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Earnings Call

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## OVERVIEW:

Co. reported 3Q16 revenues of TWD260b and EPS of TWD3.73. Expects 4Q16 revenues (based on certain items) to be TWD255-258b.



## CORPORATE PARTICIPANTS

**Elizabeth Sun** *TSMC - Director of Corporate Communications*

**Lora Ho** *TSMC - SVP & CFO*

**Mark Liu** *TSMC - President & Co-CEO*

**C.C. Wei** *TSMC - President & Co-CEO*

## CONFERENCE CALL PARTICIPANTS

**Michael Chou** *Deutsche Bank - Analyst*

**Randy Abrams** *Credit Suisse - Analyst*

**Roland Shu** *Citigroup - Analyst*

**Bill Lu** *UBS - Analyst*

**Donald Lu** *Goldman Sachs - Analyst*

**Brett Simpson** *Arete Research - Analyst*

**Charlie Chan** *Morgan Stanley - Analyst*

**Gokul Hariharan** *JPMorgan - Analyst*

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## PRESENTATION

**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

Welcome to TSMC's third quarter 2016 earnings conference and conference call. This is Elizabeth Sun, TSMC's Director of Corporate Communications and your host for today. Today's event is webcast live through TSMC's website at [www.tsmc.com](http://www.tsmc.com). If you are joining us via the conference call, your dial-in number are in listen-only mode. 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 CFO Ms. Lora Ho will summarize our operations in the third quarter of 2016, followed by our guidance for the fourth quarter of 2016. Afterwards, TSMC's two Presidents and Co-CEOs Dr. Mark Liu and Dr. C.C. Wei and Ms. Ho will jointly provide our key messages. Then we will open both the floor and the line for the Q&A.

For those participants on 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](http://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 statements 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 podium to TSMC's CFO Ms. Lora Ho for the summary of operations and current quarter guidance.



**Lora Ho** - TSMC - SVP & CFO

Thank you, Elizabeth. Good afternoon, everyone, and thank you for joining us today. My presentation will start with the financial highlights for the third quarter, followed by the guidance for the fourth quarter.

We have just finished another strong quarter. Despite a less favorable foreign exchange rate, our third quarter revenue increased 17% sequentially to TWD260 billion, exceeding the high end of our guidance given in July, due to the strong demand in overall smartphone market.

Gross margin declined 0.8 percentage point sequentially to 50.7% mainly due to an unfavorable foreign exchange rate and the margin dilution from higher 16-nanometer contribution, partially balanced by a higher utilization rate and cost improvement.

R&D expense continued to increase, reflecting a high level of development activities for 7-nanometer. Since our revenue grew faster than R&D expense, total operating expense to revenues was 9.9%. Operating margin was 40.8% in the third quarter.

Overall, our third quarter earnings per share reached TWD3.73, a 33% increase Q over Q and a 28% year over year and ROE for the third quarter was 31.2%.

Now let's take a look at the revenue contribution by application. Our third quarter business benefited from the new mobile product launches as well as the robust overall smartphone demand. Revenue increased across the board in all product segments. Communications and industrial/standard increased by 19% and 16% respectively, while computer and consumer also increased by 3% and 8% respectively.

In terms of revenue by technology, combined revenue from 16 and 20-nanometer continued to grow and represented 31% of wafer revenue in the third quarter compared to 23% in the second quarter. Meanwhile, our 28-nanometer capacity remained fully utilized and represented 24% of our wafer revenue in the third quarter.

Moving on to balance sheet, we ended the [third](corrected by company after the call) quarter with cash and marketable securities of TWD517 billion which is TWD151 billion lower than the second quarter. That was as a result of TWD156 billion of cash dividend payment in July. Correspondingly, current liabilities decreased by TWD141 billion.

On financial ratios, accounts receivable turnover days decreased by 1 day to 42 days. Days of inventory decreased by 10 days to 44 days mainly due to reduction in work in progress as a result of stronger wafer shipment and an improving cycle time on advanced nodes.

Now let me make a few comments on cash flow and CapEx. During the third quarter we generated TWD126 billion from operations, spent TWD104 billion in capital expenditure, paid out TWD156 billion in cash dividend and repaid TWD12 billion of corporate bonds. Our overall cash balance decreased TWD158 billion to TWD464 billion at the end of the third quarter.

In US dollar terms, the capital expenditure spent in the first three quarters of 2016 totaled \$6.7 billion. Our full-year CapEx budget is now expected to be slightly above \$9.5 billion, which is at the low end of our guidance.

I have finished my financial summary. Now let's turn to the fourth quarter outlook. Based on our current business outlook and exchange rate assumption of \$1 to TWD31.50, we expect fourth quarter revenue to be between TWD255 billion and TWD258 billion which represents 1% to 2% sequential decline, gross profit margin to be between 50.5% and 52.5%, and operating margin to be between 40% and 42%.

This concludes my remarks. Now I would like to turn the podium to Mark for his comments.



**Mark Liu** - TSMC - President & Co-CEO

Good afternoon. I would like to start delivering our key messages. Let me start from our near-term outlook. We concluded our third quarter with 17% quarter-to-quarter and 22% year-to-year revenue growth. This strong growth was driven by our major customer's new mobile product launch and a stronger than seasonal growth from our other customers.

In the third quarter we gained our foundry market share across most technology nodes. With strong sell-through we estimate fabless DOI exiting the third quarter will be only slightly above seasonal level.

We saw the smartphone sales improving coming into second half this year. High-end smartphone demand today is better than we previously expected. The 4G Plus deployment in China and the 4G upgrade in emerging markets also drive end demand.

PC gaming and the TV gaming markets driven by product refresh are showing good growth. Also deep learning is increasingly applied to many diversified areas. So we forecast our fourth quarter revenue to be about flat from the third quarter.

The demand for high-end smartphone will continue to improve. We estimate the year-end inventory reduction will be relatively mild. So exiting 2016, the fabless DOI will be slightly higher than seasonal level by about 2 days.

For the whole year of 2016 we forecast semiconductor market revenue, excluding memory, will have 1% growth, foundry revenue will have 7% growth, and TSMC revenue will achieve 10% growth in US dollars and 11% to 12% in NT dollars.

Now I come to the leading-edge technology status and competition. First on 7-nanometer, our 7-nanometer technology development is well on track. The progress of yield improvement and device performance development are both on schedule. We are confident our 7-nanometer technology to be ahead of our competition. Our plan of risk production qualification in 1Q 2017 remains unchanged. Our 7-nanometer has been adopted not only by high-end mobile consumers -- customers, but also by high-performance computing customers for GPU, gaming, PC and tablet, virtual reality, server, FPGA, automotive and networking applications. They all have aggressive product tapeout plans, starting from early second quarter 2017. So we expect work on silicon qualification of more than 15 customer product tapeouts in 2017.

