Citi Global TMT West Conference

Company Participants

- Colette M. Kress, Executive VP & CFO

Other Participants

- Atif Malik, VP and Semiconductor Capital Equipment & Specialty Semiconductor Analyst, Citigroup Inc, Research Division
- Unidentified Participant, Analyst, Unknown

Presentation

Atif Malik {BIO 15866921 <GO>}

Good morning. Welcome to day 2 of Citi Global TMT Conference. My name is Atif Malik. I cover semiconductor and equipment stocks here at Citi. With us today are Colette Kress, CFO, NVIDIA. We also have Simona Jankowski from IR and Shawn Simmons from IR. It's a fireside chat format. I'll kick it off with my questions. And then we'll open it up to your questions.

Questions And Answers

Q - Atif Malik {BIO 15866921 <GO>}

Colette, I'm going to start with gaming. I thought it was a great idea to focus on gaming at CES this year. And you guys killed it. NVIDIA announced next-generation graphics RTX with DLSS using deep learning, new shading technology and more. The company announced 40-plus new models with GeForce RTX notebooks, with 17 new Max-Q models available in January. Price to performance on 2060 is super compelling versus 1060 and initial reviews are positive. It clearly shows the company's leaps and bounds ahead of competition. I have 2 questions on gaming. First is more of a near to midterm question. How does the launch of new products impact the 1060 channel inventory situation that the company faced last quarter?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So thanks for the introduction. It was a great overview of some of the things that we announced at our keynote on Sunday night. Yes. We used this time to focus just on gaming at our keynote. However, if you do go to the convention center and to our booth as well as there has been several blogs and discussions that we've had with our partners, our Tier 1s on the overall convention center regarding automotive. So the entire booth is focused in terms of automotive. But yes, we focused the keynote to talk about where we are in terms of our next-generation Turing and our next-generation bringing ray tracing. It was an opportunity that we were onstage

really demonstrating since the time that we have launched overall ray tracing back at gamescom to see the overall developments that we have done using ray tracing within the overall ecosystem, with many of the games that are coming out, to show the true life of how to bring ray tracing to these games and the overall improvement that we'll get. So it was an opportunity to showcase the games, showcase the progress we've made. But also to announce the RTX 2060. So your statement was how does this relate in terms of our overall 1060, which we referred to at the end of Q3, there's a little bit of excess inventory in the channel related to our 1060. Our 1060 excess inventory at the time that we had announced our Q4 guidance, we indicated that it would probably take us about 1 quarter to 2 quarters to work through. At this time, we do believe we are on track to working through that overall inventory. It's essentially a finite amount that we just have to move through. And what we have seen over this period is the normalization of the overall pricing. There has been many promotions throughout this first part of the holiday season. So we do believe we're overall on track. Now when you compare that to the overall 2060, the 2060 has an opportunity for it to look as an upgrade to several of our installed base types of cards. Looking all the way even to our overall Maxwell line, because it's very common that people are overall upgrading maybe over a 3; to 4-year period of time. So you can go and look at a 960 install base, a 970 install base and move to even the 1060 or 1070 Ti. The overall improvement matches in terms of what you probably saw in terms of the 1070, 1070 Ti, however, at a substantially lower price. The 1070 was probably around the $450. We're looking now at better performance even now at about $350 for the 2060. So it's really not a direct competitor. And nothing to really do with the overall 1060 excess inventory that we have. We still feel that is on track to be worked through.

Q - Atif Malik {BIO 15866921 <GO>}

Great. Then longer term, we had Logitech CEO present here at TMT Conference yesterday. And he sounded very bullish on eSports adoption and underlying gaming hardware peripheral demand for them. In fact, he drew a diagram behind us where he tried to explain in the upper half are all the older folks that do not get eSports and the bottom half are all the teenagers. And Colette has 2 sons that are big-time gaming fans there in the bottom half. So I think that the dynamics are such that the younger population are more latching on to this eSports trend than some of the older crowd than in this room. So my question is that Micro-Star overnight talked about a 10% type annual unit growth rate for this year. And they've become the #1 notebook gaming computer maker. How does the kind of crypto hangover change your long-term view on the gaming market? The unit expectations are kind of in line with your CAGR that you have shared in your prior analyst events. But just trying to understand what does the crypto hangover mean for the long-term health of the gaming market?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So let's go back to the statement in terms of the peripherals and the eSports and a lot of what we're seeing in terms of the overall notebooks. I think that's also a very important theme coming into CES here. We took this opportunity to also announce that we brought Turing to overall notebooks. And the notebooks will be available at the end of this month, more than 40 different configurations from many, many different vendors. When you go and look at what the overall notebooks are

