

## J.P. Morgan's Annual Tech/Auto Forum

### Company Participants

- Colette Kress, Executive Vice President and Chief Financial Officer

### Other Participants

- Harlan Sur, Analyst, J.P. Morgan

### Presentation

#### Harlan Sur {BIO 6539622 <GO>}

Okay. So good morning, everyone. Happy New Year. Welcome to JPMorgan's 18th Annual Technology & Automotive Investor Forum here at the Consumer Electronic Show. For those of you that don't know me, my name is Harlan Sur. I'm the semiconductor and semiconductor capital equipment analyst for the firm. Very pleased to have a solid day of semiconductor, automotive, automotive technology, general tech companies presenting. Also joining me here from JPMorgan are some of my colleagues. I have got Bill Peterson, who covers the RF semiconductor value chain. I've got my colleagues, Ryan Brinkman and Jose Asumendi, who cover the US and European automotive sectors. Paul Coster, our applied and emerging technologies analyst and Samik Chatterjee, who covers our IT Hardware and Telecom and Networking Equipment sectors.

We continue to expand the companies that participate at our conference. And for the first time at our CES conference this year, we have management teams from Microchip, Qualcomm, Xilinx, Cree, Gentherm, Gentex and Lear. So we hope you enjoy the conference. Remember this conference is for you guys. So ask questions. We've got a great lineup of companies. And with that, very pleased to introduce Colette Kress, the Chief Financial Officer of NVIDIA. It's been a tradition now for the past I think 5 years or 6 years now that the NVIDIA team kicks off our investor conference, because the team is driving much of the trends that you will hear about today, artificial intelligence and deep learning, next generation compute architectures and automotive, next generation gaming technology, just to name a few of the things. I've asked Colette to kick us off with an overview of what the team is showcasing here at CES or maybe GTC, the meet -- the recent GTC in Shanghai and then, we'll go ahead and kick off the Q&A. So with that Colette, thank you again for joining us this morning.

#### Colette Kress {BIO 18297352 <GO>}

Great. Thank you, Harlan for the introduction. And we're excited to be here and be your pick-off. And I think, I'm going on 6 years to 7 years actually. So I think, we're

forgetting on how many times we've been here, but we've seen a great acceleration. As you know, we are an accelerated computing company. Our focus is in many different markets. And let me talk about some of the highlights that we have seen.

Starting first with gaming, which I think is a great place to start, since we are here at the Consumer Electronic Show. Our gaming business is doing quite well. Our introduction of RTX which has been in the market for more than a year is off to a great start. We have more than a couple dozen games in the market today, focused on overall ray tracing. Ray tracing is what we believe the next wave of overall high-end graphics and high-end graphics that can be used for gaming but a lot of other different places.

We're here introducing at CES more laptops and notebooks focused on the overall RTX capabilities but also our overall Max-Q. You will probably see here, we have now reached a total of more than a 140 laptops focused on gaming, focused on RTX that you will see new ones even here today. We've talked about our overall cloud gaming and our introduction of cloud gaming with many of our partnerships with the overall telcos and our GTC in China in December, we announced another partnership with Tencent bringing overall cloud gaming to an important market there in overall China. We're also here at CES announcing a new form of our overall G-SYNC, which is exclusive with many of the overall LG monitors that you're out there. It brings a higher overall hertz or about 360 hertz to overall playing games in a very competitive environment such as overall eSports. We know that eSports is again a very important part of what we see in terms of gaming around the world and it was taken off to on great, great strides.

Additionally, focusing on not only our overall gaming business but focusing on accelerated computing in terms of what this means in terms of the data center. We have announced a great acceleration of what we're seeing right now, both in the overall hyperscales, increasing their overall purchasing and a lot of that has been fueled by a very important industry of conversational AI with the underpinnings of natural language processing. Recommendation engines are also very key. So we are off to really focus with our TensorRT overall software and are inferencing to influence a big part of this overall growing market. We also focused in China GTC, we focused on overall edge computing. So our EGX overall platform which we will focus on our probably next cloud platform. We've seen some major wins when we think about the edge, focusing on companies such as Walmart, as well as the US Postal Service that is using our overall platform to help in many of those areas of either warehouse management or just focused on in terms of the overall supply and demand management that we see.

