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2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd
Earnings Call

EVENT DATE/TIME: JANUARY 18, 2018 / 6:00AM GMT



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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PRESENTATION

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

(foreign language) Happy New Year, everyone. Welcome to TSMC's Fourth Quarter 2017 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 through TSMC's website at www.tsmc.com. (Operator Instructions). As this conference is being 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 Chief Financial Officer, Ms. Lora Ho, will summarize our operations in the fourth quarter 2017, followed by our guidance in the first quarter of 2018. Afterwards, TSMC's 2 Co-CEOs, Dr. Mark Liu and Dr. C.C. Wei; CFO, Ms. Lora Ho; and TSMC's Chairman, Dr. Morris Chang, will jointly provide our messages. After that, Chairman Chang will host the Q&A.

For those participants in the call, if you do not yet have a copy of the 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 everyone that today's discussions may contain forward-looking statements that are subject to significant risks and uncertainties, which could cause the 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.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

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

Thank you, Elizabeth. First of all, Happy New Year. Good afternoon. Thank you for joining us today.

My presentation will start with financial highlights for the fourth quarter and a recap of 2017 for the whole year. Then after that, I will provide the guidance for the first quarter.

Fourth quarter revenue increased 10.1% sequentially to TWD 278 billion, mainly driven by major mobile product launches and continuing demand for cryptocurrency mining. Gross margin increased 0.1 percentage point sequentially to 50.0% as the benefit from higher capacity utilization and the inventory valuation adjustment helped offset the impact from continued 10-nanometer margin dilution and NT dollar appreciation. Total operating expenses increased by TWD 1.3 billion but, thanks to operating leverage, only represented 10.4% of revenue versus 10.9% in the prior quarter. And operating margin increased by 0.3 percentage point sequentially to reach 39.2%. Overall, our fourth quarter EPS reached TWD 3.83, and ROE was 26.9% for the quarter.

Now let's take a look at wafer revenue contribution by application. During the fourth quarter, Communication and Computer increased 20% and 8% from the prior quarter, respectively; while Consumer and Industrial/Standard decreased by 38% and 4%, respectively. On a full year basis, Computer and Industrial/Standard increased 25% and 14% year-over-year, respectively; while Communication and Consumer decreased 2% and 10%, respectively.

Now let's take a look at the revenue by technology. 10-nanometer process technology continue to ramp strongly, accounted for 25% of total wafer revenue in the fourth quarter. The combined 16/20 contribution was 20% of total wafer revenue. Advanced technologies, meaning 28-nanometer and below, accounted for 63% of total wafer revenue, up from 57% in the third quarter. On a full year basis, 10-nanometer contribution reached 10% of total wafer revenue in 2017. The combined 16 and 20 contribution was 25% of total wafer revenue. Advanced technology, 28-nanometer and below, accounted for 58% of total wafer revenue, up from 54% in 2016.

Moving on to balance sheet. We ended the fourth quarter with cash and marketable security of TWD 649 billion, an increase of TWD 148 billion. On the liability side, current liabilities increased by TWD 60 billion. On financial ratios, accounts receivable turnover days decreased 2 days to 40 days, while days of inventory decreased 1 day to 52 days.

Now let me make a few comments on cash flow and CapEx. During the fourth quarter, we generated about TWD 204 billion cash from operations and spent TWD 61 billion in capital expenditure. As a result, we generated free cash flow of TWD 143 billion, and our overall cash balance increased TWD 145 billion to reach TWD 553 billion at the end of the fourth quarter. In the U.S. dollar terms, our fourth quarter capital expenditure reached \$2.1 billion, and the totaled CapEx for the whole year was USD 10.9 billion.

Now I would like to give you a recap of our performance in 2017. 2017 was another strong year of -- for TSMC as, once again, we set a new record in terms of both revenue and earnings despite a 5.5% [appreciation] (corrected by company after the call) in the NT dollars. Our revenue grew 9.1% year-over-year in U.S. dollar terms and 3.1% in NT dollars to reach TWD 977 billion as we saw wafer shipments increase across nearly all technology nodes.

Gross margin increased 0.5 percentage point to reach 50.6% in 2017 as continual operational efficiency improvement and better capacity utilization more than offset the headwinds from the unfavorable exchange rate and the 10-nanometer margin dilution.

Our operating margin declined 0.5 percentage point to 39.4% as we increased our R&D spending ratio to 8.2% of revenue, reflecting a higher level of 7-nanometer and 5-nanometer development activities. Our effective tax rate for 2017 was 13.5%, same as in 2016. And full year earnings per share was TWD 13.23.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

On cash flow, we spent TWD 331 billion in capital expenditure or \$10.9 billion in U.S. dollar term, while we generated TWD 585 billion in operating cash flow and TWD 255 billion in free cash flow. We also paid TWD 182 billion in cash dividend, an increase of 17% from 2016.

Now I have finished my financial summary. Now let's turn to the first quarter guidance. Based on the current business outlook, we expect first quarter revenue to be between USD 8.4 billion and USD 8.5 billion, which is an 8.3% sequential decline but a 12.6% year-over-year increase at the midpoint and represent a new record high in terms of first quarter revenue. Based on the exchange rate assumptions of USD 1 to TWD 29.60, our first quarter gross margin is expected to be between 49.5% and 51.5%. Our first quarter operating margin is expected to be between 38% and 40%.

This concludes my remarks. Now I would like to turn it over to Mark for his comments.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Thank you, Lora. Good afternoon.

Firstly, I would like to talk about our "Everyone's Foundry" strategy. Being everyone's foundry is the strategy TSMC takes by heart. Through our technology and services, we build an Open Innovation Platform, where all innovators in the semiconductor industry can come to realize their innovation and bring their products to life. As our customers continue to innovate, they bring new requirements to us, and we need to continuously develop new capabilities to answer them. In the meantime, they utilize those shared capabilities such as yield improvement, design, utilities, foundation IPs and our large-scale and flexible capacities. In this way, this open innovation ecosystem expands its scale and its value. We do not compete with our customers. We are everyone's foundry.

Now on cryptocurrency demand. In the past, TSMC's open innovation ecosystem incubates numerous growth drivers for the semiconductor industry. In the '90s, it was the PC chipsets; then in the early '20s, the graphic processors; in the mid- to late '20s, it was chipset for cellular phone; recently, start 2010, it was for smartphones. Those ways of innovation continuously sprout in our ecosystem and drive the growth of TSMC.

