad of devices and systems combining high-performance, high-density and low-power silicon process technologies.

In the Data Center, we began shipping the new Cascade Lake family of high-performance Xeon processors with DL Boost for accelerated AI performance, hardware-based security mitigations, and the first implementation of Optane DC persistent memory.

Many of our Data Center OEMs and cloud customers are now offering early trials of Intel Optane DC persistent memory, which is enabling entirely new usage models and improved system performance.

In Client Computing, we launched our new 9th Gen Intel Core desktop product lineup for gaming and content creation, growth segments that demand Intel performance.

We also previewed our upcoming 10-nanometer Ice Lake client CPUs, which will deliver unprecedented levels of integration including DL Boost, inference acceleration, Wi-Fi 6, Thunderbolt 3 and Gen11 graphics, our first integrated GPU with a full teraflop of performance. Our 10-nanometer yields continue to improve, and Ice Lake remains on track to be in volume systems on retail shelves for the 2019 holiday selling season.

In Q4, we also made important progress in AI, 5G and autonomous driving. For artificial intelligence, we saw accelerating adoption of OpenVINO, our open-source toolkit for neural network optimization and a rapid deployment of AI-based computer vision.

In addition to the strong adoption of OpenVINO by the developer community, we also launched several new products during the year, including our third-generation vision processing unit. Our partners created a catalog of AI-based vision accelerator cards with our VPU and FPGA products. While digital video was once a vertical within the IoT business, AI-based machine vision is becoming a critical horizontal capability that cuts across all IOTG verticals. And our leadership portfolio, both hardware and software solutions, is removing the barriers to deployment and accelerating IOTG's growth.

We also highlighted a new AI product on our road map, the Nervana Neural Network Processor for Inference or NNP-I, which is designed to accelerate inference workloads and achieve the highest performance per watt in the industry. We expect NNP-I to be in production this year.

5G is another big opportunity for both our PC-centric and data-centric businesses. At CES, we unveiled the new 10-nanometer-based network system-on-chip, code name Snow Ridge, developed specifically for 5G wireless access and edge computing. Snow Ridge will bring Intel architecture into wireless access base stations, and allow more computing functions to be distributed out at the edge of the network. We expect to be in production on Snow Ridge in the second half of this year, which is also when we'll deliver our first 5G modem, the Intel XMM 8160 5G.

In autonomous driving and ADAS, Mobileye's effort to lead this revolution continues to build momentum, with 28 new design wins and 78 vehicle model launches in 2018. In the fourth quarter, we announced plans to commercialize Mobility-as-a-Service in Israel with Volkswagen and Champion Motors, making Mobileye's breadth of products, technology and services unmatched in the industry. Mobileye's products now span from open ADAS and AV compute platforms to turnkey vehicle retrofits to ultimately Mobility-as-a-Service. And they are enabled by the industry's best vision algorithms and driving policy software, the groundbreaking RSS model for AV safety and REM, real-time crowdsourced maps.

At CES, we announced important progress for both RSS and REM. ITF, China's leading industry organization for transportation standards, approved a proposal to standardize RSS for the China market. We also completed the mapping of Japan's highway system,

25,000 kilometers of roads using data harvested from a customer fleet of vehicles outfitted with EyeQ4 in just 24 hours.

This is a task that would have previously required thousands of hours of driving and scanning using specialized vehicles. This sort of breakthrough is possible only with Mobileye's combination of technology and massive market scale, and it positions Mobileye to monetize ADAS and AV technology long before level four and five autonomy are deployed at scale. And REM will be monetized in areas beyond autonomous vehicles. We just announced a partnership with Ordnance Survey who use data collected via consumer vehicles outfitted with EyeQ4 to help utilities manage infrastructure.

Looking back at 2018, it is abundantly clear that Intel's employees, the unstoppable engine driving our innovation, are more determined than at any point in our history to make Intel technology the foundation for the world's most important innovations and advances. Not only was it a record year from a financial perspective, we achieved major milestones in terms of our diversity and inclusion goals.

We reached full representation in our U.S. workforce two years ahead of our plan. We also achieved gender pay equity across our global workforce. And to celebrate 50 years of Intel, more than 68,000 employees volunteered approximately 1.5 million hours in the communities where we operate. I'm proud of what Intel employees achieved in 2018 and I'm equally proud on how they responded to challenges.

With that, let's turn to the financial results.

