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AMD.OQ - Q4 2022 Advanced Micro Devices Inc Earnings Call

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OVERVIEW:

Co. reported 4Q22 revenue of $5.6b, net income of $1.1b and diluted EPS of $0.69. Expects 1Q23 revenue to be approx. $5.3b plus or minus $300m.

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CORPORATE PARTICIPANTS

Jean X. Hu *Advanced Micro Devices, Inc. - Executive VP & CFO*

Lisa Su *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Ruth Cotter *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

CONFERENCE CALL PARTICIPANTS

Aaron Christopher Rakers *Wells Fargo Securities, LLC, Research Division - MD of IT Hardware & Networking Equipment and Senior Equity Analyst*

Christopher Brett Danely *Citigroup Inc., Research Division - MD & Analyst*

Joseph Lawrence Moore *Morgan Stanley, Research Division - Executive Director*

Mark John Lipacis *Jefferies LLC, Research Division - MD & Senior Equity Research Analyst*

Matthew D. Ramsay *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Ross Clark Seymore *Deutsche Bank AG, Research Division - MD*

Stacy Aaron Rasgon *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Timothy Michael Arcuri *UBS Investment Bank, Research Division - MD and Head of Semiconductors & Semiconductor Equipment*

Toshiya Hari *Goldman Sachs Group, Inc., Research Division - MD*

Vivek Arya *BofA Securities, Research Division - MD in Equity Research & Research Analyst*

PRESENTATION

Operator

Hello, and welcome to the AMD Fiscal Fourth Quarter and Full Year 2022 Financial Results Conference Call and Webcast. (Operator Instructions) As a reminder, this conference is being recorded. It's now my pleasure to turn the call over to Ruth Cotter. Please go ahead, Ruth.

Ruth Cotter - *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

Thank you, and welcome to AMD's Fourth Quarter and Fiscal Year-End 2022 Financial Results Conference Call. By now, you should have had the opportunity to review a copy of our earnings press release and accompanying slideware. If you've not reviewed these documents, they can be found on the Investor Relations page of amd.com.

We will refer primarily to non-GAAP financial measures during this call. The full non-GAAP to GAAP reconciliations are available in today's press release and slides posted on our website.

Participants in today's conference call are Dr. Lisa Su, our Chair and Chief Executive Officer; Jean Hu, our Executive Vice President, Chief Financial Officer and Treasurer; and Devinder Kumar, our Executive Vice President. This is a live call and will be replayed via webcast on our website.

Before we begin, I would like to note that Mark Papermaster, Chief Technology Officer and Executive Vice President, Technology and Engineering, will attend the Morgan Stanley Technology, Media and Telecom Conference on Monday, March 6. And our first quarter 2023 quiet time is expected to begin at the close of business on Friday, March 17.

Today's discussion contains forward-looking statements based on current beliefs, assumptions and expectations, speak only as of today and as such, involve risks and uncertainties that could actually cause the results to differ materially from our current expectations. Please refer to the cautionary statement in our press release for more information on factors that could cause actual results to differ materially.

Now with that, I'll hand the call over to Lisa. Lisa?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Thank you, Ruth, and good afternoon to all those listening in today. Before discussing our financial results, I wanted to make a few comments about our CFO transition. I'd like to start by thanking Devinder for all of his contributions to AMD over the last 39 years. During his tenure as CFO, we built a strong financial foundation that has enabled AMD's significant growth and success. On a personal note, his partnership and expertise have been invaluable to me. I know I speak for all of AMD when I say we appreciate all he has done for the company and wish him the best in his upcoming retirement.

I also want to welcome our new EVP and CFO, Jean Hu, to our first AMD earnings call since joining us earlier this month. Jean's more than 14 years of public company CFO experience and proven track record of financial leadership make her an excellent addition to our team. I look forward to working closely with her as we continue to transform and scale our business.

Now turning to the business results. 2022 was a strong year for AMD as we navigated the challenging macro environment to deliver best-in-class growth and record profitability driven by our Embedded and Data Center segments. We also transformed the company. We accelerated our Data Center business and closed our strategic acquisition of Xilinx and Pensando, significantly diversifying our business and strengthening our financial model as our Data Center, Embedded product sales grew from $3.9 billion in 2021 to $10.6 billion in 2022.

Looking at our financial results. Fourth quarter revenue increased 16% year-over-year to $5.6 billion, driven by significant growth in our Embedded and Data Center segments, which accounted for more than 50% of overall revenue in the quarter. On a full year basis, we grew annual revenue 44% to $23.6 billion. We set annual records for revenue, gross margin and profitability driven largely by a 64% increase in our Data Center segment revenue and the strong performance of our Embedded segment following our Xilinx acquisition.

Turning to the fourth quarter business results, starting with our Data Center segment. Revenue increased 42% year-over-year to $1.7 billion, led by increased adoption of our EPYC processors by cloud providers. In cloud, sales to North American hyperscalers more than doubled year-over-year as hyperscale customers continued moving more of their internal workloads and external instances to EPYC processors. EPYC processors now power more than 600 publicly available instances globally following the launches of new AMD-based instances from AWS, Microsoft and others in the quarter.

In Enterprise, revenue declined year-over-year as demand slowed based on the macro environment. Against this backdrop, we continue expanding our pipeline and closed a number of new wins in the fourth quarter with Fortune 500 financial services, automotive, technology, energy and aerospace companies. In HPC, growing EPYC processor adoption was highlighted by the number of AMD-powered supercomputers on the latest top 500 list increasing by 38% year-over-year. AMD now powers more than 100 of the world's fastest supercomputers and 15 of the top 20 most energy-efficient supercomputers in the world.

