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2330.TW - Q2 2018 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

EVENT DATE/TIME: JULY 19, 2018 / 6:00AM GMT

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PRESENTATION

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

(foreign language) Welcome to TSMC's Second Quarter 2018 Earnings Conference and Conference Call. This is Elizabeth Sun, TSMC's Senior Director of Corporate Communications and your host for today.

Today's event is webcast live through TSMC's website at www.tsmc.com. (Operator Instructions) As this conference is viewed by investors around the world, we will conduct this event in English only.

The format for today's event will be as follows: First, TSMC's Senior Vice President and CFO, Ms. Lora Ho, will summarize our operations in the second quarter 2018, followed by our guidance for the third quarter. Afterwards, Ms. Ho and TSMC's CEO, Dr. C.C. Wei, will jointly provide the company's key messages. Then, TSMC's Chairman, Dr. Mark Liu will host the Q&A session, where all 3 executives will entertain your questions.

For those participants on the call, if you do not yet have a copy of today's press release, you may download it from TSMC's website at www.tsmc.com. Please also download the summary slides in relation to today's earnings conference presentation.

As usual, I would like to remind everybody that today's discussions may contain forward-looking statement that are subject to significant risks and uncertainties, which could cause actual results to differ materially from those contained in the forward-looking statements. Please refer to the safe harbor notice that appears on our press release.

And now, I would like to turn the microphone to TSMC's CFO, Ms. Lora Ho, for the summary of operations and current quarter guidance.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Thank you, Elizabeth, Good afternoon, everyone. Thank you for joining us today. I will first summarize our second quarter financial results and then provide the guidance for the third quarter.

Our second quarter revenue was USD 7.85 billion, a decrease of 7.2% sequentially, but an increase of 11.2% year-over-year. In NT dollars, revenue declined 6% sequentially mainly due to the impact from mobile product seasonality.

Gross margin was 47.8% in the second quarter, a decrease of 2.5 percentage points versus first quarter. About 2 percentage points of the decrease was attributable to the absence of the favorable inventory valuation that I had mentioned in April, while the remainder was attributable to a lower level of capacity utilization, partially offset by cost improvements and slightly more favorable foreign exchange rate.

Operating expenses ratio was 11.3% as our revenue decreased more than our expense decreased. Operating margin decreased 2.8 percentage points Q-over-Q to reach 36.2% in the second quarter.

As I said during the last quarterly conference, the corporate tax rate was increased to 17.5% in the second quarter as we accrued the 10% tax on undistributed retained earnings, the tax rate will fall back to 10% to 11% level in the second half, and the full year tax rate will be about 12%. Overall, our second quarter EPS was $2.79 and ROE was 18.7%.

Now let's take a look at wafer revenue contribution by application. During the second quarter, Communication and Industrial standard decreased 14% and 1%, respectively, while Computer and Consumer increased by 34% and 23%, respectively.

Now let's take a look at revenue by technology. We begin volume production of 7-nanometer process technology in the second quarter. The revenue contribution was less than 1% in second quarter, and it will ramp to above 10% in the third quarter. 10-nanometer contributed 13% of total wafer revenue during the second quarter, while the combined revenue from 16- and 20-nanometer accounted for 25%, and 28-nanometer was 23%. Advanced technologies defined as 28-nanometer and more accounted for 61% of total wafer revenue.

Moving on to the balance sheet. We ended the second quarter with cash and marketable securities of TWD 749 billion, an increase of TWD 65 billion from the first quarter. On the liability side, current liabilities increased by TWD 121 billion as we accrued about TWD 208 billion for cash dividends, which will be paid out today.

On financial ratios, accounts receivable turnover days decreased 4 days to 38 days. Days of inventory increased 11 days to 74 days primarily due to the ramp-up of 7-nanometer, which has a longer cycle time and a slightly increase in raw wafers.

Now let me make a few comments on cash flow and CapEx. During the second quarter, we generated about TWD 130 billion cash from operations and spent TWD 60 billion in capital expenditures. As a result, we generated free cash flow of TWD 70 billion. Overall, cash balance increased by TWD 54 billion to TWD 632 billion at the end of the second quarter. In U.S. dollar terms, the capital expenditures spent in the first half of the 2018 totaled USD 4.5 billion.

Now I have finished my financial summary of the second quarter. Now let me provide you the third quarter guidance. Based on the current business outlook, we expect third quarter revenue to be between USD 8.45 billion and USD 8.55 billion, which is an 8.2% sequential increase at the midpoint.

Based on exchange rate assumption of USD 1 to TWD 30.50, our third quarter gross margin is expected to be between 48% and 50%. And our third quarter operating margin is expected to be between 36.5% and 38.5%. This concludes my financial summary.

Now let me make remarks on capital expenditure and profitability. I'll first talk about the capital expenditure. In our last Investor Conference in April, we stated our 2018 CapEx budget to be between USD 11.5 billion to USD 12 billion. However, we now plan to trim our CapEx budget by about USD 1.5 billion and expect our 2018 CapEx to be between USD 10 billion and USD 10.5 billion.

The reduction of 2018 CapEx come from the following 3 factors. The first one, about USD 700 million came from delay of payment to 2019 due to leading edge tool relocation schedule adjustment. However, the planned capacity remained unchanged.

Second, about USD 600 million comes from efficiency gains that allow us to spend less on tools. Third, about USD 200 million comes from the U.S. dollar appreciation against euro and Japanese yen.

My second remark is regarding profitability. Now I will talk about third quarter '18 gross margin and the overall outlook of our profitability. Our third quarter gross margin is expected to improve from second quarter by more than 1 percentage point. The increase mainly comes from better utilization rate, more favorable foreign exchange rate and improved profitability of our back-end business, offset, however, by the unfavorable technology mix, which include the ramp of 7-nanometer that is expected to dilute our gross margin by more than 1 percentage point in the third quarter, and the lower contribution from 28-nanometer. The net gain in gross margin, therefore, is expected to be slightly more than 1 percentage point.