now accomplishing, they're accomplishing the generation that is extremely focused on thin and light and also extremely focused on providing overall top-end performance with no desire to give on either one of those. So we had worked for quite some time. We had done this with the overall Pascal as our first trip to the overall OEMs, helping them redesign the underlying boards. So that they could accomplish a high-performance overall chip along with the overall thin and light. This is a very major theme that is happening. People want to play their game on their desktop. They want to continue in a mobile form and have the parties where they're able to bring their overall laptops with them and that they can continue the same game, they can continue moving with it. So we're really excited to also take Turing to the notebooks. If you recall from our Q3 earnings, we announced that our overall notebook business was growing probably close to 50%. (Can beat) almost near doubled the overall growth rate in terms of our overall gaming. So it's an important piece, not necessarily a peripheral. But what you see is a lot of things being added on to the overall gaming piece. So 2018, the calendar year is behind us. 2018 started in quite a unique position. That is when we were facing a significant spike in terms of the overall cryptocurrency. We had a cryptocurrency board-specific. But again, we had supply issues where sometimes that ran into our overall gaming. Now when we got to the end of 2018, it ended a little different than we had expected, as we had to balance that out in terms of what we had seen at the very beginning that we had to work through in terms of the 1060. We tend to sit there and think that in totality, 2018 is probably, as a whole, a good number from total overall gaming. As we look forward and we think about the overall industry, whether that be eSports, whether that be overall gaming notebooks, as we think about bringing overall ray tracing, we know that the overall gaming industry is still a very important part of entertainment, a very important part of social. It is a social platform for many of those teenagers, many of the upcoming. And we have people that are gaming longer. So all those things are intact. We believe our overall strategy of addressing this market. We just had a couple of bumps that we had to work through in terms of 2018.

Q - Atif Malik {BIO 15866921 <GO>}

Great. And we had semiconductor companies talk about consumer and industrial spending being weak in China at this conference. What percentage is China of your total and gaming sales? And have you seen any impact from China demand on gaming ban of sorts?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So our China business, in terms of around the world, in terms of global -- globally, when we think about our overall gaming business, we think about it probably in about a 1/3, 1/3, 1/3 piece, meaning the end customer, the end gamer, we've got about 1/3 of them here in North America. We've got about 1/3 of them in Europe. And we probably have another 1/3 in the Asia Pac and China area. However, China as a part of the overall Asia Pac is quite significant in terms of that area. So over the overall holidays, leading even before the holidays, the overall China regulatory was still trying to find its feet and get some traction in terms of how they were going to redo the overall regulatory. During the overall holidays, we heard more in terms of them moving a little bit faster in terms of the regulatory aspects of games. And we do believe they were probably on a much better track to look at these games and decide how they would want them put into market to meet their

desires in terms of in China. So we do believe that overall, bringing forth the desire to move faster on that and get -- and make some traction will overall help the overall gaming industry as a whole. Before though, it's not necessarily that we saw any direct impact from that potential slowdown, because that really is more on the software side and the GPU platform being inside the overall computing platform wasn't necessarily affected.

Q - Atif Malik {BIO 15866921 <GO>}

Great. And moving on to just the data center part of your business that accompanies the T4, GPUs delivered 40x faster inference than CPUs. How has Turing been received by hyperscalers and the cloud customers so far?