Moving forward in terms of key area in terms of automotive, over in China, we announced in terms of our DRIVE platform with DD [ph]. But we also announced our overall next generation architecture Orin, which is probably 7x faster than our current overall architecture focused on Xavier. These are platforms that are both available for -- work with the overall automotives today and we have one of the true end to end platforms focused on automotive that takes everybody, all the way from the datacenter and focusing on training, simulation of the data for later for it to be in

terms of production inside of the car. We've had a lot of other great announcements that you'll see here, but I'll just start there with a quick summary.

**Harlan Sur** {BIO 6539622 <GO>}

No, thanks for the great introduction. You know, it's well what a difference a year makes. Last year, at this time, we were talking about crypto inventories, we were talking about the slowdown in the data center business, you entered calendar year '19 with your business down about 30% year-over-year. If you hit your guidance for this quarter, you will actually exited calendar year '19 at plus 30% year-over-year. Consensus has you guys up 20% in calendar year '20 which is your fiscal '21. Help us understand the trends and product cycles that are going to drive this fiscal year, fiscal '21 and longer term, how should we think about the overall growth profile for the different businesses gaming, data center, ProViz and automotive.

**Colette Kress** {BIO 18297352 <GO>}

In the perspective of overall gaming, we're very, very well positioned. We have, as we always do a full-lineup that allows gaming at a lot of different overall price points. We are the provider now that is focusing on overall ray tracing. First to overall market and being end-market for a year and also even upgrading what we had in terms of our existing Turing RTx cards to incorporate our overall Soopers [ph]. We went into the overall holiday season knowing that this would be a great holiday seasons for the games that were coming out, you will see in terms of games such as Call of Duty and Wolfenstein also coming to market using our overall ray tracing capabilities. So as we move forward, we are setting the way for ray tracing to take us through the next generation of gaming, but not only focus just on the overall desktop. As you know, we're bringing ray tracing to the overall notebooks. Opening up a market of probably untouched of the mobility of overall gaming at a high-end overall performance incorporating our overall Max-Q.

And then lastly, we know that the world of cloud gaming is an important area still in its overall infancy. But we are the best to bring that to market with many of the different telcos and what many of the overall partnerships that can overall focus. So we will continue to see the importance of gaming as an entertainment overall industry as well as our platform being leading edge. Now when we focus in terms of on data center. Data center and its opportunity, we're probably approaching a new wave of overall AI. If you went back to the early 2012 time frame, that was a time frame that people were bringing to market, the use of GPUs for overall image detection, image categorization and actually quite excited about it because it did change a lot of key apps.

What we have seen as early as the overall summer time is the evolving of natural language processing with Google and its blog in terms of its overall BERT model in showing people how they are using a technique to better understand how search commands are created and how better to solve this, is an important expansion of both natural language processing, not only for the overall hyperscales but for start-ups, for consumer Internet companies, but also many of the overall enterprises. You've seen now a wave of focus on conversational AI and we're only just beginning.

This is something that probably takes a 100x more computing performance than what we have seen in overall history. It's a focus of not only on the training, but also on the overall inferencing side.

You've seen our growth in terms of inferencing. Inferencing is now solidly within the double digits as a percentage of our overall data center business, but you also have a case, where we are shipping more overall inferencing cards than what we are seen in terms of overall training. So we have a great path going forward, not only with conversational AI but the recommendation engines broadly overall using GPUs.