The fourth quarter closed a record 50th anniversary year with strong data-centric and PC-centric growth. Revenue for the quarter was $18.7 billion, up 9% year-over-year. Our data-centric businesses were collectively up 9% and our PC-centric business was up 10%. Operating margin of 35% was approximately flat, with strong mix and continued spending leverage, offset by 10 nanometer cost and growth in our adjacent businesses.

Strong business performance, spending leverage, and a lower tax rate resulted in non-GAAP net income of $5.9 billion, up 14% year-over-year. EPS of $1.28 was up 18% year-over-year. For the full year of 2018, we generated $14.3 billion of free cash flow, returned $16.3 billion to shareholders including $5.5 billion in dividends; repurchased 217 million shares; and increased our buyback authorization by $15 billion. Free cash flow was $1.2 billion short of our October expectations due largely to an increase in accounts receivable.

To summarize, we had a strong quarter and fantastic year with full year revenue up 13% or nearly $6 billion higher than our original forecast in January. Earnings per share was up 32% and free cash flow was up 38% over last year. We're expecting another record year in 2019. And as a result of our continued growth, we are raising the dividend 5%. Our leadership products continue to win share in our expanded TAM as both our data-centric and our PC-centric businesses continued to grow in the fourth quarter.

Our data-centric businesses were up 9% for the quarter as customers choose our performance products to move, store and process more data faster from the cloud to the edge. And our PC-centric business was up 10% as we saw continued strength in the commercial and gaming PC segments and we gained modem share.

Moving to earnings, we generated solid EPS expansion in the quarter up 18% year-over-year and our operating income increased $580 million with operating margin approximately flat year-over-year in the quarter. Our EPS improvement was driven by growing demand for higher performance products in the data center and client businesses, leading to higher volumes and ASPs, continued spending leverage, a lower tax rate and lower share count as a result of buybacks.

Our focus on operational efficiency continues to produce strong results, with 2018 spending as a percentage of revenue at 28.6%, down over 7 points since 2015 and meeting our 30% commitment two full years ahead of our goal. R&D is up $1.4 billion over the same period, as we continue to increase investment in areas that will drive growth in our expanded TAM such as product leadership, artificial intelligence and autonomous driving. Over the last three years, we've grown annual revenue by more than $15 billion, while adding less than $250 million in spending, resulting in a more than 25% increase in revenue per employee.

Now some Q4 performance highlights by segment. The Data Center Group delivered another greater than $6 billion revenue quarter and a growing storage and networking CPU TAM that is greater than 30 million units. Revenue of $6.1 billion was up 9% year-over-year, but below our October expectations.

Year-over-year growth decelerated as all three major verticals within DCG were impacted by weakness in China demand and as some CSPs moved to consume capacity put in place earlier in the year. Platform unit volume was up 9% and ASPs were up 1%.

Our Xeon ASP grew mid-single-digits as customers continue to transition to Xeon Scalable and a richer mix of higher performance products. We also saw ASP expansion in our SoC products and much higher SoC volume as we continue to have success in network transformation. The higher SoC volumes resulted in more modest blended platform ASP growth.

Non-CPU adjacencies were down 2% driven by several large one-time deals in the fourth quarter of 2017 that did not repeat in the fourth quarter 2018. Cloud revenue grew 24% year-over-year decelerating from Q3 2018.

Enterprise and government revenue declined 5% year-over-year on a very challenging compare versus fourth quarter 2017 and weaker China demand. Comms service provider revenue grew 12% year-over-year on continued MSS gains as customers choose to virtualized and transform their networks on Intel Architecture.

Our other data-centric businesses IOTG, NSG and PSG achieved solid growth in Q4. Together we're up 9% year-over-year or 13% excluding the Wind River divestiture. Our

Internet of Things business had revenue of $816 million, down 7% or up 4% excluding Wind River with operating profit of $189 million down 27% year-over-year due primarily to supply constraints.

Mobileye revenue was $183 million up 43% over last year as design wins and ADAS adoption continues to accelerate. Our memory business delivered revenue of $1.1 billion up 25% year-over-year due to strong data center growth and continued Optane adoption offset by a weaker NAND pricing environment. The shift of our data center and client SSDs to our 64-layer 3D NAND continues in both the data center and client businesses with volume mix greater than 75%. NSG was approximately breakeven for the year.