A - Colette M. Kress {BIO 18297352 <GO>}

Yes. Real interesting with our Turing architecture, as we do with all of our architectures, we bring it to each and every single one of the markets that we participate on. So when we brought Turing architecture, starting off with the workstation, moving to overall gaming, we also came forth with what we refer to as our T4, which is essentially our inferencing board that we can now fully address a very, very important market in the data center. Probably one of the most important size of markets that we are seeing in terms of our data center opportunity. We put together the T4, it can be an overall form factor, about the size of an overall candy bar, that can easily slot into existing slots currently in many of the different servers. It brings an opportunity to address a market which has essentially been an x86 CPU overall market, in terms of doing that inference with the hyperscales as well as in terms with overall enterprises. So we're excited in terms of the awareness of the T4, the initial excitement over there. We also had Google to be one of the very first ones to move to provide it within their cloud. So we are gaining some tremendous traction. We had traction just with inference, even with our Pascal line. Then the T4 allows us to continue with more focus in terms of on the Tensor Cores and on the software layer to address this very important market for us.

Q - Atif Malik {BIO 15866921 <GO>}

Great. Then we've heard about data center demand slowing down in some areas in semiconductors like storage due to the memory oversupply. Have you seen any impact to AI-driven growth? And longer term, how do you think serverless computing services, such as AWS Lambda, impact your data center demand?

A - Colette M. Kress {BIO 18297352 <GO>}

Yes. So I think 2018, a significant amount of buildout around the world and a focus in terms of the additional compute that they think is necessary for so many different types of applications, as well as a focus in terms of on AI. As they work in terms of optimizing, we spent a lot of time with them to say what have they learned over that period of time, how do they think about the new configurations that they may want to do. We don't have any ability to see the overall world insight on what that's going to be looking into 2019. But what we can do is we have worked extremely hard to expand our overall TAM, our opportunity and our priorities for where we think that things will grow in terms of the overall data center. As you've seen us bring together

overall to the data center, we started way back with overall high-performance computing. But we know with the slowdown of Moore's Law, there has been even more focus in terms of using acceleration in supercomputing, use acceleration in high-performance computing, as they need that additional throughput for the work that they are doing. Even in supercomputing back in the fall, of the TOP500 supercomputers, brand-new ones being brought to that list, we were in 56% of them. So a very significant portion are now moving to the overall acceleration, a very important expanded market. AI is probably another one. You saw the hyperscales move quite quickly. Deep learning, we are very well-known to be probably the leading provider of all deep learning overall compute that's there. That has moved to the focus in terms of inference, as we've also expanded our market to deal with, I have trained my overall data, what do I want to do in terms of that inferencing stage? And we're right there expanding the market to address those as well, both from a hardware and software. In this latest last quarter, you saw us bring to market our focus in terms of machine learning. Machine learning is different in terms of the overall AI. We're talking about a significant amount of big data. You have a lot of data scientists that are working on very specific applications, open-source types of applications, in order to mine the massive amounts of data that enterprises have. Things that we do to help forecast by using the overall data to come together with that. We believe we now have a great offering for them with RAPIDS to, again, now expand into that market for the enterprise. So no matter how you want to think about the overall data center, the goal is to say for each and every important workload that will be there in the data center, can we overall fuel with the overall work that we have done? That's the best we can do in terms of lining up for the priorities of 2019.

Q - Atif Malik {BIO 15866921 <GO>}

Great. And switching over to auto, over the past few years at CES, you have announced significant partnerships in the auto space. Can you talk about the new partnerships and opportunities with Level 2+ DRIVE AutoPilot that you announced this week?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So DRIVE AutoPilot really takes beyond the ADAS and really at certain times, you can go into an autopilot mode. What we had announced previously was that Volvo has chosen us for that autonomous vehicle. And will come out with their full fleet using our underlying platform. We are also on the floor of the convention center with many of our partners, Conti, ZF, that are also locking into our overall underlying compute platform to build these types of systems as we go forward. We announced also with Daimler, a focus not only for AI within the cockpit. But they will also use our underlying compute platform for the future of AI with their cars as well. So these are some of the great things that we'll see. We'll likely see these passenger cars start to hit in about 2020. But equally, at this time, we'll probably see robo-taxis continue to be built alongside, bringing that AutoPilot. And those might be here at the end of '19, of the current year.

