Company Name: AMD
Company Ticker: AMD US
Date: 2019-01-29
Event Description: Q4 2018 Earnings Call

Market Cap: 19,238.59
Current PX: 19.25
YTD Change($): +.79
YTD Change(%): +4.280

Bloomberg Estimates - EPS
Current Quarter: 0.076
Current Year: 0.622
Bloomberg Estimates - Sales
Current Quarter: 1429.000
Current Year: 6907.516

Q4 2018 Earnings Call

Company Participants

- Laura Graves
- Lisa T. Su
- Devinder Kumar

Other Participants

- Toshiya Hari
- Matthew D. Ramsay
- Vivek Arya
- Mark Lipacis
- Stacy Aaron Rasgon
- Ross Seymore
- Aaron Rakers
- John William Pitzer
- Mitch Steves
- Blayne Curtis
- Joseph Moore
- Vijay Raghavan Rakesh

MANAGEMENT DISCUSSION SECTION

Laura Graves

GAAP and Non-GAAP Financial Highlights

We will refer primarily to non-GAAP financial measures during this call except for revenue, gross margin and segment operational results, which are reported on a GAAP basis

The non-GAAP financial measures referenced herein are reconciled to their most directly comparable GAAP financial measure in today's press release which is posted on our website

Lisa T. Su

Q4 Highlights

Revenues and Gross Margins

- 2018 marked another year of strong financial performance driven by our expanded high-performance product portfolio despite near-term graphics weakness
- We grew annual revenue by 23% with Ryzen, EPYC and datacenter GPUs product revenue growing by more than $1.2B for the year

- Our new products gained share and significantly expanded gross margin, leading to our most profitable year since 2011
- Looking at Q4, revenue of $1.42B increased 6% from a year ago, with approximately 65% of sales coming from our new products
- We reached an important milestone in our business in the quarter as our high margin datacenter CPUs and GPUs accounted for a mid-teens percentage of overall revenue
  - While we expect our datacenter revenue to be lumpy, the ramp of our datacenter business is beginning to contribute meaningfully to our financial results

Computing Segment

Sales, Client Processor Unit Shipments and Reveneus

- Looking at our Computing and Graphics segment, we delivered our eighth straight quarter of y-over-y segment revenue growth
- Sales of Ryzen desktop and notebook processors and datacenter GPUs offset lower GPU sales as the channel continued working through elevated levels of Graphics inventory
- Client processor unit shipments grew by more than 50% from the year-ago period
- We had our highest client computing revenue in more than four years and we believe we gained client CPU unit share for the fifth straight quarter

2nd Gen Ryzen Mobile Processor

- At CES, Acer, Asus, Dell, HP, Huawei, Lenovo and Samsung all launched notebooks powered by our new 2nd Generation Ryzen Mobile Processor with Radeon Vega graphics
  - The 2nd Gen Ryzen Mobile Processor delivers more performance, enhanced features and longer battery life than any mobile processor we've ever built, and is the fastest processor available for ultrathin notebooks

AMD-based Chromebooks

- The industry's first AMD-based Chromebooks launched earlier this quarter from Acer and HP.
- We expect additional AMD-based Chromebooks to launch later this year as we expand our participation in this growing portion of the PC market
  - Based on the competitive positioning of our Ryzen processors, we expect the number of Ryzen systems that will launch in 2019 to increase by more than 30% from 2018, with the number of Ryzen notebook systems planned to launch increasing by more than 50%

Graphics Segment

Revenues and Shipping

- In Graphics, GPU revenue decreased y-over-y driven largely by lower channel GPU and memory sales, partially offset by a significant increase in datacenter GPU sales

- We saw an improvement in channel GPU sellout throughout the quarter as our partners continued to drain their inventory
  - There is still more work to do, but we remain confident we're taking the right actions to further reduce channel inventory
- We set a record for professional GPU revenue in the quarter driven by multiple high volume wins for our Vega-based datacenter GPUs
- We started shipping our new 7-nanometer Radeon Instinct accelerators in the quarter and introduced a major set of enhancements to our datacenter GPU software that make it easier for customers to deploy Radeon GPUs for AI and machine learning workloads

Gamers and Creators

- At CES, we highlighted the significant gaming momentum we are generating for Radeon across consoles, PCs and the cloud
- For gamers and creators, we announced our return to the high-end GPU market with the new Radeon VII GPU.
- Powered by our 2nd Generation Vega graphics core and featuring 16 gigabytes of second-generation high-bandwidth memory, our new 7-nanometer Radeon VII GPU delivers leadership performance in content creation and compute workloads, and is very competitively positioned when running the most demanding AAA games at 4K resolution
- In cloud gaming, we announced that Google selected Radeon Pro GPUs to power their game streaming initiative, Project Stream
  - The performance and differentiated virtualization features of our Radeon Pro GPUs enables Google to deliver an uncompromised high-definition gaming experience on virtually any PC.

