Company Name: AMD
Company Ticker: AMD US
Date: 2017-01-31
Event Description: Q4 2016 Earnings Call

Market Cap: 29,559.14
Current PX: 27.33
YTD Change($): +8.87
YTD Change(%): +48.050

Bloomberg Estimates - EPS
Current Quarter: 0.054
Current Year: 0.659
Bloomberg Estimates - Sales
Current Quarter: 1256.958
Current Year: 6821.103

Q4 2016 Earnings Call

Company Participants

- Laura Graves
- Lisa T. Su
- Devinder Kumar

Other Participants

- Mark Lipacis
- Matthew D. Ramsay
- Vivek Arya
- Stacy Aaron Rasgon
- Ross C. Seymore
- Christopher Adam Jackson Rolland
- Christopher Hemmelgarn
- John William Pitzer
- Joe L. Moore
- Vijay R. Rakesh
- Kevin E. Cassidy
- Ambrish Srivastava

MANAGEMENT DISCUSSION SECTION

Laura Graves

GAAP and Non-GAAP Financial Measures

Additionally, please note that we will be referring to non-GAAP figures during this call, except for revenue and segment operating income or loss, which is on a GAAP basis

The non-GAAP financial measures referenced are reconciled to their most directly comparable GAAP financial measures in the press release and CFO commentary, which is posted on our website at quarterlyearnings.amd.com

Lisa T. Su

Q1 Highlights

In 2016, we made meaningful progress across the company, strengthening our product offerings, regaining share in key markets, and creating a solid foundation for sustainable growth

Revenues

- Fourth quarter revenue of $1.11B grew 15% from the year ago period, based on a substantial increase in Computing and Graphics segment revenue

- Revenue decreased 15% sequentially, based on seasonally lower semi-custom SoC shipments, while we achieved our second straight quarter of Computing and Graphics segment revenue growth
- For the full year, growth across both of our business segments resulted in a 7% increase in annual revenue, non-GAAP gross margin expansion, and positive FCF.

Computing Segment

Revneues and Sales Growth

- Looking at our Computing and Graphics segment, on a full year basis, CG annual revenue grew for the first time since 2011, as our focus on strengthening this key part of our business gained momentum
- Fourth quarter revenue increased 28% from the year ago period, based on strong GPU and mobile APU sales growth
- Our CG quarterly revenue was the highest in two years
- Our client revenue was the highest in seven quarters, and we delivered our highest graphics processor revenue in 11 quarters

Mobile APU Shipments and Desktop Processor Sales

- Mobile APU shipments and revenue growth accelerated as strong adoption of our 7th generation notebook APUs drove notebook share gains in the quarter
- Desktop processor sales increased sequentially and declined from a year ago, in advance of our Ryzen desktop processor launch this quarter
- At CES, we highlighted broad design win in ecosystem momentum for Ryzen. 17 different system integrators unveiled Ryzen-based gaming and enthusiast systems and multiple ecosystem partners announced plans to offer a broad range of premium Ryzen motherboards
  - We have also secured a number of high-end design wins for Ryzen with our global OEMs. We remain on track to launch Ryzen in early March, with widespread system and channel availability expected on day one

Graphics Segment

Sales and Desktop GPU Shipments

- In graphics, strong sales increases across all of our product lines drove a double-digit increase in GPU processor revenue from a year ago
- Desktop GPU shipments and revenue increased by double-digit percentages from a year ago, based on growing OEM and channel adoption of Polaris GPUs
- Polaris processor sales were particularly strong in the performance and enthusiast portions of the market, resulting in our highest channel GPU sales in more than two years

Mobile GPU Sales Growth and Professional Graphics

- Mobile GPU sales growth outpaced desktop in the quarter, and we believe we gained further share in this part of the market as the first Polaris-based notebooks launched
- We also launched Radeon Pro 400 mobile GPUs in the quarter
  - These ultrathin performance GPUs are ideal for mobile content creators, and are powering Apple's latest premium MacBook Pro notebooks
- And in professional graphics, we finished off a record year with record quarterly revenue and unit shipments
  - Traditional workstation GPU sales grew in the quarter as HP, Dell, and others began offering systems powered by our recently-launched Radeon Pro WX GPUs