Q - Atif Malik {BIO 15866921 <GO>}

Great. Citi is very bullish on the total opportunity for the car of the future, with our lead auto analyst expecting to see a steeper curve in the post-2021 adoption rate of

autonomous cars than consensus thinks and perhaps more in line with Jen-Hsun's $60 billion TAM by 2035. Can you just talk about how NVIDIA fits into the equation of enabling these cars of the future? And when should we expect significant revenue growth in the auto business?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So when you think about what we are going through in terms of a transformation in the overall automotive industry, it's a lot different than the days when we were initially putting infotainment systems and digitalizing our overall cockpits. We are thinking about the overall transportation system as a whole that has the ability to not only improve safety. But the overall collective servicing that is done through the overall transportation. So yes, passenger cars are important. But we can think about everything from the overall trucking system. We can think about the overall delivery system. And we can also think about what we would want to do in terms of shuttles, taxis and all of that. It is a major transformation for that. Right now, we see safety being very, very important, to make sure they have that right as we go into the cars. But we think about all of the challenges in terms of delivery, delivery of goods, how that can free up, if we actually did it by autonomous, because it's very difficult, given everything has now moved from brick-and-mortar to potentially, in terms of purchases online. So there's a lot of additional transformation that will happen. But what is key in every single aspect of that is it is a significant hard computing problem. It is a significantly hard computing problem that essentially takes AI to infer what the either best route is or the perception of what you see in terms of out there. We are, in terms of a leading platform, a platform that we have today from end-to-end that starts with the underlying hardware but moves to an overall programmable ability level, all the way up to many of these OEMs and manufacturers in terms of their software application. So we feel very good, ahead of the curve. And essentially, many of the partners that you will see at the convention center here definitely will say their work is here and working with NVIDIA.

Q - Atif Malik {BIO 15866921 <GO>}

And how do you expect your auto ASPs to grow over time from Level 2+ opportunity next year to driverless taxi by 2021? Do ASPs vary by type of vehicle, truck versus car? Or is the main variance in the level of autonomy?

A - Colette M. Kress {BIO 18297352 <GO>}

So it is going to depend on every single one of the OEMs and/or the startups. But you're correct. Sometimes, when you're going to full autonomy, you are looking for a solution that helps you secure any of the overall passengers and/or the goods that would be there. What that means is if there is not a driver, it can't be autopilot and then go back to the driver. If there is no driver, you need multiple systems to be assured that, that will drive in all different types of scenarios, thus, additional amount of hardware, a tremendous amount of additional backup overall software that provides that. That's what drives an overall higher ASP as we move to the overall higher autonomous capabilities. So we will have different ranges. We also don't have a set overall configurations for any of this. Many of this is working with the overall OEMs on their strategies and how they want to do this. So what we'll see probably over the next couple of years, you will see a lot of the development work if they

would like a car to be on the road in 2020, 2021, they're probably going to need to decide those partnerships that they need to make fairly soon in order to meet the driving time of 2021 for the cars to be on the road. We work with them sometimes on the platform. We will work in many different degrees in terms of the software that is needed to do that autonomous driving.

Q - Atif Malik {BIO 15866921 <GO>}

Okay. And on the competitive front, the growth potential in this market is attracting more and more competitors. Can you help us understand what your secret sauce is versus Intel, Mobileye, Xilinx, Renesas and NXPI and all these newcomers?

A - Colette M. Kress {BIO 18297352 <GO>}

Yes. Honestly, there's a lot of different processors inside of a car. For years, it has been a growing population of overall processors. But not all processors are the same. So there are many that are helping with different parts of the overall digitalizing of the overall car, or many other different types of features that may be there. But what we bring to that is not just to land and say we actually have a processor. We have worked feverishly on taking what we have learned from the data center, what we have learned in terms of our work on AI, to bring that to the car and bring AI to the car. We are probably the only one standing that can take the significant amount of data that needs to be processed, the high-definition maps, bring that into a single, overall module today to be able to calculate that types of compute. There is a significant amount of processing that needs to go around the car, a significant amount of sensors, radar, backup systems. So that in any type of scenario, the car would be able to drive. That's a lot of data input. We have that overall processing power today. That is the secret. So those that often refer to thinking about that in a couple of years, they're going to miss a very important time right now that says they have the desire to bring this autonomous capabilities in the next couple of years. They need something to test and develop on today. And that's what we're working through.