Enterprise, Embedded and Semi-Custom Segment

Reveneus

- Turning to our Enterprise, Embedded and Semi-Custom segment, revenue was flat from a year ago as a double-digit percentage decrease in Semi-Custom revenue was offset by strong growth in EPYC processor sales
- As expected, Semi-Custom sales were down from a year ago based on where we are in the current console cycle
  - This console generation remains one of the most successful ever, as Microsoft and Sony combined have now shipped well in excess of 120mm AMD-powered consoles

Shipments and Cloud Adoption

- Fourth quarter server unit shipments more than doubled sequentially based on growing demand for our highest end 32-core EPYC processors with cloud, HPC and virtualized enterprise customers
- As a result, we believe we achieved our goal of mid-single-digit server unit share exiting 2018
- We had another strong quarter of cloud adoption, highlighted by industry leader Amazon announcing new versions of their most popular EC2 computing instances powered by EPYC processors, businesses can easily

migrate their AWS instances to AMD and save 10% or more based on the technology advantages of our platform

EPYC Processors

- Microsoft Azure also announced general availability of their AMD-based storage instance in the quarter, as well as a new HPC instance powered by EPYC processors that is 33% faster than competitive x86 offerings
- We secured multiple HPC wins in the quarter, including Procter & Gamble, the U.S. Department of Energy, and one of Europe's largest supercomputers at the University of Stuttgart's High Performance Computing Center
- Lawrence Livermore Labs also announced a new supercomputer featuring both EPYC processors and Radeon Instinct Accelerators that will be used for machine learning and big data analytics workloads

Next-Generation Rome Server Processor

- Customer interest in our next-generation Rome server processor remains very high
- Rome is expected to deliver four times the floating-point performance and double the compute performance per socket compared to our current generation EPYC processors
- We publically demonstrated a single 64-core next-generation EPYC processor outperforming two of our competitors' highest-end server processors in multiple workloads
  - Rome development is proceeding very well and we are on track to start shipments midyear

GLOBALFOUNDRIES

- I am also pleased to report that we concluded discussions with GLOBALFOUNDRIES on the seventh amendment to our wafer supply agreements
- The amendment affirms the strategic partnership with GF for products built at 12-nanometers-and-above and provides AMD with full sourcing flexibility at the 7-nanometer-and-below nodes
  - GF continues to be a critical supplier of AMD's current generation products and will play a key role in our next-generation Ryzen and EPYC products with our chiplet strategy

Summary

- In summary, 2018 was another strong year for AMD.
- Increased adoption of our high-performance products drove a second straight year of double-digit annual revenue growth, expanded gross margins and improved profitability
- I would like to thank the more than 10,000 AMD employees, whose dedication to building great products, have made these results possible

Graphics Channel, Macro Uncertainties and Gaming

- While headwinds remain in the Graphics channel and macro uncertainties are causing some caution in H1 2019, we believe we are well positioned to gain share throughout the year and accelerate growth as we ramp our next-generation 7-nanometer products
  - As we enter 2019, we are preparing to launch our strongest product portfolio ever

- In gaming, we will launch our high-end Radeon 7 GPU in February followed by our next-generation Navi GPUs later in the year

Client Computing and Investments

- In client computing, we started the year with our second generation Ryzen mobile processors and we are on track to launch our third generation Ryzen desktop processors in the middle of the year
- And in the server market, we expect to deliver a significant step function performance increase with the launch of our next generation Rome processors in the middle of the year
- I am very proud of what we accomplished in 2018 and even more excited about how our long-term investments are set to pay off in 2019

Devinder Kumar

Financial Highlights

Revenues and EPS

- New product introductions drove the highest annual revenue since 2011 and a significant improvement in gross margin y-over-y
- EPS increased from $0.10 per share in 2017 to $0.46 per share in 2018
- Full year 2018 revenue was $6.48B, up 23% year-on-year driven by strong performance in the Computing and Graphics segment with significant growth in Ryzen processor sales
- Although there was weakness in the Graphics channel in H2, we saw strength in datacenter CPUs and GPUs

Gross Margins and Operating Expenses

- Gross margin was 39%, up 440BPS from the prior year
- Gross margin improvements were primarily driven by our new Ryzen, EPYC and Radeon products
- Operating expenses were 29% of revenue, an improvement of 2 percentage points from the prior year

Operating Income, Net Income, Debt and Leverage

- For the full year, operating income was $633mm, up $409mm from $224mm in the prior year
- Net income was $514mm, up $411mm compared to net income of $103mm in the prior year
- On the balance sheet, we reduced principal debt by $171mm and improved gross leverage significantly from 4.6 times a year ago to 1.9 times at the end of 2018

Q4 Results

Revenues and Sales

- Let me turn to the details of Q4 results

- Fourth quarter revenue, gross margin, operating margin and EPS all improved year-on-year
- Quarterly revenue of $1.42B was up 6% from a year ago
- Strong sales of Ryzen and EPYC processors and datacenter GPUs more than offset lower channel GPU and Semi-Custom sales during the quarter
- Fourth quarter 2018 revenue did not include any IP-related revenue and blockchain related GPU revenue was negligible

Gross Margins and Operating Expenses

- Gross margin was 41%, up 740BPS from 34% a year ago
- Year-on-year gross margin improvement was driven primarily by the ramp of Ryzen and EPYC processor sales
  - Gross margin has increased y-over-y for seven consecutive quarters, driven by a higher percentage of revenue from new products
- Fourth quarter 2018 gross margin excludes $45mm write-down of older technology licenses that are no longer being used
- Operating expenses grew 9% y-over-y to $474mm and remained approximately flat as a percentage of revenue from the year ago period
  - We continue to invest in our product roadmap and go-to-market activities as we gain market share in important markets

Operating Income, Margins, Net Income and EPS

- Operating income was $109mm, up $90mm from $19mm a year ago
- Operating margin was 8%, up from less than 2% last year
- Net income was $87mm compared to $8mm a year ago
- Q4 2018 net income excludes a withholding tax refund plus interest of $43mm related to an IP litigation settlement from 2010
- Diluted EPS using a diluted share count of 1.180B was $0.08 per share compared to $0.01 per share a year ago

