JPMorgan Tech Forum

Company Participants

- Rob Csongor, VP, IR

Other Participants

- Harlan Sur, Analyst, JPMorgan
- Unidentified Participant, Analyst, Unknown

Presentation

Harlan Sur {BIO 6539622 <GO>}

Okay. Good morning, why don't we go ahead and get started. Good to see all of you. My name is Harlan Sur, small; to mid-cap semiconductor and semiconductor capital equipment analyst at JPMorgan. We are very pleased to have Rob Csongor, Vice President of Investor Relations at NVIDIA here with us this morning. We also have Colette Kress, who recently joined NVIDIA -- she is there waving -- recently joined NVIDIA as their Chief Financial Officer. This happened in September. So Colette, thank you for joining us this morning as well.

NVIDIA held its press conference on Sunday evening. And what I've asked Rob to do is to spend a few minutes just giving a brief overview of what the team is showcasing here at CES. And then we will open it up for Q&A. So Rob, thanks very much for joining us this morning.

Rob Csongor {BIO 3210739 <GO>}

Okay. Thanks, Harlan. Good morning, everyone. It's pretty exciting -- CES for us.

I think, as you guys know, NVIDIA is singularly focused on visual computing. And what that has meant for NVIDIA in the past has been primarily the PC. NVIDIA has been reinventing itself and bringing visual computing into a number of new markets as visual computing becomes important in other markets. And it's been extremely exciting for us at CES to show the work that we have been doing and the work that some of our partners have been doing, including some really exciting announcements last night and some more announcements coming today. So I'll not just cover what -- not only what we covered at the press conference. But I'll also talk about some of the new news that's coming on.

I can summarize what we have announced really in three fundamental areas. First of all, we made a number of new announcements on gaming. We announced a few

new things on chips. And we announced a few new things about cars. So what I'll do is kind of run you through those things.

On the gaming side, you guys are no doubt aware that there is a next-generation gaming console fleet out there. But the other thing that's out there now in what is the largest gaming market is next-generation PC gaming. And we announced a very key technology called GameStream. Fundamentally, what next-generation PC gaming is is the ability to play the highest-fidelity games anywhere you want.

So what we demonstrated was NVIDIA technology running first of all on a PC. So we were playing the latest high-end Batman game. The audience could see Batman playing on a PC. But then we showed it playing on a television using the shield device that we had. GameStream is streaming live in perfect synchronization anything that's happening on your PC into another room in your house, where you sit and play with a shield. And then play it on the television.

We then showed the same game not just playing on a shield. But also being streamed from France. So in other words, what we showed was interactive gaming going over 6000 miles, 30 milliseconds. That's how long it takes the speed of light to reach from France to Las Vegas. And we showed completely synchronous interaction playing the same game, Batman, on a mobile device, being streamed from France.

So these are new technologies that fundamentally take gaming and allow you to have the highest fidelity, highest performance PC gaming. But play it anywhere you want; on the road, inside your house, in front of your PC or in front of your television. And these are technologies that we think are important and coming out very soon.

The other key announcement we made in gaming was a new technology called G-SYNC. Now if you're a gamer, you will be intimately and immediately familiar with the phenomena of tearing. So for those of you not familiar with it, historically -- and this is a decades-old problem -- the monitor and PC exist out of sync with each other. In other words, the monitor -- the GPU renders frames for a game interactively. And then the display displays it when it can.

So in order to sync the two, what happens is you buffer. And occasionally what you'll see is stuttering on the screen, or you'll see the phenomena known as tearing where half the screen will be rendered. Then it's already rendering the next frame. And then they are out of sync. So you see this kind of rippled tear across the middle of the screen. This is a decades-old problem that everybody has lived with. We have been working on new technology that goes into the monitor and then synchronizes the monitor so that the monitor and the GPU exist in perfect synchronization. It displays when we render. And what that required is technology and then collaboration with all of the display guys. So what we announced at CES was that display manufacturers, including ASUS, BenQ, Philips and a whole list of other display manufacturers are going to be releasing G-SYNC monitors that allow this frame rate.

It sounds like second-order technology. And I promise you it's not. Some of the reaction from the press has been this is the single biggest thing we've seen in gaming in a very, very long time. It creates the immediate effect of 60 frames per second, silk graphics and gaming instead of this decades-long problem with stuttering. So those are the announcements on gaming.