Lately, we observed the demand from cryptocurrency mining surged. Cryptocurrency mining requires massive, high-performance and low-power computing. TSMC's advanced technology and productization serves -- services suits it well. We have sized 2018 cryptocurrency mining demand carefully. Since it is still in its early stage of development, it is difficult for us to forecast its demand too far into the future with accuracy. However, as long as the cryptocurrency miners can derive positive returns, demand for TSMC wafers will continue. Furthermore, we are quite certain that deep learning and blockchain technologies, which are the core technology of cryptocurrency mining, will lead to new waves of semiconductor innovation and demand for years to come.

Now on N5 progress and EUV readiness. Our N5 technology development is well on track for 1Q 2019 risk production. We already achieved good SRAM yield. Device development is also well on plan. Progress on both are similar to our N7 to the same development stage. N5 customer test chips are already running in our fab.

We also made significant progress in improving EUV capability and the manufacturability. We have been consistently demonstrating high yield on N7+ and N5 development lots. EUV source power is now operating at 160 watt to support our N7 and N5 development activities. EUV scanner with source power of 250 watt will -- has been installed in our fabs. Capability of in-house EUV pellicle making has also been established with low defect level and good transmission properties. So we are confident that our EUV technology will be ready for high-volume production for N7+ in 2019 and N5 in 2020.

On the growth platform of our mobile, high-performance computing, IoT and automotive. In 2017, last year, all our growth platforms, mobile, high-performance computing, IoT and automotive, registered double-digit growth -- revenue growth in U.S. dollars. Moving into 2018, growth of these platforms continue. We estimate that the high-performance computing platform will register the strongest growth in U.S. dollars.

For smartphones, smartphones will continue to include new features, such as 3D authentication, 3D sensing, AI for face and voice recognition and 18:9 display. Our smartphone customers are taping out 7-nanometer for premium phone and 12-nanometer for mainstream phones, both are on track to ramp in 2018.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

In 2018, high-performance computing business will enjoy the most growth from GPU and cryptocurrency ASICs. The key technologies for high-performance computing are 16- and 12-nanometer and 7-nanometer together with our CoWoS technology.

IoT business growth in 2018 mainly comes from smart voice assistant devices, application processor for wearables and wireless MCU for smart homes. Our 22 ULP, ULL, ultra-low-power, ultra-low-leakage technology, will be key to all these applications.

Automotive business in 2018 will come mostly from increased IDM outsourcing to TSMC in new technologies. We have built automotive-specific design ecosystem on 16 FFC in 2017, and we'll complete that on N7 in 2018. TSMC's superior manufacturer -- manufacturing quality, sufficient capacity support and our long-term automotive supply commitment are the key enabling elements to expand this business.

Thank you. I'll turn the microphone to C.C. Wei.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Thank you, Mark. Let me talk about the near-term demand and inventory.

We concluded our fourth quarter with 10% Q-over-Q growth in U.S. dollar, which was slightly above the guidance we gave 3 months ago despite a continuing inventory reduction by our customer. Fourth quarter's strong result was mainly driven by a major smartphone release, which is based on our 10-nanometer process with InFO and the strong demand in cryptocurrency mining.

Concluding 2017, semiconductor, excluding memory, growth was 9%, while foundry grew 8%. TSMC's revenue grew 9% in U.S. dollars and accounted for 56% of the total foundry market segment share.

Moving into first quarter 2018, our revenue in U.S. dollar is likely to decline by about 8%, as Lora just have guided. This is mainly due to smartphone seasonality, offset partially by continued demand for cryptocurrency mining. Fabless DOI exceeding 2017 was a few days above seasonal level. Moving into 2018, we forecast fabless DOI to trend up but will track seasonal pattern.

Now let me talk about N7 and N7+. So far, we have already taped out 10 customers' products in 7-nanometer. And we are currently qualifying this product in 2 different fabs, in preparation for volume production starting in second quarter this year. During first quarter 2018, we expect to tape out another 10 products. In total, we expect to have taped out more than 50 customer products in 7-nanometer by the end of 2018. Major applications covered by these tape-outs are in mobile, gaming, CPU, FPGA, networking and AI. In essence, almost every area that requires high-performance and lower-power consumption will benefit from TSMC's 7-nanometer solution.

In terms of performance, power, area density and schedule, we believe our 7-nanometer solution is leading in the foundry industry. We will introduce our N7+ technology later this year. Here, we plan to replace some immersion layer by deploying a few layers of EUV processes. Currently, we have already demonstrated the same level of 256 megabit SRAM yield at N7+ as compared to N7.

Then let me move to N10 status. We successfully ramped up 10-nanometer in 2017. 10-nanometer contributed 25% wafer revenue in 4Q '17, up from 10% in third quarter. Full year 10-nanometer accounted for 10% of our total wafer revenue. Both defect density and device performance are meeting our targets. Despite that most of our current 10-nanometer mobile customers will start to migrate to 7-nanometer this year, we continue to expect a year-to-year growth of our N10 business in 2018, driven by application processor, cellular basedband and ASICs CPU.

Now let me touch about N16, in 12-nanometer demand outlook and the competitive position. TSMC continues to enhance technology performance for every node, and 16-nanometer is no exception. We have moved from 16-FinFET to 16FF+ and then to 16FFC. Now we are moving into 12FFC. With 12FFC, we can improve the device by about 10% from 16FFC, will reduce the power consumption by about a 20%, all the while we expect to reduce the die costs as well. It is the fourth year today that our N16, N12 enter into high volume production. And we still expect to see very strong demand for this node, which is supported by current plan of 120 tape-outs this year, covering a variety of mainstream smartphones, cryptocurrency, AI, GPU, and RF products. Although other foundries may have plan to enter into 12-nanometer node, TSMC achieved the lowest defect density and enjoys a very competitive cost structure. As a result, we expect our market segment share in this node will be increased.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Now let me move into 28-nanometer. Similar to 16/12-nanometer node, TSMC continues to improve the N28/N22 performance from 28LP to 28HP, to 28HPC and 28HPC+. And now to 22ULL and ULP, which stands for ultra-low leakage and ultra-low power. The newly introduced 22ULP/ULL will enhance performance by increasing speed by about 15%, will reduce the power consumption by about 25%, with an overall die area shrink of 5% to 10% as compared with the 28HPC+. Both 22ULP and 22ULL are ideally suited for IoT and RF-related applications.