To build our Data Center leadership, we launched our fourth gen EPYC processors this past November that deliver up to 2x faster performance in cloud, enterprise and HPC applications, and are up to 80% more energy efficient than the competition's most recently announced offerings. We are seeing very strong customer pull for fourth-gen EPYC CPUs, which complement our third-gen offerings with additional performance and capabilities.

Initial cloud deployments are going very well, and we expect to ramp both internal workloads and public instances throughout 2023.

For Enterprise, there are more than 140 fourth-gen EPYC platforms in development from HPE, Dell, Lenovo, Supermicro and others, an increase of 40% compared to the prior generation.

Now looking at our broader Data Center portfolio. We had record sales of our Xilinx Data Center and networking products in the quarter, led by strong demand from financial services companies for our newly launched Alveo X3 series boards, optimized for low latency trading. Sales of our Pensando DPUs also ramped significantly from the prior quarter, driven by supply chain improvements and continued demand. We are very pleased with the customer reception of the Pensando technology with good long-term growth opportunities as DPUs become a standard component in the next generation of cloud and enterprise data centers.

Data center GPU sales were down significantly from a year ago when we had shipments supporting the build-out of multiple Instinct MI250 accelerator supercomputer wins. In January, we previewed our next-generation MI300 accelerator that will be used for large model AI applications in cloud data centers and has been selected to power the 2-plus exaflop El Capitan exascale supercomputer at Lawrence Livermore National Laboratories. MI300 will be the industry's first data center chip that combines a CPU, GPU and memory into a single integrated design, delivering 8x more performance and 5x better efficiency for HPC and AI workloads, compared to our MI250 accelerator currently powering the world's fastest super computer. MI300 is on track to begin sampling to lead customers later this quarter and launch in the second half of 2023.

Turning to our Client segment. Revenue declined 51% year-over-year to $903 million. We continue to ship below PC consumption in the fourth quarter as we focused on further reducing downstream inventory. While overall PC demand remains soft, desktop channel sell-through increased sequentially during the holiday season. We launched our latest generation Ryzen 7000 series notebook processors earlier in January, including our Ryzen 7040 CPU series that deliver leadership performance in battery life and are our first processors to feature Ryzen AI, the industry's only dedicated on-chip AI inference engine in an x86 processor. Ryzen AI is powered by the highly scalable XDNA architecture, which is the first integration of AMD and Xilinx IP, less than a year after closing the acquisition.

We also launched our Ryzen 7045 series CPUs, our first mobile processor based on a chiplet design that delivers significantly higher performance than the competition in gaming and content creation applications. We have more than 250 ultrathin gaming and commercial notebook design wins, spanning our full family of Ryzen 7000 series processors on track to launch this year, an increase of 25% year-over-year with the first notebooks planned to go on sale in February.

Now turning to our Gaming segment. Revenue declined 7% year-over-year to $1.6 billion as lower gaming graphics sales more than offset higher semi-custom revenue. Semi-custom SoC revenue grew year-over-year as demand for game consoles remained strong during the holidays. Gaming graphics revenue declined year-over-year as we further reduced desktop GPU downstream channel inventory. Channel sell-through of our Radeon RX GPUs increased sequentially, and we launched our high-end Radeon 7900 series GPUs to strong demand based on the performance of our new RDNA 3 architecture and 5-nanometer chiplet design.

In January, we announced our first RDNA 3 mobile GPUs that have been selected to power new gaming notebooks from Dell, Alienware, ASUS and others that are on track to begin shipping in the first half of 2023.

Looking at our Embedded segment. Revenue increased significantly year-over-year to a record $1.4 billion. We had record sales across a number of our Embedded markets, including communications, automotive, industrial and health care, aerospace and defense, and test and emulation. In communications, we saw particular strength with expanded 5G wireless installations in India and ongoing wired infrastructure deployments with Tier 1 communications providers. Automotive growth was driven by the ramps of new Ford camera, 4D radar and infotainment wins across multiple customers. We recently announced multiple new wins for our automotive grade Zynq UltraScale+ platforms with some of the largest vehicle equipment suppliers including Aisin next-generation Automated Parking Assist system and DENSO's next-generation LiDAR platform that can improve the resolution required for autonomous driving and other industrial machine vision applications by 20x.

We also continued to see strong growth with industrial and health care, aerospace and defense and tested and emulation customers in the quarter, driven by SAM expansion for our leadership-adaptive SoCs, new design win ramps and increased supply across multiple nodes.

Taking a step back, as we approach the 1-year anniversary of the closing of our Xilinx acquisition next month, the integration has gone extremely well, and our Embedded business has become a major growth driver for AMD, strengthening our financial model and significantly diversifying our business. In addition, we are seeing substantial new revenue synergy opportunities as we combine Xilinx's industry-leading adaptive products and 6,000-plus customers with AMD's expanded breadth of compute products and scale.

In summary, overall, 2022 was a strong year for AMD despite the weak PC market. We significantly grew our Data Center, Embedded and Gaming businesses and executed well across our product portfolio. As we enter 2023, we expect the overall demand environment to remain mixed with the second half stronger than the first half. In the PC market, we are planning for the PC TAM to be down approximately 10% for 2023. We expect to continue to ship below consumption in the first quarter to reduce downstream inventory, which is reflected in our guidance.