Computing and Graphics Segment

Revenue Growth

- Now turning to the business segment results
- Computing and Graphics segment revenue was $986mm, up 9% y-over-y
- Revenue growth was driven primarily by continued strong Ryzen desktop product sales and the adoption of second generation Ryzen mobile processors largely offset by lower channel GPU and memory sales compared to the prior year
  - Ryzen products continued to ramp and were greater than 80% of total client revenue driven by OEM and channel momentum

- In Graphics, sales were down y-over-y due to negligible blockchain-related revenue in Q4 2018 as well as elevated levels of Graphics inventory in the channel
- Total Graphics revenue grew sequentially driven by strong Radeon, datacenter, GPU sales

Operating Segment Income

- Computing and Graphics operating segment income was $115mm compared to $33mm a year ago
  - The increase was driven primarily by strength in Ryzen product sales and significantly higher ASPs in both desktop and notebook compared to a year ago

Enterprise, Embedded and Semi-Custom

- Enterprise, Embedded and Semi-Custom revenue was $433mm, flat from the prior year
- Server revenue growth was offset by lower Semi-Custom revenue
- EPYC processor units more than doubled sequentially driving significant growth in datacenter revenue in the quarter
- EESC segment operating loss was $6mm compared to a loss of $13mm a year ago
  - The improvement due to higher EPYC processor revenue was partially offset by lower Semi-Custom revenue and continued engineering and go-to-market investments in the server business

Balance Sheet Items

Turning to the balance sheet

Our cash, cash equivalents and marketable securities totaled $1.16B at the end of the quarter

We generated FCF of $79mm in the quarter

FCF was a negative $129mm for the full year, primarily due to growth in inventory related to new products and the timing of collections

Inventory was $845mm, up $107mm sequentially primarily due to the ramp of new products

Debt, EBITDA and Gross Leverage

- Total principle debt was $1.5B as we further reduced term debt by $60mm during the quarter resulting in total debt reduction of $171mm during 2018
  - We expect to pay off the remaining $66mm of 2019 term debt in March 2019 and beyond that, there are no long-term debt maturities until 2022
- Adjusted EBITDA was $152mm compared to $58mm a year ago, and on a trailing 12-month basis, adjusted EBITDA was $803mm, more than doubling y-over-y
- Gross leverage was 1.9 times as we ended 2018 and we are pleased to have achieved our long-term gross leverage target of less than two times

Wafer Supply Agreement

- Before turning to our financial outlook, let me discuss our wafer supply agreement with GLOBALFOUNDRIES.
- Today's seventh amendment of the WSA spans from January 2019 through March 2024
- It establishes purchase commitments and pricing at 12-nanometer and above for the years 2019 through 2021
  - The amendment also provides AMD full sourcing flexibility at 7-nanometer and beyond without any onetime payments or royalties for products purchased from other foundries

Outlook

Q1

Revenues, Gross Margins and Operating Expenses

- Turning to the outlook for Q1 2019
- We expect revenue to be approximately $1.25B +/- $50mm, a decrease of approximately 12% sequentially and 24% y-over-y
- Sequentially, the decrease is expected to be primarily driven by continued softness in the Graphics channel and seasonality across the business
  - The y-over-y decrease is expected to be primarily driven by lower Graphics sales due to excess channel inventory, the absence of blockchain-related GPU revenue and lower memory sales
- In addition, Semi-Custom revenue is expected to be lower y-over-y, while Ryzen, EPYC and Radeon datacenter GPU product sales are expected to increase
- In addition, for Q1 2019, we expect non-GAAP gross margin to be approximately 41%, non-GAAP operating expenses to be approximately $480mm, non-GAAP interest expense, taxes and other to be approximately $25mm and we also expect to record $60mm IP licensing gain associated with the THATIC JV in Q1 2019 which will be a benefit to operating income and recorded on the licensing gain line of the P&L.

Full Year

Revenue Growth, Gross Margins and Operating Expenses

- For the full year 2019, despite near-term weakness in the Graphics channel and a cautious macro environment, we expect high-single digit percentage revenue growth driven by Ryzen, EPYC and Radeon datacenter GPU product sales and as we ramp our 7-nanometer products throughout the year
  - We expect non-GAAP gross margin to be greater than 41%, non-GAAP operating expenses to be approximately 29% of revenue and a non-GAAP tax rate of approximately 4% of pre-tax income

Closing Remarks

In closing, we made excellent progress in 2018

We grew the top line by more than $1.2B, expanded gross margin and significantly improved profitability

We continue to execute our long-term financial model driven by our new high performance computing products that gained solid momentum last year

We are pleased to enter 2019 with a strengthened balance sheet and a strong portfolio of next-generation products capable of driving continued financial growth

QUESTION AND ANSWER SECTION

Operator

Certainly. We'll now be conducting a question-and-answer session. [Operator Instructions]. Our first question today is coming from Toshiya Hari from Goldman Sachs. Your line is now live.

<Q - Toshiya Hari>: Great. Thank you. Thank you so much for taking the question. Lisa, I had a question on your full year 2019 outlook. You guys are guiding revenue growth kind of in the high-single digit range. Embedded in that outlook, what kind of growth rates are you assuming for your core businesses; Computing, Graphics, Semi-Custom and server CPUs. Then on the gross margin side, 41% or greater. Is the improvement y-over-y primarily a function of revenue growth and mix or is the amendment in the WSA playing a role there as well? Thank you.

