Company Name: Advanced Micro Devices
Company Ticker: AMD US
Date: 2018-01-30
Event Description: Q4 2017 Earnings Call

Market Cap: 12,416.96
Current PX: 12.87
YTD Change($): +2.59
YTD Change(%): +25.195

Bloomberg Estimates - EPS
Current Quarter: 0.061
Current Year: 0.365
Bloomberg Estimates - Sales
Current Quarter: 1247.842
Current Year: 6157.435

Q4 2017 Earnings Call

Company Participants

- Laura Graves
- Dr. Lisa T. Su
- Devinder Kumar

Other Participants

- Hans Mosesmann
- David M. Wong
- Mark Lipacis
- Stacy Aaron Rasgon
- Vivek Arya
- John William Pitzer
- Joe L. Moore
- Ross C. Seymore
- Brett Simpson
- Tristan Gerra
- Srini Pajjuri
- Ambrish Srivastava

MANAGEMENT DISCUSSION SECTION

Laura Graves

GAAP and Non-GAAP Financial Measures

Additionally, please note that we will be referring to non-GAAP financials during this call, except for revenue and segment operational results, which are on a GAAP basis

The non-GAAP financial measures referenced are reconciled to their most directly comparable GAAP financial measure in the press release and CFO Commentary, again, both posted on our website

Dr. Lisa T. Su

Business Highlights

Opening Remarks

- Three years ago we set out a strategic plan to reshape AMD to become a high-performance computing leader through great products, deep customer relationships and a simplified and focused business strategy. 2017 marked a key product and financial inflection point for AMD
- Our newest wave of high performance products and consistent execution created significant momentum for our business over the last year

Revenue and Gross Margin

- Fourth quarter revenue of $1.48B grew 34% from the year-ago period, and we significantly expanded our gross margin and improved profitability
- For the full year, we increased annual revenue by over $1B, resulting in 25% annual revenue growth
  - We expanded gross margin and achieved full year profitability

Computing and Graphics Segment

- Looking at our Computing and Graphics segment in the quarter, we delivered very strong Q4 results as we continued the ramp of our Ryzen CPU and Radeon Vega GPU products
- Computing and Graphics segment revenue increased 60%, and we significantly improved operating income from a year ago
- Client Computing revenue increased both y-over-y and sequentially
- We outperformed seasonality in Q4, driving strong double-digit sequential revenue and unit growth based on very strong sell-out of Ryzen processors throughout the holiday season

Ryzen CPU Family

- We expanded our Ryzen CPU family further into the consumer market with the introduction of the AMD Ryzen Mobile processor with Radeon Vega graphics, combining the power of our Zen CPU and Vega GPU architectures into the fastest processor in the industry for ultrathin notebooks
- Ryzen Mobile-based notebooks are currently available from Acer, HP and Lenovo with multiple new systems expected from all top five PC manufacturers in H1 this year

Graphics

- In Graphics, we delivered our second straight quarter of record GPU revenue with significantly improved ASP and increased unit sales from a year ago, driven by strength across our entire Graphics product portfolio
- We saw a strong demand for our Polaris products across both the gaming and blockchain markets, and Radeon Vega GPU revenue more than doubled from the prior quarter, driven by strong gaming demand in the add-in-board channel, as well as strength with strategic OEMs

New iMac Pro

- Apple launched the new iMac Pro, the most powerful Mac ever made, featuring AMD’s Radeon Pro Vega product in the quarter
- We also began shipments of a new semi-custom GPU that is integrated into an Intel multi-chip processor package
  - This semi-custom product opens up a complementary market for our high-performance graphics products and extends the power of Radeon graphics to more gamers and premium PC buyers

Professional Graphics Business

- Our Professional Graphics business had its best quarter ever based on growing data center sales highlighted by strong Radeon Instinct MI25 sales to a major cloud provider
- For the full year, Computing and Graphics segment revenue increased 54% over the prior year as we launched more than 40 new high performance CPUs and GPUs

Enterprise Embedded and Semi-Custom Segment

- Turning to our Enterprise Embedded and Semi-Custom segment, revenue increased 3% from a year ago driven by the ramp of our EPYC processors
- Q4 server revenue and unit shipments increased sequentially and from a year ago as the market continues to qualify and deploy our family of high-performance EPYC processors
  - We closed dozens of new server deals in the quarter, securing key design wins with education, financial services and hosting companies

Microsoft Azure

- We also had several key announcements in the quarter as we continued to see a steady drum beat of adoption
- Microsoft Azure became the first public cloud instance powered by AMD with their L-Series of virtual machines for storage optimized workloads
- Hewlett-Packard Enterprise began volume shipments of the EPYC-based ProLiant DL385 Gen10 server, which recently set world records for floating point performance
  - Baidu deployed AMD EPYC single-socket platforms into their data centers to power AI, big data, and cloud computing services
- And Dell EMC has completed the qualification phase for their EPYC-based systems, and we'll be sharing more on launch plans shortly