Now on 5-nanometer, since the beginning of this year, our 5-nanometer technology has graduated from pathfinding to enter technology development phase. Recently, our EUV technology development made good progress. The throughput and reliability of EUV scanners, the sensitivity of EUV photoresist, and the quality of EUV mask blank and the pellicles all improved. Of course there's still a way to go.

We will use EUV lithography extensively in our 5-nanometer flow to improve density, simplify process steps and reduce cost. Our plan of risk production qualification in first half 2019 remains unchanged.

Now I want to report to you about our growth platforms. I will report to you our first two growth platforms. The first is mobile platforms. We believe mobile will continue to be a growth driver for TSMC in the next few years. We forecast worldwide smartphone unit growth rate be at mid single digit in the next five years.

The silicon content of smartphone will continue to increase, driven by increasing smartphone features such as dual camera, security sensing, AR/VR and migration to 4G, 4G+ and 5G, particularly in high-end smartphones. Those high-end smartphone features will also proliferate to mid and low-end smartphones.

There are other smartphone features yet to be seen. For example, deep learning for AI inference will also increase smartphone silicon content in the next five years. More high-performance processor will be used for context-aware applications and provide new user experience.

For this mobile platform we will complete developing 7-nanometer in 2017, upgrade 7-nanometer in 2018 and complete developing 5-nanometer in 2019 to support smartphone and high-end mobile products on an annual cadence.



For mid to low-end mobile and wearable products we will continuously offer cost-reduction technologies with 28HPC+, 16FFC and its derivative technologies.

Included on our mobile platform there are TSMC's highly innovative and differentiated InFO advanced packaging for low power and small form factor. We also offer our next-generation CIS technology, RF technology, SOI RF front-end, power management IC, fingerprint, near-field communication and various MEMS sensor technologies in this mobile innovation platform. We believe we are in -- we are very well positioned to grow in this mobile market in the next few years.

Now I turn to high-performance computing platform. In addition to mobile, we have also identified high-performance computing as another area of growth. In the trend of digital world, more and more devices are connected and more and more data are generated, collected, filtered, processed and analyzed at all levels, at local, in the network as well as in the cloud. This trend calls for more pervasive silicon processors for those computing nodes.

Recently, deep learning market calls for new levels of parallelism and new levels of compute efficiency from our customers. These rapid development of artificial intelligence technology allowing machine ability to see, hear and predict has huge implication in many industry verticals like healthcare, media, consumer, automotive and so forth. The silicon content to support AI applications I think will be huge.

We forecast the total wafer revenue opportunities, excluding memory, in this market segment could reach more than \$15 billion in five years. To capture these opportunities, we offer optimized 7-nanometer in 2017 and optimized 5-nanometer in 2019 in TSMC's high-performance platform. These technology offers include high-performance standard cell library, optimized metal interconnect and optimized EDA design flows for high-performance computing design.

On our advanced packaging side, we will continue to offer 2.5D and 3D IC integration solutions, in addition to the current CoWoS as part of our high-performance computing platform. They will support increased memory bandwidth for low-power, high-performance computation.

Thank you for your attention. I turn the microphone to C.C. Wei.

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**C.C. Wei** - TSMC - President & Co-CEO

Thank you, Mark. Good afternoon, ladies and gentlemen. Let me start with 10-nanometer status. We have transferred our 10-nanometer from R&D to production in third quarter this year. Our first 10-nanometer customer product has been produced with reasonable yield. Defect density and device performance continue to improve in much the same way as we did at the ramp-up stage of every leading edge technology node.

So far we have received five production tapeouts for high-end mobile products. We are preparing capacity for 10-nanometer production ramp up by the end of this year and expect shipment in first quarter next year.

Currently, there are about 2,500 engineers and 1,200 technicians that are working in the fabs on 10-nanometer. Additional 1,000 engineer and 500 technicians will be added to our 10-nanometer production team by the end of this year for the preparation of volume ramp in 2017.

As to our 16-nanometer FinFET, the defect density and cycle time continue to improve and are very competitive. In addition to mobile application processor, other applications such as cellular baseband, graphic processor for video game, AR/VR, deep learning and AI have strongly adopted our 16-nanometer solutions. As a result, our 16-nanometer business this year is expected to become more than five-fold of this level compared to last year.

In order to support the applications for mid to low-end smartphone and wearable products, we continue to work with customers to further shrink the die size while improving the performance in 16FFC.

Now on 28-nanometer, the demand for our 28-nanometer technologies has continued to be strong throughout this year and is expected to last through many years. So we are judiciously adding some bottleneck tools to meet the strong demand. Applications related to mid and low-end

smartphones as well as the WiFi, digital TV, set-top box, flash controller and others has found TSMC's 28-nanometer a desirable solution. With our differentiated technology, stable yield, shorter cycle time and large capacity, we have been very competitive in this node and are confident to maintain our market segment share for this node.

All the nodes from 28-nanometer all the way to 0.35 micron and even to 1 or 2 micron technology has been an important contributor to TSMC's profitability. We developed a broad portfolio of logic-based specialty technologies such as the CMOS image sensor, embedded flash, power management IC, fingerprint sensor, and MEMS to backfill our legacy logic capacity which is converted into these specialty technologies. And we continue to earn good margin from this business.

Today we have more than 8 million 12-inch equivalent wafer annual capacity from these older nodes. We believe this is by far the industry's largest capacity on those older nodes.

Now let me talk about one of our growth platform, automotive. There are many new applications being developed in automotive industry such as ADAS, night-vision, smart and green energy, electrical vehicles etc.

We believe those new applications will trigger or have triggered the new opportunities and requirements on semiconductor industry. For example, inside a car there will be a lot of sensors to collect environmental information, RF devices to connect with the outside world, more video displays, etc. The car also need a very powerful MCU or many powerful MCU to analyze data for better safety and functionality.

TSMC has been working with customer to develop necessary technology to capture those opportunities. Today we offer a broad range of technologies including advanced logic, embedded flash, CMOS image sensor, MEMS, and BCD to serve customers' need.

In addition to technology offer, we also put a lot of effort on quality and reliability for automotive platform. For example, in Q3 this year we started to provide ISO 26262 compliant IPs for 16FFC for automotive ecosystem. With our manufacturing excellence, which has been demonstrated in high-volume production with stable yield, and the broad range of technologies, we are ready to serve this growing market.