As expected, Micron exercised its right to call Intel's interest in our joint venture IM flash technologies. This announcement does not change Intel's plans in the coming quarters and the close of the call is at our discretion up to one year after the date of the call with a supply agreement that extends beyond the close. We have manufacturing options available and have been shipping a broad portfolio of Intel Optane technology products for more than a year. We will continue to expand our product line and lead the industry with this exciting new technology.

PSG's revenues came in at $612 million up 8% on strength in the data center and comps segments. We saw continued momentum in PSG's data center segment up 50% over last year. In the Advanced Products category, our 28, 20 and 14 nanometer solutions grew an outstanding 70%. Operating profit was $162 million up 4% year-over-year.

Finally, the Client Computing Group delivered another outstanding quarter with revenue of $9.8 billion up 10% year-over-year. Commercial and gaming demand continued to be strong. The notebook segment grew 8% year-over-year. The desktop segment grew 3% year-over-year.

Supply remained constrained particularly at the value end of our product range. We are working closely with our customers to align demand with available supply while we add capacity and we expect supply-demand balance to improve by midyear. Client adjacencies grew 45% year-over-year driven primarily by increased modem share gains though modem revenue fell significantly below our expectations as a result of weaker smartphone demand.

Our operating profit grew $402 million year-over-year with operating margin up 1 point. While our PC volumes were down 2%, our leadership product performance and segmentation contributed to strong mix. The investments we have made in the business organically and through acquisition are delivering excellent cash flow generation. For 2018, we generated $29.4 billion in cash from operations. We invested $15.2 billion in capital expenditures and delivered $14.3 billion in free cash flow, up 38% year-on-year, and closing the gap versus EPS by 4.5 points.

During this period, we returned 114% of our free cash flow to our shareholders. Buybacks totaled $10.7 billion and dividends totaled $5.5 billion. In addition, settlements of our convertible debt reduced fully diluted shares by 40 million. To wrap up with our full-year

results, we ended 2018, our 50th anniversary year, with our third consecutive year of record results. Revenue of $70.8 billion, up 13% year-on-year driven by 20% growth in our data-centric businesses and 9% growth in our PC-centric businesses.

We started the year in January expecting to generate $65 billion in revenue, 30% operating margin and $3.55 in EPS. The growth that we and the industry have seen has been remarkable. We ended the year approximately $6 billion higher in revenue with operating margin of 35% and $4.58 in EPS. Operating income of $25 billion was up 25% on strong execution across the businesses and disciplined spending.

In October, we provided a preview of our outlook for 2019. At the time, we described a combination of tailwinds and headwinds that were balanced. The tailwinds were an expanded and growing TAM, product momentum, and business mix. The headwinds were tougher compares following an especially strong 2018, increasingly competitive environment and global trade. Since that time, trade and macro concerns, especially in China, have intensified.

Cloud service providers shifted from building capacity to absorbing capacity and the NAND pricing environment has further deteriorated. Those incremental headwinds are impacting our revenue expectations and slightly reducing our operating margin percentage forecast. The remaining factors are roughly consistent with our October assessment.

Now, turning to our outlook for 2019, we expect 2019 to be another record year for us as the world's appetite for the analysis, transmission, and storage of data continues to grow. We are forecasting revenue of approximately $71.5 billion, up 1% year on year, and operating margin of approximately 34%, down less than 1 point year on year.

We expect a modest decrease in gross margin percentage driven by the 10-nanometer ramp and the growth of our adjacencies. This will be partially offset by increasing OpEx leverage as we continue to make thoughtful trade-offs and invest in R&D that will accelerate our growth and profitability.

We expect the full-year tax rate to be approximately 13.5%, following several beneficial discrete events in 2018. And we expect EPS of $4.60. We expect gross capital expenditures of $15.5 billion with logic spending up and memory spending down. The increase in logic CapEx reflects our effort to meet our customers' needs and avoid constraining their growth, while our investment in memory is focused on the sit up of our independent technology development facility in New Mexico.

And finally, we expect free cash flow of $16 billion, an increase of approximately 12%. As we look to the first quarter of 2019, we are forecasting revenue of approximately $16 billion, flat year on year, excluding Wind River. We expect PC-centric revenue to be up low-single digits on higher modem share and data-centric revenue to be down low-single digits on broad weakness in data center and continued NAND pricing pressure. We expect operating margin of 29%, down 1 point year over year, with a decline in gross

margin as a result of the 10-nanometer ramp and the growth of adjacencies partially offset by increased spending leverage. We expect EPS of $0.87, flat year on year.