<A - Lisa T. Su>: Sure. Thank you for the question. So relative to the full year guidance of up high-single digits, you know the primary growth drivers are – Ryzen and EPYC are the two largest growth drivers with datacenter GPU. Also, we're expecting that to be up. And then we would expect that Semi-Custom will be down. If you look at the lifecycle of Semi-Custom, we'll be in the seventh year of the console cycle. And so we expect Semi-Custom to be down approximately 20%. And then we would expect Consumer Graphics to also be down, let's call it, double-digit as we really burn off some of the channel inventory that we see in H1. So Ryzen and EPYC are the large drivers of the growth, and that's as we launch our 7-nanometer products throughout the year.

And then your second question was?

<Q - Toshiya Hari>: Yeah. Gross margins; 41% or greater, that's 2 percentage point or greater improvement y-over-y. Is that primarily a function of revenue growth and improvement in mix given Ryzen and EPYC or is the WSA amendment providing a tailwind wind as well?

<A - Lisa T. Su>: Yes, it's primarily due to mix. So the mix of the higher margin, new products Ryzen, EPYC and the datacenter GPUs.

<Q - Toshiya Hari>: Got it. Thank you.

<A - Laura Graves>: Next question, please.

Operator

Certainly. Our next question is coming from Matt Ramsay from Cowen & Company. Your line is now live.

<Q - Matthew D. Ramsay>: Thank you very much. Good afternoon. Lisa, I guess I wanted to attack Tosh's question on the full year a little bit differently, and maybe just talk about, a little bit, what share gain assumptions you guys are embedding for your 7-nanometer roadmap vs. maybe some pragmatism or conservatism on the market just given the macro. I mean Intel talked about a flat PC TAM in terms of units, and obviously is only, I guess, guided us to mid-single digit growth for their sort of expansive server business for the year. And you guys are starting off down maybe 25% y-over-y in revenue for Q1 given what's going on in the Graphics business. So maybe you could just walk us through a little bit what you're thinking about the TAM growth of your two main growth markets for the year vs. share gains you're embedding. Thank you.

<A - Lisa T. Su>: Yeah absolutely, Matt. So look, I think as it relates to the market, I don't think we would have a very different view of the market as others may have stated. Our story really is a share gain story. And when you take a look at sort of the progress that we've made in 2018 and the design wins that we have in 2018 as we go over to 2019 when we look at both Rome as well as Ryzen, we look at sort of the breadth of OEM platforms that we have, the customer engagements by workload and sort of how we see that progressing, we feel very good about the opportunity to gain share as we go through the year, particularly given how competitive the product set is.

Similarly on the PC side, we've made nice progress over the last four or five quarters on Ryzen. We started strong on desktop and then in the last couple of quarters we've made good progress on notebook. We see a broader portfolio with our OEMs as we go into 2019, and we also see a more competitive desktop product line as well as notebook product line. So that's how we're thinking about the year.

To your point about starting a little bit with lower guidance in Q1, I think that's true. When we look at Q1, particularly on a year-on-year basis, there are a lot of moving pieces. But it's primarily due to the Graphics channel and that's both the reduced demand as well as the absence in blockchain revenue on a y-over-y basis as well as the Semi-Custom business. But as we move forward, as we go into Q2 and beyond, we see a significant opportunity with the ramp of our new products and that's how we see the year.

<Q - Matthew D. Ramsay>: Got it. Thank you very much for the color there. That's helpful. Devinder, maybe just a couple of little things in terms of licensing gains and IP revenue. I got asked a few times tonight, so I just want to clarify it here that, the gross margin outlook for Q1 does not include any IP or licensing gains? And then for the full year, are you including any IP revenue in the revenue outlook?

And how should we think about the rest of the THATIC licensing gains applied to sort of timing for when those might get recognized? I know it's a lot there, but lots of questions on just the moving pieces there tonight. Thank you.

<A - Devinder Kumar>: Yes. I can take that. License gain essentially does not impact gross margin. That is on a separate line altogether on the license gain line of the P&L. So the gross margin is not impacted by that. As far as IP revenue is concerned, in Q1, there is no contemplated IP revenue. So the gross margin at 41% guide is based on the products that we have. And for the year, at this point, outside of the THATIC JV, IP licensing gain that we are expecting to record in Q1, while there might be opportunities from an IP standpoint but nothing substantial contemplated at this point.

<Q - Matthew D. Ramsay>: All right. Thank you very much.

<A - Laura Graves>: Thanks, Matt.

Operator

Thank you. Our next question is coming from Vivek Arya from Bank of America Merrill Lynch. Your line is now live.

<Q - Vivek Arya>: Thanks for taking my question. Lisa, I'm curious as you look back at 2019 (sic) [2018] (30:10) and the success you had with EPYC, the initial success with EPYC, what was the mix of cloud vs. Enterprise? And then how do you think it trends in 2019 because of all the concerns around slowdown in cloud CapEx and so forth? And as part of that, if you could share with us what your market share assumptions are as we exit the year on EPYC?

<A - Lisa T. Su>: Yes. Sure, Vivek. So look, as we look through 2018, we are pretty pleased with our progress on EPYC. And coming off of Q4, actually it was a fairly strong fourth quarter for us in the fact that we doubled the number of units for our server business. And when you look at that mix, it is more cloud weighted. So we had some large deployments that went online here in Q4 and that was positive for us.