We estimate the total market of automotive-related ICs, measured in wafer value excluding memory was about \$4 billion in 2015 and about \$6 billion by 2020. We expect our wafer business from automotive-related ICs will more than double from 2015 to 2020.

Now let me talk about IoT. IoT is another growth area we have identified. This market is fragmented with diversified products. We estimate the total market of IoT-related ICs, again measured in wafer value excluding memory, was about \$2 billion in 2015 and expected to reach about \$6 billion in 2020.

For those IoT products, we have focused our efforts on providing ultra low-power technologies. For example, we offer 55-nanometer, 40-nanometer ultra-low power for low- to mid-performance IoT products, and 28 ultra low-power and 16FFC for high-performance applications. Furthermore, we also integrate the ultra low-power RF, embedded flash as well as sensor solutions such as CMOS image sensor and MEMS, to enable machine-to-machine or human-to-machine interface.

With our broad range of low power technologies and specialty technologies we believe we are well positioned to capture the growth opportunity in the IoT market. And we expect to grow our IoT business at a faster pace than the overall IoT market in the next few years.

Now I will talk about InFO. TSMC's InFO has been in volume production since second quarter this year. Currently, there are more than 2,000 engineers and technicians working in our Longtan site for InFO production. While we are confident that InFO will contribute more than \$100 million revenue to us in fourth quarter this year, we continue our effort on cost reduction and yield improvement, also with good result. More customers have engaged with us on the InFO technologies for the purpose of enhancing their product performance. Major application is still in mobile product. We are now qualifying for the next-generation InFO technology. A few hundred more engineers are expected to be added to our Longtan site when we begin our next-generation InFO production in year 2017.

Now let me talk about the Nanjing project. Our Nanjing project was announced last December. It includes a wholly-owned 12-inch wafer manufacturing facility and a design service center for the purpose of providing closer support to our customers in China and to further extend our business opportunities. We broke ground for the fab in early July. The production is expected to start in second half 2018 with 16-nanometer. We believe it will be the most advanced fab producing 16-products in China at that time.

Our design service center in Nanjing has already started functioning with more than 50 engineers now and expect to grow to about 100 by next year. We expect this design center will greatly help our customers in China to shorten their learning cycle and speed up their new product introduction to the market.

Thank you for your attention. Now I'll turn the podium to Lora.

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**Lora Ho** - TSMC - SVP & CFO

I would like to make a few comments on capital expenditure, profitability and dividends. The first regarding CapEx. TSMC's 2016 capital budget is estimated to be slightly above \$9.5 billion, which is closer to our low end of our guidance. We have guided \$9.5 billion to \$10.5 billion three months ago. It is mainly due to improving cycle time estimated for 10-nanometer; we are able to shorten the lead time for capacity installation, which leads to a reduction of our 2016 estimated CapEx. However, this reduction in 2016 will not change our planned capacity for 10-nanometer in 2017.

Our estimate for the capital intensity going forward remains unchanged at around low to mid 30% level for the next few years.

I will talk about profitability. In the past few years, despite the higher CapEx which leads to a substantial increase in depreciation expenses, we have been able to improve our structural profitability significantly. We plan to keep our structural profitability at a high level by continually working on price, cost and utilization rate with careful planning of capacity. Going forward, we expect to be able to maintain our gross margin rate at close to 50% level.

My last comment is about the dividend. Given our target revenue growth rate for the 2016 to 2020 five-year period to be compounded annual growth of between 5% and 10%, and our capital intensity to stay at low to mid 30% of our revenue, we anticipate an improving free cash flow after debt service in the next few years. Therefore, we also expect our dividend per share to increase in the next few years. This concludes my remarks.

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## QUESTIONS AND ANSWERS

**Elizabeth Sun** - TSMC - Director of Corporate Communications

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 two at a time to allow all participants an opportunity to ask 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 that into English before our management answers your question. For those of you on the call, if you would like to ask a question, please press the star then one on your telephone keypad now. Questions will be taken in the order in which they were received. If at any time you would like to remove yourself from the questioning queue, please press the pound or the hash key.

Now let's begin the question and answer session. First person to raise their hand is Deutsche Bank, Michael Chou.

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**Michael Chou** - Deutsche Bank - Analyst

Thank you. My first question is regarding the 16-nanometer UTR next year. Given that your key customer may shift to 10-nanometer next year for high-end products, so what is your expectation for UTR next year in 16-nanometer?



**C.C. Wei** - TSMC - President & Co-CEO

For UTR, actually you are asking for the 16-nanometer business next year. Actually there are some mid and low-end smartphone who are entering into this node. So, so far so good.

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**Michael Chou** - Deutsche Bank - Analyst

So does that mean you will have a similar UTR level next year versus this year?

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**C.C. Wei** - TSMC - President & Co-CEO

Roughly.

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**Michael Chou** - Deutsche Bank - Analyst

Roughly. Thank you. Second question is regarding your 28-nanometer market share next year. Do you expect it to be still very dominant next year versus this year, given rising competition from the other foundries?

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**C.C. Wei** - TSMC - President & Co-CEO

I just mentioned that we are confident to maintain the market segment share, so yes.

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**Michael Chou** - Deutsche Bank - Analyst

A follow-up question for 28-nanometer, do you expect tier-two foundries can gain market share in high-K/metal gate area more substantially next year, because given that it seems that UMC may try to increase high-K/metal gate shipment next year?

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**C.C. Wei** - TSMC - President & Co-CEO

Could you please repeat your question on high-K/metal gate.

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**Michael Chou** - Deutsche Bank - Analyst

Yes. Given that UMC may try to increase high-K/metal gate shipment next year, so how do you have a high market share in 28-nanometer next year?

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**C.C. Wei** - TSMC - President & Co-CEO

I just mentioned that lot of customer find our solutions very desirable. And so, again I would like to say that we are confident to maintain our market segment share.

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**Michael Chou** - Deutsche Bank - Analyst

Thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

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

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**Randy Abrams** - Credit Suisse - Analyst

Okay. Yes, thank you. You gave us some good figures on the growth drivers in new areas. Traditionally, IDMs have had a lot of market share in high-performance computing, automotive and even microcontroller and IoT. Your foundry share is 55%. If you could give some approximation what you expect your share in these where you put HPC \$15 billion, auto about \$6 billion, IoT growing to \$6 billion. Like if could you talk about what your market share in these traditionally IDM applications.

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**Mark Liu** - TSMC - President & Co-CEO

On the high performance computing, I cited \$15 billion next five years. It's really a rough estimate. Many of the application we cannot really grasp today, like artificial intelligence. We don't know how fast and in what form it will grow. So this is based on current knowledge.