We expect 2019 to be our fourth record year in a row. We feel great about where we are and where we're going. Five years ago, we set out to transform Intel from a PC-centric company to a data-centric company. Today, our strategy, products and people are delivering on that ambition with strong growth, record results and the largest TAM opportunity in the company's history.

I have been inspired and humbled time and time again by our employees' commitment to this company, their colleagues, and our customers. And we're just getting started.

I am convinced the board will close on a new CEO in the near future and I believe the management team, myself, and the 107,000 employees will rally behind him or her to take this company to a whole new level. In the meantime, we will not be distracted by the void.

With that, let me turn it over back to Mark and we'll get to your questions.

Mark H. Henninger {BIO 17653227 <GO>}

Okay. Thank you, Bob. Moving on now to the Q&A, as is our normal practice, we would ask each participant to ask just one question. Operator, please introduce our first questioner.

Q&A

Operator

Thank you. Our first question comes from John Pitzer with Credit Suisse. Your line is now open.

Q - John William Pitzer {BIO 1541792 <GO>}

Yeah. Good afternoon, Bob. Thanks for letting me ask a question. Congratulations on the solid results. Just relative to the DC, the data-centric guidance for the full year of up mid-single digits year over year in calendar year 2019, you did a good job kind of explaining of what's causing the weakness in Q1, DCG and the NAND pricing.

But as you look throughout the year from a minus kind of low-single digits to full year being mid-single digit growth, you are kind of looking for an acceleration against what becomes harder year-over-year compares in the June and September timeframe at least. I'm just kind of curious if you can help us frame how you think that reacceleration occurs. How long of a pause are you seeing with the cloud customers? And importantly, how are you thinking about increased competition in 2019 in the data-centric businesses, especially in the server business as you think about mid-single digit year-over-year growth?

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yes. Thanks for your one question, John. I'll take a stab and then Navin is here with me as well. I'm sure he has a few comments. First, I would say that as we look at just overall demand for the data center environment, the end-user demand by consumers and by enterprises, the workloads that we're seeing – the continuing growth in workloads we are as excited about the future as we've ever been. So we feel pretty good about the medium and long-term trends.

As you know in 2018, our growth rate particularly in the cloud was up 45% through the first nine months of the year. So what we saw in the fourth quarter was, as I've mentioned, we saw a little bit of consumption going on. As you know the purchases are done in kind of in cycles, massive purchases through the first nine months. And we started to see some of those purchases consumed in the fourth quarter. And we end the year, we think, with inventory levels on the server side of the business just a little bit higher than they have been historically.

So as we project forward in the first six months of the year, we think that it's going to continue to be both consumption on the server side and pricing in the NSG environment to be down through the first six months. And consistent with kind of historical patterns, we do expect the purchasing to start picking up again in the second half of the year. So that's kind of how we see it. Medium, long-term we feel great. Massive buying in the first nine months. The buying slowed a bit in fourth quarter and we expect that to continue through the first six months.

I think just – I think the last part of your question, I think, just competitively then I'll kick it over to Navin, look we're going into 2019 with every expectation to compete to protect our share position across our entire business. So we're going to – we're obviously investing in the capital required to ensure we don't constrain customers' growth. We're continuing to invest in R&D. And third, we're going to invest to protect our competitive position both on the PC side and the data-centric side. So yeah, we expect competition to be stronger as we go through 2019. But we're going to – our guidance incorporates the fact that we're going to fight to protect our position. Navin, any?

A - Navin Shenoy {BIO 15945890 <GO>}

Maybe the only thing I'd add, John, is that from a product point of view, the dynamic to think about in 2019 is that as Bob mentioned, we began shipping for production Cascade Lake our next generation of Xeon. And really that product is going to ramp – start to ramp in the middle part of the year and into the second half of the year. The design momentum looks very strong. The product features look very compelling. The AI capability we have with DL Boost, the support for Optane persistent memory, the security hardware mitigation fixes so that the customer momentum around that product line looks very strong. But it really doesn't ramp until the middle to the second half of the year. So as Bob said, the first half a little bit tougher but the second half with product momentum, as well as what we're hearing from our customers, we expect to be better in the Data Center Group.

A - Mark H. Henninger {BIO 17653227 <GO>}

Thanks, John.