That said, TSMC's financial objectives remain unchanged. Our goal is to achieve revenue and net income compound annual growth rate in the next few years to be between 5% and 10% in U.S. dollars, gross margin to be about 50%, operating margin to be about 39% and ROE to be above 20%.

This ends my remark. Now let me turn the microphone to C.C. for his comments.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Thank you, Lora. Good afternoon, ladies and gentlemen. Let me start with our near-term demand outlook. We conclude our second quarter with revenue of TWD 233.3 billion or USD 7.5 -- USD 7.85 billion, in line with our guidance given 3 months ago. This result reflected mainly a stronger demand from high-performance computing, including cryptocurrency mining, but it was offset by seasonal decline in high-end smartphones.

Moving into third quarter 2018. Our business is expected to benefit from new product launches using TSMC's industry-leading 7-nanometer technology, while cryptocurrency mining demand will decline due to weakening cryptocurrency prices. That being said, we do see slight improvement in smartphone demand in second half of this year as compared to our forecast 3 months ago. GPU demand for AI in the gaming continue to increase.

For the full year of 2018, we forecast the overall semiconductor market, excluding memory, will grow by 5% while foundry is expected to grow by about 7%. We forecast TSMC's 2018 revenue in U.S. dollar will grow by a high single-digit rate rather than the previously stated about 10% due to general weakness in cryptocurrency mining demand.

Now let me move to long-term business growth driver. As we stated 3 months ago that we are optimistic about the development of the industry's mega trend, particularly AI and 5G communication. Recently, we have observed more promising development. For example, we see AI continues to fast proliferate from data center to edge server and to end client devices. As for 5G, major operators in several countries have roll out the development schedule, while multiple ODMs and IC vendors have planned their 5G products, which are set to ramp in the coming 2 years. Despite the slowing unit growth in smartphones in the near term, we expect the development of 5G while fuel the next wave of smartphone growth both in units and in silicon content.

In HPC, we expect the increasing workload in data center and complexity of AI will boost the demand for AI accelerator, GPU and CPU in server. We also expect the introduction of next-generation video gaming will add growth of HPC. We believe all our 4 core platforms -- smartphone, HPC, IoT and automotive -- are well positioned to benefit from the longer-term mega trend of AI and 5G. With our leading and comprehensive technology offering our vast capacity and our policy of not competing with customers, we will be able to support our customers to expand their markets and, therefore, fuel our future growth.

Let me talk about N7 ramp-up status. TSMC's 7-nanometer technology is leading in the industry. It has the best performance, power and area density, and its schedule is ahead of competition. For the tape-outs that we have completed for customers, all have very good yield and performance. We forecast a total of more than 50 customer product tape-outs by end of this year from a wide range of applications covering mobile, server CPU, network processor, gaming, GPU, FPGA, cryptocurrency, automotive and AI. Our 7-nanometer is already in volume production and accounted for

less than 1 percent of our total wafer revenue in second quarter. It's expected to jump to more than 10% of our wafer revenue in third quarter and is estimated to contribute more than 20% revenue for us in fourth quarter this year.

Let me talk about the N7+ and EUV. Our 7-nanometer-plus or N7+ can leverage the success of our N7 and enjoy 15% to 20% better gate density and more than 10% power reduction. With a few EUV layers replacing certain immersion lithography process, we are able to have fewer masking layers, shorter cycle time and less process complexity. Therefore, we expect to achieve better yield as compared to our N7.

Furthermore, as we have fine-tuned all the advanced equipment to their optimum condition due to the ramp-up of both our 10-nanometer and 7-nanometer technologies, we believe we can leverage our production learning to 7+ and enjoy the industries of best defect density among our peers' comparable technologies.

The silicon results from our N7+ today are very encouraging. The lead N7+ product has tape-out early this month, and we expect to receive a few more tape-outs by end of this year. Volume production will start Q2 next year. That is Q2 2019, which will be the world's first EUV foundry production by that time. We have made ready multiple EUV scanners to support not only the N7+ development but also N5 development. Our silicon data have proved all the benefits we expect from process simplification with EUV. In addition, we have also started our N3 technology development using EUV.

Now let me talk about the EUV status. Good progress continued to be made in the EUV infrastructure in the last few months. They include photoresist, mask defect and yield, pellicle defects and transmission. Beside the silicon development, EUV technology continues to mature toward high-volume production. We have achieved 250 watts source upgrade in April, and the tools are running smoothly with minimum degradation and high level of uptime. In summary, we started EUV development work early, and we have secured the largest number of EUV tools among our peers to be ready for 2019 volume production for N7+ and 2020 volume production for N5.

Let me talk about N5. Our 5-nanometer technology, N5 is progressing well. The 256 megabits SRAM yield is 1 quarter ahead of schedule, and the device performance is well on track. TSMC's N5 will begin risk production in first half 2019. We believe it will be the most advanced technology in the foundry industry by that time. We are actively engaging with several lead customers, and we are running their test chip now. We expect to receive first customer product tape-out in first half 2019. Volume production is expect to start in first half 2020.

I'm talking about now with our specialty technology. We work closely with our customer to accelerate our specialty technology roadmap. By leveraging our logic capability, we develop specialty technology features, such as MEMS, CMOS image sensor, high-voltage power management IC, emerging and embedded memories and analog. To more advanced node, including 55-, 40-nanometer and 28-, 22-nanometer. These efforts bring scaling benefit to our customers.

Our 22ULP process is qualified and on track for risk production in August. That is next month. About 40 customer product tape-outs using our N22 are planned in the next few quarters, covering a broad spectrum of applications from digital TV, consumer electronics, to IoT and RF connectivity. N22 have 15% performance gain, 25% power reduction, and 5% to 10% die area shrink when compared with N28. With these improvements, we expect our N22 will extend our leadership at 28-nanometer node and enjoy a long and successful economical life.