Server GPU Market and Radeon GPUs

- We also continued to make progress in the server GPU market with sales increasing significantly to support new mega datacenter deployments
- As a part of our strategy to drive Radeon GPUs into the datacenter, we announced our Radeon Instinct family of machine intelligence accelerators, and detailed our plans to expand the market for machine learning based on AMD's unique combination of high performance GPUs, CPUs, and open source software

Enterprise, Embedded and Semi-Custom Segment

Revenues and Demand

- Turning to our Enterprise, Embedded, and Semi-Custom segment, revenue increased 4% from a year ago, driven by growing embedded processor sales and ongoing demand for AMD-powered Microsoft and Sony game consoles
- As we expected, revenue declined sequentially following the annual sales peak in Q3. 2016 game console sales aligned with our expectations, resulting in new records for semi-custom annual unit shipments and sales

Embedded Processor Sales and Next-Generation Server CPU & Naples

- Embedded processor sales grew by double-digit percentages sequentially and from the year ago period, based on adoption across our targeted vertical markets
- And development of our next-generation server CPU, Naples, is on track as we continue to expand the breadth of our customer and partner engagements to enable broad platform ecosystem and software validation work in advance of launch
- Naples is meeting our performance targets and customer response to our competitiveness and differentiated feature set continues to be overwhelmingly positive
  - As a result, we expanded our design win momentum in both traditional and cloud servers as well as in the embedded infrastructure and communications markets

Priorities

- As we look back on 2016, we successfully accomplished our key priorities, including growing discrete graphics share, led by Polaris GPU adoption, regaining client compute share, led by our 7th generation APUs, growing in adjacent markets with record annual semi-custom game console revenue and professional graphics, and strengthening the financial foundation of the company by achieving annual non-GAAP operating profitability, reducing debt, and increasing cash

Revenue Growth and Margins

- All of our work for the past two years has been designed to strengthen the technical, operational, and financial foundation of the company
- We entered 2017 with strong revenue growth and margin expansion opportunities as we prepare to launch our Zen-based CPUs and Vega GPUs that can return AMD to the high performance markets, where we have not materially participated in recent years
    - The production ramp, customer adoption, and ecosystem support for our Zen-based desktop processor, Ryzen, are all mapping to our plans

Zen and Vega GPU Development

- We also remain on track to expand Zen into the datacenter market in Q2, followed by the embedded and notebook markets in H2
- Our Vega GPU development is also progressing to plan
    - Vega is designed to scale beyond the limitations of current GPUs to enable PC gaming, professional design, and machine intelligence experiences that traditional GPU architectures have not been able to effectively address

Performance

- We provided our first performance preview of Vega GPUs earlier in the quarter in advance of the launch planned for Q2 this year
- Bringing all this together, based on our current market expectations and the strength of our upcoming products
    - We are confident we can grow annual revenue, expand gross margin, and deliver non-GAAP net income in 2017

Devinder Kumar

Financiail Highlights

Revenues, Gross Margins, Debt, Interest Expenses and FCF

- 2016 was a good year for AMD as we grew revenue, improved our financial performance, and strengthened the financial foundation of the company
- AMD annual revenue grew 7% y-over-y, with growth in both business segments
- We expanded gross margin, maintained essentially flat operating expenses, achieved operating profitability, and reduced net losses significantly
- In addition, we improved our balance sheet with strategic capital market transactions that reduced and re-profiled debt and lowered interest expense
- Finally, we generated positive FCF and ended the year with cash and cash equivalents of $1.26B