And we've been -- indeed this high-performance computing include data center, network, storage and all the silicon attached with the data center. And also include AR and VR and gaming and that's our definition, not including artificial intelligence yet.

Today, in this sector, we have about 30% share. Of course we want to grow with the total segment and we also want to increase our share, together with other IDMs.

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**Randy Abrams** - Credit Suisse - Analyst

And could you talk about the automotive, what the contribution -- well, you talked about doubling the revenue. If you could give a starting point for market share in automotive?

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**C.C. Wei** - TSMC - President & Co-CEO

We are working on this automotive platform across all the technology nodes actually. So we expect to grow this area much faster than the market showed. Today, most of our product is on the MCUs. And we expect that going into a lot of high-speed computation, just like Mark pointed out, and also a lot of sensors will come with it. And so we expect to grow the market. So I don't know if that whether I answered your question on the automotive?

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**Randy Abrams** - Credit Suisse - Analyst

Or if you could give how much automotive is today for TSMC, as a percentage of revenues?

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**C.C. Wei** - TSMC - President & Co-CEO

She just gave me some hint. It's below \$1 billion.

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**Randy Abrams** - Credit Suisse - Analyst

My second question about the margins where you're guiding a little bit down in sales, but the margins are improving. And it looks like for next year, if I caught it right, it was 49% to 50%, but it's moved up a bit to 50%. You talked some on cycle time, it's a factor from cycle time improvement. If you could talk about what strides you're making on the cycle time or if there's other factors driving that margin improvement?

**Lora Ho** - TSMC - SVP & CFO

Cycle time, when I referred to the CapEx I was talking about cycle time improvement actually help the capital to be more efficient. That's why we can spend less money but you get the same capacity investment. Of course, cycle time helps yield as well. So that means when you start production then the yield can reach to optimal sooner, of course that will help the margin as well.

You were talking about the 2017. In my prepared message, I was talking about our effort on structural profitability improvement, our confidence on maintaining 50% level. Given this year's depreciation is only increased a little bit, and our CapEx is very much back-end loaded as you can see first half only about 30% and second half maybe 70%, so we expect the margin will -- we expect depreciation will go up next year. Although I cannot quantify the number because we are still working on a CapEx number for next year, so but with all those plus and minus reasons, we are still confident that the margin will be close to 50%.

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**Randy Abrams** - Credit Suisse - Analyst

Just one quick follow up, on the fourth quarter you have a couple of headwinds from currency and utilization, I guess, slightly lower. So just the improvement sequentially, is that from a 16-nanometer yield learning or if there's a factor that's offsetting that to drive the improvement in fourth quarter?

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**Lora Ho** - TSMC - SVP & CFO

16-nanometer will be a key reason because you know we are ramping very fast in 16-nanometer. In 16-nanometer it's the second year of production. I think you still remember you asked me, when can the 16-nanometer reach the corporate level? We expect the 16-nanometer it will reach the corporate level by first quarter 2017. So fourth quarter is very close to that corporate level. So that really helps our margin rate.

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**Randy Abrams** - Credit Suisse - Analyst

Okay, thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Next our questions will be coming from Citigroup's Roland Shu.

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**Roland Shu** - Citigroup - Analyst

Good afternoon. Last quarter we thought the customers are probably going to adjusting inventory in 4Q but looking at your 4Q guidance now, it seems that customers are actually still building the inventory. So will this inventory correction be delayed to first quarter next year and we are going to see a sub-seasonal first quarter next year?

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**Mark Liu** - TSMC - President & Co-CEO

I mentioned -- Our estimate fourth quarter will be flat. It's because the -- we see the end market demand is still healthy and therefore we also estimate the previously anticipated inventory reduction at the end of the fourth quarter will be mild.

This -- also supported by our major customers' 16-nanometer ramp. So that supports the fourth quarter results. So I think this -- the end of this year is more peaceful than previous years.

**Roland Shu** - Citigroup - Analyst

Okay, so that means that inventory correction probably won't be the case in first quarter next year?

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**Mark Liu** - TSMC - President & Co-CEO

Right. But the fourth quarter -- I don't think there's a major inventory adjustment in the fourth quarter either of general customers. But there are seasonalities. There are seasonalities that is not -- we cannot avoid it. And particularly the big customers' seasonality. That is the -- I think the only factor that affects the fourth quarter. But many things can still happen between now and then. So right now it's too early to tell.

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**Roland Shu** - Citigroup - Analyst

Okay, thanks. My second question is from different angle. Intel is licensing ARM's physical IP for 14- and the 10-nanometer process manufacturing. I know you don't comment your customer and the competitors directly. However, from the industry and from technical perspective, how do you think the impact to the overall foundry and that impacts to TSMC going forward? Thank you.

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**Mark Liu** - TSMC - President & Co-CEO

Well, I think that strengthens the ARM-based CPU in the processing world. And we have traditionally very strong in ARM-based ecosystem. As -not just the ARM and also many architectural license people. So it's proof that this, in order to get to the non-data-center world this is the ecosystem you're going to ride. How much threat? We don't know -- we, of course we never underestimate our competitions. Yes.

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**Roland Shu** - Citigroup - Analyst

Okay, thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Next question will be coming from UBS, Bill Lu.

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**Bill Lu** - UBS - Analyst

Hi there. Good afternoon. First question is a follow-up on HPC. Mark said that this business becomes more than \$15 billion by 2020. Can you talk a little bit more about the different segments of HPC and what do you think are the big opportunities within that \$15 billion?

Secondly, when I talk to your customers, it seems like a lot of people think that you need 7-nanometers for this to take off. So this is maybe hockey-sticking after 7-nanometers. I'm wondering if you would agree with that -- what is the linearity of that business? Thank you.

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**Mark Liu** - TSMC - President & Co-CEO

You -- first part you ask what is the component of HPC? Well, it includes many things associated with the data center. It includes the network processors and also includes the switches. And in our domain we include gaming and VR and AR and so forth. So for those market we are in a good position. However, for data center we are trying to get into a good position.

Yes, indeed we see our growth -- we expect our growth momentum will shift from high -- from mobile to high performance computing around 2019. So that's the ballpark estimate. It will depend on our 70 -- 7-nanometer, but also there are many other processors. There are many other processors that are still using 10-nanometer, still using 16-nanometer. And even 28-nanometer in this high performance computing sector.