That being said though, we are making nice progress in the Enterprise and HPC side of the business too. We've had a number of wins in the quarter as well as going into 2019. So as we look into 2019, I would expect that the early Rome deployments will also be cloud-based. We'll be the first ones, but we have a strong set of Enterprise platforms, and as I mentioned earlier, it's the breadth of the OEM platforms that gives us good confidence that we're going to a broader set of workloads and having broader coverage in the market.

In terms of share assumptions, we'll have to see how the market and the year play out, but I think what we've said before is that after reaching the mid-single digit market share in Q4 2018, we would expect it would take another four quarters to six quarters to reach 10% market share and I think we're still in that range.

<Q - Vivek Arya>: Got it. And for my follow-up, there were two things that came out on your competitors' last few public discussions which is, one, this concept of CPU shortages and I'm wondering if that has had any positive or negative effect on your strategy or your positioning?

And then, Intel has also mentioned being a little more tactical when it comes to pricing and I'm wondering how that figures into your full-year outlook. So both the impact of CPU shortages and pricing, any color would be very helpful. Thank you.

<A - Lisa T. Su>: Sure, Vivek. So look, on the CPU shortages, my comment is that there are some pockets of shortage particularly at the low end. However, our focus has really been on ramping Ryzen. And if you look at the Ryzen percentage of our overall business; Ryzen, Devinder mentioned, was 80% of our client business. So we are really actually improving our mix in the client business. I think that, again, from my view, the shortages are temporary. But we look at it as really getting consistent share gain. And as we have gone through each quarter in 2018, we've seen consistent share gain and we believe we gained share in Q4 as well. So I think we're well positioned with the portfolio and we'll certainly drive that into 2019.

And then the other?

<A - Devinder Kumar>: Pricing.

<A - Lisa T. Su>: Oh pricing. Yes. Relative to pricing, look, when we think about pricing and when we put together our long-term model, we have factored in that pricing and competition will be aggressive. I think we know that to be the case. What we've seen in the market is consistent with that. But we also believe that particularly as you go into the datacenter, the single largest factor from a buying decision standpoint is the performance and the total cost of ownership of the product. And we believe that Rome will be very, very well positioned in 2019. And so we are cognizant of the competitive environment, but feel good that we have the right setup assumptions.

<Q - Vivek Arya>: Thank you.

Operator

Thank you. The next question is coming from Mark Lipacis from Jefferies. Your line is now live.

<Q - Mark Lipacis>: Hi. Thanks for taking my question and great to hit the mid-single digit milestone exiting the year. Lisa, as you start, I just wanted to confirm you expect to start shipping Rome mid-year, and as you do what's the biggest risk for Rome? Is it execution on delivering the product or is it the sales process convincing customers to take EPYC 2 and volume?

<A - Lisa T. Su>: Yes. So I think with Rome, our biggest opportunity/risk is adoption rate. I think from a competitive standpoint, the product is very solid. Everything going through our development labs looks very good as well as our customer engagements, and so this is just about getting customers to production as fast as possible. We do expect, though, that the adoption rate for Rome will be faster than the adoption rate for Naples. And the reason for that is we are in a socket-compatible infrastructure and so customers who don't necessarily need the newest features of the platform can actually use the same motherboard and system that they currently have with Naples and drop in Rome. And so I think that will help us accelerate some of the adoption, but right now it's about helping customers in their environment. We are widely sampling Rome and there's a lot of work to be done, but we feel good about the trajectory.

<Q - Mark Lipacis>: Great. Thank you. And a follow-up, if I may, for Devinder. So inventories looked like they were up about $100mm going into a pretty healthy seasonal quarter that's declining. How should we read that, Devinder? And was there just some opportunity to get some wafers more cheaply or are you trying to stockpile product in front of launches? And when can we expect the inventory to be a source of cash on the cash flow statement? Thank you.

<A - Devinder Kumar>: Yeah, Matt (sic) [Mark] (00:36:37). So the inventory growth is primarily driven by our new products and in preparation for our 7-nanometer next-generation product launches later this year as you just mentioned. We overall expect to manage our inventory in line with revenue, but also in support of the new products that will be launching and ramping throughout the year, Lisa mentioned a few of the launches at CES and also in the script and we're prepared to support that from an inventory standpoint and we'll see how the year progresses and then manage it from there.

<A - Laura Graves>: Thank you, Mark. Next question, please, operator?

Operator

Certainly. Our next question is coming from Stacy Rasgon from Bernstein Research. Your line is now live.

<Q - Stacy Aaron Rasgon>: Hi, guys. Thanks for taking my question. Around Q1 guide, obviously you mentioned the GPU weakness, but you also mentioned seasonality across the businesses. Is my assumption correct that that means everything is basically down sequentially, CPUs, GPUs, servers? Can you tell us is that true? And if so, can you give us an idea of the magnitude like at least what is down I guess most vs. least sequentially, Ryzen vs. GPU vs. EPYC?

<A - Lisa T. Su>: Sure Stacy. So the largest driver, as I said, is the GPU channel situation on a y-over-y basis. On a sequential basis, typical seasonality for, let's call it, PCs and GPUs and datacenter is probably around 10% or so. We are forecasting or we believe that that will be down a little bit more than that. And in terms of the ranking, I would say GPUs are down a bit more than the other two segments. That's the way we currently see it.