We were really excited to announce our next-generation Tegra. You guys know that last year, we introduced Tegra 4 late to the market. And we said that we were introducing Tegra 4 late to the market in order to move in the schedule of a product called Project Logan. Well we paid the consequences last year. And on Sunday we got to reap the rewards.

So we announced a new product. Everyone was expecting it to be called Tegra 5. It's called Tegra K-1. And what we did is we took the best GPU we make, Kepler. And we moved it to Tegra. This does more than just increase the performance of our chip. What it does is instantaneously take all the content we have in PC. It takes all of the content we have in CUDA. You guys are familiar with CUDA, our computer architecture. And all of that content is now brought to the mobile world.

I've got to read you some quotes; these are quotes from the press. Anon -- from Anon Tech, I think if you guys are familiar with the tech world, he is probably one of the more respected. He said with Tegra K-1, NVIDIA went overnight from playing games to drop-dead serious. And Tim Sweeney is the founder of Epic Games. Epic Games is one of the largest content developers for gaming. Tim said we can take absolutely anything that runs on PC or high-end console and run it on Tegra K-1. I didn't think we would be at this level for another 3 to four years.

So that was one thing. By the way, Tegra K-1 consists of 192 cores. It's a 192-core super chip. But this is not like when we talk about Tegra 3 or Tegra 4. When we talk about Tegra 4, we say it's a 72-core GPU. That's talking about graphics. This is a 192-core fully programmable graphics and processing core super chip.

So we are extremely excited about that. And there's a number of things that we showcased at our event. If you come to our booth, you can see what's possible, what can you do now on a tablet, a phone, a car, with this level of processing capability.

There was one other surprise that we kind of popped. I don't think people were expecting this. But we announced that Tegra K-1 is going to come in two flavors. The first flavor is what people were expecting: a 32-bit Quad-core A-15 processor with 192 cores.

The second thing we announced was the first Denver product that we have been talking about for a number of years. So we announced a number of years ago that NVIDIA had an architectural license for ARM -- with ARM for V8. And what we not only announced yesterday. But we showed it running. We showed our dual-Denver version of Tegra K-1. And we showed it running Android. So that was the first

demonstration of Android running on a 64-bit apps processor. And that was on Sunday.

Okay, the third area was cars. What we announced on Sunday was a new product called Tegra K-1 VCM. So VCM stands for vehicle control module. So if you can imagine, what we did is we took Tegra K-1 -- and remember, I said this is not just about graphics horsepower. This is about the world of CUDA: taking all the compute applications, computer vision, all of those types of applications. And now moving it into a mobile world. And Tegra K-1 for VCM basically brings supercomputing into your car.

Car & Driver, by the way, let me just read you a quote here really quick. The next generation of Tegra will perform at 384 gigaflops with four processors per car. A two-car garage would have as much computing power as the $120 million Blue Mountain supercomputer installed at the Los Alamos National Laboratory in 1988. So this is Gary Vasilash from Car & Driver.

So I think -- the car used to be a collection of metal, upholstery and rubber. And it is very rapidly becoming a supercomputer. And it sounds very grandiose to say it. But when I tell you about what happened last night, I think you'll understand why it's not.

What we did, the second thing that we showed off was a product, an initiative from NVIDIA called Project Mercury. One of the announcements that you'll see today is announcement between NVIDIA and Audi to create rendered instrument panel consoles for the fleet of Audi cars. And what's required for consumers, if you want to replace the physical gauges and replace them with rendered, the advantages is not eye candy. It's not just eye candy. If you talk to Audi, they are dead serious about the implications of human-machine interface and the advantages of rendered displays as it pertains to safety, better features, more awareness for the driver and what they call advanced driver systems.

So one of the things that we showcased in the press event was Tegra K-1 for what's called ADAS; it's Advanced Driver Assistance Systems. So what this does is the car equipped with cameras is doing computer vision using a Tegra, to do things like pedestrian detection, collision avoidance, blind spot management, lane warning, to keep the car, adaptive cruise control, all done automatically using the computer. So there is a tremendous amount of processing power involved with doing this. And we demonstrated this.

The second thing was we showed rendered instrument cluster and the amount of horsepower -- and I just invite you to come to the NVIDIA booth, because you really have to see it to kind of grasp what you're looking at. You can custom-create your instrument panel. Using tools developed by NVIDIA and an incredible amount of software, you can create brushed aluminum, bump rubber, chrome. You can do all these things. And we couldn't do it with Tegra 4. The amount of computation required to create something that looks so real and is lit, using global illumination, to create that level of realism, is just not possible unless you have a tremendous

amount of computing power. And that's what Tegra K-1 brings to the instrument cluster. Okay?