In our Embedded and Data Center segments, we believe we are well positioned to grow revenue and gain share in 2023 based on the strength of our competitive positioning and leadership high-performance and adaptive product portfolio. We do see elevated levels of inventory with some cloud customers, which will lead to a softer first half and a stronger second half of the year. We continue working very closely with our customers to navigate the dynamic market conditions while also making the right strategic investments to exit the current cycle with an even stronger and more differentiated set of products to drive future growth.

Over the next several years, one of our largest growth opportunities is in AI, which is in the early stages of transforming virtually every industry service and product. We expect AI adoption will accelerate significantly over the coming years and are incredibly excited about leveraging our broad portfolio of CPUs, GPUs and adaptive accelerators in combination with our software expertise to deliver differentiated solutions that can address the full spectrum of AI needs in training and inference across cloud, edge and client.

Now I'd like to turn the call over to Jean to provide some additional color on our fourth quarter and full year financial results. Jean?

Jean X. Hu - *Advanced Micro Devices, Inc. - Executive VP & CFO*

Thank you, Lisa, and good afternoon, everyone. 2022 was a very strong year for AMD. We had a record revenue, gross margin, profitability, and we generated significant free cash flow. The year was also highlighted by our strategic acquisitions of Xilinx and Pensando, expanding and diversifying our business portfolio.

Fourth quarter 2022 revenue for $5.6 billion was up 16% from a year ago, driven by higher revenue in the Embedded and Data Center segment, partially offset by lower Client and the Gaming segment revenue. Gross margin was 51%, up 70 basis points from a year ago, primarily driven by richer product mix with higher revenue in Embedded and Data Center segment, partially offset by lower Client segment revenue. Operating expenses were $1.6 billion compared to $1.1 billion a year ago, driven by the inclusion of Xilinx OpEx and additional R&D and go-to-market investments to support the next phase of our revenue growth.

Operating income declined $66 million from a year ago to $1.3 billion, and the operating margin was 23%, down from 27% a year ago. Net income was $1.1 billion flat year-over-year. Diluted earnings per share was $0.69 compared to $0.92 per share a year ago, primarily due to lower client operating income.

Now turning to our reportable segment for the fourth quarter. Starting with the Data Center segment. Revenue was $1.7 billion, up 42% year-over-year, primarily driven by strong growth in third-generation EPYC server processor revenue and the early ramp of fourth-generation EPYC processors. Data center operating income was $444 million or 27% of revenue compared to $369 million or 32% a year ago. Higher operating income was driven primarily by stronger revenue, partially offset by higher R&D investment to support the top line revenue growth.

Client segment revenue was $903 million, down 51% year-over-year due to reduced processor shipments resulting from a weak PC market and significant inventory correction across the PC supply chain. Client operating loss was $152 million compared to operating income of $530 million a year ago or 29% of revenue, primarily due to lower revenue.

Gaming segment revenue was $1.6 billion, down 7% year-over-year due to lower gaming graphics revenue, partially offset by higher semi-customer product sales. Gaming operating income was $266 million or 16% of revenue compared to $407 million or 23% a year ago. The decrease was primarily due to lower graphics revenue.

Embedded segment revenue was $1.4 billion, up $1.3 billion from a year ago, primarily due to the inclusion of Xilinx Embedded revenue. Embedded operating income was $699 million or 50% of revenue compared to $18 million or 25% a year ago, primarily driven by the inclusion of Xilinx.

Turning to the balance sheet. We have a strong balance sheet with cash, cash equivalents and short-term investment of $5.9 billion at the end of the fourth quarter. During the quarter, we returned $250 million to shareholders through share repurchases. In 2022, we returned a total of $3.7 billion to shareholders which was 119% of free cash flow. We have $6.5 billion in remaining authorization to share repurchases. Free cash flow was $443 million compared to $736 million in the same quarter last year.

Free cash flow decreased primarily due to higher inventory. Inventory was $3.8 billion, up approximately $402 million from the prior quarter, primarily driven by the inventory increase in advanced process nodes to support the ramp of new products.

Now let me turn to our full year financial results. 2022 revenue was $23.6 billion, up 44% year-over-year, driven by increased Embedded, Data Center and the Gaming segment revenue, partially offset by lower Client segment revenue. On our combined AMD and Xilinx company basis, 2022 pro forma revenue was $24.1 billion, up 20% compared to $20.1 billion in 2021. Gross margin was 52%, up 370 basis points from the prior year, primarily driven by richer product mix with higher revenue from Embedded and Data Center segment, partially offset by lower Client segment revenue.

Operating expenses were 26% of revenue compared to 24% in 2021. 2022 operating income was $6.3 billion, up $2.3 billion, an increase of 56% from a year ago resulting in operating margin of 27% compared to 25% in 2021, primarily driven by higher revenue and gross margin expansion. Net income was $5.5 billion compared to $3.4 billion, up 60% from the prior year. Earnings per share was $3.50 compared to $2.79 for the prior year, primarily due to Data Center growth and addition of Xilinx.

Full year free cash flow was $3.1 billion, resulting free cash flow margin of 13% for the year. We invested approximately $1 billion in long-term supply chain capacity in 2022 to support our expectations for future revenue growth and increase market share.

Let me now turn to our financial outlook. Today's outlook is based on current expectations and contemplates the current macro environment. For the first quarter of 2023, we expect revenue to be approximately $5.3 billion, plus or minus $300 million, a decrease of approximately 10% year-over-year and 5% sequentially. Year-over-year Data Center and Embedded segment revenue are expected to grow, offset by lower Client and Gaming segment revenue. Sequentially, Embedded segment revenue is expected to increase. Client and Gaming segment revenue are expected to decline largely consistent with seasonality. Data Center segment revenue is expected to decline due to elevated levels of inventory with some cloud customers.