- Now, let me provide the specifics of Q4 2016, together with quarterly y-over-y comparisons
- Revenue was $1.1B, increasing 15% y-over-y, due primarily to higher GPU processor sales, and declining 15% sequentially, driven primarily by seasonally lower sales of our semi-custom SoCs, partially offset by higher sales in the Computing and Graphics segment
- Gross margin was 32%, up two percentage points y-over-y and up one percentage point from the prior quarter, due to higher Computing and Graphics segment revenue
- Operating expenses were $357mm compared to $323mm a year ago and $353mm in the prior quarter
  - Both increases were due to ongoing targeted investments in R&D to support our new products

Net Licensing Gain, Operating Income

- Net licensing gain associated with our server JV with THATIC was $31mm, up from $24mm in the prior quarter
- Operating income was $26mm in Q4 2016, compared to an operating loss of $39mm a year ago, and operating income of $70mm in the prior quarter
  - Operating income is down from the prior quarter due to lower revenue

Net Interest Expenses, Taxes and Net Loss

- Fourth quarter net interest expense, taxes, and other was $34mm, down from $40mm a year ago, and $43mm in Q3 2016, primarily due to reduced interest expense
- Net loss was $8mm, or a loss per share of $0.01 calculated using 931mm shares of common stock
  - This compares to a net loss of $79mm, or $0.10 a year ago, and net income of $27mm, or $0.03 in the prior quarter
- Adjusted EBITDA was $60mm compared to adjusted EBITDA of minus $5mm a year ago, and adjusted EBITDA of $103mm in Q3 2016

Computing and Graphics

Revneues and Operating Loss

- Now, turning to the business segments
- Computing and Graphics revenue was $600mm, up 28% y-over-y and up 27% sequentially, primarily due to higher GPU and client processor sales
- Computing and Graphics business segment operating loss was $21mm, improving significantly from a loss of $99mm from a year ago, and a loss of $66mm in the prior quarter, primarily due to higher sales in Q4 2016

Enterprise, Embedded, Semi-Custom and R&D Investments

- Revenues, operating income
- Enterprise, Embedded and Semi-Custom revenue was $506mm, up 4% y-over-y and down 39% from the prior quarter, primarily due to lower sales of our semi-custom SoCs
- Operating income was $47mm, down from $59mm a year ago, and down from $136mm in the prior quarter

- The y-over-y decrease was primarily driven by higher R&D investments in Q4 2016, partially offset by an IP monetization licensing gain

Balance Sheet Items

Cash, Inventory and Debt

- Turning to the balance sheet, our cash and cash equivalents totaled $1.26B at the end of the quarter, compared to $785mm a year ago, and $1.26B in the prior quarter
- Inventory was $751mm compared to $678mm a year ago, and $772mm in the prior quarter
  - Inventory levels were higher from one year ago, in support of product transitions and higher revenue in H1 2017
- Total wafer purchases from GLOBALFOUNDRIES in 2016 was $665mm and $239mm in Q4
- Long-term debt on the balance sheet as of the end of the quarter was $1.44B, down from $1.63B in the prior quarter, primarily due to debt redemptions
  - The principal debt amount of $1.77B, down from $1.93B as of the end of Q3 2016, is reflected on the balance sheet as a carrying value of debt after netting the unamortized discount of our convertible debt and issuance costs
- During Q4 2016, we redeemed $268mm principal amount of debt

Convertible Notes and FCF

- In addition, we issued $105mm principal amount of 2.125% convertible notes due 2026 as a result of the underwriters exercising the option to purchase an additional 15% of the original issuance, bringing the total principal balance of the convertible notes to $805mm
- FCF in Q4 was $167mm, a significant improvement from $27mm one year ago, and $20mm in Q3 2016