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**Bill Lu** - UBS - Analyst

I'm sorry if I wasn't clear. I appreciate the answer but I'm just wondering, within HPC if you can look at -- of the things that you talked about -- data centers and switches, etc., VR, AR -- how big is each or maybe you can rank them in terms of the opportunity?

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**Mark Liu** - TSMC - President & Co-CEO

Oh boy. I haven't bring it with me. So -- but this is -- these are the industry models. They're existing industry models, you can estimate. It's not very special. Not particularly TSMC's secret. Okay.

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**Bill Lu** - UBS - Analyst

Okay, great. Thank you. My second question is on packaging. I think roughly maybe about a year ago maybe a little bit more, you talked about InFO being about TWD100 million by fourth quarter of this year with a gross margin below corporate average. If we now look into second half of 2017 can you give us the same kind of forecast with InFO and CoWoS both in terms of revenue opportunity and margins? Thank you.

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**C.C. Wei** - TSMC - President & Co-CEO

Well, I cannot predict that 2017 second half, but I can tell you that revenue will be greater. Margin will be better.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

That's actually a very happy answer. Let's go to the line now. Operator, please have the caller on the line.

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**Operator**

Thank you. Our next question comes from the line of Donald Lu from Goldman Sachs. Please go ahead.

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**Donald Lu** - Goldman Sachs - Analyst

Oh, hi. My first question is can you comment on your silicon content for smartphones for this year and next year? And if you can specify low end and high end as before that will be good.

The second question is on your 10-nanometer yield ramp. Is the progress within expectation or is that a little better or worse? And also I think you commented that the shipment for the first product will start in 20 -- Q1 next year. And maybe you can specify whether early Q1 or later Q1? Thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Okay, first of all, I have to inform everybody the caller is from Goldman Sachs, Donald Lu. And Donald, your first question is about smartphones -- average silicon content of a smartphone, right?



**Donald Lu** - *Goldman Sachs - Analyst*

Yes, and also high end, low end, if you can separate the two?

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

Yes, that's right. You want the breakdown between high end, low end and medium end?

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**Donald Lu** - *Goldman Sachs - Analyst*

Yes. And the next --

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

And your second question is with respect to 10-nanometers in terms of the yield as well as the projected shipment of 10-nanometer next year by quarter?

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**Donald Lu** - *Goldman Sachs - Analyst*

Yes. Yes.

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**Lora Ho** - *TSMC - SVP & CFO*

All right, Donald. I will try to answer the first part of your question regarding the silicon content. If we look at the revenue per box on a smartphone, we have seen the dollar per box actually continue to increase and 2015, 2016 a slight increase. We expect the content will continue to increase in 2017 with weighted average about \$10 per box -- for us. So this is especially on the high end part. That's where the increase coming from for us.

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**Donald Lu** - *Goldman Sachs - Analyst*

So I remember the average content this year is about TWD8 per phone? And you've been talking about \$10 next year?

---

**Lora Ho** - *TSMC - SVP & CFO*

No, this year is more than \$9. Same for last year. We expect the dollar will go up to about \$10 next year.

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**Donald Lu** - *Goldman Sachs - Analyst*

Got it. Thank you.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

Second question was with respect to 10-nanometer, the yield. (Multiple speakers).

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**Donald Lu** - *Goldman Sachs - Analyst*

The 10-nanometer yield ramp -- whether it's within expectation similar to 16-nanometer or it's more challenging -- yes.

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**C.C. Wei** - *TSMC - President & Co-CEO*

It is similar. It's similar. But of course the 10-nanometer is much tougher than the 16-nanometer FinFET that -- as compared with the one year ago.

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**Donald Lu** - *Goldman Sachs - Analyst*

Got it. And also you commented that you'll enter volume production. The volume product tape-out will start in early next year, Q1 next year, is that the guidance?

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**C.C. Wei** - *TSMC - President & Co-CEO*

Yes. We start production at the end of this year but the wafer will be out in the first quarter and enter into the volume production after that.

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**Donald Lu** - *Goldman Sachs - Analyst*

Okay, so the volume production tape-out will start in Q4 this year?

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**C.C. Wei** - *TSMC - President & Co-CEO*

That's right.

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**Donald Lu** - *Goldman Sachs - Analyst*

Got it. Thank you.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

We can have the next caller on the line operator, please.

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**Operator**

Thank you. Your next question comes from the line of Brett Simpson from Arete Research. Please go ahead.

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**Brett Simpson** - *Arete Research - Analyst*

Thanks very much. My first question on 7-nanometer -- can you maybe talk about how many customers are committed? I know you talked about tape-outs for next year, but how many customers in total are committed to 7-nanometer? And if you plan to convert your 10-nanometer capacity to 7-nanometer over time, do you think your peak capacity of 7-nanometer will be higher than 28-nanometer?

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

All right, I will repeat Brett's questions. I think he's asking us about 7-nanometer first -- how many customers do we have at 7-nanometers -- total. And then if we will convert some capacity eventually of 10-nanometer to 7-nanometer, will we be able to generate 7-nanometer business, eventually, bigger than 28-nanometer business?

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**Brett Simpson** - Arete Research - Analyst

7-nanometer wafers -- yes. Wafer capacity.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

And 7-nanometers capacity.

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**Brett Simpson** - Arete Research - Analyst

Yes.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Okay.

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**Mark Liu** - TSMC - President & Co-CEO

7-nanometer customer are many. I don't remember how many, but more than 20. Many of them are working on their tape-out next year as well as 2018. 7 -- we expect the 7-nanometer business to -- of course will be larger than 28-nanometer. Capacity-wise we don't -- it could be comparable. It could be -- it really depends on the later on customers' product launch how successful they will be. But we are planning probably within -- it's comparable within the range. There's no significantly drop capacity-wise. So in that terms the business will be much bigger, in dollar sense.

---

**Brett Simpson** - Arete Research - Analyst

That's very helpful. And second question was on the Nanjing fab in China. Is that going to be TSMC moving existing capacity from Taiwan to China or will this be incremental capacity you're adding with Nanjing?

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

All right, the question is with respect to our Nanjing fab. Brett is asking whether we'll be using our existing capacity from Taiwan to be used in Nanjing, or will it be incremental capacity?

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**C.C. Wei** - TSMC - President & Co-CEO

The majority of the capacity will be moving from Taiwan fab to Nanjing.

---

**Brett Simpson** - Arete Research - Analyst

Okay. Thanks very much.



**Elizabeth Sun** - TSMC - Director of Corporate Communications

Okay, let's come back to the floor. Next question will be coming from Morgan Stanley's Charlie -- Charlie Chan.