Q - Atif Malik {BIO 15866921 <GO>}

Great. I'll pause here and see if there are any questions in the audience. If you have a question, please press the push button in front of you. Questions? Yes.

Q - Unidentified Participant

(inaudible) earlier. But can you just talk a little bit about your relationships with video game publishers? Obviously, you guys are pretty close with EA. But is there anything you can share, anything you guys do about you guys driving adoption for ray tracing technologies into the video game developers' process?

A - Colette M. Kress {BIO 18297352 <GO>}

Yes. So a great question. When we refer to our ecosystem of gaming and probably a very large differentiator that we had done many years ago is to say gaming starts either with the hardware or with the software, a chicken and an egg type of piece of it. But they are an integral part in terms of the overall gaming experience and our relationships with them are very, very deep and very, very long. Probably every single

one of the overall gaming developers and software developers out there work with us. We have a significant market share of overall PC gaming using our underlying overall platform. So the goal of when they launch an overall software game, they want a seamless view in terms of how the overall gamer feels in terms of that experience. And we have worked often months or years before they've actually launched the overall game to bring it to market. So when we launched overall ray tracing and announced, we announced first to the ecosystem and the software developers that we were bringing ray tracing to gaming before we actually even launched the overall hardware. We excited them on day 1 of just saying, wow, you are now bringing something which is essentially the Holy Grail of overall graphics at this time. Probably something that they didn't think would be available for more than 10 years out. But now with the advancement in terms of the overall processing capabilities, they can bring that market today. So as we showed here at the keynote in terms of demos, as we will continue to show, it is that work with the overall gaming population of software development and showing the work that they have done to incorporate ray tracing as well as our work to help incorporate DLSS also in terms of those games. So those relationships are deep. People ask a lot of times that says, "Well why now? Why not a large set of overall games available for the market right now?" Well it is a little bit of a chicken and egg. We have to demonstrate the overall hardware capabilities, we have to available the overall engine for them to overall write the overall games. But I think we're on an absolutely great path to bring a new set of games to the market.

Q - Atif Malik {BIO 15866921 <GO>}

Questions?

Q - Unidentified Participant

Can you talk a little bit about the rationale behind the promotion with app and gaming and the 2060, how that impacts the burn down of the 1060 inventory going forward?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure. So we're sitting here, everyone believes that the holidays are over. And we're getting ready for a new year. But the reality is we're in the middle of the holidays. And what I mean by that is there is still a significant holiday in the Asia Pac China area as they get ready for the overall Chinese New Year. This is a great opportunity. And we like to do it with our overall gaming developers, to launch with our overall GPUs and often with brand-new games that are coming. We thought this was a great opportunity to put those together ahead of some of these great holiday times and really showcase a lot of the ray tracing and the DLSS that would be available.

Q - Unidentified Participant

This morning, AMD announced their new 7-nanometer gaming cards for consumer applications. Can you comment on what you think your timing is for a 7-nanometer consumer?

A - Colette M. Kress {BIO 18297352 <GO>}

Well we just announced Turing. And we're really excited about Turing. And we don't tend to announce new products long before they're available. So we're here to announce really our next piece of overall Turing. Again, we have a different way of overall coming to market than some of our peers do. We do like to excite our gamers with what we bring to market and really showcase it. It's here today, you can try it overall today. The Turing architecture is so phenomenal, both performance increase over Pascal and then with the addressing overall ray tracing for the future, we are really talking about a next-gen and really a massive step-up in terms of what that overall gaming experience has been over the last 20 years and what it's going to look like now for the next 20 years to go. That's really what ray tracing is. So it's a little bit more than just the chip, it is about the overall technology that we're going to enable in there.

Q - Atif Malik {BIO 15866921 <GO>}

Questions?

Q - Unidentified Participant

(inaudible)

A - Colette M. Kress {BIO 18297352 <GO>}

It's hard to hear.