In addition, for Q1 2023, we expect non-GAAP gross margin to be approximately 50%; non-GAAP operating expenses to be approximately $1.6 billion; non-GAAP interest expense, taxes and other to be approximately $146 million based on a 13% effective tax rate. Diluted share count is expected to be approximately 1.62 billion shares. For the full year of 2023, we are not providing specific guidance due to the uncertainty in the macro environment. However, let me provide some color.

Directionally, we expect Embedded and Data Center annual revenue to grow from 2022 based on the strength of our product portfolio and expected share gains. In addition, we expect Client and the Gaming segment revenue to decline based on the current demand environment. We expect non-GAAP gross margin to be approximately flattish in the first half and the expansion in the second half of the year. We expect to manage quarterly non-GAAP operating expenses flat with the fourth quarter until we see the demand environment improves. For modeling purpose, we expect non-GAAP effective tax rate for the year to be 13% and the diluted share count to be approximately 1.62 billion shares.

In closing, we had a strong year with record revenue and profitability, driven by our leadership in product portfolio and the diversification of our business. Looking forward to 2023, as Lisa mentioned earlier, we'll continue to focus on executing our long-term growth strategy while driving financial discipline and operational excellence. We believe our leadership of products, growing customer momentum and strong financial foundation position us well for long-term profitable growth.

With that, I'll turn it back to Ruth for a Q&A.

session.

Ruth Cotter - *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

Thank you, Jean. Operator, if you could poll the audience for questions now, please.

QUESTIONS AND ANSWERS

Operator

(Operator Instructions) Our first question today is coming from Matt Ramsay from Cowen.

Matthew D. Ramsay - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Yes. First of all, congratulations, Jean. And congrats as well to Devinder. I mean the last 5 years of the company have been remarkable, but I remember all the work you and your finance team did 6 or 7 years ago to keep the foundation stable for what's happened since. So enjoy the retirement.

My first question, Lisa, is just about the drivers of 2023. You guys talked in the prepared script about all the different crosscurrents that are kind of going on right now versus the strength of your portfolio versus some inventory digestion in the Data Center space and obviously, what's going on in the PC market. But I've gotten about a zillion versions of the same question tonight, which was do you think the company can grow for the year 2023 overall? And if you could just kind of walk us through the drivers of the business as we work through the year.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes, absolutely, Matt. Thanks for the question. So there are lots of puts and takes in 2023, and we want to give you kind of some of the drivers. Our largest growth driver is certainly the Data Center. We are very positioned well with our product portfolio. We just launched our Genoa 4th Gen EPYC. We also have Bergamo coming this year as well.

When we talk to our cloud customers, what they're telling us is they appreciate the execution of our road map. And we have an opportunity to move more workloads to AMD as we go through the year. So we feel very good about our product positioning.

As we mentioned in the prepared remarks, coming off of a very strong 2022, there is some inventory at some of the cloud customers. And so we are expecting a softer first half and then a stronger second half, but we feel very good about our market share position and opportunity to grow with Data Center. Also on the Embedded side, I would say we have a very strong portfolio there. The Xilinx business has done very well in 2022. It's a diversified set of markets. We see strength in a number of the end markets. And so we think that's also a grower for AMD.

On the other side, our Client and Gaming businesses, we believe, will decline. We have made good progress. When we look at the PC markets in the second half of the year of 2022, we were really trying to rebalance inventory, and I think we made progress exiting Q4. We're still expecting to ship below consumption in the first quarter and then sort of go from there. Our product portfolio is strong. We think there's an opportunity for growth as we go into the second half of the year. But we think overall for the year, client will decline just given the TAM.

And then on the Gaming segment, again, we're coming off of a very strong 2022. And so console demand has been actually quite strong. And given where we are in the cycle, we would expect gaming to be down on a year-over-year basis. But overall, I think lots of puts and takes, but we're positive on what we can do in terms of the Data Center and the Embedded segments, given our product portfolio. And we'll watch the macro on the Client and Gaming and see how that plays out.

Matthew D. Ramsay - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

I guess as my follow-up, I wanted to ask a question about gross margin. The margin, I guess, sequentially down a little bit into March. But I kind of wanted to focus on the drivers of the longer-term margin that's down, I guess, 3 or 4 points from where you were a few quarters ago despite more mix of the revenue coming from Embedded and Data Center. So if there's any way that you guys could try to quantify maybe how much of the margin headwind is from just lower client revenue. How much of it might be from any programs that you're working through to clear the channel? And how might we model? What are the drivers that we should think about in terms of the margin recovering?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Maybe -- so on the overall margin, the way to think about our business, Matt, is -- and our margin is primarily driven by product mix. So as the Embedded and Data Center businesses are -- grow, so the margin expansion grows with it. In terms of the sequential question that you had from Q4 to Q1, that's just a product of the mix. So with Data Center being lower sequentially, that's that. We are also working through our client inventory clearing. What we're seeing in the PC business is, as we're going through this sort of normalization of inventory, especially on some of the older products, we do have more marketing programs and pricing incentives in place. We do expect that to normalize as we go through the first half of the year. And so as Jean said in the prepared remarks, we would expect margin expansion as we go into the second half with the growth in Data Center, Embedded and some normalization of the client business as well.

Operator

Your next question is coming from Vivek Arya from Bank of America Securities.