Outlook

Revneues, Gross Margins, Operating Expenses and Inventory

- Turning to our outlook for Q1 2017, which is a 13-week quarter, we expect revenue to decrease 11% sequentially, +/- 3%
- The midpoint of guidance would result in Q1 2017 revenue increasing approximately 18% y-over-y, gross margin to be approximately 33%, non-GAAP operating expenses to be approximately $360mm, interest expense, taxes and other to be approximately $30mm, inventory to be approximately flat sequentially
- We look forward to sharing additional 2017 and long-term guidance parameters at our Financial Analyst Day in May

Closing Remarks

In closing, we are pleased with the progress we made in 2016

As we begin 2017, we look forward to introducing several new leadership products and remain focused on further improving our financial and operational performance

QUESTION AND ANSWER SECTION

<Q - Mark Lipacis>: I'm hoping that you can help me understand the dynamic of desktop microprocessors ramping down in front of the Ryzen ramp. My understanding was that Ryzen was the higher end SKU that comped against the Core i5 or Core i7, which is above where the existing microprocessors competed in the stack. So, I'm wondering if we should think about Ryzen either cannibalizing the existing desktop microprocessors at a higher ASP or ramping down the lower end, or should we think about Ryzen layering on top of the existing lower end desktop microprocessors? Thanks.

<A - Lisa T. Su>: Look, you are absolutely right. Ryzen is really a high end desktop product and I think the comment was really around our overall channel inventories in desktops. So, we wanted to ensure a very smooth transition. No question that Ryzen will layer on top, competing well in the Core i7, Core i5 range, but we also will eventually see a full lineup of Ryzen throughout the desktop portfolio.

<Q - Mark Lipacis>: And a follow-up if I may. Is it fair to assume that as Ryzen ramps into the enthusiast stack that you would expect to see attach rates of AMD graphics cards also kind of increase, I guess I would expect to see higher attach rate of AMD GPUs with the Ryzen. Is that fair?

<A - Lisa T. Su>: Yes, if you look at our product lineup in H1, I think we have Ryzen launching in early March and then we'll have Vega, our enthusiast GPU launching in Q2 and so, as we go through the year, I think we're quite pleased with the performance that we are seeing on both of those products. And so, we should see Ryzen doing very well in the high end as well as Vega and by nature, since both of those high end markets are markets that we don't have significant presence today, there will be an opportunity to both gain share as well as increase attach rates in those markets.

<Q - Matthew D. Ramsay>: Since we sort of understand that Ryzen launching here in March is going to lead into relatively the same core that feeds the server microprocessor that launches in Q2, maybe you could give us a little bit of update on timing, to the specifics that you can, on the server launch. And specifically, what segments of that market maybe in terms of, I don't know, application segments or percentage of the server TAMs that you might be going after in the first several quarters after you launch the server product. Thanks.

<A - Lisa T. Su>: As you stated, Ryzen and Naples share the same core, the same CPU core, which is our Zen core. Our performance on that core has done very well. We have actually met or exceeded our expectations. So, Ryzen will launch in early March. Naples will launch in Q2. We have made very good progress, actually in the last few months with customers really testing the performance capability on their own software and their own application workload.

So, we feel good about where the product is positioned. We expect that the key workload – Naples really has brought applicability in the server market, but we are especially targeting workloads that will benefit from more threads, higher memory, as well as I/O-bound applications. So, we expect cloud, big data applications as well as traditional enterprise. And our focus is both with OEMs as well as ODMs to ensure that we have a strong ecosystem ready for that launch.

<Q - Matthew D. Ramsay>: I noticed that quite a big ramp y-over-y in growth in the Computing and Graphics segment, but it's still a slight operating loss on the P&L. Maybe you could talk us through maybe as the new product launches in the GPU and CPU segments for the year, how do you think about gross margin in that Computing and Graphics segment and getting that back to profitability? And then quickly, I think you guys guided to $50mm in THATIC IP revenue. Any help about how that is distributed through the year would be really helpful. Thank you.

<A - Devinder Kumar>: Let me cover the second one first, on the THATIC IP licensing gain. We had $88mm of that in 2016 as you observed, we guided $50mm in 2017. It's really dependent upon milestone deliveries, but I can share with you that based on tracking to those milestones, we expect to recognize approximately half of that, call it $25mm in Q1 of 2017.