**Harlan Sur** {BIO 6539622 <GO>}

So let's stick with the datacenter, it's roughly a quarter of your overall revenues. You will be exiting this year, as you mentioned with the business trending back to kind of 30% year-over-year growth rates after a three quarter pause by cloud hyperscale enterprise customers. We had anticipated this business coming back in the second half of 2019 as your cloud and hyperscale customers started their next wave of the spending cycle. But with the NVIDIA team, as you mentioned, it's more than just spending re-acceleration, what is this new wave of AI, their new applications like natural language, conversational AI, you've got the ramp of your inferencing business, this emerging business in edge computing. Can you just talk about all three of these dynamics and the sustainability of 20%, 30% type year-over-year growth rates, through calendar year '20 as well as beyond that.

**Colette Kress** {BIO 18297352 <GO>}

Sure. So what we had talked about with our Q3 results is we did start to see the improvement in terms of the overall purchasing of the overall hyperscales. As we had focused earlier on the year, many of our engineering engagements we knew were intact and we knew, we would get to the point, host the overall digestion to focus on overall new compute. We see the hiring continue in many of these areas, hiring in terms of the engineers at the hyperscales. You see the overall AI papers and you see a tremendous amount of start-ups focusing on AI. So sure enough in the second half of the year, we have started to see the comeback of the overall hyperscales.

Now, the return of the hyperscales is not just focused on overall internal use. The overall need for the overall cloud computing for those that don't have the capabilities to build out their older [ph] infrastructure. It allows that opportunity for them to begin their work in the cloud, they may remain in the overall cloud, but we're seeing both of those. We are seeing in terms of our overall inferencing platform, our T4, to be used worldwide. Worldwide and is actually in almost all of the different data center locations in terms of within AWS. And I think with the other hyperscales, we will slowly start to see that also happen but we have broad-based adoption of using the overall GPUs for inferencing. This is an important moment of something that we knew, we were working on an incumbent, a CPU or a traditional type of overall inferencing that a CPU is just fine.

What we're seeing in terms of the future of inferencing is the complexity, the complexity that natural language processing requires, the complexity of the amount of data that needs to be mind over a short amount of period of time and a return in a couple 100 milliseconds will require a GPU or a high performance overall processor to do that. So we're very well positioned, positioned not only on the training, but also on the inferencing side.

**Harlan Sur** {BIO 6539622 <GO>}

The first wave of AI adoption with your strong product cycle was image classification and recognition and classification and this drove three strong consecutive years of growth for your data center business given as you mentioned, the order of magnitude, compute and training complexity required for some of these natural language conversational AI models and on top of that the requirements for real-time inferencing does -- this conversational AI have the potential to again drive a multi-year kind of strong growth cycle for NVIDIA's data center business?

**Colette Kress** {BIO 18297352 <GO>}

We do believe conversational AI is the next very large wave of overall growth that we can see going forward. We're in the early stages of conversational AI both understanding the use cases for it, but also the complexity that still has to add more things to it, for example, we're really focused right now on a single language, we're focused either on overall English or in some of the overall international, but there is still a large piece to focus in terms of that translation and that overall processing.

So looking at conversational AI and the use cases, it's not just capable for overall hyperscales. You see an opportunity of moving this to the enterprises everything in terms of focusing on their call center, focus on that first dialog that you have in terms of communication and using AI to streamline the overall work that they do.

**Harlan Sur** {BIO 6539622 <GO>}

On the inferencing side, you've had big success with your T4 inferencing platform. Inferencing is now double-digits percentage of your overall data center business, now that you've had time to understand this market and looking out over the next few years. Do you think that your inferencing business can approach or even exceed the size of your training [ph] business over the next kind of 3 years to 5 years?

**Colette Kress** {BIO 18297352 <GO>}

So inferencing, we do believe is probably a larger market than what we have in terms of the other pieces. So we are continuing to concentrate on this. Inferencing in the overall data center is important, but remember also inferencing at the edge.

**Harlan Sur** {BIO 6539622 <GO>}

Right.