Operator

Thank you. And our next question comes from Stacy Rasgon with Bernstein Research. Your line is now open.

Q - Stacy Aaron Rasgon {BIO 16423886 <GO>}

Hi guys, thanks for taking my question. To maybe generalize on that, if I just look through your guidance, you're basically guiding flat in Q1 and roughly flattish for the full-year which suggest that overall you're looking for a revenue trajectory in 2019 that's very similar to the trajectory you had in 2018 which was very, very strong sequentially in many of the quarters. So I guess what is the risk, just given everything that's going on, that that may be too aggressive especially as you had a number of drivers in 2018 both on the data center as well as on the client side that aren't going to be repeating in 2019? Like how do we think about that?

A - Robert Holmes Swan {BIO 1972621 <GO>}

Well first, yes, 2018 was a great year as we mentioned earlier. It grew during the course of the year. But a function we believe, Stacy, is just the end demand for data. And we haven't seen that slow down at all, again, on workloads, insights from our customer and the industry, workloads continue to grow. The demand for analytics, for compute, for storage, for rapid retrieval, we think only continues to grow. And we believe that we have a very good position as we go into the year, including the products that Navin referenced.

So we go into the year, we think, setting expectations in line with how we expect things to play out. And I would say, today, our outlook is a little more cautious than it was a few months ago. And we try to take into account both the macroeconomics, the geopolitical risks, the modest inventory build as we enter the year and the competitive environment. We've kind of taken those into account and reflected them the best we can as we go into the year. And we feel pretty good about how things stack up right now. And our expectation, as we have in the past, is to deliver on the commitments we make as we kick off the year.

Q - Mark H. Henninger {BIO 17653227 <GO>}

Thanks, Stacy.

Operator

Thank you. And our next question comes from Pierre Ferragu with New Street Research. Your line is now open.

Q - Pierre C. Ferragu {BIO 15753665 <GO>}

Hi. Thank you very much for taking my questions. I was surprised Bob on your CapEx guidance and especially on the memory side. So, my understanding is that last year you

spent about $3 billion there with about half of that money actually coming from your clients, so not being actually Intel capital being deployed. So if you had $1.5 billion of Intel capital deployed in memory last year, if I look at your guide and think logic is slightly up, memory is going to be slightly down, so the actual Intel capital invested – deployed into memory this year is going to be up massively, maybe close to 2x. And that's in a year in which everybody in the value chain, everybody in the memory industry is actually pulling back on CapEx and limiting capacity addition. So, I'd love to understand, how you see that and how you position Intel this year in memory.

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yeah. First, I'd just maybe to start with as we see kind of free cash flow for the year, we expect to be up $2 billion year-on-year with growth capital relatively flat. And I think we said this, but just to repeat $15.5 billion going to $15.5 billion. During the course of 2019, our expectations are of that mix that we'll be more logic oriented. And that's really driven by a couple of things. One, ensuring we have the capacity to meet the 14-nanometer demand for our customers. Secondly, as we ramp 10-nanometer in 2019 and position for 10-nanometer in 2020, we'll invest the additional capital there.

And then third obviously, our expectations are to continue to invest in next node technology and particularly 7-nanometer. So, logic capital is going to be going up year-on-year. And as we indicated, memory capital will be coming down. We put the capacity in place in Dalian during the course of 2017 and 2018. And our expectations are in 2019 that we have sufficient capacity for demand. However, we are going to be investing in our own capabilities or self-sufficiencies for our Optane product. So we will use some capital on building out Optane capacity, but memory capital will be a bit lower. Gross capital will be a bit lower during the course of the year.

Operator

Thank you. And our next question comes from Chris Danely with Citigroup. Your line is now open.

Q - Christopher Brett Danely {BIO 3509857 <GO>}

Hey, thanks, guys. I'm going to shift to the expense line. So maybe give us a little more color on OpEx and gross margin trends and how you're going to hit the operating margin target?

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yeah. So, first gross margin. The qualitative context is we expect gross margin to come down modestly off of Q4 levels and a little bit more off full-year 2018 levels. And we do expect that that will be largely, although not completely offset by spending as a percentage of revenue coming down, again in 2019.

I think just on the gross margin, the trends are going to be a little bit similar to what you've seen in the past. Although, we do expect a little bit less ASP – gross margin improvement from ASP. We expect unit costs to be up a little bit and that'll be primarily as

we ramp 10-nanometer. And then the mix dynamics of more memory and more modem will weigh on gross margin a bit. So year-on-year we expect gross margins to come down a little bit.