Beyond continued performance enhancement, our excellent manufacturing capabilities and our significant investment in capacity are also important contributing factors for customers to choose TSMC as their primary foundry. Last year, we saw about 240 product tape-outs using our 28/22 node, which was a record high since 28-nanometer entered volume production in 2011. We expect that this tape-out activity to continue in this year, and we are confident that our high market segment share in 28/22 technology node will be maintained.

Now we'll talk -- I will talk about advanced packaging. I will update two of our advanced packaging technologies: chip-on-Wafer-on-Substrate, or CoWoS; and Integrated Fan-Out, or InFO.

We have developed CoWoS to support the requirements of HPC applications, particularly the area of AI, data server and networking. This is the sixth years that our CoWoS technology has been in production. We see more customers engaging with us in this technology, and we expect to receive more than 30 tape-outs in the next 3 years. Most of the products today are using 16-nanometer technology. We are actively developing CoWoS for 7-nanometer starting from this year.

TSMC's InFO has entered into high volume production for the third year, with majority of the adoption by mobile products. Beyond mobile, we are working to expand InFO to automotive and the HPC-related applications. For example, we've developed the InFO on substrate, or InFO_oS, for HPC product, and we'll qualify this technology in first half of this year and expect to enter production later this year. Today, we are working with various customers using InFO technology to cover their products ranging from N28, N16, N7 and N5 technologies.

Last, let me talk about the Nanjing fab update. We expect to expand our business in China, and to enhance our support to local customers with the Nanjing fab. Planned capacity for this phase is 20,000 wafer per month 12-inch using 16-nanometer and 12-nanometer. We broke ground for this fab in July 2016 and have now almost completed move in all production tools. We have already started initial engineering wafers. More than 1,000 engineers are working in this fab today. Customers at our Nanjing fab come from both China and the other regions with a variety of products in the initial ramp.

Due to the strong demand for our 16/12-nanometer technology node, we have pull-in the output schedule by a few months to May of 2018. We are confident that we will be able to report to you the good result of our 16- and 12-nanometer node in Nanjing.

That's all I have. Thank you for your attention. Now turn the call into Lora.

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

I'd like to make -- let me make comments on CapEx and outlook for future capital intensity.

Now let me start with CapEx. Our 2018 CapEx is expected to be between USD 10.5 billion to USD 11 billion, which is essentially flat with our 2017 CapEx. About 73% of the capital budget will be used for capacity buildup for the advanced technologies, mainly 7-nanometer, followed by 5-nanometer. Another 17% of the capital budget will be used for R&D, backend and mask.

As I stated in our last investor conference 3 months ago, in order to support our 5% to 10% growth in the next few years, we expect our CapEx in the next few years to stay a few percentage points more than USD 10 billion. This implies that our CapEx in the next few years will remain at a similar level to what we have spent last year and what we expect to spend this year.

Although our leading node capital cost continue to increase due to increasing process complexity, we are able to offset its impact to our CapEx by further optimizing our capital planning and productivity improvement.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

With the flattish CapEx going forward and the revenue CAGR of 5% to 10%, we expect capital intensity, which is the ratio between CapEx and revenue, to gradually decline from the current 30% to 35% level to [25%] (corrected by company after the call) to 30% level in the next few years. However, if any special revenue growth opportunities come along, we will certainly respond to it with appropriate CapEx.

Now, our Chairman may comment now.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I will now make some comments on TSMC 2018 outlook.

First, some comments on the semiconductor market. We estimate the supply chain inventory at the end of 2017 to be still a few days above the seasonal normal level. We estimate that the total semiconductor market will grow 6% to 8% in 2018, 6% to 8% this year. The semiconductor market, excluding memory, will grow by 5% to 7% this year, and total foundry revenue will grow by 9% to 10% this year.

Now for TSMC, we expect 2018 TSMC revenue in U.S. dollars will grow by 10% to 15% over 2017, 10% to 15% in U.S. dollars over 2017. Our revenue seasonality will be similar to 2017, stronger in the second half than in the first half. Our revenue Y-o-Y, year-over-year, growth rate now, however, will be stronger in the first half than in the second half. Basically, we expect the first half 2018 revenue growth rate in U.S. dollars will be slightly above 15% over the first half of 2017 and that the second half 2018 growth rate to be slightly under 10% over the second half of 2017. All these are in U.S. dollars. So the slightly above 15% growth rate in the first half and the slightly under 10% growth rate in the second half make up the 10% to 15% total yield growth that I spoke about. Is that clear? Good. No word in this -- everybody understands, okay.

Our strong growth in 2018 is fueled by the growth of 3 of our growth platforms. Those 3 growth platforms that fuel our strong growth this year are the high-performance computing (HPC), IoT and automotive. HPC will grow strongly due to continuing expansion of AI applications in all electronic devices and in continuing demand for cryptocurrency mining, GPU, et cetera. Mobile platform will be flat. And then, for the IoT and automotive platforms, there is considerable strength. You might describe this situation as the acceleration being enormous, but the velocity is still small.

For the last 2 years, we've been planning 5% to 10% compounded annual growth rate in U.S. dollar revenue growth in the 2017 to 2021 period. We reaffirm that plan. In 2017, our revenue grew 9%. In 2018, we expect to grow our revenue 10% to 15%. [2018] (corrected by company after the call) will be an above-average year.

QUESTIONS AND ANSWERS

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

All right, this concludes our prepared statements. Before we begin the Q&A session, I would like to remind everybody to limit your questions to 2 at a time to allow all participants the opportunity to ask their questions. Questions will be taken both from the floor and from the call. Should you wish to raise your question in Chinese, I will translate it to English before our management answers your question. (Operator Instructions) Now let's begin the Q&A session.

All right, first question will be from Goldman Sachs, Donald Lu.

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

(foreign language) My first question is to the Chairman, and very nice to see you here. What is your view on -- in cryptocurrency, which is very -- have a surge in growth in recent months? So that's my first question. The second question is on N7+. I think if I hear it correctly, the performance of N7+ is similar to N7. Is that correct on the performance and power? Just want to clarify that.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, let me answer the first. I think you all have come along here and that repeat that, and I heard that he was asking about cryptocurrency. The urge to mine cryptocurrency is very strong. The incentive, of course, depends on the price of cryptocurrency. And the price of cryptocurrency is very volatile. But the demand right now or for the last year has been very strong, and we expect it to continue to be strong. However, we have, in Mark's words, sized the demand carefully, we have sized demand carefully, so I believe that we will both satisfy our customers, and we'll not be too optimistic. So you can ask the second question on Mark -- oh, C.C., okay.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Okay. Well, let me repeat your question, the N7+'s performance versus N7, right? Okay. N7+ actually is about 10% better performance than N7. And in terms of area, it would be also about 10% smaller. But if you put all together, like a critical layer, by using EUV it reduce at the critical layer number, so we expect for wafer, you will get 10% more ties from N7+ as compared with N7.