And then as far as the second question, on the segment, Computing and Graphics, yes, very good progress. I think y-over-y and q-over-q, we are very pleased with that. The segment loss has gone down significantly from Q4 2015, where we were about $100mm to about $20mm. And with the new products that are coming up, in particular the Ryzen product we just talked about, with better gross margins and other products in the graphics base, we expect to continue to make progress in that segment and reduce the losses and get back to profitability.

<A - Lisa T. Su>: And if I can just add to that. I think the key for the Computing and Graphics segment is our participation at the higher end of the market, for both CPUs and GPUs. And as we do that, the margin expansion as well as the revenue growth opportunity are critical to get that business to profitability.

<Q - Vivek Arya>: My first question, Lisa, is on the gaming cycle. Because it seems like we have had a number of good years. So, what's your sense of where we are in that cycle, and just near-term, what is your perspective on GPU channel inventory and how you are making sure the channel is not overstocked as you go into your next generation product cycle?

<A - Lisa T. Su>: On the console market, I think you're right. I think the last few years have been very good from a console cycle standpoint. We finished 2016 with both units and revenue up. As we go into 2017, this is going to be the fifth year of the cycle, so normally, if you look at historicals, it would say that hardware sales might be down. This cycle is a bit different, with both the PlayStation 4 Pro that launched a couple of quarters ago and then the Scorpio, Microsoft Scorpio, that will launch later this year. So, we'll need to see how they do through the year. But, I think from our standpoint, the console business has been a strong business performer for us and we are pleased with that.

Relative to the GPU market, we were very pleased with the performance in Q4, and actually throughout 2016. We got both nice desktop channel as well as notebook acceleration as we went through the year. In terms of channel inventory levels, actually, they looked quite normal. I would say we drained a little bit of inventory in Q4. We would expect a seasonal slowdown as we go into Q1, ahead of our product launches, but nothing unusual in the channel inventory on the GPU side.

<Q - Vivek Arya>: And as my follow-up, if you compare AMD vs. your top two competitors, Intel and NVIDIA, what are the biggest gaps? Because it seems like you're making good progress on the hardware side with a number of new product launches. What about software? How soon do you think you can close the gap there? Thank you.

<A - Lisa T. Su>: In terms of our strategy, I think on both the CPU and the GPU side, we have been on a fairly deliberate path to ensure that we got to a very competitive roadmap. So, on the CPU side, with Ryzen and Naples, we believe we will be quite competitive. On the GPU side, as we launch Vega, we will have a full stack, sort of top to bottom with new hardware. We continue to invest in software, and our approach to software is really around open source and using the ecosystem and using the community and focused on sort of the new APIs. So in gaming, we are very focused on DX12 and Vulkan and on the professional graphics and on the GPU server side, really using our GPUOpen. So, we'll continue to invest in software. No question that that's really critical for the graphics market, but we feel we are making good progress.

<Q - Stacy Aaron Rasgon>: First, on the gross margins, I was a little surprised, given the fairly powerful mix shift between Computing and EESC that you had, that they weren't higher. In fact, they came in about 20BPS below guidance. I guess, could you elaborate on the drivers in the quarter and the drivers going forward into the next quarter, what we should expect?

<A - Devinder Kumar>: It's basically the product mix within the quarter. Q4, if you look at Q4 in particular, we were at 31% gross margin Q2 and Q3 and Q4. It stepped up to 32%. And in Q1 we're guiding at 33%. But, really, it's a function of the product mix. And you've got to recall that if you're talking about Q4, this is ahead of launching the products we just talked about in terms of Ryzen, which we expect to be shipping in the early March timeframe.

<Q - Stacy Aaron Rasgon>: For my follow-up, I know you talked about EESC being seasonally down and we're expecting it to be down, but how did it stack up, actually, vs. your expectations overall? Why was there such a big deceleration y-over-y vs. Q3 where you went from kind of up 31% y-over-y to up 4%?