Since we have already built a broad technology capacity at 12-inch for various specialty technologies, we are migrating some of our customers' product from 8-inch to 12-inch with seamless transition, while our customer can enjoy flexible capacity support and further scaling benefit. And that's all. Thank you for your attention.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

This concludes our prepared statements. (Operator Instructions) Questions will be taken both from the floor and from the call. Should you wish to raise your questions in Chinese, I will translate it to English before our management answers your question. (Operator Instructions) Now, let's begin the Q&A session.

QUESTIONS AND ANSWERS

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

First question will be coming from Credit Suisse, Randy Abrams.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

The first question I had on the 28-nanometer. You talked last quarter about it being a bit under-utilized. Could you talk about now your confidence to backfill that node? And last quarter, you mentioned a big mask investment. How much of that is tied to some of these backfill activities versus the mask writer investment for some of the advanced applications?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

So you have 2 questions. The first one is 28 nanometers loading and...

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

And 28 loading your confidence to get that loaded, the type of applications. Second part of that is the mask investment. How much of that is tied to these backfill applications versus advanced capacity?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

All right. In my statement, I say that we improved 28-nanometer to 22. And now, a lot of 28-nanometers tape-outs have been changed to 22-nanometer. And we start to ramping up 22-nanometer next month. It will take probably a few quarters so that 22-nanometer volume will be high. So I expect that after few quarters, the 28-nanometer node, the confidence to fully utilize high -- is high. Now you're talking about...

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Can I add to this one.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Yes.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Regarding your question, by the way thank you, and good afternoon everyone that joined this conference and also the online participants, particularly on this hot summer afternoon. On 28-nanometer, this is the eighth year of our 28 production, and inevitably the competition is coming gradually. And with some expectation, they build capacities. But the 28-nanometer has a lot of nuance in it. You have high performance. They're a different grade of speed. Now C.C. is talking about additional sub-node 22-nanometer. I think the under-loading will be a -- temporary, and we intend to backfill this capacity based on our technology differentiation.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

So Randy, your second question is we invest in mask capacity.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Very high CapEx last quarter for mask. Just what was the purpose or what applications you were tied to this high capacity relative to history that you've called out the mask CapEx?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Still -- actually, we invest our mask capacity because of a leading-edge node. Most of it is because of leading-edge node because it's very complicated in making the masks and many layers. Related to 28 is part of it because we still have a very high activity in 28-nanometer node. Actually, still that's #1, #2 tape-outs account for TSMC total tape-outs.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. So it sounds like it's both 28-plus for the 7-nanometer for the mask?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

And 16.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

The second question I have on cryptocurrency. In the past, it was on a lagging node like 28 and 16, where it was filling capacity as a second-wave application. How do you view crypto? It's slowing in second half? But how do you view devoting new capacity as crypto to get the best performance and power want to move to 7. So how do you see that market and also devoting capacity if it becomes more of a first-wave application?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Well, cryptocurrency all related to the hash rate. So naturally, they will move to very high-end leading-edge technologies to improve the performance and lower down the power consumption. Whether that will be that at the same time as a high loading when we move into the leading edge that I -- probably, we cannot say that. It's volatile in the business. You knew it, and it's continued to depend on the cryptocurrency's pricing, so we don't plan our capacity because of that.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from UBS, Bill Lu.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

Lora talked about a slightly lower CapEx, and $600 million of that is from the efficiency gains. Can you talk a little bit more about that? Is that mostly from 7-nanometers? Or where is the gains coming from?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Okay. The $600 million efficiency gains actually cover various area. Number one is process simplifications. If you have a simpler process, you don't need to buy that much tools, #1. And we also share tools between R&D and operations. If we can find more opportunity to share, we don't have

to buy that much tool, okay. The third one is that, relating to the backend equipments. We do see with effort from TSMC and customer jointly do see a chance for reductions. So those are the few areas that we classify as efficiency gain. Of course, you know we are always doing that, and we just have results coming right now.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Lora, I can add more color to that. What we call efficiency is that. Let me tell you, we planned customers' product out. So you need some kind of processing cycle time. You need to buy the tool. Tool has a lead time. So now we improve our process cycle time quite a lot. So now you don't have to buy the tools so early. One. The tool vendor work with us, so they also shorten the lead time. So we don't need to buy so early, and that's what we call part of the reason of that called efficiency improvement. It is continued to improve. That's progressing every day, every month.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

I guess, I'm just wondering how much of it is one-time? And how much of it can I translate into lower CapEx going forward?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

It was our continuous effort because of it's our job to shorten the cycle time. Usually, if we ramp up a new technology, the cycle times will be longer. Now we are getting better. We're getting very aggressive and very competitive cycle time, and so that's why we can cut it.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

Last follow-up on that. So I don't know the exact number of it, but I think the company has said CapEx next several years, if I'm not mistaken, $10 billion to $11 billion? So do you want to comment on that whether there's any new thinking or changes?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Of course, number is kind of a rolling forecast. As far as we can see, it's still within that range, and the CapEx intensity, as I said earlier, is somehow between 25% to 30%. We're still with that view.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

My second question is on the 7-nanometers. It sounds like it's progressing quite well and maybe slightly ahead of plan in terms of your yield improvement and such. Can you just talk about the yield and the improvements that you're making there versus the previous couple of nodes, maybe 10 and 16?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

The yield is progressing very well. Performance is good. As compared with previous node, it's comparable probably a little bit better. But I cannot give you exact.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Basically, 7-nanometer we just have a better architecture and make the yield improvement easier.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

Will that imply that you get to corporate average gross margin a little bit earlier as well?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

I think the rule of thumb, I said, about 8 quarter from mass production into quarterly average is about the same. We have seen that for every nodes have that kind of pattern. There's no exception this time.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from Deutsche Bank, Michael Chou.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

The first question is actually for 28 follow-up. You mentioned after few quarters, your UTR for 28 all relatively should improve. So is that under the assumption of the same capacity this year? And do you think the next year total 28-, 22-nanometer sales will be up year-over-year? That's my first question.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Michael, let me tell you that TSMC continued to improve the productivity. So actually even with those spend, the CapEx, the capacity continued to increase. So that every year, when we're talking about our business versus the UTR, actually, the capacity continued to increase. And your question is the revenue?