Let's see. There was -- I think today, if you say the word Android, most people think of phones and tablets, because that's what mobile is. So -- but one of the things that was announced yesterday was we did an announcement together. Google and NVIDIA together with Audi, Honda, Hyundai and GM announced the open automobile alliance group, which is -- has the objective and mission to bring the Android platform to a device that's always been mobile: the car. So when we've talked in the past about how Android is moving beyond phones and tablets to lots of other devices like televisions and consoles, yesterday's announcement is the concrete delivery. You're going to see Android in a lot of different devices. And NVIDIA's focus with Tegra is on those segments of the Android market where visual computing matters. And the automobile is clearly one of them.

There's one more announcement that you will see today. NVIDIA and Audi are announcing three new things. We are announcing a new infotainment system that's twice the power of the previous generation. We are announcing a fully integrated rear seat tablet that integrates together with the car's infotainment system. And we are announcing the first fully rendered instrument cluster powered by NVIDIA Tegra.

There was one other thing very cool. And then I am done. Last night at the Audi keynote, Rupert Stadler, the Chairman of the Board and CEO of Audi, announced a new system called zFAS. And zFAS is just astounding. At the -- I don't know if you guys saw it. But at the announcement last night, at the keynote, Audi had two cars drive themselves onto the stage. zFAS is a system for piloted driving. And Jen-Hsun, our NVIDIA CEO, came onstage with Audi to announce that zFAS is powered by Tegra K-1. So that was very exciting for us. It's just the result of a lot of work at NVIDIA and we are very pleased.

Questions And Answers

Q - Harlan Sur {BIO 6539622 <GO>}

Great. Well thanks for that overview on what the team is showcasing here.

On Tegra K-1, obviously you guys have working 28 nanometer silicon, I think the tablet you're using here is based on Tegra K-1. Is that correct?

A - Rob Csongor {BIO 3210739 <GO>}

Yes. I have one here.

Q - Harlan Sur {BIO 6539622 <GO>}

Then I think Jen-Hsun showed the Denver-based 64-bit-based version of K-1 at the press event on Sunday. So I guess the question is, when is the team going to be in the position to start shipping qualified production units? And when are we going to

actually start to see Tegra K-1 showing up in customer smartphones and tablets? Is it 2014, or is it 2015? Can you just give us a sense on time lines?

A - Rob Csongor {BIO 3210739 <GO>}

Yes, sure, it will be this year for sure.

Q - Harlan Sur {BIO 6539622 <GO>}

Okay.

A - Rob Csongor {BIO 3210739 <GO>}

When we announced Tegra K-1, we are not announcing demos. We did demos last year. We did sneak previews of Logan last year. So what we are announcing is that we are moving into production. So you're going to see devices being built in Q1. And then I would expect that you would see device -- devices start coming out in the Q2 time frame.

And most likely, the announcements -- most likely announcements are on that are done close to the launch of the product --

Q - Harlan Sur {BIO 6539622 <GO>}

Right.

A - Rob Csongor {BIO 3210739 <GO>}

-- With the exception of last night's announcements with Audi.

Q - Harlan Sur {BIO 6539622 <GO>}

And I'm assuming that the first devices that are going to be rolled out are going to be based on the Quad-Core A-15 architecture versus the Denver architecture? Is that a fair assumption?

A - Rob Csongor {BIO 3210739 <GO>}

Yes. That's right, Harlan. The first devices that are coming out are the Quad-Core A15, the 32-bit. And the 64-bit we demoed last night for the very first time. The part had literally just come back like a week ago. And it was up and running. So we said hey, let's show it.

But that will I think -- what that means is that we have functioning parts right now. And then you can look for it to come really in the second half of the year.

Q - Harlan Sur {BIO 6539622 <GO>}

Okay. And one of the trends in the smartphone and the tablet space from an applications processor perspective has been -- we've seen more and more integrated platforms coming to the market, in other words, integrated apps

processor with LTE baseband modem. So question for you is similar to your Tegra 4 strategy, you had a Tegra 4i with integrated LTE cellular connectivity. Is that a strategy that you're going to pursue as well with TK-1?