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**Charlie Chan** - Morgan Stanley - Analyst

Thanks for taking my question. My question is also on 7-nanometer. It sounds like customers' demand are very strong for 7-nanometer and you just mentioned that the 10-nanometer cycle time is shorter than your expectation. So is it possible you can bring in the mass production timing of 7-nanometer to so called the later 2017? If your risk production in 1Q next year will be smooth Thanks.

---

**Mark Liu** - TSMC - President & Co-CEO

I hope our preparation can be ahead of schedule, which we're working on to ensure our customer, when they do the product launch they get more matured condition. However, if you're asking we're pulling the ramp that will be affected by many factors. It depends on their product launch timing. And nor do we want to produce much inventory either. So that is a business decision rather than a technical decision.

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**Charlie Chan** - Morgan Stanley - Analyst

Okay, understood. And also on 7-nanometer, so do you expect customers' number or tape-out number to be more than 16-nanometer? I mean because 7-nanometer cost could be much higher than 16-nanometer. So when you communicate with your customer, how will they justify the higher cost in terms of photo mask, wafer price, IP costs, etc.

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**Mark Liu** - TSMC - President & Co-CEO

Right now it's hard. What I cited that customer number really is at this point those customer already working with us on 7-nanometer. Okay, it's by no means the total number of customers. As any node, when technology gets mature there are many, many smaller customers or more innovative other, new companies which come on board. So if you look at the 16-nanometer, they're quite a bigger number than what I tell you on 7-nanometer. But as time goes on, I believe 7-nanometer customer will continually increase.

One is in addition to the mobile application I expect high performance application -- VR, AR, artificial intelligence application -- will come -- added to our customer portfolio -- product portfolio. And that is the reason we see in one way the entry barrier is higher, so less customers can get into but the application of that technology will be wider than before. So that is what I -- what we see.

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**Charlie Chan** - Morgan Stanley - Analyst

Okay. Thank you. So lastly, very quick on the third quarter revenue, I guess the question is to Lora. So I just want to clarify, do you think the revenue upside third quarter mainly coming from the 20-nanometer or 16-nanometer? Because you mentioned that the margin dilution comes from 16-nanometers so it seems to imply the upside coming from 16-nanometer in third quarter.

---

**Lora Ho** - TSMC - SVP & CFO

Actually the third quarter revenue is supported by smartphone growth. When I say smartphone, it's more than 16-nanometer. Of course it includes 16-nanometer -- but also the companion chip that goes along to support smartphone.

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**Charlie Chan** - *Morgan Stanley - Analyst*

Okay, so it's smartphone demand across different nodes?

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**Lora Ho** - *TSMC - SVP & CFO*

Yes.

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**Charlie Chan** - *Morgan Stanley - Analyst*

Okay, thanks.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

All right. The next question will be coming from JP Morgan's Gokul Hariharan.

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**Gokul Hariharan** - *JPMorgan - Analyst*

Thank you. My first question is on HPC. I think you provided a rough estimate of \$15 billion wafer revenue in five years. Just to get some granularity on that, is that the total market demand, including IDM, fabless, everything, or does it just be foundry opportunity within that market? Because as you mentioned, some of the segments have very dominant IDM players. Some of them, like GPU, are a lot more fabless.

---

**Mark Liu** - *TSMC - President & Co-CEO*

What I cited are the wafer revenue in terms of foundry revenue. But we -- many of our customer -- fabless customer wants to get into that market and any product can be foundried, by the way, okay? So we just play together in that sector. That's all. Yes.

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**Gokul Hariharan** - *JPMorgan - Analyst*

Okay. All right. So would you say that server is still a big portion of that opportunity? Or you're not including the server opportunity which is predominantly IDM in that \$15 billion.

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**Mark Liu** - *TSMC - President & Co-CEO*

Server is included in that opportunity.

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**Gokul Hariharan** - *JPMorgan - Analyst*

Okay. All right. Second question is on 7-nanometer. I think you mentioned about 15 customer tape-outs already ready for next year. Are there a significant number of HPC-related tape-outs there, or the starting tape-outs are mostly high end mobile in that 7-nanometer?

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**Mark Liu** - *TSMC - President & Co-CEO*

There are a significant number of HPC products -- tape-outs. But in terms of volume it will be high -- mobile product volume will be much higher in the beginning.

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**Gokul Hariharan** - *JPMorgan - Analyst*

And maybe, last one, I think you had mentioned 10-nanometer you'll have more than 70% market share. Any rough thoughts in 7-nanometer, is it going to be 90% to 95%. Any early thoughts on how you think about 7-nanometer market share?

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**Mark Liu** - *TSMC - President & Co-CEO*

High. We'd say high. Higher than 10-nanometer. We want to do every nanometer higher than the previous one.

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**Gokul Hariharan** - *JPMorgan - Analyst*

Fair enough.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

The next question will be coming from Credit Lyonnais, Sebastian Hou.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Thank you, Dr. Sun. My first question is on the packaging business. So InFO and CoWoS. Did I understand correctly that the TSMC will take full responsibility for packaging of logic and memory and my question is how to split the yield issues of memory with the memory partner? And as this part of the business continues to grow in terms of revenue percentage and dollar amounts and how do you expect this to -- will this increase the business risk for you and how do you see that impact your risk, yield and profitability?

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**C.C. Wei** - *TSMC - President & Co-CEO*

To answer your question, no, we don't take full responsibility, as you said on the memory portion. Memory we will work with the memory supplier but it's mainly their responsibility to make it reliable and fully functional and can be cooperative into InFO technology. But we don't take the full responsibility, as you just mentioned.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Okay. I think my question is -- sorry, I should have asked more clearly. So my question is, when the packaging -- for example the fail -- the yield rate is not good but you have to be responsible for that cost including the memory cost, right?

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**C.C. Wei** - *TSMC - President & Co-CEO*

Oh. That's a good question. Once a part fail, which we don't expect too often, of course -- once the part fail we trace it back. We work with the customer identify whose responsibility it is.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Okay. So the yield rate is -- (inaudible) the yield rate problem is led by your memory partners and that cost will be attributed to them but not you?

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**C.C. Wei** - TSMC - President & Co-CEO

That's correct.

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**Sebastian Hou** - Credit Lyonnais - Analyst

Okay. And my second question is a very simple one. Just I noticed that your 0.11-micron and 0.13-micron revenue increased quite a lot in terms of quarter on- quarter and year on year in the third quarter. Can you give us some hints and colors on what type of application and products are that? Thank you.

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**C.C. Wei** - TSMC - President & Co-CEO

Okay. On 0.11-micron and 0.13-micron we, as I mentioned, we developed some specialty technologies and so I give you -- yes, the one or major reason probably is some of the Power Management IC.