Semi-Custom Business

- Our reentry into the server market remains on track with a steady ramp of new platforms and deployments across our OEM and hyperscale data center customers
- Our Semi-Custom business performed as expected in the quarter, as unit shipments declined from a year ago as we completed the fifth year of the current game console cycle

Spectre and Meltdown

- Before I close, I'd like to address the recent important security issues facing our industry
- Security is and always has been a fundamental focus for AMD across all our products
- We are vigilant about security in both our product design and throughout the product life cycle
- As new exploits arise like we have seen with Spectre and Meltdown, we are dedicated to responding with speed and focus to keep our customers and partners informed and protected
- As a reminder, we believe Meltdown is not apropos to AMD processors

Spectre Variant 1

- For Spectre Variant 1, we continue actively working with our ecosystem partners on mitigations, including operating system patches that have begun to roll out
- We continue to believe that Variant 2 of Spectre is difficult to exploit on AMD processors
  - However, we are deploying CPU microcode patches that, in combination with OS updates, provide additional mitigation steps
- Longer term, we have included changes in our future processor cores, starting with our Zen 2 design to further address potential Spectre-like exploits
- We continue to collaborate closely with the industry on these vulnerabilities and are committed to protecting AMD users from these and other security threats as they arise

Summary

- In summary, we are very pleased with our quarterly and full-year results
- We made significant progress in 2017 as we completely reshaped AMD’s product portfolio and launched a highly competitive set of new products
- In 2018, we expect to increase our momentum with the next wave of premium products and expanded go-to-market activities to increase our market penetration

Client Market

- In the client market, we will expand our Ryzen portfolio with new product launches, including AMD Ryzen desktop processor with Radeon Vega graphics, which is expected to deliver the industry’s highest-performance graphics engine in a desktop processor
  - Our second-generation Ryzen desktop CPU, based on our higher-performance 12-nanometer Zen+ architecture
  - And for business notebooks, our AMD Ryzen PRO mobile processors with Radeon Vega graphics
- We are also expanding our go-to-market activities with our OEM and retail partners, and we expect to launch more than 60 new Ryzen OEM systems throughout 2018

Graphics

- In graphics, the launch of Radeon Vega Mobile products will expand our Radeon Vega lineup into high-end notebooks
- Later this year, we plan to sample our first 7-nanometer Vega GPU optimized for machine learning
- In addition, we will continue increasing our software investments around machine learning to address the growing demand for an open ecosystem in the GPU compute space

Server Market

- In the server market, we will continue to work closely with major cloud vendors and OEMs to ramp their first-generation EPYC-based systems, while also completing key development milestones on our next-generation Zen 2-based server platforms

- Our Zen 2 design is now complete and we will be sampling to our customers later this year. 2018 is clearly a defining year for the ramp of our server business, and we remain focused on our goal of achieving double-digit market share in this important market segment
  - 2017 laid a solid foundation with strong financial results and significant progress towards achieving our long-term goals
- I am even more excited about 2018 as we continue our journey to position AMD as one of the premier long-term growth companies in the tech industry

Devinder Kumar

Financial Highlights

Revenue Growth

- 2017 was a pivotal year for AMD
- We grew annual revenue 25% over 2016, with revenue growth increasing every quarter on a y-over-y basis, culminating in growth of 34% in Q4 2017
- In addition, we expanded gross margin by 3 percentage points and achieved GAAP profitability for the year

Computing and Graphics

- Computing and Graphics annual revenue grew 54% in 2017, while Enterprise, Embedded and Semi-Custom annual revenue was flat
- Both segments posted operating profits for the year and it is particularly noteworthy that the Computing and Graphics segment was profitable for the first time in six years
- Based on the overall strength of the business and our new high-performance products, we have set a strong foundation for achieving our long-term financial model

Q4 Results

Revenue and Gross Margin

- Now let me turn to our results for Q4 2017
- Total revenue of $1.48B grew 34% y-over-y, driven by strong Radeon and Ryzen product demand
- On a sequential basis, revenue declined 10%, better than expected, driven by seasonally lower Semi-Custom sales and partially offset by strong demand for new CPU and GPU products
- Gross margin was 35%, expanding 3 percentage points y-over-y, primarily due to a larger portion of revenue coming from Computing and Graphics, driven by our new high-performance products

Operating Expenses and R&D

- Operating expenses were $412mm compared to $357mm a year ago

- The increase was driven primarily by R&D and new product go-to-market investments, partially offset by an R&D credit related to a technology development agreement
- Operating income was $103mm, up significantly from $26mm a year ago, and operating margin was 7%, up from 2% a year ago