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

Can you explain the last point you have at the -- about the critical layer, you have less layer with N7+?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes, because we're using the EUV to replace some of the immersion layers. So I give you one example. One EUV layer can replace a 3P3E -- replace 3 layers of immersion. So in calculation of the defect density, you'll get more dies.

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

All right. The next question will be coming from Credit Suisse and Randy Abrams.

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

The first question, I wanted to ask your growth, both for the industry and TSMC, is above trend. The prior few years were only low single digit for the industry. I'm curious how much you think is from the structural factors, meaning the new growth platforms, and how much you see is coming from cyclical factors, which sometimes see an upturn.

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

All right, Randy, your question is, with respect to our projected growth of this year, both the semiconductor and TSMC are above the industry average trend. And so the higher number, is it due to structural or due to cyclical factors?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

By structural, you mean permanent?

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

Or I'd say a new trend -- based on the growth platforms, a new trend to higher growth.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Say it again?

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

By structural, a new trend to higher growth, say, from these drivers like IoT, high-performance computing.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, it has always been our intention to be fully competitive, therefore, the least we want to do is to maintain our market share. And now as I said a little earlier, the total foundry -- all the foundries in the world, total foundry revenue will grow 9% to 10% this year. And I expect TSMC to grow revenue 10% to 15%. So that means perhaps a small gain in market share. Now what do we do to earn that? Now then I have to go back to the offset strengths we have, yes. We lead in technology, we lead in manufacturing capability, and I believe we lead in customers' trust.

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

Okay. The second question I wanted to ask was, this year, you already generated excess cash flow after paying the dividend. And you're talking about lower capital intensity the next few years. So if you could give a view now on outlook for dividend or broader payout just with this cash generation, if you could start to accelerate what we've seen in the past couple years.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Lora will...

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

Randy, we had a very good free cash flow last year, and then we also believe the free cash flow is going to be good in the future years, with what you just said, so we will stick on our plan to gradually increase our cash dividend every year. For next year, I think announcement will be made in February after the board meeting, yes.

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

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

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

Regarding the 2018 U.S. dollars sales guidance, so do you have any color for what area actually exceeded your expectation 6 months ago in terms of demand outlook? Because in the past, you mentioned that long-term sales CAGR could be 5% to 10%, right, so is any area demand actually stronger than you expected before or really exceed your internal planning in terms of demand outlook for 2018?

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

All right. Question from Michael really is that since we have stated our CAGR to be 5% to 10%, and this year, the 10% to 15% is higher than the CAGR of 5% to 10%, so he wants to understand where the extra strength is coming from.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Where is what?

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

The extra strength. Which area we are doing stronger than...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, mainly, it's in the high-performance computing platform. And as I said a little earlier, that is due to the expanding usage of AI devices in all devices. And I also said it's the continuing strong demand of cryptocurrency mining.

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

For follow-up question, so for AI, if -edge AI - do you put the category of smartphone AI into the HPC or you still put in the smartphone segment?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Since the AI in...

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

The AI-related application, if it is used in smartphone, do we categorize it in HPC or in smartphone? I believe we put it in smartphones.

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

Okay. My second question is regarding 7...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Okay, is that -- is it -- is that one -- that's what -- you are asking a second question now or what?

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

Just a follow-up -- a second question.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Are you asking a second question now?

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

Yes, second question.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

This is your second question, actually, right? So anyway, let's answer that question. Let's answer that question. I think, well, either Mark or C.C., you can take it, yes. Okay, C.C., you want to take it?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

All right. The AI in the smartphone will category into the mobile smartphone.

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

My second question is regarding your 7-nanometer sales portion in Q4 this year, in 2018, 7-nanometer sales portion in Q4 in the 2018, Q4 this year, and the whole year, do you have any forecast?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, I can say probably the whole year is roughly the 10% revenue. Okay?

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

All right, we have to move to the next analyst, which is Morgan Stanley's Charlie Chan.

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

Mr. Chairman, TSMC is really phenomenal. So my first question is kind of long. It's, again, on cryptocurrency. First of all, can you quantify the cryptocurrency contribution as you did the last quarter? I remember, it was like USD 350 million to USD 400 million now in 3Q. Can you give that data for first quarter, in 1Q? So given the strengths, can TSMC's 16-nanometer fulfill the demand? And will TSMC expand capacity for this cryptocurrency mining? This is the first question.

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

All right. Charlie's question is, can we disclose the proportion of revenue we get from cryptocurrency mining in the fourth quarter last year and the first quarter this year? And also, since this requires our 16-nanometer capacity, are we able to fulfill the demand, or do we plan to expand capacity?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Stop there.

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

Okay.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I heard the first part, but what's the second part?

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

Second part is, will we be adding capacity to satisfy the demand?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

To satisfy crypto demand?

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

Right.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I don't think we want to disclose the revenue amount for crypto. Do we?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

No.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

No, we don't. Now as to the second question, no, because of the volatility -- as we -- as I said several times, because of the volatility of the cryptocurrency demand, the possible volatility, I should say, we do not -- we are not going to add the capacity specifically for crypto. But we look at cryptocurrency demand as a part of our high-performance computing platform demand now. There are other parts of the high-performance computing. They are also fairly volatile, though not as volatile as the -- maybe as the cryptocurrency. So we look at the whole thing as a whole, and we are definitely adding capacity for the high-performance computing platform.

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

So my second question is going to be very brief. It's about your antitrust implication, given TSMC's strong industry position, so how the company is going to deal with this antitrust issue, and will they impact your 2018 operation?

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

I think Charlie is referring to, recently, the EU Commission is investigating whether or not TSMC has violated any antitrust.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, we do not think that we have any problem. However, we'll cooperate with whatever government agency that investigates it. We'll cooperate fully.

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

Next question will be coming from Daiwa's Rick Hsu.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Dr. Chang and all the senior management, my first question is, could you give us some -- maybe some ballpark number about the revenue breakdown of your 2018 revenue outlook in terms of the application HPC, IoT, automotive and mobile?