Vivek Arya - *BofA Securities, Research Division - MD in Equity Research & Research Analyst*

Best wishes to Devinder and Jean from my side as well. On the first one, Lisa, I think you mentioned some elevated inventory among your cloud customers. I was hoping you could give us some quantification of how elevated. Is it a 1-quarter issue? Is it a 2-quarter issue? Does it impact the pace of your January ramp? Because I think coming into this year, the expectations where you could grow server sales by over 20%, do you think that is still a possibility because I imagine you get some benefit from better general pricing. So just puts and takes of how we should think about your Data Center business through this year.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes, sure, Vivek. So look, we remain very bullish about our Data Center business. I mean I think the feedback that we've gotten on Genoa from our customer set is very strong. And as I said, the important thing is we are expanding workloads.

In terms of where we believe the -- as the inventory normalizes, each customer is different, so they have what they're trying to achieve in terms of inventory levels. Our expectation is that sort of the first half softness for cloud and then second half strength as that's worked through. But like I said, it's different for each customer.

And then in terms of overall growth, as I said, we're very bullish on the overall growth of our Data Center business and the opportunity to gain share as we go through the year. And as we go through the ramp in Genoa, we do have more content with the higher core count that should also help ASPs.

Vivek Arya - *BofA Securities, Research Division - MD in Equity Research & Research Analyst*

Got it. And then on the PC side and also kind of as it relates to the pricing environment, you mentioned the PC TAM is -- could be down about 10%. But when we look at the shipments, right, from you and your competitor, they could be down as much as 40% or 50%, right, year-on-year in Q1. So do you think there's a possibility that the TAM assumption of just down 10% could be an optimistic one?

Because I would imagine that would suggest the inventory clears out soon, but you're suggesting that it may not clear out until Q2. So I was just hoping you could give us some better sense for when the PC market starts recovering. And do you think it could become more price competitive before it recovers?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. So maybe just to make sure that we're just correlating the numbers. So my comment about PC TAM being down 10% was assuming if you take a look at sort of what IDC just published for 2022 at about 290 million units, and that's more of a sell-through TAM versus a sell-in TAM. So we have been under-shipping sort of the sell-through or consumption for the last 2 quarters in an attempt to renormalize that as soon as possible.

In terms of do I think it's -- I think it's in the ZIP code. I think it's in the ZIP code. So if you imagine 2023 sell-through TAM of about 260 million units, plus or minus, seems to be about the right number. We have made good progress in inventory normalization. We want to be cautious, obviously, heading into the year just given the macro environment. First quarter we said would be roughly seasonal for PCs. I think second quarter -- first quarter should be the bottom for us in PCs. We -- and then grow from there into the second quarter and then into the second half.

And I should note also, Vivek, I mean, we just launched our Ryzen 7000 series with sort of our AI capabilities, both from a notebook and desktop standpoint. So we feel good about the product road map in PCs. Obviously, we have to get through this normalization. Most of the focus is on continuing to differentiate our products and working with our customers to offer sort of very strong platforms.

Operator

Next question is coming from Stacy Rasgon from Bernstein Research.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

I noted that you said that gross margins would expand in the second half, but you didn't give us any color on how much they might expand. Can you give us any idea like first half to second half? Or I mean just for the full year, do you think gross margins grow year-over-year from the 52% that you printed in 2022?

Jean X. Hu - *Advanced Micro Devices, Inc. - Executive VP & CFO*

Stacy, this is Jean. Let me take this question, then Lisa can add. As we talk about it, it's both our Embedded and Data Center segment have strong gross margins. So we feel pretty good about second half.

We continue to have the growth of both Embedded and Data Center segment. The major headwind we are facing is really Client side, which if you think about the gross margin in the first half of 2022 versus the first half of 2023, the major impact is from the client revenue, inventory correction, which impact the gross margin in the Client segment.

So going into second half, the normalization of the Client segment will help us to expand the gross margin. I think it really depends on how the Client segment will recover. That will drive the gross margin if it's going to go back to the first half of 2022 or expand beyond that level. But overall, we feel pretty good. Once we normalize the Client segment, our gross margin will continue to expand.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

So I guess I'd ask the question again, for 2023, do you think gross margins can expand over 2022?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Maybe what I would say, Stacy, is I think we've given you the puts and takes for where the margin goes. I think it depends a bit on what happens in the macro environment. But we do feel good about second half expansion, and we'll see sort of the relative recovery in macro as it relates to all of our segments.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Got it. I guess for my follow-up, maybe it follows up on that a little bit more just around the mix. I get how Data Center and Embedded should be growing in the second half versus the first half. But presumably, Client will, too, first half to second half, given that you are under-shipping, it sounds like by a pretty wide margin right now. How do you feel about your mix just across the 4 businesses of the second half versus the first half?

Do you think your Data Center plus Embedded mix, as a percentage of total revenue in the second half, is materially higher than it is in the first half? Or I mean could it even be not that different at all given the potential growth that you might see just from the channel normalization in clients?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. I think the way to think about it is, I think our Data Center grow -- growth in the second half versus first half, we expect that to be significantly stronger. As it relates to clients, we would also expect it to be stronger. Again, depending a bit on macro and sort of how the TAM actually evolves. I think for the Embedded businesses, I would say that we expect to grow over the full year 2023 versus 2022. What we see right now is a fairly strong backlog and good visibility into the first half of the year. I'm not ready to say that Embedded will grow in the second half versus the first half, though, because we're coming off very strong growth already. And so I think those are the puts and takes.

Operator

Next question is coming from Toshiya Hari from Goldman Sachs.