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**Colette Kress** {BIO 18297352 <GO>}

Inferencing edge computing but also edge in terms of autonomous devices will be very key.

You've seen us focus not only on the processor for those different capabilities but also the software stack, one of our focus areas in the last six months, the last nine months is unique overall software packages that really address the industry's overall applications that are out there, you see us focused in terms of Clara, Clara is our software capabilities and focusing on overall healthcare. Metropolis. Metropolis is our overall software platform to deal with in terms of the places of the world that you may be not just focused on cities, but anything inside of a building or otherwise. You see us focused on Isaac. Isaac is focused on our overall robotics platform and thinking about the autonomous piece. You can also of course think about our overall DRIVE platform.

**Harlan Sur** {BIO 6539622 <GO>}

That's right.

**Colette Kress** {BIO 18297352 <GO>}

Our DRIVE platform is focused in terms of automotive. Each and every single one of them is important to influence the acceleration, not just in the data center, but in the edge and what is required to help that is the connection with the overall application and that is our work that we've really been focusing on.

**Harlan Sur** {BIO 6539622 <GO>}

You rolled out another vector of the product platform, which you've mentioned several times, it's your EGX platform. Can you just talk about this. It seems like it's more of a data analytics platform that's GPU accelerated versus an AI-based platform, but this type of analytics has wide applicability across a number of different verticals. Can you maybe just help us compare, contrast your edge computing platform versus your cloud and data center platforms?

**Colette Kress** {BIO 18297352 <GO>}

Sure. It is a form of thinking about what is necessary at the overall edge to focus in terms of a cloud that doesn't have the capabilities to allow for it to go all the way back to the cloud in terms of that overall functioning. So you're looking for a form of computing that either is needed in the milliseconds to respond and or incorporates overall data that is confidential in nature that you don't want back in terms of the overall cloud. So these are some of the things that we may see in terms of healthcare, in terms of devices, scanning devices or otherwise, that you could do the overall scanning and have the results in instantaneous amounts of time rather than what we have seen in the past of that entire industry.

In terms of what we see already in use of end-store capabilities. And what you see inside of the stores in terms of both check out, you can look at the US Postal Service in the same manner. How quickly can I move the overall mail through by using overall AI capabilities, than their overall manual function. So this is something that we believe the edge platform will be an enormous part of the type of compute that will happen. In the years to come, we'll see every single device focusing on a overall ability to accelerate and we believe, our platform is very well positioned for that.

**Harlan Sur** {BIO 6539622 <GO>}

Great. Before I move on to the gaming, I just wanted to see if there are any questions in the audience. If there are questions, I would just ask for you to wait for the microphone. Okay. Why don't we move over to the gaming side of your business. 50% of your overall business, you entered this year with the business down 40%, you're exiting it with it being up 50% year-over-year. But Q4 from a sequential basis is going to be down primarily on notebooks and your console business just normal seasonal trends but desktop is driving a strong upgrade cycle with your RTX platforms, the ramp of your new GTX SUPER mainstream platforms and a strong lineup to go along with that of blockbuster games that support your ray tracing technology, sticking with desktop for a moment in talking with your board level partners, game developers, retailers, what's your sense on the demand pull this holiday season and as you look into the lineup of games for 2020, how do you see the demand trends for this coming year?

**Colette Kress** {BIO 18297352 <GO>}

Sure. So we entered into the holiday season, the holiday season starts as early as November, holiday season for example, starts with Singles' Day on 11/11. A very important start of that overall holiday and we're actually not done, we're waiting now for Chinese New Year, which is usually at that tail-end of our overall holiday season. But each of the overall points that you have probably seen through, discussions with the overall channel and the partners is its actually going quite well. It's going quite well up and through our overall expectations that we had planned for the quarter, as we do have a full-lineup available. We have a lineup that now focuses on ray tracing and bringing ray tracing down into the upper \$200 of a retail price for you to overall be able to appreciate the overall ray tracing capabilities, but this also allows us to influence all types of overall sales not just focus on desktop.