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

Yes. Will 28/22-nanometer together be up year-on-year in 2019 and do you maintain the same -- I shouldn't say maintain the same. Given under-utilized 28-nanometer, would you consider converting 28 node capacity to advanced node going forward or you will adjust and maintain the same capacity?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Converting the capacity is last resort, okay. We want to fill the capacity based on technology. This is a constant effort. And 22-nanometer is one example. There are other specialty technologies on the pipeline to offer, and that is our first result, hopefully, to get to fill it up as much as we can. If by then that we'll have other capacity adjustment option. But at this time, it's not on our plan.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

So do you expect revenue?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

I would expect in 2019 probably drop a little bit because we are ramping up. And after that, we'll start to increase.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

You mean, 2020?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Yes.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

Second question, regarding 7-nanometer progress. You mentioned you will do server CPU, if I heard you right. So would that be ARM-based or x86 or you cannot give color for that?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

It's too specific. So it's a CPU.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from Citigroup's Roland Shu.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

You talked about 7-nanometer will be more than 10% of the total revenue in 3Q versus less than 1% in second quarter. So the increase for the 7-nanometer is more like 10%, but the 3Q overall revenue guidance growth is less than 10%. It means the other revenue from 10-nanometer and above are declining. So can you give us more color for this technology node, which node is strong, which node is weak in 3Q?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Which node is strong? Which node is weak?

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Yes. Because the overall 10-nanometer, 16, 20, 20 and above the overall revenue in 3Q will decline sequentially. So I would like to know for which node specifically is strong and which node is weak in 3Q?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

I cannot comment on that, right.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

But we know 10-nanometer actually will still decline. Is that right?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Right.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

So it means 16 would be still...

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

You want to ask one by one, huh? Starting from 0.15-micron, something like that. That's good enough. Actually, you know that our 7-nanometer is very strong. 7 and 10 very strong. 16-nanometer is fully loaded. So that's good enough information for you to estimate.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Okay. And follow-up question for this 7-nanometer ramp-up because now we think 7-nanometer will be a major node like 16- and the 28-nanometer. So question is for next year, for 7-nanometer revenue ramp-up, will it be similar as 16-nanometer in 2016 or 28-nanometer in 2013, which is the second year for you ramp up this...

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Stronger than any node we have in history.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Okay, so that means I know for next year for maybe on a single quarter for 7-nanometer, reach 30% of the total revenue will be a reachable target.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

I don't want to go to a quarter, okay, Roland. I would say we just said, 7-nanometer will account for 10% third quarter, more than 20% in fourth quarter. For next year, 7-nanometer will account for more than 20% for the whole year. That's all I can say.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Okay. Second question is for June monthly sales unusually declined by double digit percentage point year-on-year and quarter-on-quarter. Was that because customer did not take the wafer shipment in their quarter-end? Or was that purely because of the demand weakness?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Don't look at monthly revenue, because look at the quarterly revenue, which we have just provided guidance.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Okay. I still have to ask, how about the 3Q monthly sales linearity in 3Q?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

The monthly linearity is not really in our control. The customers shipping ahead of their schedules, sometimes within a couple days range they want to adjust their inventory, and there are many factors. So it's not to our target that we target each month have a financial goal, rather it would be a quarterly goal.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from CL Securities' Sebastian Hou.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

My first question is on N5. Regarding the tape-out, early mentioned that you expect to receive the first tape-out in first quarter or early next year. So how much -- how many tape-out do you expect to receive by the end of next year before the mass production begin in first half 2020?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Actually, we don't know at this time. 5-nanometer as a node, of course, is in the development. Right now we know that we have customer test chips put it in our test vehicles, several of them. And those are the functional blocks of their products. So at this time, most of them haven't committed a tape-out date. So we really cannot summarize the number particular time, but the engagement activity is very active.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

So how do you compare the engagement activity or customer interest to N7 at the same...?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

At this time, probably less than N7 at the beginning because this is a big investment for our customers. And they would -- I think they are planning later time when N7 gets to ramp up in full.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Then how do you see the ROI in N5 and 7. If less interest right now, and how do you -- and the investment probably larger for you, and how in terms of payback, ROI? How do you compare N5 and 7 at this moment?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

It will be very similar.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay. My second question is on the advanced packaging that noticed -- I think TSMC has continued to roll out new or launch new packaging offerings almost every year. So can you give us more -- some update on that? And what kind of -- how many product offerings you have on this? And do you see this becoming -- TSMC become even more serious in packaging rather than just in the past to facilitate the big customers?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

We have been very serious all the time. And in fact to add some color to it, in the future, we see the high-performance computing is very important. And the TSMC's advanced packaging here for the customer to improve the system performance and so there are more and more activities to engage with the customer for their high-end computing devices.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay. So can we assume that a big portion of the new tape-out you are receiving on 16-, 12-, 7- and potentially 5-nanometers will adopt your packaging solution whatever it's InFO, its variance, or CoWoS?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Sebastian, the advanced packaging is a major thrust of our technology development. The reason is the Moore's Law over the years is indeed slowing down. That means we have to create more value to our customer on their product to allow the technology migration continue. And advanced packaging is -- you can almost say -- it's a parallel thrust together with Moore's Law to develop our customer's product. And advanced packaging development encompass the -- our customer's architecture development and algorithm development. In that, I'm talking about we're going to the 3D-IC and that is the purpose to add to this Moore's Law development to maximize our customer's product. Okay, so this is not a typical packaging business. It is a major technology development for TSMC. Although today it is indeed more expensive, some of the market sector cannot afford it. So today we see the affordable segment will be the high-performance computing, particularly the server and also the high-speed networking area. Of course, the current biggest customer is in the mobile and I believe the mobile sector will gradually come in when they see the value. So it is not a typical Moore's Law pace, rather it is additional development effort to augment it to the Moore's Law. That is my response in the total picture.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

So this part of things are now -- before the InFO launch and now you have more offerings, so presumably, you can generate more packaging revenue going forward and that is incremental compared to the past. So can we assume that your packaging revenue -- I know you report it in non-wafer revenue, part of this, and mask, and that is about over 10% last year. And can we assume that those part of the business can reach by -- grow faster than your wafer revenue going forward?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Of course. Of course, we want to -- we expect that. Again, it is -- in this semiconductor, packaging in the past hasn't been playing the role of increased system performance. And this is a new and we indeed first see in our biggest customers' verification products. But there our new customers are interested in that, including some of them are mobile, some of them are high-performance computing, but cost is always a factor in determining when do they move into this technology. Then that varies segment by segment.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from JPMorgan's Gokul.