Toshiya Hari - *Goldman Sachs Group, Inc., Research Division - MD*

Lisa, the pushback that we often get is AMD is doing really well, gaining share, but you're gaining share in relatively mature markets. And when it comes to AI, you do have a strategy, but you really haven't shown the product set, if you will. You talked about how you have CPU, GPU, FPGA and Pensando, and you're shipping samples of MI300, I guess, later this quarter and potentially launching in the second half. At what point do we, as analysts and investors, start to see your AI strategy materialize in the P&L and your profitability, if you will?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Thanks for the question. We believe that AI is a huge driver of compute growth. And given our portfolio, it should be a driver of our growth as well. I think if you think about the product sets that we are putting sort of AI content in, you should expect MI300, of course, on the GPU training side. We just launched Ryzen AI in our PC portfolio. You can expect additional AI acceleration coming in our server portfolio as well. So you're going to see AI broadly across our road maps.

In terms of when -- we've talked before about sort of our Data Center GPU ambitions and the opportunity there, we see it as a large opportunity. As we go into the second half of the year and launch MI300, sort of the first user of MI300 will be the supercomputers or El Capitan, but we're working closely with some large cloud vendors as well to qualify MI300 in AI workloads. And we should expect that to be more of a meaningful contributor in 2024. So lots of focus on just a huge opportunity, lots of investments in software as well to bring the ecosystem with us.

Toshiya Hari - *Goldman Sachs Group, Inc., Research Division - MD*

That's very helpful. And then, Lisa, as my follow-up, I had a question on profitability in your client business or your PC business. I think a year ago, margins were really high. Supply was relatively tight. Since then, with the inventory correction and perhaps a little bit more competition, your profit margins are down. You talked about the first half of this year still being sort of in digestion mode, and then in the second half, things normalizing. But would it be realistic to assume your gross margins in the Client business return to first half '22 levels? Or in hindsight, margins back then were perhaps you were over-earning in that business given the environment?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Sure. So I think on the Client segment, it's fair to say that we believe, given where we are with the client inventory levels, the first half will certainly be lower. We expect some improvement in the second half. But in terms of overall margin, we expect that the client business will be below the corporate average, and that's how we're modeling the client business.

Operator

Next question is coming from Aaron Rakers from Wells Fargo.

Aaron Christopher Rakers - *Wells Fargo Securities, LLC, Research Division - MD of IT Hardware & Networking Equipment and Senior Equity Analyst*

Yes. I guess the first question is going back to the Data Center piece of the business and specifically around the ramp of Genoa. I'm curious, is there any help that you can provide us with thinking about the ASP uplift you expect to see with the Genoa product cycle? And I guess at some point through 2023, how do we start to think about the Bergamo product cycle as well impacting the server CPU business?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure. So Aaron, we started shipping Genoa in the third quarter that ramped into the fourth quarter and will continue to ramp through 2024. The way I think about -- or the way you should think about the Genoa ramp is that it is a new platform for our customers. So they'll be introducing it -- introducing first-in-cloud sort of internal workloads and then going to external workloads and then enterprise. So I think it will be throughout 2024. We have -- I'm sorry, throughout 2023.

We do have higher core counts on Genoa. So you would expect that, that will give us some ASP uplift as we go through to some of those higher core count products. Bergamo will launch in the first half of the year. We are on track for the Bergamo launch, and you'll see that become a larger contributor in the second half. So as we think about the Zen 4 ramp and the crossover to our Zen 3 ramp, it should be towards the end of the year, sort of in the fourth quarter, that you would see a crossover of sort of Zen 4 versus Zen 3, if that helps you.

Aaron Christopher Rakers - *Wells Fargo Securities, LLC, Research Division - MD of IT Hardware & Networking Equipment and Senior Equity Analyst*

Yes, that's very helpful. And then as a quick follow-up, the business doesn't really ask that much about, but it's been doing phenomenally well here these last couple of quarters. It's actually the Xilinx business. I know it's within the Embedded largely. But your self reporting, I think if I read the filings correctly, growing 40% plus on a like-for-like basis for Xilinx. I think your competitor also growing a solid pace. How do you think about the sustainability or durability of that demand in that Embedded or Xilinx business as we move through '23?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure. So Aaron, that business has done very well. So the Xilinx business, I think our overall Embedded business continues to do well. When we look across the subsegments, there are puts and takes in the subsegments. But what we see is content is going up. So we had records in communications, industrial and health care, aerospace and defense, automotive. We have the Embedded processor content that's also going into automotive. So we feel very good about that business.

I think as we look into 2023, I mentioned this in the question with Stacy, we have a very good visibility to the first half just given the lead times and the backlog. And the first half looks strong, so we expect to grow sequentially in the first quarter. As we go into the second half of the year, we're monitoring the overall demand environment. And just given how strong it's been, we are looking at whether there'll be some puts and takes in some of the end market segments there. But overall, I think the key point is the content, and our design win momentum is good, and we continue to ramp new design wins in the Xilinx business.

Operator

Your next question is coming from Joe Moore from Morgan Stanley.

Joseph Lawrence Moore - *Morgan Stanley, Research Division - Executive Director*

I wonder if you could talk to us about the puts and takes of PC market share in a down 10% environment. I would assume it helps you with consumers better than commercial, but what is your progress in terms of penetrating the notebook market and penetrating the commercial market where you could continue to gain share?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Joe, we view that the opportunity -- so first of all, I would say that in general, the PC market share numbers are probably a bit noisy right now, just given all of the sell-in, sell-through and the inventory dynamics that are being worked through. Actually, in the fourth quarter, we believe we gained a little bit of share in the PC market. As we go forward into 2023, we think our product portfolio is very strong. As we look at Ryzen 7000 and where it goes and where we are positioned in the commercial as well as the high-end consumer segments, we're not changing our strategy on PCs. Quite -- a few years ago, we really focused on sort of the more premium segments. We have less penetration in the low end, which I think is helpful. And as we go forward, we're continuing to focus on commercial PCs and getting a larger footprint in there.