Morris Chang - Taiwan Semiconductor Manufacturing Company Limited - Chairman

Well, those 4 are our growth platforms. We do have other platforms, which happened to be declining, actually. So giving you the percentage actually don't tell you anything, but can we -- Lora or C.C., do we -- yes, I mean, he wants to know the percentage of revenue in HPC, in mobile, in IoT and -- I think maybe you can give them some approximate numbers, yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

All right. Approximately, actually, the mobile smartphone, throughout the half of what, is it...

Morris Chang - Taiwan Semiconductor Manufacturing Company Limited - Chairman

Mobile, mobile.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

Mobile will be about 1/2; and then followed by the HPC, that would be about 25%; and another probably around 10% from automotive and IoT, the rest of that. Did that answer your question?

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Yes, that's very clear. That's pretty good direction. Then the second question is about the inventory. I know Dr. Chang was talking about your end Q4 inventory was -- a few days above seasonal. And I'm not sure if you also commented about your inventory view for the first quarter this year is going to be coming down and tracking the seasonal average, or am I missing something?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

We exited 4Q '17 with a few days above the seasonality. And then we expect this start to increase again because of our customers start to build for the New Year's. And so the inventory will increase a little bit, but it's still the seasonal sub-pattern, I'd say, is nothing surprised as compared with the previous years.

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

Next question will be coming from Credit Lyonnais', Sebastian Hou.

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

So my first question is on the -- what's your expectation for the growth from your Chinese customers? If I calculate correctly, it seems like your revenue from China has doubled in the past 3 years. And do you expect such doubling pattern to persist in the next few years?



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

So Chinese customers have been growing quite fast. Do we continue to expect the percentage to our revenue will double in the next few years as it has done...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Will we continue to what?

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

Expect the customers' revenue to double in the next few years.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

First, the Chinese customers have grown very fast. I guess -- you want to answer it? I was going to say I think the cryptocurrency thing, which is the volatile one, is the part of the Chinese customers. Yes, it has been growing fast. But you go ahead and answer the rest, okay?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, if you ask me whether China customer will grow, will double in the next few years, certainly. I think it has full potential to achieve that. The cryptocurrency is part of it, but even with after cryptocurrency cool and other application will continue to sprout in China I think.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

You said cool. Don't say cool. It may not cool.

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

Just a follow up on that, how do you see -- besides cryptocurrency, how do you see the -- also there is a rising numbers of the Unicorn, the start-ups in China. They want to design their ASIC or a lot of them are working on AI. And do you also expect that to be an important growth driver for your Chinese revenue in next few years for that doubling pattern?

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

So Sebastian is wondering if beyond the cryptocurrency mining, there are other IC designers in China the focuses on AI, whether or not these type of applications will drive the doubling growth of the customers.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, look. We are everyone's foundry, we are everyone's foundry. And being the technology/capacity/manufacturing leader, we are really in a really good position. So all right, so if they grow, great. We will grow with them. And we don't particularly care customers in which region grow. So we are kind of region-blind, okay, as far as where the growth comes from. We're everyone's foundry, everyone in the world, we're everyone's foundry. And usually, the customer that has innovations -- has innovative designs that grow the fastest. And so I'm sure that the Chinese innovations will grow very fast. But then, the rest of world is not just stay put. They are growing to -- I don't know -- does that answer your question? Or, No?

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

Yes. Second question yes, the second question is on the -- I wonder what's the TSMC's expectation and your estimate -- or evaluation on the raw wafer supply shortage. And remember, the same time last year, CFO give an estimate about how the price hike will impact the margin profit. I wonder if you have a similar numbers you can give this year?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Do you want to answer the question?

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

The raw wafer has been in short supply in 2017. We expect the short supply will continue through this year as well. But fortunately, because we are a big purchaser, so we were able to engage some of the vendor in the long-term contract. So we should be safe in terms of supply.

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

And how about the price increase impact on the profitability?

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

Yes, the price has indeed increased and has been affecting our margin as well. I think maybe 6 months ago, we have indicated the margin impact for 2017 will be around 0.2 percentage point something. With the continual hike in price and the impact in 2018 will be bigger. So we expect impact will be maybe half point, 0.5 to 1 percentage point impact to gross margin. Well, anyway, we'll try to offset that with some of the productivity improvement and other cost reductions.

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

Is it possible to pass the cost increase to your customer?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

No, I don't think so.

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

Okay. I think it's about time that we go to the call first because there are quite a few analysts queuing on the line. So operator, could you please go to the first caller on the line?

Operator

Your first question comes from the line of Mehdi Hosseini from SIG.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

My first one has to do with the impact of EUV from your capital density. When you look into 2019-2020, is EUV actually helping you with lower capital intensity? Is it helping you with lower CapEx spend? And if not, when should we expect to see that? And I have a follow-up.

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

We spent several hundred millions in EUVs since last year. And going forward this year and next year, the EUV investment will continue to go up. However, the number has been included in our overall CapEx budget, which I was just mentioning, \$10 billion to \$11 billion. While it is true that the CapEx per 1,000 wafer investment will be higher if you move into the more leading-edge technology, particularly 5-nanometer. But also, the purpose of introduction of EUV is to simplify the process. So with the process simplification, therefore, the overall patterning cost will not increase compared to the multi-level patterning or the immersion version. So that was the simple answer to your questions.

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

And with regard to the packaging, non-wafer revenues in in '18 '19 and 2020. How should we think about the diversification, scaling up InFO and also CoWoS? Is there any number you can provide us or maybe perhaps qualitatively you can help us? Again, the question has to do with revenue contribution from system in a package InFO and CoWoS in 2018, 2019, and 2020.

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

So maybe this question is regarding advanced packaging in terms of its revenue contribution to TSMC in 2018 all the way to 2020.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Say it again?

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

The advanced packaging such as InFO and CoWoS, the contribution to TSMC's revenue in percentage.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Lora, please.

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

I will talk about the whole assembly packaging service in TSMC instead of just a single out InFO or CoWoS. The backend service accounts for about 7% of the TSMC revenue...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Several, several...

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

7%.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

7%, 7%.

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

Of TSMC's revenue 2017. With the continued growth in -- particularly in InFO and CoWoS going forward, we expect the percentage will go up slightly in out years.

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

Okay, we should go to the next caller on the line. Operator, please.

Operator

Our next question comes from the line of Roland Shu from Citigroup.