On spending, as you know, we kind of – we exit this year with spending levels down in the 26% in the fourth quarter and a little under 29% for the full-year. So we're way ahead of our – the three-year plans that we laid out a couple years ago and we feel pretty good about the progress we've made on the spending. And we've done it without cutting R&D. During that timeframe, R&D has grown. We've been investing in the right things. Those things are growing faster. As a result, spending has come down 700 points from 2015 levels.

As we go into 2019, spending overall we expect to come down. Some things we did during the course of the second half of 2018 including the exit of – we exited Wind River. We exited wearables. We exited some of our new technology, small little businesses. We exited those businesses in the second half of the year and we did some restructuring in the second half of the year.

So as we go into 2018, all that benefit from a relatively low Q4 $4.9 billion run rate we expect that spending for the full-year will be down year-on-year. So you net all that together and we have a – we've been really focused on growing the operating income dollars of the company.

We focus on but we're not preoccupied with where the gross margin is going to land. Our focus has been on how do we grow the operating income dollars of the company. And in a relatively small growth year, we see keeping operating margins at 34% to be a relatively good place without (42:52) the investments we need to make to continue to progress into 2019 and 2020.

Operator

Thank you. And our next question comes from Ross Seymore with Deutsche Bank. Your line is now open.

Q - Ross Seymore {BIO 20902787 <GO>}

Hi. Thanks for letting me ask a question. Just wanted to follow-up, Bob, you gave a lot of great detail there on the margin side, especially on the OpEx side. I wanted to go right back to the gross margin side though and somewhat simplistically perhaps, but you kept the gross margin guide basically the same as you did at the end of last quarter despite the headwinds to mix seemingly with your data center commentary and data center being worse and your revenue being lower. So is there any more color you can give on the puts and takes that leads to just the modest decrease given those other variables that seem like they have increased as headwinds from when you last talked about gross margin in 2019?

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yeah. The gross margin, Ross, isn't really any different. The puts and takes back then, as I indicated, were modest ASP growth as we are going to fight to protect our market share position. We don't expect a lot of ASP growth. Again, 10-nanometer ramp, not really any different. I highlighted it in the prepared remarks, we feel very good about kind of where we are in ramping 10-nanometer during the course of the year to get systems on the shelf for the holiday season, so no real change there.

And modem and memory growth will be a little bit slower today versus where we were 90 days ago. So, on the operating margin – or operating margin percent, that's a slight positive.

The real only change from 90 days ago is just we're a little more cautious on our revenue outlook, and our spending hasn't really changed. So, we got a slight – not as much leverage that we expected back in October, but still good spending leverage during the course of the year. So, not really any different on the gross margin and spending dynamics that we thought 90 days ago, except a little less leverage on the spending line.

Operator

Thank you. And our next question comes from Vivek Arya with Bank of America Merrill Lynch. Your line is now open.

Q - Vivek Arya {BIO 6781604 <GO>}

Thanks for taking my question. Within DCG, how should we think about the mix, cloud versus comms versus enterprise, for Q1 and 2019? Thank you.

A - Navin Shenoy {BIO 15945890 <GO>}

Yeah. Thanks, Vivek. It's Navin here. Look, we've been – over the last 18 months been working hard to diversify the end customer segment mix inside of DCG. And there's three large components, the enterprise and government segment, the cloud segment and the comms segment. Cloud and comms is about two-thirds of the business now, where it was about one-third several years ago. And so I don't see any major changes to the way things play out in terms of where the growth will come from as we look into 2019 and beyond.

While the first half in the cloud will be a little bit tougher, we do expect that cloud continues to grow as they start to move and to build out again in the second half. In the comms segment, we continue to gain share in that segment, a large TAM where we have relatively small share; and as we grow our network SoC portfolio. And as the market moves to 5G, we expect to continue to gain share. And in the enterprise and government segment, while we've seen stabilization there over the last four or five quarters, we're not really counting on the enterprise and government segment for growth. We do expect that enterprises will continue to make strategic choices about what to deploy on-premise and what to deploy in the cloud. And, in general, that business is not one that we count on for growth. So in general, you'll see us continue to push on comms and cloud to drive growth, particularly in the second half of the year.

Operator

Thank you. And our next question comes from Chris Caso with Raymond James. Your line is now open.