Gokul Hariharan - *JP Morgan Chase & Co, Research Division - Head of Taiwan Equity Research and Senior Tech Analyst*

My first question is on N7+ and N5. So given N5 is a pretty high layer count for EUV. In your early engagement with customers, are you seeing customers trying N7+ at least for some small-volume products and then going to N5? Or are you seeing more customers directly going to N5? And

could you also give a view on how big N7+ is likely to be? Is it going to be a small volume node, but N7+ is still going to be majority of the 7-nanometer family? It's my first question.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Gokul, no correlation when the customer need to go to N7+ and then go to N5. Customer choose working with TSMC for their product development. So they choose the best technology, but at the time that fits their product with. So no correlation. But you are talking about whether they need to go through this, no.

Gokul Hariharan - *JP Morgan Chase & Co, Research Division - Head of Taiwan Equity Research and Senior Tech Analyst*

So you feel like that customers are already comfortable with the EUV throughput at that level of layer count to directly correlate?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

They are, because we communicate with them our progress and our status. And actually today we have a very good progress and still feel comfortable with.

Gokul Hariharan - *JP Morgan Chase & Co, Research Division - Head of Taiwan Equity Research and Senior Tech Analyst*

Okay. Just one clarification on the smartphone commentary in terms of slightly better demand that you're seeing in smartphones compared to the last 3 months. Could you classify it? Is it more coming in the mid- to low end? Or is it really at the high end? And second question is, is it because TSMC is gaining more share compared to what you expected to -- or your gains are coming faster? Or is it view on the overall smartphone market itself?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Most of these high-end smartphone, all right. And mid-, low end, the industry-wise is weak, although it's gradually coming back, but its pace of coming back is slower than expected.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from Goldman Sachs, Donald Lu.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

I have 2 questions. First question is about China, here I have 2 specific questions. One is that earlier this year when the ZTE saga starts to play out, MediaTek initially said it cannot ship to ZTE, but my understanding is TSMC has never turned down ZTE's wafer order. So I'm wondering what's going on here? Is there a law or rule or something going forward going to dictate how we can serve Chinese customer because Chinese customer now account almost 1/4 of your revenues? Second on China is UMC is going to lift its China -- entity in China and arguably can get a lot of capital for R&D and the growth. Will TSMC one day consider that and I'm sure it will be very well welcomed? Yes, I have another question, but I will wait.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

First, on ZTE. Yes, when U.S. government put a ban on the shipment to ZTE, indeed most company, ZTE's supplier, stopped their shipment. However, TSMC is not a direct supplier to ZTE. It's not a direct supplier to ZTE. So indeed, some of the -- they do have a subsidiary of ZTE and -- but according to the rule you need to have a certain percentage of value-added from the U.S. And so for that particular subsidiary, the value-added is mostly from China and from TSMC. So that also is beyond the restriction scope.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Sorry, can you explain a little more here? I understand ZTE also makes chips and that's manufactured at the TSMC, so that's not correct?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

No, no. ZTE do not make chips and send order to TSMC. They do have a subsidiary, a small design house and very small volume, have some business with us. However, we talked to Taiwan government and outside counsel, the value-added doesn't occur at U.S. So it was not in the restriction scope.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

And hypothetically, if HiSilicon have a problem similar to the ZTE, would that be a...

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

I don't want to answer the hypothetical question, okay. Thank you. You have another question?

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Yes. It's on the potential Asia listing of your great fab...

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Okay, this goes to Lora. Lora, tell me we are not short of capital, okay.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Yes, company go for IPO, main purpose to source the funding and we have enough funding to support our growth. There is no plan for us to do that, okay.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

I have second question is on 7-nanometer, the first is about China. 7-nanometer, I have a question. What was TSMC's market share at 16-nanometer and at 7-nanometer foundry market? And also how, compare the TAM, how much is 7-nanometer TAM versus 16-nanometer TAM in terms of market size?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Our 7-nanometer market share and 16-FinFET, okay. 16-FinFET market share is very high and 7-nanometer is even higher.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

How much high, 10% more?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

I cannot be so specific, right. High is high.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Is the TAM of 7-nanometer...

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

The TAM of 7-nanometer is bigger.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Bigger than 16?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Yes.

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Why is that because historically that seems to be decreasing. Why 7-nanometer?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Well, just some reason. We are talking about AI, we are talking about 5G, high-performance computing all add together so..

Donald Lu - *Goldman Sachs Group Inc., Research Division - Equity Analyst*

Talk about dollar, dollar of TAM, right? Thank you.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Let's actually go to the line for the first caller on the line. Operator, please.

Operator

We have a question from [HSBC, Steven Pelayo.]

Steven C. Pelayo - *HSBC, Research Division - Regional Head of Technology Research, Asia-Pacific*

In the fourth quarter conference call, you disclosed last year's 7% of revenues came from back-end services, now you're talking about also improved profitability in that area. Can you help us understand your outlook for total back-end services contribution this year? And how significant the profitability improvement is?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Back-end contribution this year and profitability.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

The back-end contribution to total revenue is increasing. It's slightly higher than last year with the more advanced packaging coming on the line. So I think backend and EBO add up is slightly more than 10% of our revenue versus about 10% last year.