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**Sebastian Hou** - Credit Lyonnais - Analyst

Thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

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

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**Rick Hsu** - Daiwa - Analyst

Yes, hi. Good morning -- sorry, good afternoon. My first question is I think Lora was talking about your revenue CAGR in the next -- well, three years to five years will be 5% to 10% per annum. I wonder if you could give us some ballpark number. If I want to break it down on the incremental revenue increase across the board with your four demand drivers like you include HPC, mobile, auto and IoT, could you give us some idea the contribution from each category?

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**Lora Ho** - TSMC - SVP & CFO

I cannot. I think Mark said last quarter in the five-year timeframe half of our growth will come from the mobile field and about a quarter for high performance computing area. And the other quarter will be from IoT. That's the ballpark I think.

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**Rick Hsu** - Daiwa - Analyst

All right, thank you. All right. The second question is I think this year your revenue growth is going to be pretty strong based on your 5% to 10% guidance. And that also increase the comparison base for next year. So if I want to ask for some color about your next year's growth it's going to be a 5% to 10% range, would you be -- would that be closer to the lower end or higher end?

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**Lora Ho** - TSMC - SVP & CFO

I will not comment 2017 growth at this moment. You can just follow our indications. We still believe in the five years to 10 years compound annual growth rate will be between 5% to 10%. Of course, some year will be higher. Some year will be lower. But this is our goal -- to drive the compound growth rate 5% to 10%.

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**Rick Hsu** - Daiwa - Analyst

Thank you so much.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

I think we will need to go to the line first before we come back to the floor for the follow-up questions. Operator, could you please have the next caller on the line please?

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**Operator**

Thank you. Our next question comes from the line of Steven Pelayo from HSBC. Please go ahead.

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**Steven Pelayo** - HSBC - Analyst

Yes, just a couple of clarifications first. Your China revenue -- despite total Company revenue being up so much, your China revenue in dollars was down pretty significantly. It seems to happen every third quarter, but I guess I'm surprised, given some of the strength that we've seen in China smartphone. Maybe you can comment a little bit about what's going on in China, what you're seeing there and thoughts for the fourth quarter.

And then the second clarification question that I had was just on gross margins. You had said that around 50% for next year. I'm curious if that's more of a full-year number or when I think about it on a quarterly basis -- can you talk a little bit about seasonality in large customers, rising depreciation? I know in the past you've smoothed it a little bit as well in the first half by starting wafers. I guess I'm worried a bit about first half next year gross margins. Can they also still be close to 50% in a seasonally soft period? Those were my two clarification questions.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Steven, you talk so fast it's even beyond me. So I really -- I haven't caught your first question quite well, but I think the second question you want us to explain about gross margins for next year, right?

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**Steven Pelayo** - HSBC - Analyst

Primarily during the seasonally soft period so in the first half of the year, can your gross margins still sustain about 50% as you had suggested, I think, for the full year?

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Are you asking about 2017? Okay. Yeah. 2000 --?

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**Steven Pelayo** - HSBC - Analyst

Correct. First half next year and a seasonally softer period, can gross margin sustain 50%?

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**Lora Ho** - TSMC - SVP & CFO

I will not particularly comment on quarter gross margin outlook but if you hear what I said earlier, in the longer term we intend to keep it about 50%. Of course, some quarters depending on the seasonality and utilization may swing a little bit. And we have the 10-nanometer which will be dilution to our margin as it comes on. But over and over I think 50% -- about 50% is probably good direction.

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**Steven Pelayo** - HSBC - Analyst

Okay, let me just jump to my last longer-term question. Midway through the third quarter one of your competitors now, Intel, seems to have rebuild their foundry effort. TSMC's been under attack many times in the -- over the years and you guys have done a great job with your scale, your tech leadership, existing relationships, your customer agnosticism, if you will. But I'm just curious -- is there anything different this time with some of the competitive threats out there? Are you hearing any differences from a customer perspective, or even from just a competitive perspective on pricing or incentives -- or just the general specmanship that's going on right now? Any thoughts on competitive landscape this time around?

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**Mark Liu** - TSMC - President & Co-CEO

Steven, can you speak slower? Because really, the bandwidth is very narrow, so only part of the spectrum was received.

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**Steven Pelayo** - HSBC - Analyst

Maybe it's my (multiple speakers)

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Maybe I can summarize your very long question. You are just asking, what's the impact to TSMC if Intel becomes very serious about foundry, right?

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**Steven Pelayo** - HSBC - Analyst

Well, they certainly have threatened in the last 90 days with a greater level of intensity. And so I'm curious if anything's different from a competitive landscape perspective this time around. In the past you have done a great job fighting off competition. Do you see anything different this time around?

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**Mark Liu** - TSMC - President & Co-CEO

We intend to do a great job going to the future too.

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**Steven Pelayo** - HSBC - Analyst

Okay, fair enough, guys. Thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Thank you. Thank you, Steven. Let's come back to the floor. Okay, follow-up question first come from Credit Suisse, Randy Abrams.

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**Randy Abrams** - *Credit Suisse - Analyst*

Thank you. Last year there was CapEx savings where the mobile products migrated 20-nanometer to 16-nanometer and there was capacity conversion. Could you talk about the outlook for the 16-nanometer node, if you expect to backfill as some of the leading products move? Or you could see the same type of move of converting capacity from 16-nanometer down to 10-nanometer and 7-nanometer. Then is it efficient to make that capacity conversion?

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**C.C. Wei** - *TSMC - President & Co-CEO*

We build our capacity according to the demand, of course. And so the next year we expect customer move -- especially the high-end smartphone -- to move from 16-nanometer to 10-nanometer. And then we expect the second wave and third wave customer to enter into 16-nanometer. So far we will convert some of the 16-nanometers capacity into 10-nanometer. We will, if the demand is not as high as this year.

And you are talking about the conversion efficiency -- it's quite high.

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**Randy Abrams** - *Credit Suisse - Analyst*

Okay. So when you're saying, so your base case is no conversion; it's only on a demand disappointment that you -- like your base case is you can fill that capacity? Okay.

The second question, you used to disclose IDM business every quarter. It's no longer in the quarterly -- but IDM last year grew from 15% to 18%. So it's actually a reversal that IDMs grew as a percent of sales. If you could talk about that bucket, which it seemed like it continued to come down relative to Fabless. But with some of the mergers like NXP-Freescale, are you seeing as a result of that any change in outsourcing or for your overall IDM business any change?