Q - Unidentified Participant

(inaudible)

A - Colette M. Kress {BIO 18297352 <GO>}

Okay. So I think I heard a portion of this. So let me -- I think I hear ProVis. I think I hear RTX bring into that and what does it do to that market. I think it's a really great question that we, I haven't gotten the opportunity to explain. A very important market that we also expanded with our overall Turing architecture is what we brought in terms of overall the pro visualization business. That is our business that we refer to as our enterprise graphics business. So bringing ray tracing to that overall business is a huge undertaking and very, very well received from a very important part of those that build films, special effects, build catalogs, photo editing, all of these different things really have massively now been able to improve with the overall capability of overall ray tracing. Additionally, what we are doing is expanding the market to do -- to address an important part of that overall process and the process of overall rendering. Rendering the frames of overall special-effects is a significant time consuming as well as a significant amount of processing power to do that. Generally, right now, there is about 1.5 million x86 CPU servers that do this overall rendering in terms of rendering farms. What you'll find in this industry is they will often build their layers of frames that they have done in terms of special effects, 1 inch by 1 inch. And then hope overnight that, that will render by the time they come back in the morning. Then they will go and work in terms of fixing and adjusting in terms of what they did. Not an overly efficient process as they have wasted a lot of time waiting for render and wanting to do a lot of that on-the-fly. So this is an expansion of our overall market that we can now address with these render farms by

making them overall GPU, overall server farms as well. So we are addressing, also with our Turing architecture, moving towards ProVis to not only focus in terms of just the design work on the workstations. But also what we can do in terms of the rendering farms.

Q - Atif Malik {BIO 15866921 <GO>}

Collette, on the financial model, gross margins, you guys have natural tailwinds from auto and data center, which are higher than corporate average in terms of profitability. In gaming, strength factor last year, maybe you guys benefited in first half from crypto cards. And how should we think about this year, the gross margin trajectory with gaming and the inventory situation with 1060 and the launch of the 2060 comps?

A - Colette M. Kress {BIO 18297352 <GO>}

Yes. So our business model and our focus has been over the last 3 and five years, when we think about our overall gross margin, is continue to build bigger, better overall value-added platforms. That means even from a gaming perspective to our ProVis, to our overall data center as well as what you discussed in terms of our automotive. And so what you have seen over that period of time is a massive increase in our overall gross margins. Probably five years ago, down in the high 30s and 40s. And we're now sitting around the low 60% in terms of overall gross margins. Last year, a continuation of that. Although the first part of the year, yes, influenced by overall -- the wide need to supply for overall cryptocurrency and restock that allowed us to raise our overall gross margins. Our gaming gross margins sit about at the company average. They sit about as the company average. It makes sense because gaming is probably a very good percentage of our overall company revenue. We are enabling, with the overall software in our pro visualization and our data center as well as our future automotive platforms to increase gross margin because we can leverage that overall software, which is essentially the work of our R&D folks, when we look at our overall gross margins. It's still early to say because probably mix is the largest driver of what drives our overall gross margin. The more that we have in terms of the value-added platforms, the more our gross margin can grow. The growth that we've seen probably in gross margin historically has been a phenomenal increase year-over-year. But we still see the opportunity to grow it, probably just not at the rates that we have seen historically.

Q - Atif Malik {BIO 15866921 <GO>}

Great. And in terms of capital allocation, you guys announced a share repurchase program in the last earnings call. Can you just talk about the priorities this year? And how does M&A fit into that? Are you still looking into software as the predominant area for M&A?

A - Colette M. Kress {BIO 18297352 <GO>}

Sure, great question. So our overall work that we did, we tend to address and look at our overall cash on hand to say what is that best use of that cash that we have. We are very locked into our overall shareholder return program. We will continue in terms of both a combination of repurchasing shares as well as our dividend that we

have as well. But when we think about our focus, our #1 focus is going to be investment back into the business. Once we receive what we can do in terms of that investment, we do look at M&A. And M&A as overall possibilities of where we can tuck in sometimes technology teams or where we can add key features to the very defined overall market segments that we have done. It's not been ever a very large portion of our overall investment in terms of the M&A. But that doesn't mean we aren't always looking for opportunities that might be a great mix.

Q - Atif Malik {BIO 15866921 <GO>}

Great. And time is winding down. So Colette, thanks for coming to the Citi conference.

A - Colette M. Kress {BIO 18297352 <GO>}

Great, thank you.