<A - Lisa T. Su>: It was very much in line with our expectations. If you look at our Q3, our Q3 was actually very strong, and that was the quarter where there were significant builds ahead of the holiday launches. So, when you look at the console cycle, in general, they tend to build really for holiday. And so, July, August, September, October are big build months. November is like half a month, and then it decelerates in December. So, it was not unexpected and actually performed in line with our expectations.

<Q - Stacy Aaron Rasgon>: Why was the build so strong in Q3 than relative, was that – y-over-y, was that just like the PlayStation Pro or was there something else going on in Q3 that took it up so much y-over-y vs. Q4?

<A - Lisa T. Su>: It was new product. And if you look, in addition to the PS4 Pro, they also, both console manufacturers had new systems that they launched in that timeframe, as well.

<Q - Ross C. Seymore>: One for you or Devinder. For Q1, and then perhaps more importantly, for the full year, can you just talk a little bit about the dynamics between your two segments? You guide down 11% for Q1, which is above or below that number. And then, how does mix change throughout the year, as you have a bunch of new products launching on one side of the equation, but perhaps not as many on the EESC side?

<A - Lisa T. Su>: For Q1, I think if you look at the overall – the guidance sequentially down 11%, you would expect that the Semi-Custom business should be down more than that, and you've seen that in our numbers the past couple of years. So, it's behaving as it normally would. Sequentially, you would expect that the Computing and Graphics segment would be better than seasonal, given that we'll have one month of Ryzen in the market.

On a y-over-y basis, I would say the Computing and Graphics business is where you're seeing the majority of the growth as we go into Q1, with both GPU as well as Ryzen driving that growth. As we go forward in the year, I think the expectations are that the product launches tend to be faster in the CG segment. In other words, from launch to revenue ramp it's faster because it's more consumer-based. So, as we launch Ryzen in first quarter and Vega in second quarter and then the notebook and embedded in H2, you would expect to see that reflected.

On the EESC side of the business, we do have our Microsoft Scorpio design win that will ramp in the year, and that's an important one from the Semi-Custom side. And we'll see Naples ramp, as well, albeit server will tend to be a little bit slower from design win to revenue ramp. We would expect some contribution in H2.

<Q - Ross C. Seymore>: And then for my follow-up, one perhaps for either of you, again. How do we think about the OpEx side of things as we go through the year? And I know you purposely didn't guide to it in your 2017 as a whole, but conceptually, when you're launching a bunch of new products, is it fair to assume that the SG&A side of things could support those launches' increases? Any sort of color you can give about your philosophy on OpEx would be helpful.

<A - Devinder Kumar>: Our philosophy, first of all, is to be very disciplined about managing the OpEx. We did that, as you saw in the 2014-2015 timeframe. In 2016, we made some very targeted investments to products, which is, with the launches that are happening in 2017. I'd say they are going to pay off in terms of all the products we have on track to launch in 2017. We have invested in software. We have got, obviously, some go-to-market expenses as we get into 2017. But I would say that you see our guidance for Q1 2017 at $360mm.

So, you will see a trend of continuing investment in product roadmap, new product launches, software. R&D, if you look at it on a year-on-year basis, is up, actually close to $50mm and SG&A was down, even though we were essentially flat on OpEx 2015 to 2016. And, I think, as you look at 2017, we'll continue to stay lean in SG&A and prioritize investments in R&D for the go-forward execution of our plans going into future years.

<Q - Christopher Adam Jackson Rolland>: On the server side, you guys talked about Naples and, Lisa, you mentioned more threads, higher memory, and I/O. With these products, do you anticipate taking more share in the cloud? Or how do you think you're going to fare vs. kind of enterprise, storage, coms, high performance? Is it going to be a lot more kind of cloud-centric?