I will say the enterprise work that we're doing on the server side, I think, links very well to the commercial PC work, and we're continuing to invest in sort of the sales and marketing resources to ramp that side of the business.

Joseph Lawrence Moore - *Morgan Stanley, Research Division - Executive Director*

Great. And then going back to the Genoa question that was asked a second ago, as you are in this kind of budget-conscious environment, you're introducing a chip in a system that has pretty high platform cost. Does that slow the adoption at all? It seems like people -- and your competitors are dealing with some of the same issues. Just how does the current environment affect the rate at which Genoa will ramp?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. I would say, Joe, the total cost of ownership benefit of Genoa, particularly in some of the larger cloud workloads, is very, very significant. So I wouldn't say that, that's necessarily slowing the pace of adoption. It is a new platform though. So if you think about when we went from Rome to Milan, it was basically similar platforms. So I would say that, that ramp was a bit faster.

But as it relates to Genoa, we had always expected that Milan and Genoa would coexist through 2023. And that we would have -- we still have Milan instances that are just ramping now, and we expect that will continue through 2023. And so I really view this as the natural thing when we introduce Genoa at sort of the higher core count, that both will coexist. And as some of the platform costs come down, you'll see the Genoa cutover, and that's what I mentioned towards the fourth quarter of 2023.

Operator

Your next question is coming from Ross Seymore from Deutsche Bank.

Ross Clark Seymore - *Deutsche Bank AG, Research Division - MD*

Let me ask a question. And Jean, congrats on the new job. Lisa, I was hoping you could give a little bit of sequential color to just size the magnitude of the 3 segments that are going down in the first quarter and then Embedded going up. And really what I'm getting at there is, in an answer to a prior question, you talked about the mix being a headwind to gross margin. And I think, Jean, you cited Data Center dropping as a percent of the mix. So just trying to get the magnitude of just how much Data Center has to drop to make that outcome on the mix side be true.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure, Ross. So let's see. We said the Client and Gaming segments would be seasonal. So you would expect that the Data Center would be more than seasonal. So maybe to help you size that, think about the Data Center sequential drop as double digit, whereas the Client and the Gaming segments are more like single digit, if that helps.

Ross Clark Seymore - *Deutsche Bank AG, Research Division - MD*

Yes, it does. And anything similarly on Embedded? Is that kind of up single digits?

Jean X. Hu - *Advanced Micro Devices, Inc. - Executive VP & CFO*

Yes. Yes. Embedded will grow sequentially single digit. Yes.

Ross Clark Seymore - *Deutsche Bank AG, Research Division - MD*

Got it. Sorry for the nitpicky question. A bigger picture one for you then, Lisa, on competitive intensity. On one hand, I could see that the total cost of ownership benefits of these products, multicore, better performance, et cetera, could lead to higher ASPs, whether you're talking about the Data Center side or your Client business. On the other side, competitive intensity and overall demand is weaker. And at some point, you might even get deflationary costs on the foundry side of things. Can you talk a little bit about the pricing environment given those somewhat contradictory pressures?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure. So maybe let me separate Data Center and Client because they're a little bit different. I think on the Data Center side, we would -- we do see that, in general, the performance, the power performance, the total cost of ownership, selling the solution is the most important piece of it because the solutions are actually quite different in terms of what you can do between sort of 4th Gen EPYC and sort of other solutions. The environment is always competitive, but we feel very good about the overall value proposition that we bring to both cloud and enterprise customers.

I think on the Client side, we've said for the last couple of quarters that the pricing environment is more aggressive. I think that normally happens when the industry is working on rebalancing. I think we're working on rebalancing, our OEM partners are working on rebalancing. The retailers are working on rebalancing. And so there are more incentives and more -- a more aggressive pricing environment.

I view that, that's primarily on, let's call it, older products, let's call it previous generation products. And as we work through that, there will be some normalization as we think about our newer generation products, where there's more capability added. So hopefully, that gives you a little bit of the puts and takes.

And in terms of the cost environment, I think all of us in the industry have seen some elevated costs, but I think we also see -- expect that to normalize, too, as everyone is sort of optimizing their CapEx spending.

Operator

Your next question today is coming from Mark Lipacis from Jefferies.

Mark John Lipacis - *Jefferies LLC, Research Division - MD & Senior Equity Research Analyst*

Congrats to Jean on the new seat. Two questions, if I may. First, on the PC side. Can you give us a sense about roughly how far under consumption, you believe, you're shipping on the PC side, either in Q4 and Q1?

And Lisa, correct me if I'm wrong, I thought I heard you say in an answer to an earlier question that you expect the PC client just to grow into second quarter. So does that suggest that 1Q, you think, is the bottom on the PC? And then I had a follow-up.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure, Mark. So we -- so the first -- the second question, yes. We do believe the first quarter is the bottom for our PC market -- for our PC business, and we'll see some growth in the second quarter and then a seasonally higher second half.

In terms of the under shipment, I mean, I think we're -- we under-shipped in Q3, we under-shipped in Q4. We will under-ship, to a lesser extent, in Q1. So I think you can infer that from our guidance of single-digit down. And then we'll be back to a more normal environment.

Now just as a reminder, though, the first half is not usually a -- the first half is usually a seasonally weak client time anyways. So we would expect more lift in the second half, not so much in the second quarter.