Net Income and Adjusted EBITDA

- AMD received a one-time tax credit of $18mm as a result of U.S. corporate tax reform, which resulted in a net tax benefit of $8mm in the quarter
- Net income was $88mm or diluted EPS of $0.08 as compared to a net loss of $8mm or $0.01 per share in the year-ago period
- Adjusted EBITDA was $142mm compared to $60mm a year ago, and adjusted EBITDA for 2017 was $445mm

Computing and Graphics

- Now turning to fourth quarter business segment results
- Computing and Graphics segment revenue was $958mm, up 60% y-over-y, due to strong sales of our Radeon graphics and Ryzen desktop processors
- Computing and Graphics segment operating income was $85mm, compared to a loss of $21mm a year ago
- The strong improvement was due to higher revenue

Enterprise, Embedded and Semi-Custom

- Enterprise, Embedded and Semi-Custom revenue was $522mm, up 3% y-over-y, driven by server revenue
- Operating income was $19mm, down from $47mm a year ago, primarily due to the absence of a licensing gain and ongoing R&D investments, partially offset by the benefit from a richer product mix

Balance Sheet Items

Cash and Cash Equivalents

- Turning to the balance sheet
- Our cash and cash equivalents totaled $1.18B at the end of the quarter, up from $879mm in Q3, due to significantly higher cash flow from operations
- Inventory was $739mm, down slightly from the prior year and down 7% from the prior quarter
- Total principal debt, including our secured revolving line of credit, was $1.7B.

Long-Term Debt and FCF

- In Q4, we deployed cash to repurchase $38mm of long-term principal debt, resulting in a total reduction of long-term debt of $138mm in 2017
- Our gross leverage ratio has improved from 10 times in 2016 to 3.8 times at the end of 2017
- FCF was $339mm, up sharply from $32mm in the prior quarter

- Q4 is typically our strongest cash-flow quarter, and for the year, FCF was $45mm negative due to increased working capital in support of higher revenue

New Revenue Recognition

- Before we turn to guidance, I want to highlight that we are adopting the new revenue recognition accounting standard effective 2018
- We are adopting this standard under the full retrospective method, which we believe is most helpful to our investors
- For the full year 2017, the impact of the accounting change to revenue was immaterial, and we expect the impact to be immaterial on 2018 annual revenue
- For Q1 2018, AMD expects revenue to be approximately $1.55B +/- $50mm, an increase of 32% y-over-y, primarily driven by the strength of the ramp of Ryzen, GPU and EPYC products
- For comparative purposes, under the new accounting method, Q1 2017 restated revenue was $1.18B and Q4 2017 restated revenue was $1.34B

Non-GAAP Gross Margin

- In addition, for Q1 2018, we expect non-GAAP gross margin to be approximately 36%, non-GAAP operating expenses to be approximately $435mm or approximately 28% of revenue
- Non-GAAP interest expense, taxes and other to be approximately $30mm and inventory to be up sequentially in support of higher revenue
- For 2018, we expect double-digit percentage growth in annual revenue, greater than 36% non-GAAP gross margin
    - Non-GAAP operating expenses to be approximately 28% of revenue
- In addition, we expect a tax rate of approximately 10% of pre-tax income for 2018

Summary

In summary, we made significant progress in 2017

We are pleased with the momentum in our business and delivered outstanding top line revenue growth, margin expansion and achieved profitability for the year

We continue to make strong progress towards our long-term target financial model, and our goal in 2018 is to deliver significant revenue growth and increased profitability as we continue to invest in our multi-generational, high performance product roadmaps

QUESTION AND ANSWER SECTION

<Q - Hans Mosesmann>: Congrats on the quarter and guide, guys. Can you please give us the puts and takes for Q1 guide? There's lots of moving parts, and so I think that would be helpful. Thanks.

<A - Dr. Lisa T. Su>: Yeah, absolutely, Hans. Thanks for the question. So our Q1 revenue guidance was up 32% year-on-year, and if you take a look at that, it's actually significantly better than our typical seasonality. Primarily that's due to the new product strength. So we see GPUs, Ryzen and EPYC all up in Q1 and that's contributing to the strong guidance. We do expect that the Semi-Custom business will be down in Q1 relative to Q1 2017, just due to the fact that we're in the sixth year of the cycle. So if you actually take the new product strength, the guidance is actually over 32% year-on-year.

<Q - Hans Mosesmann>: Okay. And the seasonality of the Semi-Custom will continue to be weaker on a y-over-y basis for the rest of the year? Is that the way to model that?