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

Hi. Good afternoon. Thanks for taking my question. Hi, Mark. You mentioned there is increasing IDM outsourcing trend in the new technology. However, we suspect one of your IDM customer is in-sourcing baseband product this year. So, for this year, do you see the total IDM outsourcing trend will be increased more than this IDM insourcing trend?

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

Roland, I think you are asking if TSMC will continue to see the IDM outsourcing as a trend. And then...

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

Yes.

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

And then are you asking some proportion or percentage? No?

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

No. I think proportion and also maybe for the total revenue contribution point of view. Thanks.

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

Revenue contribution or proportion.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Of IDM outsourcing?

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

Of IDM, yes.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Do we even have a number on that, Lora? The answer to the first question whether the IDM outsourcing will continue. Yes, I think it will, but on the second part -- second part of the question is a number. Well.

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

We don't have a number, okay.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Actually, frankly, I would say that almost without exception, every IDM has become fab light, almost without exceptions. There are exceptions. Yes, and all I'm saying. Excuse me. And All I'm saying is that those that are already fab light will become fab lighter and lighter.

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

Okay. Understood. Thank you. I think the follow-up question to Mark is that, Mark, let's just say, is seeing this outsourcing trend in new technology. Can Mark add more color on what kind of technology are these IDMs are looking for and what kind of applications are they outsourcing to foundry? Thanks.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Yes, Mark.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes. IDM has not been building new fabs for quite some time. But as technology is progressing, when they reached to below 90-nanometer and they almost solely depend on the foundry support, and that's why we see the continued trend. And all those are specialty technologies.

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

But these technology are new to TSMC or new IDM?

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

What was the question?

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

Yes, right. The technologies are these new to TSMC or new to IDM?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Both are new to the IDM and also new for TSMC.

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

Okay. So these technologies, what kind of applications for this technology will be?

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

Applications.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, mostly in the automotive and IoT, yes, in those 2 categories.

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

Operator, can we continue to the next caller, please?

Operator

Yes. Our next question comes from the line of Steven Pelayo from HSBC.

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

Just one quick follow-up on crypto. I know you don't want to disclose what it was in the fourth quarter. I wonder if you could at least disclose what it was for full year 2017 and maybe just directionally, is it increasing every quarter for you.

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

All right. Cryptocurrency proportion to TSMC's revenue. Can we disclose what's the impact? What's the proportion in 2017 and what's the direction quarter-over-quarter during this year, whether it is increasing every quarter or increasing in some quarter, decreasing in some quarter?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, C.C. or Mark, you want to answer that question?

JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, the cryptocurrency mining, the demand to TSMC. Actually, last year, of course we saw the strong increase in the second half of last year. But after that, I think it's keep a little bit flat for this year throughout this year.

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

Okay, fair enough. And then I want to ask a little bit about above 10-nanometer. If you look at the fourth quarter, it looks like if we exclude 10-nanometer, the rest of the company, roughly 75% of revenue was down about 8% quarter-to-quarter. And things like consumer were off pretty significantly and even 28-nanometer was off 15%. So, I guess, I'm trying to understand, is that normal seasonality? I would have thought we were seeing broader strength from an overall semi cycle when we look beyond just 10-nanometer.

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

So Steven's curiosity is about our fourth quarter. Since 10-nanometer accounted for 25% of our fourth quarter revenue. If we take that out, the non-10-nanometer business is a decline of 8% quarter-over-quarter. In a seasonally -- supposedly seasonally strong quarter. Is that normal?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, to answer that question, you actually -- if you take out the 10-nanometer that representing a big portion of the smartphone business. So I don't know if you take out the smartphone, which is about a 50% of TSMC's revenue, cannot be, say others continued strong fourth quarter or something like that. So it's not very appropriate to just take out the 1 node by talking the whole market segment. I'm talking about the smartphone HPC. In fact, really the HPC increased. But we enter into the first quarter. The smartphone seasonality dropped and HPC continue to be strong.

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

And if I could just follow up quickly to that, what do you think 10-nanometer will then be in the first quarter? How big of a seasonal decline do you see in the first quarter? That's it for me.

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

He's asking us to give a guidance in the first quarter this year, 10-nanometer contribution.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

The first quarter 10-nanometer that is decreasing because of -- as I said, the seasonality of the smartphone business.

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

Okay, I think we have answered Steven's questions. And now we are coming back to the floor. First, we are going to ask JPMorgan's Gokul to ask his question.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

I had a couple of questions on 7-nanometer. Could you talk a little bit about what is your expected market share if we think about the N7 and N7+ over the next couple of years? The second part is I think Mark mentioned in the last call, more than 50% of the tape-outs for 7 are HPC-related. Could you talk about what could be the size of HPC-related production revenues? Because not every tape-out is equal in volume now that you're getting closer to production if you could give some color on that?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Could you repeat the question?

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

Right, Gokul's question is first asking us to quantify over our market share at the 7 and 7+ nanometer. That's his first question for the next few years, market share...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Market share on 7 and the 7+?

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

7 and 7+, right.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Well, we haven't even started producing 7 here. Is that a question or...

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

Yes, that's your question, right?

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

Yes.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

We intend, I can only say -- we intend to have a very high market share. At least on 7, which we will start producing.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

This year in the end of first half.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

June, he means June, the end of first half, Okay, which we'll start producing in June. And we intend to have a very high market share. In fact, I would say 100% close. Close, anyway. Now the 7+ comes, even what about, a year later?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

A year later. Why don't you ask the question for 7+ a year from now, okay?

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

And Gokul's second part of the question is since we have said that more than 50% of the tape-outs is for HPC, so he wants to know whether or not it is also revenue percentage. Number of tape outs HPC is more than 50%, whether or not the revenue contribution will also be more than 50%.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Yes.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Well, I would say initially, actually, smartphone business still occupy the majority of 7 nanometers of business, followed by the HPC. But that would be a few quarters away.

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

So HPC will be more 2019 kind of.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes.

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

All right. Then there will be a follow-up question from the floor coming from Credit Suisse Randy Abrams.

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

Actually wanted to go back to mobile. I think in the remarks earlier, you mentioned it will be flat for the mobile platform this year. Could you talk about your view on the market say for volume or content? Maybe a change in that or is it a view temporarily there are some market share swings on that front.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

You want to answer, C.C?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes, let me comment on the mobile -- the smartphone unit first. This year, we expect smartphone unit growth will be in the low single digit. However, the high-end smartphone will be decreasing for this year. And middle end and low end will be increasing a few percentage points. So in total, it will be a low single digit growth. And for TSMC that we saw that we combined all the smartphone together, and wafer revenue will be flat as compared with last year.