<Q - Stacy Aaron Rasgon>: Got it. Thank you. For my follow-up, I had a question just on general EESC. So its revenues are flat y-over-y. The server revenues are up a bunch. It's still losing money. And I get it there's some incremental investments and everything, but I guess how do we think about the profitability of that segment? How big does EPYC or Rome in the server business need to get before its sustainably profitable, especially if Semi-Custom is going to continue the decline, you said 20% in 2019?

<A - Devinder Kumar>: Yeah. I think the key, Stacy, is going to be ramping the server business in 2019. You are right that y-over-y we look at it. It's lost a little bit of money, but fundamentally it's investing in the go-to-market programs and launching the new products, investing in the ongoing engineering work that's needed to make sure that customers bring out the product on time. And Semi-Custom, given the fact that it is in the seventh year of the cycle, we expect that to be down from 2018 to 2019, but we do expect to go ahead and ramp our server business and that will definitely benefit the EESC profitability in 2019.

<Q - Stacy Aaron Rasgon>: Right. Do you think it's profitable for the full year?

<A - Devinder Kumar>: Too early to tell. I don't want to predict profitability at the segment level, but we'll see how it evolves over the year.

<Q - Stacy Aaron Rasgon>: Got it. Thank you so much.

<A - Devinder Kumar>: Thank you.

<A - Laura Graves>: Thanks, Stacy.

Operator

Thank you. Our next question today is coming from Ross Seymore from Deutsche Bank. Your line is now live.

<Q - Ross Seymore>: Hey guys, thanks for letting me ask the question. Lisa, a potentially different way to ask the same question on the full year 2019 guide. Late last year at a few different events, you talked about the server business being second-half weighted. If I go through the remainder of this year, it seems like you have to grow the better part at

20%-plus sequentially in each quarter to get there. I know it's not going to be perfectly linear like that. But I guess my overall question is if the server side of the business is back-half weighted, what sorts of businesses are helping the middle portion of the year? Is there some snapback on the GPU side? Is there something going on in the Ryzen side? Just trying to get somewhat of the shape of the year off of a base that's admittedly pretty low as your first quarter starting point.

<A - Lisa T. Su>: Sure, Ross. So, I think it is fair to say that our quarterly progression will have a lot to do with our product launches. So, you would expect that server will be more H2 weighted than H1. In general, our business is more H2 weighted though, if you think about the consumer portions of our business. But think about it as we would expect sequential growth in PCs. We would certainly expect sequential growth in datacenter, although stronger in H2. We would – we're also, as we see the GPU business right now, we see Q1 as the low point in the business, with the channel getting improving as we go into Q2 and we have additional product launches there as well. So, that's the way we would see the portfolio. And Semi-Custom, although, it's lower on a y-over-y basis, we would expect it to also increase as we go from second quarter into third quarter as well.

<Q - Ross Seymore>: Perfect. Then, a question on the GPU side, your big competitor in that market, obviously, is having some current issues and mentioned that the new product at the high-end wasn't selling through. Are you at all concerned that the competitive landscape in that market, whether it's because China demand being weaker as they cited or them having to be a little bit more aggressive on pricing, would do anything to your ability to penetrate the market with either existing or new GPU products as the year progresses?

<A - Lisa T. Su>: Yeah. So, when we look at the GPU market, and let's separate sort of gaming and datacenter, I think on the gaming side, from what we are seeing, we did see sellout increase in Q4 vs. Q3. So, gamers are still buying GPUs. They may be more discerning about price points. And so, I can imagine that there might be a bit more softness at the high-end vs. in the mid-range. But we believe that we have a good understanding of what's happening in the gaming side of the business and it will be driven – our gaming growth will be driven by new products. We would see that as we go through this year and with our Radeon VII launch, as well as our Navi launches on the gaming side.

On the datacenter side, we're making good progress in GPU datacenter, obviously, from a low base. But the GPUs in the datacenter are very workload dependent, and there are some workloads that actually we do very well in things like cloud gaming and virtualization and we have some early HPC wins. And so, we see this as sort of customer acquisition, [ph] new deployment (00:43:21). And so, those are the sources of growth on the GPU side for us.

<Q - Ross Seymore>: Thank you.

Operator

Thank you. Our next question today is coming from Aaron Rakers from Wells Fargo. Your line is now live.

<Q - Aaron Rakers>: Yeah. Thanks. Thanks for taking the questions as well. Just two questions, if I can, building on that last one. In your prepared remarks, you noted that you've reached the milestone of which GPUs as well as datacenter CPUs reached mid-teens percentage of your total revenue. I'm curious, as you kind of contemplated your full year guidance, where do you think that mix of business can go and is there a point in time where we actually – you foresee us kind of getting granularity on how big the datacenter GPU business is trending?

<A - Lisa T. Su>: Yes, Aaron. So, I think the mid-teens percentage revenue for us in Q4 was a good milestone. I mean, I think that's a meaningful percentage of our revenue and it was a contributor to our gross margin as we exited 2018. I think as we go into 2019, again, we will continue to give you visibility into where the datacenter growth is. To be fair, my expectation is that the CPU side of the datacenter business will grow faster than the GPU side, just given what we see in terms of overall deployments. But I think both businesses will be meaningful for us and are a key part of the growth story for us in 2019, and we'll continue to give color on how they develop as the year develops.

<Q - Aaron Rakers>: Okay. That's very helpful. And then, just real quickly on the Semi-Custom side. As you kind of contemplated the guidance as well through the course of this year and that 20% decline for the full year, is your assumption that Q1 kind of marks the bottom and we can grow seasonally off of that level or should we think about something differently from a progression through the quarters in 2019?