<A - Dr. Lisa T. Su>: Yeah. So what you should expect with Semi-Custom is on a full-year basis the revenue will be likely down compared to 2017 just due to where we are in the cycle, and units will be down. There will be a bit of an adjustment to the seasonality as we move over to the new accounting regulations with ASC 606, and so we'll see, let's call it, a bit more revenue in H1 and a bit less revenue in H2. So for the year, it is very similar and then we'll see a little bit of shift in the quarterly profile. But again, back to your question, your initial question on Q1 revenue guidance, it is really driven by new product strength.

<Q - David M. Wong>: Following on from your answer to Hans' question, Lisa, can you give us some feel for the revenue, the new product momentum in terms of sales in Q4 2017 and in particular, any numbers on Ryzen, EPYC or Vega, absolute sales dollars or sequential growth in Q4 would be helpful.

<A - Dr. Lisa T. Su>: Yeah, absolutely, David. So we had a very strong Q4. If you look at the overall business, it was up 34% year-on-year. If you look underneath that, the Computing and Graphics business was very strong. So we saw 17% sequential growth, significantly better than seasonality. That was up on client, particularly Ryzen desktop, had a very strong holiday. We also started initial shipments on Ryzen Mobile.

And then on the Graphics side, we saw strength in all product lines. So we saw strength in the channel for both gaming as well as blockchain. We saw strength in OEMs as we ramped Apple with our Vega processors. We also saw strength in professional graphics as we launched some GPU compute into the data center. So overall, those were the puts and takes. Semi-Custom was down sequentially. Again, that's as expected given the typical seasonality of the Semi-Custom business.

<Q - David M. Wong>: Great. Thanks. And, Devinder, it might have been nested in what your prepared remarks, but do you expect your net debt will grow in the seasonally weak H1 2018? And if so, how much might net debt go up?

<A - Devinder Kumar>: Net debt, when you say net debt, just explain that, David. What do you mean by that?

<Q - David M. Wong>: Well, debt minus cash. Well, do your cash balances fall during H1?

<A - Devinder Kumar>: The debt levels came down in 2017 because we did repurchase some of the long-term principal debt to the tune of $134mm. And in the guidance we provided we said that 2018 would be FCF positive. So if anything, I guess the net debt as you look at it would come down as we get to H2 2018.

<Q - David M. Wong>: But any help in H1? What happens to the net debt in H1?

<A - Devinder Kumar>: Typically, we invest in the business. As you saw in the guidance, I expect inventory to be up in Q1, and obviously with the strength of the business momentum that Lisa just talked about, we're prepared to go ahead and purchase product or wafers to go ahead and fund the business.

<Q - Mark Lipacis>: Lisa, I was hoping you could give us a little more color on EPYC. Are we starting to get past pilot programs now and getting deployed into production environments? And can you give us a sense of the take of EPYC in the cloud vs. enterprise? Thanks.

<A - Dr. Lisa T. Su>: Yeah, absolutely, Mark. So, look, we are pleased with where we are with EPYC. We think we've made very nice progress in Q4. We announced that the large OEMs are now qualified and starting to ship to end customers. And so we have seen very nice design wins in sales at some marquee end customers. If you look across education, financial services and the hosting business, those are looking good.

On the cloud side, we have publicly talked about Microsoft Azure as well as Baidu adopting EPYC in their cloud environments. We are working with a number of the other cloud players to adopt EPYC, and we're working on some of the optimizations required there. So, overall, we're very pleased with the momentum. I think we always knew that there was a qualification cycle to go through, but we've gotten through some of the major qualifications here in Q4. And especially, as we look in December, we actually closed a number of new deals with the platforms being available for sale.

<Q - Mark Lipacis>: Thanks. That's helpful. And then, on the C&G side, very impressive growth. Can you give us a sense of to what extent that growth was driven by Ryzen products vs. Radeon? And then, on the Radeon side, can you give us a sense of what blockchain was to the contribution and how you're viewing the sustainability of that? It seems like it's getting consistently strong. So appreciate any updates on your view on that segment. Thank you.

<A - Dr. Lisa T. Su>: Yeah, absolutely, Mark. So, look, on the Computing and Graphics segment, we grew about $140mm sequentially. And if I look at that growth, it was across Ryzen and Radeon. If you look at blockchain, in particular, our estimates are that it was about 1/3 of the growth, 1/3 of the $140mm. And then the rest of the 2/3 are around the GPUs – the other segments of GPUs and Ryzen.

When I look going forward, clearly, blockchain is a little bit of a fluid and dynamic market. We did see some strength as we went into December. We see strength as we're going into Q1. I'm sure many of you have seen that the graphics channel is very low, and we're certainly working to replenish that channel environment. So we think that graphics in general is going to be strong into H1 and that's some of what's contributing to our strong Q1 guidance. But overall, my comments are we're seeing nice momentum across Ryzen and all of the GPU segments, which is important for us as we go into 2018.