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

And the second follow-up, it's more broadly on the margins. You mentioned the wafer price impact. If you could give a broader picture on the other swing factors, a comment on depreciation, the 7-nanometer ramp and FX, a view on that. And the second part is, is there a new seasonality for margin? And it seems like the last year or 2, you had better margin in the first half, but then you have the new technology ramp in the second half. So if you expect that same type of seasonality again?

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

There are several things that will affect our 2018 margin. Number one is wafer price, we were just talking about that. The other one is the ramping of 7-nanometer. We expect ramping profile for 7-nanometer will be very similar to 10-nanometer at the same time, and that we expect the margin dilution for second half of this year will be 2 to 3 percentage point, which is also similar to 10-nanometer. Other than that, the foreign exchange is -- it can move positively or negatively. It's totally out of our control. I don't know what to say about that. Other than that, we have been doing all our efforts trying to plan the capacity better, reduce the costs, improve the productivity, and that would hopefully we can offset some of the potential negative factors. But having said so, as we have said, TSMC's financial goal for revenue on the next few years will be 5% to 10%, and the gross margin will be about, about 50%. But, of course, every quarter can be different. For example, the first quarter, as I just guided, actually included a about 2 percentage point inventory valuation, which is a positive to first quarter. As utilization move every quarter, that could be a factors, okay.

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

Depreciation...

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

Depreciation, with \$10.5 to \$11 billion, we expect the depreciation grow year-over-year by mid-teens.

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

All right, then a follow-up question from Morgan Stanley's Charlie Chan.

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

So actually, 2 small follow-ups. So first of all on the AI semiconductors. So now, those ASIC design customized chip is taking place and they have to replace that GPU. So if that trend continue to happen, do you think they will impact your GPU foundry business? And that is the first question. And the second question is regarding the IDM outsourcing. I think the logic chip outsourcing I think is already very clear, right. But for those specialty



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

semiconductor outsourcing, like power management IC, does that need some technology or process transfer from your IDM customers to TSMC. How does that work?

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

First question is with respect to the growth of the ASIC customers, whether or not ASIC will gain more popularity over GPU. And if that is the case, what's going to impact TSMC because we have GPU business.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Why don't you answer that? Mark will answer the first question.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

On the ASIC, AI ASIC, right, I think it -- of course, more -- as more customers get into the AI ASIC, that part of business will grow. However, it's also very clear that GPU, in some part of the market segment. For example, at least the data center is very solid. So I see in the future different design occupy different part of the market, and that is the situation so.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

And there is a second question.

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

Second question is the outsourcing from IDM beyond logic such as specialty technology, do we see -- how do we work with IDM's on those specialty technology when we phased-in their technology...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I think you answered that question earlier, I think. while you -- while that was the point earlier or somebody...

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Okay, both. I think we have a very deep specialty technology development. Some of the IDM just use our own technology, particularly moving into the finer nodes. But they are in order or older nodes definitely as their demand increases, we are also doing this phase-in, not transfer, phase-in. That means using our technology base to stimulate their technology to do the foundry services for them.

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

Okay, follow-up question from the floor, and that will be coming from Deutsche Bank, Michael Chou.

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

First question is regarding your 16-nanometer growth outlook. Is that right, your 16-nanometer revenue could be up year-on-year in 2018 or do you have any color for that?



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

16-nanometer?

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

Yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

It's a little bit increasing.

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

Okay, one follow-up question is you mentioned cryptocurrency, right, so do you think in 2019, most of the cryptocurrency demand will shift to 7-nanometer or do you think that people will still try to use legacy node in the future?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

Yes, a lot of applications from this cryptocurrencies mining; bitcoin, light coin, they are all different kind of applications. So they're using a lot of technologies. But most of them are advanced technology from 7, 10, 16, 12, it's all...

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

Okay, second question is do you think your 28-nanometer sales will be up year-on-year this year or be flat?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

28-nanometer?

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

Yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

This year, it will be a little bit decreasing.

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

Okay, we still have quite a few analysts waiting on the queue on the call. So I think we really need to go back to the call. Operator, could you please get to the next caller on the line?



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Operator

Next question comes from the line of Bill Lu from UBS.

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

I've had a chance to visit a few of TSMC's customers recently especially in the areas of HPC and cryptocurrency. What I seem to be hearing is that foundry suppliers, especially at the leading edge are getting quite tight. Now your guidance for the full year is obviously very good, but that 10% to 15% is that constrained by supply?

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

Bill, your background noise is actually quite strong, so let me see if I understand your question. You are asking whether or not 2018's 10% to 15% growth, are we constrained by capacity. Is that your question on the leading edge?

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

Yes, so does that reflect the demand environment or is that constrained by capacity?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

What was the question again?

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

Whether or not our growth this year is constrained by capacity.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Is what?

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

Constrained, limited by capacity.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Huh?

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

(foreign language)



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Oh the question is do we have -- is our 10% to 15% growth being limited by our capacity. No, no, it's not. Is it?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

A little bit.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

A little bit? A little bit, yes. A little bit.

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

Yes.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

But...

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

So the follow up is, is there a situation where you may raise capacity and increase CapEx a little bit and when will that be?

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

Please repeat your question again.

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

I'm sorry about the background noise. I'm just wondering given that it is somewhat capacity-constrained, what do you have to see to increase your capacity and CapEx?

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

Whether or not we'll increase CapEx this year.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

No, we have already given our guidance. Lora has already given our guidance on CapEx. And that is what we think we will spend. It's what you said 10...

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

10...



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Lora Ho - Taiwan Semiconductor Manufacturing Company Limited - CFO and SVP of Finance

\$10 to \$10.5 to \$11 billion.

Morris Chang - Taiwan Semiconductor Manufacturing Company Limited - Chairman

\$10 to \$10.5 to \$11 billion, yes.

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

Bill, so we have answered your questions, right?

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

Yes. My second question is on 28-nanometers. Now it looks like it's a bit weaker in the short term. TSMC I think has been saying pretty consistently that the 28 demand is going to be long-lasting. I'm wondering if you still feel that. Any changes to your long-term outlook for 28.

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

So as we said that we expect 28-nanometer to decrease a little bit this year, but at the same time, we also said the demand for 28-nanometer is long-term, it's lasting. So is this decline a temporary situation?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director

Judging from the tape-out activities, yes, we expect this decreasing it's just a short-term phenomena. In the long term, we hope that the business will grow as the tape-outs showed.