<A - Lisa T. Su>: The great thing about Naples is it really is a general purpose product. So, we will play in all of those segments. I think the cloud tends to move a bit faster in terms of just, again, from design win to revenue. So, we certainly are very focused in the cloud, but I'm also quite enthusiastic about our opportunities in traditional enterprise as well as some of the storage and networking spaces.

<Q - Christopher Adam Jackson Rolland>: And then, with, let's say, Summit Ridge and Vega and Naples all coming online here, can you guys talk about where these products, the gross margins are vs. either your corporate average or a comparable product now? And if things ramp the way you expect them to, when might you hit the low end of your long-term gross margin range?

<A - Lisa T. Su>: Clearly, you mentioned some of the key products that are margin drivers for us. So, Ryzen in high end desktop, our server CPUs, server GPUs, professional graphics, are all north of the corporate average. We still have game consoles, which will be a significant piece of our business that will be less than corporate average. So, our expectation is that we will make progress with margins as we ramp these products. Relative to when we'll hit the long-term guidance, I think we'll defer that perhaps to our Analyst Day and note that the target is still to be within the 36% to 40% range on a long-term model.

<Q - Christopher Hemmelgarn>: First of all, a number of questions have touched on this, but with Ryzen launching and Vega in Q2, you presumably see some pretty big channel fill in Q1 and into Q2. Could you just talk about how you see that impacting seasonality through the rest of the year? Q3, Q4 normally bigger quarters for PC sales, but you got big product launches in H1.

<A - Lisa T. Su>: We are certainly looking forward to those product launches and the way we view it is, yes, there's some bit of channel fill, but I think there is also some pent up demand for really great products in the gaming space. Both Ryzen and Vega are targeted at those enthusiast gamers. So, certainly we do expect normal seasonality, would say that H2 would be stronger. Note that on Ryzen, we are starting first in the channel and with system integrators and then OEMs will launch shortly thereafter. So, you'd expect a stage launch of our partners.

<Q - Christopher Hemmelgarn>: And then just as a follow-up, so, you've announced your first non-game console semi-custom win launching this year. As that business has matured, can you talk how you see further opportunities to grow outside of the core game console market there?

<A - Lisa T. Su>: We have talked about three design wins and those are in progress now. In terms of ongoing engagements, we have a nice pipeline. We continue to view semi-custom as a strategic way for us to utilize our IP in our design capability. And so, we'll continue to view that as one of our go-to markets for the IP that we are developing. And we'll talk more about sort of the semi-custom opportunities as we go forward.

<Q - John William Pitzer>: I wanted to go back with my first question to the OpEx line and if you just look at total dollars spent, you're spending well below your two main competitors. And I'm just kind of curious, as revenue growth starts to kind of reemerge in the model, how should you think about or how should we think about OpEx growth relative to revenue growth? Is there a target that you can give us that you'd like OpEx to grow half as fast as revenue, or are you at a point now where you see a lot of incremental investments that are worth doing that might have OpEx growth growing faster than that? Any guidance there would be helpful.

<A - Lisa T. Su>: We have shown that we can be very disciplined with OpEx and I think we will ensure that – OpEx will certainly not grow faster than revenue. So that won't happen. I think the opportunity for leverage does exist longer-term in our model. But in the short-term, I'm very focused on ensuring that we execute our product roadmap really, really well. And so, this year, it's about our product launches making sure that we have the right software investments and go-to-market. We are going to see improvement in the financial performance as a result of the margin expansion and we'll look to find leverage on the OpEx line I think in the longer-term as we continue to make progress. But again, we will be very disciplined on the OpEx line.

<Q - John William Pitzer>: As my second question, just going back on the gross margin for Ryzen and Vega. I guess can you help me understand just given where in the stack those two parts will compete, why they shouldn't have gross margins that are more comparable to your two closest peers? Is that kind of the internal target, is that how we should be thinking about it? Or any guidance there would be awesome.