<Q - Stacy Aaron Rasgon>: My first is on gross margin. Can you give us a feeling – do you expect Q1 to be the trough for gross margins through the year, given you're guiding in line to maybe a little above for the year where you're guiding Q1? And can you give us some feeling on the puts and takes of gross margins as we go through the year, particularly around things like business mix, lower seasonality and lower growth in Semi-Custom vs. some of the new products, for example?

<A - Devinder Kumar>: Yeah, Stacy, I can take that and then, Lisa maybe can add. As we start the year, as Lisa said, we do see momentum from the new products, the Ryzen, the GPUs and EPYC, and margin is up on a sequential basis. We're starting off the year at 36%. We previously said that for 2018 we expect margin to be greater than 36%. So it is a good start for the year, starting off well with the 36% guide. Obviously, the new products are having benefit then. And then the one thing I will add from what Lisa said earlier, in particular, with the Semi-Custom business timing is there is some incremental Semi-Custom revenue that gets recognized in Q1 as compared to the past from a timing in the year standpoint. But overall, I think the 36% is where we are starting off in Q1 and very pleased with that.

<A - Dr. Lisa T. Su>: Yeah, Stacy the-

<Q - Stacy Aaron Rasgon>: So you do believe you – okay, I'm sorry.

<A - Dr. Lisa T. Su>: Go ahead.

<Q - Stacy Aaron Rasgon>: I was just saying, so you do believe Q1 is probably a trough in terms of gross margins?

<A - Dr. Lisa T. Su>: Clearly, Stacy, H1 is usually the weaker half of our business because we are a consumer-led business. So starting off with 36% margin in Q1 is a good start. And we do expect that the new products will continue to ramp as we go through 2018. So I think that's how we view the puts and takes going forward.

<Q - Stacy Aaron Rasgon>: Thank you. For my follow-up, I know your competitor saw some unusual strength in the enterprise market and enterprise spending in Q4. I understand your exposure at this point to those enterprise wins is certainly less, but what are you seeing in terms of enterprise ramp? Are you seeing anything unusual or more or less sustainable in terms of strength vs. what you'd ordinarily expect to see this time of the year?

<A - Dr. Lisa T. Su>: Yeah, Stacy, I think your question is about the market, and our market share is still relatively low. So our exposure with EPYC is there's a lot of activity. There's a significant amount of activity with customers, both – in all segments, cloud and enterprise, although I wouldn't say that that's necessarily a market trend. I would say that's more sort of where we are with our EPYC qualifications and ramp. And so we don't see – for example, we don't see that Q4 was especially strong and there will be a drop-off in Q1. In fact, we expect that EPYC should grow as we go through Q1 and the rest of 2018.

<Q - Vivek Arya>: For my first one, just a clarification. I know it's been asked a few times, but what would your Q1 sales and gross margin outlook have been under the older accounting methodology?

<A - Devinder Kumar>: Vivek, we're adopting the new revenue accounting standard under what is the full retrospective method because we believe this is most helpful to the investors, and for good measure we have provided Q1 2017 and Q4 2017 on a restated – we have restated the revenue, and obviously Q1 2018 guidance under ASC 606. We will publish the restated numbers as part of our Form 10-K. And from a Q1 2018 standpoint, if you look at the numbers, let's say if you compare to Q4 2017 on a sequential basis, the revenue is up quarter on quarter and largely that's the strength of the new products in Q1 2018.

<Q - Vivek Arya>: All right. I ask that you're starting the year at a very strong 30%-plus base and you're saying double-digit growth for the year and double-digit is a very, very wide range. So, Lisa, could you help us at least get some level set of what double-digit growth means for the year?

<A - Dr. Lisa T. Su>: Yeah. So we are starting the year strong, Vivek. I think maybe to give you a little bit more color on your question as it relates to Q1 guidance, we are – as Devinder said, we are giving all guidance and forward-looking comments on ASC 606. However, the largest impact, particularly as it relates to revenue, is really sort of the Semi-Custom business. As you know, our Custom business is a little unique because it's a singular customer. And so, under the new revenue recognition rules, we would actually take revenue with non-cancelable POs.

So that impact in Q1 sort of guidance would have been about, let's call it $100mm or about – thereabouts. And so that might help you calibrate where we are. I think any way you look at it, the new product strength is the most important factor, but we also want to be clearer on what the accounting rule impact would be. Does that help you, Vivek?

<Q - Vivek Arya>: Yeah, Lisa, very helpful. And for my follow-up, traditionally there has been a very large price delta between your and Intel product; sometimes 50%, 60% plus in PCs and servers. As you look ahead with the new products, are you starting to see some of that price converge? Like are you being positioned in segments where you had not been previously so you can get the benefit of much better ASPs than you've had historically?