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

So judging by the tape-out activities, what do you think the 28 demand will inflect?

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

28 will be flat? You mean...

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

No, when does the inflection point for 28-nanometer demand will start going up again?

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

When will it go up again, when will 28-nanometer business go up again.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

We certainly hope as soon as possible.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Look, there is the 22 you know, and 22 is made on the same capacity as 28, and the 22 is growing.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Yes, in the next few years, the 22 will play a more important role.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

So the -- the answer to the question when will 28 go up again, my answer is that when the 22 grows sufficiently, and we expect it will.

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

Okay, I think we have answered Bill's question. Let's move on to the next caller on the line. Operator, please.

Operator

Yes, next question comes from the line of Patrick Liao from Macquarie.

Patrick Liao - *Macquarie Research - Research Analyst*

I have only one question. Will 7-nanometer yield rate start from a higher base since more than 90% of the equipment is compatible with 10-nanometer?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Did you hear the question? Would you please repeat?

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

Yes, 7-nanometer yield rate, Patrick is asking whether 7-nanometer yield rate will start from a higher base because there is 90% equipment in common with the 10-nanometer.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

Our progress in the 7 nanometer's yield definitely is a little bit better than 10-nanometer at the same period of time.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Perfect. It's better.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

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

Okay, now I know there are still quite a few hands on the floor. So we are coming back to the floor. That will be Goldman Sachs, Donald Lu.

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

Yes, my first question is on Moore's Law. I think 5-nanometer is around the corner and in the bag, so to speak. How about the 3-nanometer? And how about 2.5 if stops at some point, what would TSMC do? You have such a technology lead scaling. How you build the next technology barrier? The second question is on industry consolidation. I think chairman have commented before, but just want to hear it again, I guess. If just assuming Broadcom and Qualcomm merge at some point, you're going to have a huge customer. How you deal with this kind of huge customer?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Will you repeat the whole thing because...

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

Right. First question is with respect to Moore's law. Donald is asking us...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Moore's Law?

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

Moore's Law, and that what is the status of 3-nanometer and what will happen to TSMC if Moore's Law stops at some point in the future.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

All right, let's answer that question first. Mark?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

I think C.C. mentioned, 7-nanometer already in the fab. So the original 7-nanometer team, most of them is starting work on 3-nanometer already. So -- but the company has a pipeline of technology development. We also have a big team of pathfinding, pathfinding that is develop technology to see 3 and/or possibly beyond. And we also have a small research team that's exploring further outing of technologies. So our R&D is organizing in full spectrum, exploring to the future technologies also.

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

Can you comment on the progress at the 3? Is this feasible and...

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Progress on the 3-nanometer pathfinding. We'll, go ahead. It's positive.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

It's possible. I think from our program lead. So we have a monthly review and including Chairman also. So it is real.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Look, I review it every month. I review all the advanced technologies, 7 and 3. And the EUV and the CoWoS, InFO, every month. And on -- specifically on the 3-anometer. The program manager has become increasingly positive. It is still pathfinding. So when we first started it about more than a year ago, there was a question of whether it was even feasible. Now he has become increasingly positive that it is feasible. And that he in fact is now working on concrete ways. Well, that's the pathfinding. I mean he is defining the path. That's a fair assessment. Yes, yes. And...

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

Second part of the question is industry consolidation. How would TSMC deal with big customer?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I just refuse to comment on that because I think you mentioned a pair. And both of them are very good customers of ours. So and we stay neutral. And I'm -- yes, okay.

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

Follow-up question. Yes, follow up Credit Lyonnais' Sebastian Hou.

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

My first follow-up is on the 8-inch revenue. It was growing year-over-year in 2017. But I remember a year ago, initially, last year was guiding -- the company was guiding might decline. So I was wondering what has changed. What's the change that lead to the upside and what's your outlook for 2018 on 8-inch?

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

Okay, Sebastian's question is a year ago, we were guiding 8-inch revenue to decline. But then in reality, that revenue actually went up. So what happened and what's the outlook for us this year?

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Do you -- does Lora want to answer -- and no, C.C., you can answer that. You have picked up the microphone already.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

I picked up the microphone to give it to Lora.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Okay, yes.

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

It is indeed that our 8-inch demand is very strong, and I think it's mainly from these IoT and Automotive stuff, right. So in this year, we still believe the 8-inch revenue will continue to grow.

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

Thank you. Second part of my follow-up is the -- is a little bit different questions. Not on the silicon. But I wonder if TSMC's -- what is TSMC's strategy on compound semiconductors. It seems like there are more applications down the road like power device, VCSEL and RF, microLED, et cetera. So I was wondering what's the TSMC strategy on this because we haven't heard about this before?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

We did not specify so many compounded semiconductors at development but we did say that gallium nitride is a one that we're developing. And for the power management IC, and for power devices also that we are developing it for the working with the customer. And today, the business is still very small but we saw a high potential out of that.

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

So when do you expect this potential to be realized in the revenue?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - Co-CEO, President & Additional Director*

It's starting from this year, but probably in the 2019, 2020. You will see kind of reasonable amount coming out. This is the 6-inch wafer right now.

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

All right. Due to the consideration of time, I think we will stop taking analyst questions. But Chairman still have a few remarks to make.

Morris Chang - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

I just want to say that even though I will continue to be the chairman until June 5 this year, June 5 this year, but this is the last time that I plan in this conference. And for the last 2 years now, I have appeared only once a year in January. In 2016, I appeared once in January. And 2017, again, I appeared only once in January. And so this year, this will be the last time. And I'm bringing -- I really have spent many years with some of you, many years, more than 20 years. Although I think most of you probably haven't attended this particular conference that long. But having here almost 30 years I think, yes. And I enjoyed it, and I think that we all -- at least I hope that I had a good time. I hope that you had a good time, too. And I will miss you, and thank you very, very much. Thank you. Thank you. Thank you.

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

All right, thank you, Chairman.



JANUARY 18, 2018 / 6:00AM, 2330.TW - Q4 2017 Taiwan Semiconductor Manufacturing Co Ltd Earnings Call

And before we conclude today's conference, please be advised that the replay of the conference will be accessible within 3 hours from now. Transcript will become available 24 hours from now, both of which will be available through TSMC's website at www.tsmc.com.

Thank you for joining us today. We hope you will join us again next quarter. Goodbye, and have a good day.

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