Q - Chris Caso {BIO 4815032 <GO>}

Yes. Thanks for letting me ask the question. Just wanted to receive an update on some of the CPU shortages that you've been experiencing. How you're progressing on alleviating those shortages? What effect that may have had on the Q4 results given that, I guess, there was some supply tightness at least coming into the quarter? And then, on that, with demand slowing a bit, is there any fear? Do you have any visibility about customers who may have attempted or succeeded in building some inventory amid those shortages?

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yeah. Yes. First, in the fourth quarter, just in terms of isolating how we prioritize our capacity. Server, no shortages. Within the client business, prioritization is big core and, to a lesser extent, small core, lower value oriented products. And so we did -we do feel like we constrained a fairly healthy PC ecosystem in the fourth quarter. I think when the dust settles on PC TAM, our expectation is it was probably flat and our shipments were down 2%. That was a function of we delivered every product that we could right up through December 31. So we did have some constraints on the ecosystem and on our customers during the course of the quarter.

At the end of the year, Chris, I think inventory levels relative to the beginning of the year were a little bit higher. Maybe a week-and-a-half, two weeks higher as we enter the year. And our expectations for the year is the PC TAM is going to be relatively flat and that, for us, is a good place to be. We're probably halfway through the PC refresh cycle. We feel things to be relatively flat during the year. Inventory levels in the channel's a little bit higher ending the year. For us, inventory levels were relatively low, as you might imagine on CPU, just because of the constraints we've been dealing with.

Our expectation is, working with our customers, that we will be through the supply constraints as we exit the second quarter of the year. Again, we'll use the same prioritization of server, big core, small core, but will be a little bit short on some product mix and on small core until we get probably through to the second quarter. And that will constrain us a little bit on just overall growth in the first half of the year.

Operator

Thank you. And our next question comes from Harlan Sur, JPMorgan. Your line is now open.

Q - Harlan Sur {BIO 6539622 <GO>}

Good afternoon. Thanks for taking my question. Just wanted to get an update on 10-nanometer manufacturability. I know last quarter the team mentioned that 10-nanometer yields were tracking 14-nanometer yields at a similar point prior to production ramp. Is the

team still seeing good improvements in 10-nanometer yields? Are you still tracking 14-nanometer yield ramps? And can you just give us an update on early 7-nanometer development and manufacturability?

A - Venkata M. Renduchintala {BIO 17672754 <GO>}

Harlan, hi. This is Murthy. I'll take that question. I can only add to what Bob said in his opening statements, that we continue to make solid progress against our plan that we shared with you during the course of 2018. And as I said on the last call, I feel better about our traction today than I did 90 days ago. So that continues to bode well for our product launch ambitions, which Bob summarized as having systems on shelf for holiday season 2019 with a barrage of products across all of our businesses to follow shortly thereafter.

And I would like to take the opportunity to just remind everybody that at CES and in the analyst meeting we had at the end of last year, we did show 10-nanometers across the entire portfolio of our product ranges. We talked about Ice Lake clients, which clearly was top of mind in the early discussions. But we also talked about Lakefield, Bob mentioned that as well. We also – Navin talked about 10-nanometers for Ice Lake server. And we also talked about 10-nanometers moving into our networking and 5G program, which we believe is going to be a big growth sector.

So, the story is not just about 10 nanometer yields, but 10-nanometer now being a key part of our entire product portfolio. And as I say, I think that, coupled with our focus on the pillars of technology that Bob talked about, in my mind, I think, puts our product portfolio, looking forward, in a pretty good position.

So, net-net, I think 10 nanometers is looking better now than at the last earnings call. It's broadly deployed across our portfolio. And that, in combination with the other technology ingredients that Bob talked about, we believe, sets us up for a pretty exciting product road map.

Q - Harlan Sur {BIO 6539622 <GO>}

Thank you.

Operator

Thank you.

A - Mark H. Henninger {BIO 17653227 <GO>}

Operator, I think we've got time for two more questions.

Operator

Our next question comes from Ambrish Srivastava with BMO. Your line is now open.

Q - Ambrish Srivastava {BIO 4109276 <GO>}

Bob, I just want to go back to the energy and the profitability in what was a really booming year for memory. Obviously, price has started to come down back half of the year, but NSG was barely profitable. So, just from a CFO perspective, what is your tolerance level for having a business – a segment that could go into a deep cyclical downturn and – not could, it is heading into a deep cyclical downturn. So, how do you think about having a commodity within the Intel umbrella and again the risk, not risk tolerance – the tolerance for lack of profitability? Just your perspective on that, please. Thank you.