A - Rob Csongor {BIO 3210739 <GO>}

We haven't announced anything. We just announced the Tegra K-1 right now. So we haven't announced any kind of roadmap really beyond that. But it's clear that the modem is important for us.

One of the other things that Audi talked about last night was the concept of the connected car. All these cars are going to be connected via LTE, almost continuously. A recent report came out. And by 2017 almost every car on the road will be connected on a continuous basis.

So the investment we made in acquiring Icera was our recognition that this is a key component of visual computing. We are not in the baseband business; we are in the visual computing business. And the baseband helps us.

Now in some cases, an integrated solution might make sense. And in some cases a discrete solution would make sense. So I think we are -- we will have both. You will see both. And then as we get more into these markets, I think we'll unveil more of our roadmap and you will see where we make decisions on what goes where.

Q - Harlan Sur {BIO 6539622 <GO>}

Okay. As it relates to Tegra VCM for automotive, I think this is a great example of addressing the need for more processing horsepower, processing capabilities in cars to support things like ADAS, right, for things like collision avoidance. ADAS requires heavy computational power running very sophisticated algorithms. So how does this move to more intelligence in the car increase in NVIDIA's dollar content per car, looking out over the next 1 to three years? So for example, if you take the current Audis that are shipping today with -- I think it's Tegra 3. And maybe compare that to some of the partnerships that you are announcing today and those cars. And how much Tegra content could we see in the next 2 to three years?

A - Rob Csongor {BIO 3210739 <GO>}

You could end up -- I would say with as many as eight processors per car. The first cars with NVIDIA really just focused on infotainment. And when I say infotainment, that really means the car nav. We very rapidly started moving to cars that had two. So for example, the Tesla S sedan, you guys are familiar with, has a big beautiful 17-inch display in the center, very high-resolution moving map of Google Earth. That was a collaboration between NVIDIA and Audi and Google. And that car has two.

I think when you start introducing instrument cluster, when you start introducing ADAS, you very rapidly start adding -- you need a lot more compute capability to do those types of things. And I think as more and more of these features and all of these features are very, very visual computing-intense, as you said, you will see more processors.

Q - Harlan Sur {BIO 6539622 <GO>}

Okay. Obviously, the design-in lead times are pretty long in the automotive space. So when would you envision seeing Tegra K-1 VCM starting to show up in next-generation automobiles?

A - Rob Csongor {BIO 3210739 <GO>}

That's actually a great question. The answer a long time ago would've been: it takes forever. I was actually -- I started -- in 2003, I was actually GM of automotive. And we closed our first design win. And that product didn't come to market for six years.

I think one of the things that Rupert Stadler talked about last night in his keynote was that the car is evolving. The car always used to lag technology-wise behind consumer electronics because of the fundamental nature of how a car was architected in. With VCM capability -- imagine a backplane similar to a PC with a consistent architecture. And as new technology comes, you can simply replace a VCM and put in the latest technology with the appropriate software.

The end result is that time to market for new technology literally has gone from six years to a couple of months. And I think what you will see going forward is that the car is going to advance beyond the capabilities of your smartphone very rapidly. As you can imagine, in order to do pilot of driving, computer vision and all of that type of thing, that's a level of horsepower that I don't think you have in your smartphone today.

Q - Harlan Sur {BIO 6539622 <GO>}

Why don't we see if there are any questions from the audience.

A - Rob Csongor {BIO 3210739 <GO>}

It's perfectly clear, yes.

Q - Unidentified Participant

The technology seems really impressive. But how much is the incremental revenue growth of the new product versus the old? And how much more profitable or less profitable is the new product?

A - Rob Csongor {BIO 3210739 <GO>}

That's a good question. I would say that we haven't talked -- we haven't unveiled specific ASPs. And there's a lot of productization and a lot more things that have to happen. But we have talked about the revenue growth of our automotive business.

Today, it's roughly a $100 million business for us. But very rapidly ramping. And it's very steadily ramping. We have also said that it is our largest backlog -- revenue backlog. And the reason is the bad news is, as Harlan said, is it takes forever to get designed in. But once you get designed in, you get a purchase order that extends

out for many, many years. So that's why the revenue backlog is something a lot more visible for us.