As you know, we are focused in terms of on the notebooks, our notebooks over the last several years have continued to outgrow what we have seen in terms of the desktop, our overall notebook business is approaching approximately one-third of our overall gaming business as a whole. So an important piece and you'll see a significant amount of that out here at CES.

The overall OEMs have focused on this notebook is in a unique niche for them to attract the overall gamers. The gamers that aren't necessarily interested in building their own overall desktops, but now can have that high-performance in their overall notebook design. Our overall ray tracing even from a desktop standpoint has now

accumulated to be more than 60% of our overall sales on the desktop and is making a good path in terms of with the notebooks as well.

**Harlan Sur** {BIO 6539622 <GO>}

And then, so let's -- let's talk about the cloud gaming segment of the market, NVIDIA has its GeForce NOW cloud gaming platform, you've announced some partnerships with regional global telco service providers. At the recent GTC in China, NVIDIA and Tencent announced a partnership, where you'll be supporting Tencent, the largest gaming company in China, largest gaming company globally by providing them with your GPU technology to power their cloud gaming platform. Can you give us more insights into the partnership, will you be supplying your GeForce NOW architecture or are you just going to be supporting them more with your GPU products. And when do you expect the service to kind of go mainstream?

**Colette Kress** {BIO 18297352 <GO>}

So right now, our relationship with Tencent has always been there as a continuation of not only focusing on gaming in China, but also in focusing in terms of in the data center. This was an opportunity for us to align with a very important partner in overall, China. Tencent here to endorse the growth of overall cloud gaming, even though we're still in the early stages. They have right now overall pods focused on building out into their overall data center and will come to market soon in terms of their testing. Testing the overall first pass of some of the software that is necessary and will come out later in terms of where they are in that overall relationship, ready to go overall live. But we're excited about this as an important partnership, a partnership that allows us to both respect the overall ecosystem as they continue to address the overall gaming market, it's a win-win for both Tencent and NVIDIA gaming.

**Harlan Sur** {BIO 6539622 <GO>}

And actually, that's a good segue because Tencent like I said, is the largest gaming company in the world. But they are also the largest gaming company in China and I always bring up China on the conference calls because it is the largest gaming market in the world, 700 million gamers in China, obviously, the home of Tencent and many of your key data center customers are in China as well. I remember, when you started off calendar year 2019, Tencent specifically called out weak demand trends in China but China demand especially gaming, it seems to have come back strong. So help us understand what's driving the China demand?

**Colette Kress** {BIO 18297352 <GO>}

Yeah, I think, a year ago, probably in a different space in China did have probably some slower quarters than we had expected, but where we stand right now, things are growing quite well in overall China. China is an important part of our overall gaming business, but also very important part of our data center business as you inferred. But what we see there is the adoption of our full stack, our full stack not just focused on in terms of our ray tracing but we also sell cars into that market that are



important just for overall gaming as a whole, but allows them to have both the new architecture even if they may -- not the overall ray tracing. It's an important piece when you think about the overall iCAFE market there. The iCAFE market is one of its own not necessarily something that's always worldwide but important part of overall China. We continue to see them looking for the overall upgrade opportunities of our platform and we continue to hold a significant market share in China against many of our peers.

### **Harlan Sur** {BIO 6539622 <GO>}

Before I move on to autos, are there any questions from the audience on either gaming or data center segments of the business. Okay, why don't we switch to auto, auto is roughly 5% to 6% of your business. But with a long tailwind and expected to grow strongly as the market transitions more and more towards autonomous driving, you guys announced strong success with your Xavier SOC platform. And as you mentioned at GTC in Shanghai, you announced your Orin platform, help us understand the differences between Orin platform, help us understand the difference between Xavier, Orin and maybe discuss the timelines on when we should start to see first production volumes of your AV platforms with your major auto OEM partners.