<A - Dr. Lisa T. Su>: Yeah, Vivek, absolutely. So, if we look in 2017 full year and look at our ASPs in the Client business, the Graphics business and the Server business, albeit it's early, we are definitely seeing a significant ASP expansion as a result of the fact that our products are now covering the higher end of the market. So we're competing very well in the higher end of the market. I expect that there's still a delta, but that delta is converging, given our product coverage.

<Q - John William Pitzer>: Congratulations on the strong results, and thanks for letting me ask a question. Lisa, while the y-over-y gross margin improvement has been strong, both in the calendar sort of third quarter, fourth quarter and now on the guide in Q1, the sequential gross margin leverage is perhaps a little bit less than I would have thought, especially as you move into Q4 and Q1, and Semi-Custom comes down.

Now I know there's been sort of a lag effect as Ryzen grows as a percent of the mix. But maybe you can help me understand where we are as far as Ryzen as a percent of the mix being a positive influence on gross margin. And then just relative to your long-term gross margin target of 40% to 44%, how far does Ryzen get you before you become more dependent on EPYC ramps later this year into 2019 and beyond?

<A - Dr. Lisa T. Su>: Sure. So a lot of different questions there, John. Let me try to unpack it there. So let's talk about sort of Ryzen and sort of the margin, both Q4 and Q1. On the Ryzen, to give you sort of a flavor of where we are in terms of the new product ramp, Ryzen Q4 was probably in the high 40 percentage of our overall Client business, and we expect that that will be over 50% starting in Q1 2018. And so that ramp definitely helps, and it's part of our sequential 100 basis point improvement from Q4 to Q1.

I think in terms of overall new product revenues, if you take Ryzen, EPYC, and then our new Graphics products in totality, in Q4 they were about 33% of our revenue, and we expect that to ramp nicely as we go into 2018. So I think we are getting the margin leverage. The margin leverage certainly from Q4 to Q1 is due to the fact that we have strong products.

And the thing that's a little bit different this quarter is because we are guiding under ASC 606, and as a result of that, Semi-Custom, which is typically seasonally down Q4 to Q1, in this case it's actually up a little bit Q4 to Q1. And so that's a headwind on the margin, but overall, we're still up 100BPS. Does that kind of get to the gist of your question?

<Q - John William Pitzer>: No, that's helpful, Lisa. And then maybe a second question, just on the OpEx. Revenue for the calendar first quarter significantly above where the Street was expecting, but so was OpEx. And I'm curious, is there any sort of unusual expenses around Spectre or Meltdown that's going on? And then to continue that, for the full year you're guiding OpEx about in line with your long-term target, so is there opportunity that your long-term target can come down and maybe 28% of revenue on OpEx comes down over time? Or how should we think about that leverage?

<A - Dr. Lisa T. Su>: Yeah. So, look, so relative to OpEx, I think our long-term guidance was 26% to 30%. CY2017 we were roughly approximately 30% if you look at it for the full year basis. We're guiding 2018 to approximately 28%. So we're starting to see some of that leverage. Granted, we're starting off in Q1 which is usually a low quarter for us. And then as we go forward, we're certainly looking at more leverage in the model, but we are investing in sort of the key new products. We are investing in software. And I think that's absolutely the right thing for us to do.

As it relates to any unusual expenses with Spectre and Meltdown, there are no particular unusual expenses related to that. I think what we are doing is we're investing in the business. We believe strongly in the product roadmap that we have, and given the significant revenue growth, we believe we can afford to invest in the business.

<Q - Joe L. Moore>: I wonder if you could talk a little about the product that you announced with Intel over the course of Q4, the Semi-Custom Graphics product. I guess interesting to see the two companies working together. Can you put that product into context for us? Are there things that you could do going forward? And then is that going to be in the Semi-Custom part of revenues or in the Compute part? Thank you.

<A - Dr. Lisa T. Su>: Sure, Joe. So, the product that we announced with Intel was a Semi-Custom Graphics product. So what we're doing is we're selling silicon to them and then they're packaging it in a multichip module, and they're marketing it and selling to end customers.

From my standpoint, this is an excellent way to get more Radeon GPUs in as many applications as possible, and so our strategy is we'll build our own standard products, we will build custom products for customers. And then look for how do we get Radeon in as many places as possible.

For this Graphics revenue because it's very similar to discrete graphics, we're actually reporting it in the Computing and Graphics segment, and we did see some initial revenue from that in Q4. But it is, as I said, it's a Semi-Custom chip that is sold to them with their – to be packaged with their products.