Mark John Lipacis - *Jefferies LLC, Research Division - MD & Senior Equity Research Analyst*

Got you. Okay. That's very helpful. And then a follow-up, if I may, on the -- China is lifting, as they're lifting the COVID restrictions, I guess I would imagine that you would expect that ultimately, at some point, to translate into higher demand. And I'm wondering if you could just kind of share with us your thoughts about how that might play out. And could you remind us, to the extent that you can help us understand the risk to the supply side for you in the event that the COVID spreads rapidly as they lift the restrictions and impacts what you have on the supply side there.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure, Mark. So we've done a very good job in our supply chain in terms of risk mitigation. So we have -- we don't believe that we have a significant risk as it relates to COVID future outbreaks, if there are any. As it relates to China recovery, I think we would benefit from a China recovery. It's very difficult to call. I mean we've seen, certainly in our Data Center business, we saw in the second half of the year and last year in the first half of this year that the China Data Center business has been weak for us. If there was a recovery, I think we would benefit from that. Similarly, some of the other consumer patterns as well. But it's very difficult to call. So we put that in the bucket of macro uncertainty, and we'll see how it plays out.

Ruth Cotter - *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

Operator, we'll take 2 more questions from 2 callers, please.

Operator

Certainly. Our next question is coming from Chris Danely from Citi.

Christopher Brett Danely - *Citigroup Inc., Research Division - MD & Analyst*

Great. Congrats on being the first all-female CEO, CFO team. It's a long time coming. So your gross margins held up pretty well for the Q1 guide despite high-margin Data Center business going down. So if the Data Center business remains weak and has a rough quarter in Q2, can we expect a similar gross margin resiliency?

Jean X. Hu - *Advanced Micro Devices, Inc. - Executive VP & CFO*

Yes, definitely. I think as I said earlier, the major impact on gross margin actually is the PC Client side. The stabilization and the bottoming of Client on the business really help us with the gross margin at the current level. Second half, we should see the expansion of gross margin.

Christopher Brett Danely - *Citigroup Inc., Research Division - MD & Analyst*

Sure. And as my follow-up on your PC Client business, so it had its correction a little bit later than some of the other folks in the semi industry and was obviously a little bit steeper. Can you talk about why that happened and why we should or should not expect that? Or could that happen in the Data Center business as well?

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

I guess Chris, what I would say is I think the PC market has been volatile, and we did significantly -- coming off the pandemic, there was very high demand during the pandemic, and I think we were all adjusting as we're looking at sort of the demand environment post-pandemic and with macro uncertainty. I think the Data Center business, we have again, our -- we're heavily weighted towards cloud, and we have very good discussions with our overall customer set in terms of what they need. I think what's going in our favor in the Data Center is our workloads are expanding. And so we've heard from all of our cloud customers that they're adopting both Milan and Genoa in more workloads than previous. And so I think that gives us good confidence.

And frankly, the Data Center customers are also giving us good visibility into what they need for 2023. So there is an adjustment in the first half. And I think that's something that we understand. And we also expect that we're going to have to ramp up production in the second half as some of the demand resumes. And I think the overall factor of compute in the cloud being a very important long-term driver is definitely there. So we feel good about sort of where we're positioned.

Operator

Our final question today is coming from Timothy Arcuri from UBS.

Timothy Michael Arcuri - *UBS Investment Bank, Research Division - MD and Head of Semiconductors & Semiconductor Equipment*

Lisa, I had a question on your Client business. I know that your competitor at times uses rebates and subsidies. But the numbers that are in their filings have gotten pretty vague. So I take it from your answer to a prior question that you think that's more on legacy parts. I guess I'm just kind of wondering what changes or impact that's had on your business. And I continue to hear these worries that it's going to have some lasting effect on your share and particularly on your margins.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure, Tim. So let me make a couple of points. I think all of us, as we participate in the PC industry, there are various parts of the ecosystem that we work with. We work with our OEMs, we work with our retail partners, we work with our distribution and channel partners. And we're all working together to work through sort of the elevated inventory levels. As I said, I think we've made good progress on that. And I think we have much better visibility into the various pieces.

As it relates to the pricing environment, I do believe that the pricing environment is -- particularly when you're clearing older inventory or older-generation products, is a bit more competitive. And we see that. As we look forward, the way we're modeling the Client business is that we are modeling gross margins to be less than corporate average. That's different than our previous modeling.

So previously, Client was more like at corporate average. And I think given the -- I think the nice thing is our business is quite a bit more diversified now. And so with our Data Center, Embedded businesses really being strong growth drivers, I think Client continues to be a good market overall. And as we work through this, we will see some of the normalization that Jean mentioned.

Timothy Michael Arcuri - *UBS Investment Bank, Research Division - MD and Head of Semiconductors & Semiconductor Equipment*

And then I guess just as the last thing, you went through some puts and takes on the different pieces for the year, but I just wondered if I could just get you to kind of give a bias for what you think that the revenue for the year is the bias. It sounds to me like the bias is more up than down, but I just wanted to give you a chance to maybe confirm that or not.

Lisa Su - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

I think Tim, the answer is yes. But again, let's work through the next couple of quarters. And we feel good about how our products are positioned, and we just need to work through the macro and see how that plays out.

Ruth Cotter - *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

Great. Thank you. That concludes today's earnings call. Again, welcome to Jean, and we're delighted to have her on board, and much gratitude to Devinder for his 39 years of service and all his leadership. And we look forward to touching base with all participants throughout the quarter. Thank you.

Operator

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

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