### **Colette Kress** {BIO 18297352 <GO>}

Great. So we announced our next overall architecture for the SOC and focusing on a big piece of that on our overall automotive partnerships. So Orin is probably about 7x the overall compute capacity in terms of what we had with Xavier and Xavier was probably top of line against any overall competitive view of it even from a standpoint of their PowerPoints [ph] that they may have had of something in the future.

We know the importance of the overall data collection, the data processing that is going to be necessary inside of the AV cars as we move forward. So we see this as something that we'll have in the hands of our overall auto customers in the couple of years ahead, but an important piece in terms of finishing up that full platform.

Our platform view and focus in terms of AV cars is not just focused in terms of on the production, it's focused, as well as back in terms of the data center, you've seen us focus on creating the overall ability for them to overall test their platforms with both simulated data and or live data. There is a significant amount of training the overall data for these overall AV cars. We're seeing what we will call is a fork in the road of the type of AV that we are working on with many of our overall OEMs, focusing on AV that will focus on high Level 2 moving to Level 3 but also on the other side, focusing on robo taxis or focusing on Level 4 and overall above.

We can do these two things separately with Level 2 plus working on high end passenger cars and looking at Level 4 with removing the overall driver and what we'll find is confined overall scenarios. Now, what we're seeing in the overall market for automotive is it's taking them a little bit longer, the investment that they need to focus on this is something that's going to draw them out, probably closer to the 2022 time frame versus a little bit earlier than what we have had previously

communicated. So we're still working with them, we're probably one of the only ones with a full platform today, that they can build upon, test upon of something that would actually be inside the production pod.

**Harlan Sur** {BIO 6539622 <GO>}

Great. Any updates for us on the proposed acquisition of Mellanox. I know, you're waiting for China approval.

**Colette Kress** {BIO 18297352 <GO>}

So with our Q3 results, we had announced that we believe that the closure of our Mellanox acquisition would probably fall into the first couple areas of 2020 and even since then we have reached overall regulatory approval with the overall EU. With the EU, with unconditional and nothing holding us back in terms of when we actually close. So yes, we are waiting on China. And again, we do believe this will close in the first part of 2020.

**Harlan Sur** {BIO 6539622 <GO>}

So first half of 2020 is that...

**Colette Kress** {BIO 18297352 <GO>}

The first part of 2020, we have to see.

**Harlan Sur** {BIO 6539622 <GO>}

Okay, last question on the financials. There was a big step up in gross margins last quarter 64%, the kind of back to the gross margin levels during the first half of 2018. Part of that is normalization of the business, you guys are past the inventory overhang. The higher margin data center business is starting to have flat and gaming continues to perform very-very strongly through the holiday. So how do you -- how should we think about the sustainability of the 64% plus sort of gross margin profile going forward?

**Colette Kress** {BIO 18297352 <GO>}

Yeah, so our gross margin has always been influenced probably by the biggest piece being our overall mix. The mix starts even with our overall gaming business and with inside our overall gaming business. We have many high-end overall gaming, overall cards and platforms that influence just the overall growth of gross margin. We continue to see an opportunity for people to both upgrade and upgrade choosing a higher end overall card, but the overall ray tracing capability also allows us to appreciate higher gross margins.

Then you discuss in terms of what data center and/or ProViz does to our gross margin as well. Now that we've seen a return in terms of the growth both from a

training and/or an inferencing standpoint that can as well overall influence, our overall gross margins. As we move forward, we will continue to concentrate and see that growth likely improve in the future, but it will probably change a bit quarter-by-quarter with the mix.

**Harlan Sur** {BIO 6539622 <GO>}

Great. With that, we're out of time. Colette, thank you as always.

**Colette Kress** {BIO 18297352 <GO>}

Thank you, so much. Appreciate it.

**Harlan Sur** {BIO 6539622 <GO>}

Appreciate it. Yes, thank you.

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