<Q - Ross C. Seymore>: Lisa, one for you back on the crypto side of things. It was great to see the incremental color that you gave, but is there any way you could give an absolute dollar amount whether it be in Q4 or just full year 2017, and how much you believe crypto contributed to your revenues?

<A - Dr. Lisa T. Su>: Yeah, absolutely, Ross. So it is hard to estimate. I think we said before it's hard to estimate just given some of the crypto sort of GPUs are sold through the same channels as our gaming channel. I previously said we thought it was about mid-single digits percentage of our annual revenue. It may be a little bit higher than that, let's call it a point or so, but it's – really a lot of our growth is outside of the blockchain market.

What we see in the market, though, is – because I know there's a lot of conversation about this out in the market, it is an important market. I mean, we're now seeing it from the standpoint of there is a lot of dynamic movement in the market. But it is consuming a lot of GPUs. It's a good part of our business, and we intend to sort of work with the large players to better forecast that business going forward.

But I don't want that to take away from the fact that we had significant growth in the GPU business outside of blockchain as we really ramp our Vega product line, as we ramp our GPU compute product line, as we ramp Apple. And so those are all important pieces of our GPU story.

<Q - Ross C. Seymore>: Perfect. That's helpful. As my follow-up I wanted to go back to a statement you said in answering a prior question about the Semi-Custom business being up sequentially, and then saying it was about $100mm benefit. Is that up sequentially you're talking about relative to Q4 pre or post the ASC adjustment? Just trying to tie this all together and kind of get the moving parts behind your guidance because it is much higher than I think where many of us expected it to be.

<A - Dr. Lisa T. Su>: Yeah. So let me try and Devinder may keep me – make sure that we're clear here. So the $100mm that I referenced was relative to Q1 2017 adjustment, which was approximately $200mm or so. If you look at it on a sequential basis, it won't be up $100mm, it will be up somewhat less than that. But typically we're quite – we're down quite a bit in Semi-Custom, and so it is a different seasonal pattern than we would normally see.

<Q - Brett Simpson>: I just had a question on crypto. I mean, if I look at the amount of hash compute being added to Ethereum in January, I mean, it's more than the whole of Q4. So we've seen a big start to Q1. So I'm just wondering what's the balance or the sort of mix in your C&G division between GPU and CPU sort of looking at Q4 and how it changes into Q1. And is there any sort of acute shortages here? I mean, can you foundry partners – do they have the capacity to support you with the ramp of GPUs at the moment? And is there enough HBM2 DRAM to source as well? Thank you.

<A - Dr. Lisa T. Su>: Yeah, right. So in relation to your question about Client and Graphics, look, both the Client business and the Graphics business grew sequentially in Q4, so both of them were strong businesses for us. And as I said, there are – crypto was one driver, but there were numerous other drivers as well.

Relative to just where we are in the market today, for sure, the GPU channel is lower than we would like it to be, so we are ramping up production. At this point, we're not limited by silicon per se, so our foundry partners are supplying us. There are shortages in memory and I think that is true across the board, whether you're talking about GDDR5 or you're talking about High-Bandwidth Memory. We continue to work through that with our memory partners, and that will be certainly one of the key factors as we go through 2018.

<Q - Brett Simpson>: Okay. Thanks very much. And just to follow up on 7-nanometer, I mean, a lot being talked about at 7-nanometer with TSMC ramping fairly shortly, and also Intel being perhaps a little delayed on 10-nanometer. Can you talk about what your plans are for 7-nanometer in 2018? Can you ship a CPU platform based on 7 nanometer this year or are you also seeing some delays in 7-nanometer with your foundry partners?

<A - Dr. Lisa T. Su>: So relative to 7-nanometer, 7-nanometer is a very important node for us. We're doing very active development to the 7-nanometer across our GPU and our CPU portfolio. Relative to shipment dates, I'll wait until we get closer to production before we talk about that. But what we have said is that we will sample a GPU here in 2018 targeted at machine learning and that will be in 7-nanometer technology. And we are also actively working on CPU products in the 7-nanometer technology as well.

<Q - Tristan Gerra>: You've mentioned that you expect very strong demand from blockchain in H1. How aggressive are you in terms of embedding that type of trend in your Q1 guidance? Just trying to get a sense of the contribution from that segment in your Q1 guidance. And also, is the margin profile any different than the rest of your GPU business?

<A - Dr. Lisa T. Su>: So I think as we said on Q1 guidance, it is really strength across our new products, so it's not just the blockchain or crypto conversation. That's one factor. But we do see strength across the rest of our GPU business, as well as our CPU business with Ryzen and EPYC. So, of course, we take into account what we believe the demand will be here in Q1, and we think we're fairly balanced with that. And overall, given the current lead times, I think we have good visibility into what the order pattern is and so on and so forth.