Steven C. Pelayo - *HSBC, Research Division - Regional Head of Technology Research, Asia-Pacific*

Okay. And one more question for you, Lora. I remember last year, you also had 10-nanometer going greater than 20% of revenues in the fourth quarter. This year, you have 7-nanometer going greater than 20% of revenues in the fourth quarter. The guidance that you just gave for the third quarter suggested 100 basis points of headwind from the initial ramp of 7-nanometer. I'm curious as 7-nanometer goes to more than 20% of revenues in the fourth quarter, does the volume start to offset and you won't get as much of a headwind? Or the fact that it's such a large percentage of mix, will 7-nanometer still be a significant headwind to potential margin progression going into the fourth quarter?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

So Steven's question is, if we ramp 7-nanometer to more than 20% revenue in the fourth quarter, what will be the margin headwind brought by this ramp?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

In the first year of production -- but actually usually the margin for 7-nanometer is lower than corporate average. So we do see, with the third quarter guidance I just gave you, which include 10% contribution from 7-nanometer, this is going to dilute corporate margin by 1 percentage point -- slightly more than 1 percentage point. And going forward to the fourth quarter where 7-nanometer will account for more than 20% of total wafer revenue, we expect the dilution will be about 2.5 percentage points to corporate gross margin.

Steven C. Pelayo - *HSBC, Research Division - Regional Head of Technology Research, Asia-Pacific*

Okay, great. And if I could just sneak one last one in, I'm surprised we haven't talked much about feedback from your customers on potential trade war impacts. Does TSMC have a viewpoint? And what are you hearing from your customers on potential impacts for the rest of this year?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

On the U.S.-China trade tension and the issue, the tariffs on the 3 waves, first wave is on the $34 billion products, second wave on $16 billion and third wave is on the $200 billion, and only the first wave has been executed today. And in that, we see very minimal impact for our business and our customer. Those are the -- mostly, we relate it to the IC -- related to the semiconductor is only discrete devices in the first wave. On the second

wave, although it's still in the comment stage, but we do a thorough check on that effects. It does include integrated circuits. However, we look at it and still have a very minimal impact, effect, in our business so far. So even though the SIA in the U.S. is still protesting about including the IC into the second phase, but what I've been talking about even though they put it into effect, it's still very minimal effect.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question we'll be coming back to the floor. Sorry, let's come back to the floor first. It will be from Morgan Stanley's Charlie Chan.

Charlie Chan - *Morgan Stanley, Research Division - Technology Analyst*

So my question is actually a follow-up to previous questions. First of all is the smartphone semi better in third quarter. Is that -- do you see a upward revision of smartphone semiconductor or -- you mean is that better than second quarter? Can you comment on that?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Of course, it's better than second quarter because 3 months ago, we are a little bit more conservative. But recently, the development in the smartphone unit actually recovered. So it's better than what we forecasted 3 months ago, but it's not a big deviation from our forecast at the beginning of this year.

Charlie Chan - *Morgan Stanley, Research Division - Technology Analyst*

Okay. And I guess, another question that we also care about is your revenue exposure to the crypto semiconductor. So after 2 quarters, what is the exposure in the first half? And what do you think percentage of crypto semi will be in the second half?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

We already mentioned that because of our cryptocurrency's pricing, so we forecast softer demand from the cryptocurrency mining in the second half. So as what's the ratio between the first half and the second half, I cannot be specific, but one of the reasons is very uncertain, right. It's volatile, but our own forecast we lowered it down.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

I think the true picture is we -- currently, we had our best effort to forecast a weaker cryptocurrency. However, it's largely compensated by the increased strength of the smartphone. So that's why the total number we have forecast is not that different. However, cryptocurrency still has some uncertainty, right, that's why we adjusted the 10% number. But still, we are going to fight for that to reach close to that, yes.

Charlie Chan - *Morgan Stanley, Research Division - Technology Analyst*

Okay. So my next question is regarding your AI semiconductor. It has been a very strongly growing sector over the past 2 years, right, and it's going to be another key growth driver for coming years. So can you give us some numbers? For example, the AI semiconductor contribution this year, last year and the growth trajectory in the coming year, especially next year, are you going to see AI semiconductor double? And I want to define this AI semiconductor a little bit. So that should exclude the AI features including in the smartphone chipset. I'm referring to those discrete chips mainly is for cloud, AI or the edge AI.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Wow, that's a good question, but very hard to answer because most of the AI's functionalities today is embedded into the existing product. For example, you look at the smartphone in these days, the application processor embedded a lot of AI functionality inside. So you can have a lot of new features, right, the face recognition, the voice recognition and then -- et cetera, et cetera. So if you want to specifically identify what is increase over last year, what is increase of this year is pretty hard for us to do. But we can see the activity going up because you look at networking processor keep coming, application processor for all the smartphones keep increasing functionality so you can estimate what kind of die size they increase, so the silicon content. By doing that, you probably can figure out what is that contribution and why TSMC making it so big deal because we saw the trend from AI and 5G all combined together, that would be a megatrend.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Let me add some for further future communication purposes. AI is in every growth segment we have, okay. In the smartphone, in the automotive, in IoT, AI increased the silicon content. For the high-performance computing, indeed there are a lot of discrete AI chips. So with those discrete AI chips that include the xPU, accelerator GPUs and network processors and some of them even Games in that -- those are discrete CPU. So as we speak today, indeed high-performance computing growth is pretty fast. Last year was [20%], this year is [40%],(corrected by company after the call) around that, because the reason it's slowing down because cryptocurrency is included in the high-performance computing. So going up is still the highest growth sectors today we have, yes, but future is very difficult to predict. Like this year, we're just trying to help our customer to expand their market as quickly as possible.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

I think we still need to go back to the line for the next caller. Operator, please.

Operator

Next question is from Agency Partners, Douglas Smith.