A - Robert Holmes Swan {BIO 1972621 <GO>}

Yeah. First, a couple of things. When we look at – I mentioned this in the prepared remarks and Murthy touched on it. When we look at the technologies that we believe are going to be imperatives going forward in this increasingly data-centric world process, CPU architecture, interconnect, software, memory is a key component. And all the advancements in CPUs will be constrained if you don't have differentiated technology in memory. So, we think that the role memory plays going forward is increasingly important.

In terms of the – just the CFO lens of having a commodity in the portfolio, I'm not too excited about it. And that's why the investments we're making in memory are for what we believe differentiated technology, both in the manufacturing process capabilities of 3D NAND but also the differentiated technology for Optane and the role that it plays both on the PC side, but most importantly for us on the data-centric side.

So, we're not particularly excited about commodities. When we make these investments, it's really geared towards products and technologies that are increasingly important and those technologies that are differentiated from kind of the core memory space that help us, in conjunction with the CPU, solve customers' problems.

A - Navin Shenoy {BIO 15945890 <GO>}

I'll just maybe add one thing – it's Navin – as an example of that. The Optane Persistent Memory combined with Cascade Lake, Xeon plus Optane, that is a platform play. Optane Persistent Memory works uniquely with Xeon. And as I think about and talk to customers about the massive amount of data growth we're seeing, the ability for us to uniquely tie those two assets together and solve customer problems is a differentiator for us and allows us to drive growth. And so, to the extent we can exploit more of those kinds of opportunities, things get more exciting from a business unit Xeon point of view.

Operator

Thank you. And our next question comes from Timothy Arcuri with UBS. Your line is now open.

Q - Timothy Arcuri {BIO 3824613 <GO>}

Thank you. Navin, I had a question for you and sort of there seems to be a little bit of a different tone between what we hear from your cloud customers. The compute guys, you and the memory guys, are seeing weakness, but the networking companies still sound

fine. So, is it just an inventory digestion of computer and then servers, or is there something structural happening there? Thank you.

A - Navin Shenoy {BIO 15945890 <GO>}

Yeah. I think, as Bob said, and I think we sort of talked about a little bit, we had three quarters of really, really strong growth in 2018 in the cloud. And that was driven by product cycles as well as the typical multi-year buildout pattern with Xeon Scalable. And if you look back at all the historical trends we've had in the cloud business, we've always said there's some lumpiness to the business and there's periods where people build and then there's periods where people consume. The signals we get from our customers is period of build for compute is going to shift now to a period of consumption and that started in the second half of the fourth quarter, and we expect that to continue through the first half of the year.

Secularly, over the long-term – medium to long-term, the cloud business is going to continue to grow. There's no doubt about that. Both the consumer cloud and the enterprise/commercial cloud, we see both of those continuing to grow. And the appetite for compute, I think, is somewhat insatiable. Bob talked about compute cycle growth. Our five-year forecast for compute cycle growth or MIPS growth is 50% CAGR over the next five years. I've seen nothing slowing that down over the next number of years. So, that would be how I kind of answer that one, Tim.

A - Robert Holmes Swan {BIO 1972621 <GO>}

All right. Let me – maybe if I could just close out, Mark.

Look, we think 2018 was a great year. Strategically, what it is we're trying to do and the opportunities we see are as strong if not stronger today, heading forward as they've ever been. We think 2019, for us, is going to be another record year. At the same time, we realize that first quarter is just going to be lower, and the practical reality is we think we have a reasonably good read on the level of inventory that's in the ecosystem. I'd say this particularly – we're getting better and better on the diagnostics around the DCG business. The Q4 to Q1 dynamics for DCG, historically, have been sequentially down, 8% to 10%. And the practical reality is, as we see it now, is that could be double in the first quarter, but that has nothing to do with the strength of the business, the product line portfolio we have coming, and our excitement about delivering a real strong 2019 as we go forward.

So, thank you very much for joining us, and I'm sure we'll talk to you soon.

A - Mark H. Henninger {BIO 17653227 <GO>}

Operator, please go ahead and wrap up the call.

Operator

Ladies and gentlemen, thank you for participating in today's conference. This concludes today's program, and you may all disconnect. Everyone, have a wonderful day.