So based on what we can see, we have talked about the fact that we see the business roughly doubling on a year-to-year basis to $400 million by 2016. And depending on how fast some of these new driver systems and advanced features go. And I think you will learn a lot more -- there's a lot of design wins and a lot of things that we haven't been able to introduce or talk about yet. And I think as some of that becomes clear, you'll see a lot more of the tangible indicators of that revenue growth.

Q - Harlan Sur {BIO 6539622 <GO>}

That -- so that was doubling to $400 million in fiscal 2016, right?

A - Rob Csongor {BIO 3210739 <GO>}

I think we said by 2016.

Q - Harlan Sur {BIO 6539622 <GO>}

By 2016, okay, got it. Question over here?

Q - Unidentified Participant

Could you talk about design wins on 4i?

A - Rob Csongor {BIO 3210739 <GO>}

The question is -- can we talk about design wins on 4i? The honest answer is no, not today. We don't have any news to date on that. CES has actually become less and less of a phone show. I think a lot of people kind of look at MWC as their next stuff. But Tegra 4i is doing great. And when we have some news, we'll share it.

Q - Harlan Sur {BIO 6539622 <GO>}

I've got a question on Tegra 4. We were surprised with the win that the NVIDIA team captured on the Xiaomi Mi-3 smartphone for China. As most of you know, Xiaomi is one of the fastest smartphone suppliers in China. Up until the Mi-3, Xiaomi had exclusively used QUALCOMM on their prior 2 generations of phones. And we're also hearing about Tegra 4 showing up on smart TD-LTE smartphones at ZTE and a few more high-end China smartphone suppliers.

So the question for you is -- what are the performance differentiators that are enabling Tegra 4 to do well, especially with some of the high-end China smartphone OEMs?

A - Rob Csongor {BIO 3210739 <GO>}

That's a great question. And I think it's -- if I can, I'll kind of take your question and try to address I think what is one of -- a fundamental concept of Tegra.

We get asked all the time, how can Tegra succeed when you're going to be competing against MediaTek and QUALCOMM on low-end phones and so on? It always is kind of a weird question for us because, similar to the PC market, we have never been a low-cost supplier. We have never competed in the low end of the PC market. 70% of the PC market you don't need an NVIDIA GPU and we've never sold to it.

What we do is we carve out segments of these markets where visual computing matters. And then we sell into those markets where people really value it. Then we drive a very large business with very large gross margins, good operating income, we generate cash etc., etc.

In the PC market, those segments are gaming and professional design. Our strategy with Tegra is the same. You will not see Tegra in low-end phones competing with MediaTek, or with QUALCOMM. But you will see Tegra in devices where visual computing matters. The Xiaomi phone is an example of a device where visual computing matters. Xiaomi wanted to put out a phone that would win every benchmark in the China press. They would outperform smartphone, outperform Samsung Galaxy S4. And it would run the best games in the largest Android gaming market in the world, which is China. And for that, they went with Tegra. And they accomplished exactly what they set out.

Now phone -- I know that when you say Android, you automatically think about phone. And phone is an opportunity for NVIDIA. But we view the Android opportunity for Tegra as much, much more than phones. Another way to say it is that it is not critical to the success of Tegra for us to win every phone design. And hopefully, when you take a look at new types of devices coming out, new types of tablets, when you see the capabilities of what Tegra K-1 can do in a tablet, when you see what it does to a car, when you see what it can do to other devices that I think you'll see coming out this year, then I think you will understand that NVIDIA's focus.

Q - Harlan Sur {BIO 6539622 <GO>}

Got it. One question back there.

Q - Unidentified Participant

What is your view on the Chromebook market and the suitability of the ARM architecture for it and NVIDIA's plans?

A - Rob Csongor {BIO 3210739 <GO>}

That's a great question. You guys know we are very close to Google and we collaborate with them on a lot of things. We see Chromebook and clamshells and Android in all of these markets kind of evolving into a lot of different types of devices with a lot of different flexibility and different kind of features and capabilities.

Today, Chromebook is a very convenient way to look at documents, to look at Google Docs, to browse the web and do a number of things. It isn't a primary gaming platform today. And for that, I think that's why you will see most of our focus

today more on the Android side. But the line is blurring. So I think we have some interesting things that are going on with Chromebook and we look forward to talking about them hopefully soon.

Q - Harlan Sur {BIO 6539622 <GO>}

Great. We're just about out of time. Rob, thank you very much. I always appreciate it.

A - Rob Csongor {BIO 3210739 <GO>}

Thank you very much. Thanks for your time.