Douglas P.E. Smith - *Agency Partners LLP - Research Analyst*

Couple of quarters ago, Morris Chang said that there were no plans to expand manufacturing capacity in the U.S. because of current events. Has that been rethought? And the second question is what step is TSMC taking to protect its intellectual property given there have been a lot of allegations of IP theft recently.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

First question is to -- we have mentioned that we have no plan to expand manufacturing capacity in The United States. Have we changed our mind?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

No, we did not. It's working. No, we did not change our plan. Only when it's necessary we'll do it, so far we did not see the need to put -- to establish a new fab in the U.S.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

The second question is how do we protect our intellectual property against theft?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Yes, this is the -- actually, this is the core of China-U.S. trade tension and we take it very seriously, too. And theft can come -- we call it espionage, can come from everywhere, not just from one country or there are sometimes the indirect that come to the -- getting our proprietary information. I can only say that we are fiercely protecting our IP and information because those are -- IP information is originally developed TSMC over the past -- more than 30 years and that is ours. No other states can take it or putting the effort to espionage. That is the main focus among all this tension.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Now we come back to the floor. The next question will be coming from UBS, Bill Lu.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

So there's been quite a few questions today on advanced packaging and how that's sort of helping with Moore's law slowing down. If you look at these HPC applications, the move to the parallel compute, the requirement to access high-bandwidth memory, that, I think, is a big part of the packaging trend. I just feel like packaging is going up in value, but so is memory, right. Is there a case to be made for TSMC doing more there either in terms of partnerships or in terms of own efforts? Or just comment on that space.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

You are right. We don't produce memory, neither DRAM or flash, but we work very closely with 3 memory houses, including Samsung and Hynix and Micron. And all the engineers work together very closely and at this point, the engineering work is further intensified. And so -- this is our strategy is that we still want the memory supply can come from multiple sources for our customer so that they can have most freely develop their product. And yes, there is -- among the 3, some of the memory company work closer with us, but all 3 are working quite closely with us to help our customer's product to get to that market, yes.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

Second question is on your ASP. If you look at last several years, CapEx going up and now the CapEx intensity is coming down a little bit and yet you've got -- you're going to have big market share of 7-nanometers in the big market that is upcoming. What is the thinking here? Should we think that with lower cost that you can pass it on to the customers given that you are going to get to your ROE goals? Or how do we think about that?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Bill, I thought you were asking about ASP and then you are also asking about how we deliver value to our customers?

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

Sorry, I guess, my question is if you think about ASP with your -- last several nodes, ASP has been going up, right, but now that your cost structure is coming down, does that mean we should expect flatter ASP going forward?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Okay. Do we share our cost-reduction benefit with our customers more than before, which is reflected in the price, that's what you're asking.

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

I just realized last several nodes that the leading edge actually has been shrinking, right. And so now you've got a big market, your cost is coming down. If you're not going to raise price, you should benefit more because the size of the market might grow. Just how do you think about that problem, I guess?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

I still don't understand that you are talking about that is getting more mature so then the cost is down and so that's how we have to lower down our price?

Bill Lu - *UBS Investment Bank, Research Division - MD and Asia Semiconductors Analyst*

I'm sorry. I'm not being very clear. Just comment on ASP next couple of years, I guess?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

We sell by the value. We don't sell by the cost, that's the first rule. And we work with the customer to make sure that their product can be sellable, feasible in the market. So that's all the rule of thumb that we consider. Okay.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from Crédit Suisse, Randy Abrams.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

First question I want to ask on the 4 growth platforms, if you could give an update. Mobile, I think, in the past early in the year was flat or that was the expectation, now I think it came down. So if you could give your view now that mobile platform expectation year-over-year? And then for the other three, an updated snapshot like how large HPC, IoT and auto are for TSMC now?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Okay, let me answer that. As I just mentioned, I think that because of introduction of the AI and 5G, so even we start to forecast that the mobile smartphone, the contribution to our growth will continue, but yes, one surprisingly good result from the HPC. So HPC's contribution now it will be comparable to the mobile phone and then followed by IoT and automotive. So that now is a 2 big contributor. We used to say mobile is 50%, now it's a little bit less than 50%. And then HPC will be close into mobile's contribution now in the course per se.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. But I guess, could you -- I think, HPC has been running -- or growing from 20% to 25% or just kind of the range now for HPC and then, I think, the last metric auto was about $1.4 billion. I'm not sure if you've given that IoT, but if you have kind of a rough -- just so we have a rough picture since that's the way we're looking at the business now?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Well, you're asking a question through lens of the future. Look at it, high-performance computing today is 25%. We expect that percentage will increase slightly and mobile percentage will decrease slightly. And IoT and automotive, those are roughly about 6% or 7% of our business, but that growth rate is pretty fast, talking about 20 more -- more than 20% growth year-after-year. So that is our current picture of the growth and that is also why we see this as 4 growth drivers for TSMC.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. In the 6% to 7%, is that combined? Or each one?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Each one.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. The second question I have on gross margin, following up to Steve's question, there's about 1.5% headwind in Q4 from 7-nanometer. But you're also guiding growth, again, in fourth quarter based on the full year guidance. So do you expect you can offset the depreciation -- sorry, the 7-nanometer headwind with growth to keep margins at your similar levels?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Actually, the headwind for 7-nanometer in fourth quarter is 2.5%, not 1.5 percentage point because the volume is pretty big.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

2.5% over third quarter, okay.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Over third, yes, you're right or 1.5% more than third quarter. Well, there are many factors and 1.5% is not that big. There are things can be done to improve the product mix if the utilization gets better and we have better cost efficiency, then you can get there, yes. So I'm not projecting that, but that's all the effort we'll be exercising in the company.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be from CL Securities, Sebastian Hou.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

My first follow-up is to clarify what Mark just said on the HPC revenue growth, was it [20%] last year, about [40%] (corrected by company after the call) this year?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Yes, including the crypto.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay. Okay. So if we look at the full year guidance for this year is high single-digit rate and if we take cryptocurrency out of it this year and last year, apple-to-apple comparison without cryptocurrency, what's the growth rate for TSMC -- what's the growth guidance for TSMC for this year? Still in the range of 5% to 10%?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