<A - Lisa T. Su>: For the high end parts, both Ryzen and Vega, and Naples frankly, we should expect that they are well above our corporate average in terms of margin. As it relates to our competitors, I think that's a harder question.

But our goal is to make sure that we have very competitive product on a pure performance basis. And so, that's been the goal and that's certainly how we are viewing it. But we will also have some opportunity for price performance leverage as we gain share in the market. So, I think where we are positioning the products is the right place and the right balance between revenue growth and margin and we'll certainly look for every opportunity to improve our margins over time.

<**Q - Joe L. Moore**>: The question I get most frequently is sort of Zen looks pretty exciting in 2017, but you're competing with Intel who has got 10nm product coming. And how do we think about this on a multi-year basis, Zen as the springboard to compete with them and anything you can share in terms of the product roadmap and sort of the longer-term competitiveness of these products you're introducing now?

<**A - Lisa T. Su**>: We do think Zen is very, very competitive for where we are. In terms of our longer-term roadmap, I think as with anything, for top OEM customers, especially server datacenter customers, they are investing in a roadmap. So, they are not just buying a point product and we have a multi-generational roadmap that we are working on, including sort of the Zen 2 and the Zen 3 follow on. From our standpoint process technology, we ramped 16nm and 14nm really well last year and into this year. We are actually in the process of developing now in 7nm and we think the 7nm foundry roadmaps that are available are very competitive and will ensure that we have a strong multi-generational roadmap.

<**Q - Vijay R. Rakesh**>: To beat up on this, but when you look at Radeon Instinct GPUs and the Vega architecture in Q2 2017 and H1 2017 here. Are the gross margins more in the 40% to 60% range, I think going to datacenter vs. what your existing margins are?

<**A - Lisa T. Su**>: It's fair to say that both professional graphics and our Radeon Instinct line are higher than the normal consumer GPU products in terms of margin, and we view the datacenter GPUs as a great growth opportunity for us and so it's a key area of focus.

<**Q - Vijay R. Rakesh**>: And you mentioned GPUs seeing traction in multiple-threaded applications, and so with that strength there especially with [indiscernible] (44:15) what are your expectations for growth in that market? Obviously, you're going from zero, but incrementally what should that drive in revenues for AMD? Thanks.

<**A - Lisa T. Su**>: We view GPU servers as a very good growth opportunity for us. We are starting from a small base, but we have had some really good engagements with cloud customers and we had some meaningful revenue in H2 2016 and we expect it to be a growth driver for us into 2017 and beyond.

<**Q - Kevin E. Cassidy**>: On your Zen product lineup, you'll have an APU in H2? And what kind of GPU would that have on it?

<**A - Lisa T. Su**>: We will have an APU, we call it Raven Ridge, in H2 off of the Zen Processor Core and we haven't announced details of the graphics just yet.

<**Q - Kevin E. Cassidy**>: Will that be targeted for both desktop and notebook?

<**A - Lisa T. Su**>: It will be, but it's a very strong notebook part when you think about sort of the high end notebooks, 2-in-1s, and those types of things. But yes, it can also be used in desktop.

<**Q - Ambrish Srivastava**>: I had a question on inventory, Devinder. You did give us a reason for why the inventory is higher, but what I'm trying to understand is why the delta between the guidance that you'd given which was supposed to be in the $660mm amount, which you guided to? Was there a change in what you were expecting for the roadmap? Was it uncertainty that you had guided to $660mm and now you came up to the number that you reported on Q4? Thank you.

<**A - Devinder Kumar**>: It's fair to say that from the time I gave the guidance $660mm coming in at $750mm, there were some changes. But let me explain. First of all, it was higher than anticipated due to product ramps, product mix and also a higher expected revenue in H1 2017. We also had an opportunity to purchase some inventory in a tight PC supply environment at commercially favorable terms, and we took the opportunity to go ahead and purchase the

inventory, given what we see from a revenue standpoint for H1 2017.