<A - Lisa T. Su>: Yeah. Aaron, yeah, that's the correct way of thinking about it. So, Q1 will be a low, Q2 will be higher, Q3 will be higher, and then Q4 will come down again. That should be the seasonality of Semi-Custom.

<Q - Aaron Rakers>: Okay. Thank you very much.

Operator

Thank you. Our next question is coming from John Pitzer from Credit Suisse. Your line is now live.

<Q - John William Pitzer>: Yeah. Good afternoon, guys, and congratulations on the solid results. Lisa, notwithstanding that the macro is extremely uncertain, making any predictions difficult, I'm just kind of curious going back to Ross' question, how do you see sort of the cadence of growth sequentially throughout the year? Because as he pointed out, if you kind of divide it up equally by quarter, you're growing north of 20% in Q2, Q3, Q4, half-on-half growth would be somewhere around 50%. If you assume more seasonal, and seasonal is a little bit difficult to get to because of the change of accounting, I think you get half-on-half growth as high as 75%. So, as you think about the full year growth, is this something that's more like 50% half-on-half or 75% half-on-half?

<A - Lisa T. Su>: Yeah. Thanks for the question, John. It might be a little bit early for us to go there, but what I would say is the following. When we look at the year-on-year compares from 2019 to 2018, Q2 2018 was still a very strong quarter for us, because we still had a significant amount of blockchain sales in Q2 2018. So, I expect that we will grow sequentially into Q2, but I think that will still be, let's call it, a tougher year-on-year compare. But then when we get into H2, we expect to be fully ramped on the entire 7-nanometer portfolio. And so, we would see a heavier weighting in H2. So, we see sequential growth into second quarter, but more heavily weighted into H2.

<Q - John William Pitzer>: That's really helpful. And then, Devinder, on the profitability front, if you kind of run the numbers, from Q1 guidance to kind of what you need to be exiting Q4 at to hit the full year number, you could see revenue up well over $1B Q1 to Q4. I'm a little bit surprised that despite that the gross margin guidance isn't a little bit better. I know you guided the full year to greater than 41% with Q1 at 41%. But I'm kind of curious, if you look at a Q4 run rate that's north of $1B higher than Q1 run rate, how should we think about gross margin and operating margin exiting the year?

<A - Devinder Kumar>: Yeah. I think, John, if you look back at the last many quarters, I think seven quarters year-on-year, we've improved gross margin on the strength of the newer products. We ended the year quite well in 2018 and achieved gross margin in Q4 that was nice. And now we start the year with 41%, and as we start the year, it's early we're guiding greater than 41%. I think you should expect that as the products ramp, in particular with the 7-nanometer product that Lisa referenced, our margin should continue to improve and we'll see where we end up by the end of the year, but we do expect that year-on-year margin goes up from where we ended in 2018 at 39% and greater than 41% for 2019.

<Q - John William Pitzer>: Thanks, guys.

Operator

Thank you. Our next question is coming from Mitch Steves from RBC Capital Markets. Your line is now live.

<Q - Mitch Steves>: Hey. Thanks for taking my question. Two quickly, first on the C&G side. I realize that there is going to be a lot of kind of sequential difficulties there, but when I think about the long-term growth rate, I know you guys had kind of talked to high-single to double-digit growth. Is that still essentially what you think that business can grow at long-term?

And then secondly, in terms of the next EPYC 2, is there any reason why it would underperform a Intel 10-nanometer in a testing environment? And if so, why would that be?

<A - Lisa T. Su>: Let me take the second question and then maybe, Devinder, you can take the first question. So, as it relates to our Rome product, when Rome was originally planned, we had planned that it would be competing against a 10-nanometer product. So, that was our expectation when we started. I think we've shown some of the generational performance advantages in terms of double the performance on a socket basis, four times performance on a floating-point basis.

And the other thing I would say is that with our 2nd Generation Rome, the customer set is now more used to our architecture. And so, some of the architectural and software improvements that we've also spent quite a bit of time on over the last four to six quarters are coming into play. So, I think we feel very good about the competitive positioning of Rome, and the other thing to keep in mind is we're deep in development of our next-generation beyond Rome. So, the Zen 3 product portfolio is deep in development as well. And so, our goal is to ensure that we have a consistent cadence of very competitive products.

<A - Devinder Kumar>: Yeah. And then, as far as your question on the segment growth is concerned relative to high-single-digits growth for the company level, in both of the segments, there are some factors that come into play. In Computing and Graphics, obviously, we feel good about the datacenter side of the GPU, but on a compare basis when you look at 2018 to 2019, we do have the impact of the blockchain and some memory sales from 2018 that don't happen in 2019 from a standpoint of where the market is.

And then on the EESC side, Semi-Custom being down, obviously, is a factor when you compare year-on-year per segment, but good growth on the datacenter piece of it, in particular with the 7-nanometer Rome product ramping in the back-half of 2019, and that's the way you kind of look at it. It is still early in the year from an overall standpoint, and where we ended up in 2018, we're projecting high-single-digit growth at the company level for 2019 over 2018.

<Q - Mitch Steves>: Got it. Thank you.

Operator

Thank you. Our next question is coming from Blayne Curtis from Barclays. Your line is now live.