We don't have that number readily, but I think that for this numerical answer, maybe Elizabeth can relate to you after the meeting.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay, great. And going forward, I think, you maintained a CAGR, compound annual growth rate, of 5% to 10% and that's including crypto or without crypto?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

That's including the crypto. But as we look at today, the crypto will be not in the factor, if you talk about 5-year horizon, but things can change. But at this time, we don't count on the crypto.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

So which means the non-crypto part of the high-performance computing segment, you're becoming more confident, can we say that?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Yes.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay. Second follow-up is on the mature node. If I calculate your 0.11-micron process nodes above, assuming that's on 8-inch fab, but I know you, some of you used to tell me that you manufacture those node. But presumably, 0.11-micron above node in the first half this year versus first half last year, the Y-o-Y is down by 8%, 9% U.S. dollar terms. So there's been a lot of industry saying about that 8-inch foundry is very tight, demand very strong, price high, et cetera, but we don't see that reflected on TSMC in the first half this year. So can you tell us what's going on?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

It's actually -- you are talking about our 0.11-micron and above revenue decreasing. Actually, we are fully loaded in that 8-inch wafer fab. So that's why I mentioned in my statement that we are transferring some 8-inch wafers product into a 12-inch wafer so that we can have more capacity to serve the customer. As for the revenue, I did not have exact number in my hand. We are -- but the wafer pricing is dropping. We did not -- I do not have an exact number in my hand.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

It look like it's 8-inches is 0.15 and below. You're talking about 0.11 and below. I think that's the difference. So there are some under-utilization in that part from that point, yes.

Sebastian Hou - *CL Securities Taiwan Company Limited, Research Division - Research Analyst*

Okay. But you are seeing the wafer pricing is declining is due to the product mix or like-to-like comparison? Because we heard like some other -- your peers are raising price since the beginning of this year and maybe another wave of the price hike in second half?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

I don't comment my competitors' behavior. But for TSMC, we actually what we work with our customer and once we settle down the wafer pricing, we have a commitment. We don't easily change that, okay. Even we observe the raw wafer's pricing increase, we stick on our commitment to our customer.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be coming from Deutsche Bank's Michael Chou.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

The first question, you mentioned high-end smartphone unit is stronger than expected, than 3 months ago, can I say that?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Yes, you can say that.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

Okay. Is that broad-based or customer-specific?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

It's broad-based.

Michael Chou - *Deutsche Bank AG, Research Division - Semiconductor Analyst*

Okay. Second question is more housekeeping. What's the outlook for the other segment Consumer, Industrial because you mentioned crypto and the smartphone?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

So you are asking the third quarter segment? Okay. In the third quarter, we see Communication improve, Computer decline the most, Consumer slightly decline, Industrial about flat.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Next question will be from Citigroup's Roland Shu.

Roland Shu - *Citigroup Inc, Research Division - Director and Head of Regional Semiconductor Research*

Just one question. You have sufficient capital to fund your growth and also you are generating more free cash flow. So are you considering to do the share buyback? Or by what kind of criteria you are considering to do share buyback?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Currently, it is not in our plan. Actually, we have done a very thorough study of how do we return cash to shareholder. I think the general feedback is our shareholder prefers cash dividend than buyback.

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

Now we need to go to the line. Operator, please have the next caller on the line.

Operator

Our first question comes from the line of Mehdi Hosseini.

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

A couple of follow-ups. I noticed your wafer shipment in the March and June quarter has been a rather flattish while revenues down by high single digit both in March and June quarter. Should we expect wafer shipment in the second half to be flattish? Or how should we think about the trend in the second half, and again, the trend between wafer shipment and the revenues, Q3 and Q4? And I have a follow-up.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Wafer shipment in the second half will be increasing, will be higher than the first half so as the revenue. Did I answer your question?

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Would your inventories remain the same?

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

You mean our own inventory?

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Yes, because your days of inventory has been coming up over the past 6, 7 months.

Lora Ho - *Taiwan Semiconductor Manufacturing Company Limited - CFO and Senior VP of Finance*

Yes. Inventory mainly for TSMC's work-in-process and we had a 73-days inventory at the end of second quarter. With revenue of 7-nanometer, we expect that inventory will go up a few days in third quarter but will come down as we ship more 7-nanometer by end of fourth quarter. So our inventory are mainly work-in-process.

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Okay. And then I have a question regarding the longer-term trend, specifically on artificial intelligence. Can you provide some qualitative assessment how you see the mix between GPU and ASIC evolving for the AI application?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

All right. Mehdi, your question is with respect to future artificial intelligence-related ICs. You want us to give you some sort of qualitative descriptions about the breakdown between GPU and ASIC?

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Yes, yes. And my -- the purpose of asking this question is I'm just trying to get a sense of how the market trends are evolving and also how we should think about the difference in the die size. I'm under assumption that GPUs generally are bigger dies compared to ASIC. And how should I think about this looking forward?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO & Vice Chairman*

Well, we can only say that AI will be implemented in the GPU, CPU area. Comment on customer's die size, no, we cannot comment on that, but it's increasing, that we can say. And AI going to be used in lot of functionalities anyway.

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Sure. Let me rephrase the question. Would the wafer capacity requirement for AI be different between GPU and ASIC?

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

The wafer requirement? What...

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Wafer capacity requirement, does that make a difference for you, yes.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

So let me give you probably not exactly what you want. The biggest portion of high-performance computing today, in TSMC, is xPU, followed by GPU. Okay, in the high-performance computing...

Elizabeth Sun - *Taiwan Semiconductor Manufacturing Company Limited - Senior Director of Corporate Communication Division*

All right. Now with this very bright, long-term outlook of artificial intelligence, bigger die size, a lot of wafers, we will conclude our -- today's conference.

So please be advised that the replay of the conference will be accessible within 3 hours from now. Transcript will be available 24 hours from now, both of which will be available through our website. Thank you for joining us today. We hope you will join us again next quarter. Goodbye, and have a good day.