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**Mark Liu** - *TSMC - President & Co-CEO*

Did you say the IDM revenue growth is 18%.

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**Randy Abrams** - *Credit Suisse - Analyst*

Yes, in the annual time it was 18%. The year before it was 15%.

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**Mark Liu** - *TSMC - President & Co-CEO*

IDM?

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**Randy Abrams** - *Credit Suisse - Analyst*

For IDM.

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**Mark Liu** - *TSMC - President & Co-CEO*

IDM outsourcing or IDM?

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**Randy Abrams** - *Credit Suisse - Analyst*

Well, just IDM as your percent of revenue. Like the total bucket of IDM.

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**Mark Liu** - *TSMC - President & Co-CEO*

I see. We indeed, our growth more recent years comes from fabless, also from IDM outsourcing and from system companies. As a matter of fact, if I look at the recent history, the growth fastest is from system companies, then the IDM outsourcing then the fabless growth.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

If I can add, this year the number will be similar to last year.

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**Randy Abrams** - *Credit Suisse - Analyst*

Thank you.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

Okay. Next follow-up question will be coming from Citigroup's Roland Shu.

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**Roland Shu** - *Citigroup - Analyst*

Thank you. I just have one follow-up question for your inventory level. I know your inventory is mainly from WIP and also finished goods. However, looking at this 3Q you have a 17% higher revenue compared to second quarter but your inventory has declined about 10%. Agree you said you ship off this WIP. However, in 3Q you probably have much more wafer starts also. So that actually will be turned to the WIP. So just I want to understand what is the percentage for your finished goods in your inventory? Are you -- did you ship off these finished goods to your customer in 3Q?

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**Lora Ho** - *TSMC - SVP & CFO*

Simple answer is yes. We have very low finished goods inventory. If you understand our business model that's the way it should be. So majority part of our inventory is WIP.

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**Roland Shu** - *Citigroup - Analyst*

Okay.

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**Lora Ho** - *TSMC - SVP & CFO*

So when we're talking about cycle time it does help to reduce the inventory because you don't need to build that earlier. So you can do pretty efficiently.

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**Roland Shu** - *Citigroup - Analyst*

Okay, so how much cycle time you have been reduced in 3Q?

**C.C. Wei** - TSMC - President & Co-CEO

Actually most of the cycle time reduction comes from the manufacturing side. I'll give you one example. I cannot nail down between the second quarter and the third quarter but I'll tell you that last year and this year we probably improved by 20%. We shortened that cycle time.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Okay, there are follow-up questions first from Morgan Stanley's Charlie Chan.

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**Charlie Chan** - Morgan Stanley - Analyst

Thanks. So, Mark, a couple of weeks ago you announced that TSMC's going to kick off the 3-nanometer R&D. But that doesn't really show in your competitors' roadmaps, not even the 5-nanometer. So what is TSMC seeing that your competitors don't see in terms of technology breakthrough or any customers demanding for that 3-nanometer? Thanks.

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**Mark Liu** - TSMC - President & Co-CEO

I'm sure our competitors are working on it. So I just have the chance last week in TSIA's annual meeting. I spelled out our 3-nanometer status. And everybody's working on it I believe. At least the top three or four. And it's still in the pathfinding mode and how to do the transistor I think everybody is searching it. Maybe it's not obvious at this point, but that is what the researching is about. So we intend to invest heavily in the much forward-looking R&D anticipating all kinds -- both in the Moore's Law scaling as well as the 3D IC integration. So we intend to fulfill the future system requirement this way and to fit our technology just for the future system requirement, instead of just so-called CPU cadence. Thanks.

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**Charlie Chan** - Morgan Stanley - Analyst

So in your long-term revenue mix, so Lora just mentioned that the long-term your mix will be half from mobile, one quarter from HPC, one quarter from IoT.

So what is it today? I mean the mix today from these three segments?

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**Lora Ho** - TSMC - SVP & CFO

We didn't separate the revenue on the way you describe. We just have a communication -- computer, consumer, industrial/standard, which you can find from our management report, which a very big part is communication and the increasing important part is industrial and standard, computer getting smaller.

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**Charlie Chan** - Morgan Stanley - Analyst

Okay.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

Okay, follow-up questions also will be coming from Credit Lyonnais, Sebastian Hou.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Thank you. I have questions from -- more from the -- in terms of margin from the application perspective. So if you look at your future growth driver, smartphone, or just mobile and high performance computing and automotive and IoT. We understand mobile so far account for a large chunk of your business revenue contribution. And automotive and high performance computing right now is still relatively smaller. But I believe this part will be -- presumably this part -- these two businesses will grow faster. So in terms of the margin will these two parts of the business carry higher than the other business margin? And how do you see this impact your margin? Will it bring more upside to your margin down the road?

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**Mark Liu** - *TSMC - President & Co-CEO*

Right. Lora just mentioned we try to keep our 50% to -- around 50% margin. Of course, the higher the better and we want to work on our value add for our customers.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Okay. And my follow-up questions on that is on your 7-nanometer because you have two variants for mobile and high performance computing platform, and do you see any margin or profitability difference between these two variants?

---

**Mark Liu** - *TSMC - President & Co-CEO*

At this point it's too early -- too early to say. We're just working with our customers. You know the price changes year-by-year. So how it pans out is yet to be seen. I certainly hope the high performance computing margin is higher than our mobile because -- and look at Intel's margin. But we still at the same time want to enable our customer to enter that high performance computing market. And that is the consideration. At this point we do not assume major differences but of course we work with our customer to get their margin high -- therefore, we benefit our margin too.

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**Sebastian Hou** - *Credit Lyonnais - Analyst*

Thank you.

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**Elizabeth Sun** - *TSMC - Director of Corporate Communications*

All right, finally the follow-up question will be coming from Deutsche Bank's Michael Chou.

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**Michael Chou** - *Deutsche Bank - Analyst*

About the outlook by segment for Q4?

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**Lora Ho** - *TSMC - SVP & CFO*

We have guided kind of flat fourth quarter, so on the segment side we expect communication and computer will grow slightly and consumer industrial will decrease. So net is flat.

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**Michael Chou** - *Deutsche Bank - Analyst*

All right. Regarding the 16-nanometer market share what is your expectation for next year versus this year? Will that be similar?

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**C.C. Wei** - TSMC - President & Co-CEO

It will be similar.

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**Michael Chou** - Deutsche Bank - Analyst

Thank you.

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**Elizabeth Sun** - TSMC - Director of Corporate Communications

All right in that happy note we will conclude third quarter's conference and conference call. Thank you for joining us this time and I will see you next quarter.

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