<Q - Blayne Curtis>: Thanks for taking my question. Lisa, I just wanted to ask you, you laid it out a little bit, but in terms of EPYC 2, same socket, but you have sampled it early. In terms of getting over the finish line and getting these shipped, I guess the customer still has to wait for production silicon and then typically people talk about 6 to 12 months to kind of test it and make sure it does everything with the production silicon. So, can you just walk me through that timeline because, obviously, you're baking in a pretty steep ramp in H2? Thanks.

<A - Lisa T. Su>: Yeah. So, we started sampling EPYC actually last year, so H2 last year to some of the top-cloud vendors as well as our OEM partners. We've had a significant amount of development with our ODM partners as well. So, I think there is a good amount of overlap between the customer development cycle and our development cycle.

Now, as you said, production silicon is very key and ensuring that the final specifications are locked in is work that we still have to do here in H1 this year, but I think we feel good about it. We feel good about the platforms, the customer engagements, the current progress of development, and so that is very much our plan from an execution standpoint.

<Q - Blayne Curtis>: Thanks. And I just wanted to ask on the GPU side, it looks like your ASP is up substantially with the datacenter. I'm just kind of curious as you think about the mix of datacenter, how do you think about the trajectory of that business? I mean, is that portion lumpy as well or is this kind of the go-forward kind of level after that pretty sharp initial shipment in December? Thanks.

<A - Lisa T. Su>: Yeah. So, on the datacenter side, we do expect that the datacenter GPU business will be a growth driver for us in 2019. It will be a little bit lumpy, so I wouldn't say it's a straight line. But I would say on a y-over-y basis, it's an important growth driver for us. And as it relates to the overall datacenter GPU ASPs affecting overall

ASPs, I think that's true, because the gaming ASPs are – I'm sorry, the gaming business was lower than expected given the channel inventory situation. So, I think it's also just weighted in terms of the units.

<Q - Blayne Curtis>: Thanks.

<A - Laura Graves>: Thank you, Blayne. Operator, we have time for two more questions, please.

Operator

Thank you. Our next question is coming from Joe Moore from Morgan Stanley. Your line is now live.

<Q - Joseph Moore>: Great. Thank you. It seems like the GPU datacenter business is doing pretty well. Can you give us some color – if you look at mid-teens exposure overall between the two datacenter businesses, CPU and GPU, can you give us some qualitative sense for how much of that is GPU at this point and what are the main applications, is it mostly virtualization? What other applications are you seeing there?

<A - Lisa T. Su>: Sure, Joe. So, for the mid-teens percentage of revenue in Q4 between CPU and GPU, it's actually roughly similar. And then, in terms of the workloads on the GPU datacenter side, we do very well in cloud gaming, we do very well with our virtualization solutions and we have some early traction in HPC.

<Q - Joseph Moore>: Great. Thank you. That's helpful. And then, I guess just in terms of the business segmentation, I think you've alluded to this earlier, but it seems like the conversation typically is around microprocessor, Graphics and Semi-Custom as sort of three different opportunities. Have you thought about moving the segmentation to more in line with that? And I realize that's easy to talk about and hard to implement, but what's your thought in terms of over time sort of migrating that more in line with the way you guys talk about the business?

<A - Lisa T. Su>: Yeah. So, we look at the business in all different cuts, as you can imagine, we look at it by segment. Our CG and EESC, CG is very much a PC-driven segment and EESC with Enterprise and Semi-Custom. And we are also, based on some of the feedback, trying to be a little bit more granular in terms of how the various businesses fall underneath that. So, I think as the datacenter business becomes the larger piece of our business, we'll continue to look for how do we get – give you guys more color and more transparency on how that is doing.

<Q - Joseph Moore>: Great. Thank you.

Operator

Thank you. Our next question is coming from Vijay Rakesh from Mizuho. Your line is now live.

<Q - Vijay Raghavan Rakesh>: Yeah. Hi, guys. Just in terms of the GPU gaming side, you mentioned higher inventory levels. I was wondering if you can give us some number on where normal inventory GPU levels are and where are they running currently. Thanks.

<A - Lisa T. Su>: Yeah. So, when we look at the GPU channel inventory, we do believe our channel partners reduced inventory in Q4 and they will reduce inventories in Q1. We still think that Q1 levels are elevated and there will be some spillover into Q2 where we'll see some elevated inventory levels. We'll have to see how the sell through really plays out. But my expectation is that in Q2, we'll have sort of improved channel inventory levels and we will return to sequential growth in the gaming side of our business.

<Q - Vijay Raghavan Rakesh>: Got it. And on the 7-nanometer side, is the 7-nanometer GPU and CPU – as those ramp in the back-half, are they accretive to this 41% gross margin levels? Thanks.

<A - Lisa T. Su>: Yeah. So, the 7-nanometer GPUs on the datacenter side started ramping in Q4. So, that was part of the datacenter GPU revenue that we talked about. The 7-nanometer CPU will ramp middle of the year, and the 7-nanometer CPU and GPU are both above corporate average margins, so you would expect that they're above the 41 points and would be sort of accretive to margin as that mix improves.

<Q - Vijay Raghavan Rakesh>: Got it. Thank you.

Operator

Thank you. We've reached the end of our question-and-answer session. I'd like to turn the floor back over to management for any further or closing comments.

Laura Graves

Thank you very much, operator. We appreciate everyone joining us here today. We're quite proud of the accomplishments in 2018 and look forward to seeing you all on the road in 2019. Have a great afternoon.

Operator

Thank you. That does conclude today's teleconference. You may disconnect your lines at this time and have a wonderful day. We thank you for your participation today.