So I think the key point is crypto is strong right now, but we do believe that it is a very dynamic environment and so we have to watch that very closely. And there are numerous other product drivers in our Q1 guidance, including the CPU business, which is an important driver.

<Q - Tristan Gerra>: Okay. And as a quick follow-up, in terms of the ramp of EPYC, should we look at a kind of linear ramp throughout this year? Or is there more of an inflection point at any given time that you would expect – or any given quarter that you will expect this year?

<A - Dr. Lisa T. Su>: I do expect a steady ramp of EPYC as we go through the year. Our target is to be at mid-single digit unit share by the end of 2018. And so there would be significant revenue from EPYC as we are in H2 2018. But certainly, I would expect a steady ramp throughout the year.

<Q - Srini Pajjuri>: Just a couple of clarifications. First, I guess, Devinder, the accounting change, you kind of gave us an explanation how the seasonality works for Q1. I'm just curious as to how your seasonality changes as we go into Q2, Q3 and Q4. Because historically, you were down in Q1 and kind of flattish in Q2, and then up in Q3 and Q4. So just trying to understand how the accounting change impacts that seasonality.

<A - Devinder Kumar>: Yeah. I think the most significant change is from our Semi-Custom business where you're going to see acceleration of revenue in H1 as opposed to where it used to be weighted towards H2. And that's just a timing issue within the year. Annually, there's not much impact. It's pretty immaterial from that standpoint. But timing-wise, you will see recognition of revenue earlier in Q1 and Q2; and then, obviously, we still have it in Q3 and Q4. So seasonality for the Semi-Custom business changes, as Lisa said earlier, typically Q4 to Q1 is down, and now Q4 to Q1 is up.

<A - Dr. Lisa T. Su>: Yeah. But I would add, though, just for that seasonality question, I think what you'll see is perhaps a little bit of a flatter profile. We used to have a very high peak in Q3, and now I think you'll see a little bit of a flatter profile with sort of second quarter still be higher than first quarter, third quarter higher than second quarter, and then fourth quarter we would expect to be down.

<Q - Srini Pajjuri>: Great. And then, Lisa, just another clarification on Ryzen. Obviously, you're seeing very strong ramps. I would have expected you to see a little bit of ASP benefit in Q4, but it looks like ASPs came in flattish. I'm just curious as to why they're only flat, not up sequentially.

<A - Dr. Lisa T. Su>: Yeah, sure. So I think when you look at the ASPs, it's very dependent on the actual mix. And so underneath the client ASPs, we actually saw desktop a little bit lower, and that's because the desktop sales in the holiday season were a little bit more weighted to Ryzen 3, which has a lower ASP than some of the Ryzen 5 and Ryzen 7. But we actually saw mobile ASPs up because we saw the beginning of the shipments of Ryzen Mobile, which pulled ASPs up. So it's just the detailed mix of the business. But overall, I think we saw very strong growth.

<Q - Ambrish Srivastava>: I just had a question on FCF since I pestered you so much on that. Good to see a solid quarter on that front. But my question really is, how should – you've guided for an increase in FCF for next year. Should we expect the same kind of dynamic that you've had this year seasonality in Q4? And then also, you had to build up working capital and inventory specifically because of the dynamics on memory and the tightness earlier in the year. So what are some of the puts and takes there, if you could please help us with that? Thank you.

<A - Devinder Kumar>: Yeah. I think you rightly observed. I mean, our strong quarter from an overall standpoint where cash is concerned and cash from operations are very strong in Q4 and FCF was $339mm, ending at the $1.18B. There is typically pressure on cash in H1 just given the fact that the revenue is there, and we buy the wafers to support the business and then it gets better in the second of the year.

As far as working capital is concerned, it's a little bit early to tell. I think it depends upon how the revenue unfolds. Obviously, we have managed it pretty well, but supporting the higher revenue from the strength of the business is going to be the key from that standpoint. But to your point, I do feel very good as to where the cash ended up. I do feel very good with how we have done from our managing the balance sheet for working capital and the debt levels, and 2018 we are guiding to FCF being positive for the year.

<Q - Ambrish Srivastava>: Okay. And a quick follow-up for you, Lisa. If you look at the double-digit growth for this year, what are the absolute dollar drivers in terms of which product categories do you expect within EPYC, GPUs for machine learning, or for Ryzen, if you were to rank order those in terms of absolute dollar impact this year?

<A - Dr. Lisa T. Su>: Yeah. So if I were to rank order those, I would say that both EPYC and Ryzen as we deploy Ryzen more into the notebook form factor, which is a very significant OE ramp, are very key for that. I think GPUs and machine learning are also a strong growth driver for us, but just given sort of where we are from the base that we're starting with, I think the other two are just more significant.