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Earnings Call

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OVERVIEW:

Co. reported 1Q16 EPS of TWD2.50. Expects 2016 revenue growth to be 5-10% and 2Q16 revenue (based on current business outlook and exchange rate assumptions of \$1 to TWD32.30) to be TWD215-218b.



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PRESENTATION

Elizabeth Sun - *TSMC - Director of Corporate Communications*

(Spoken in Mandarin). Welcome to TSMC's first-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. If you are joining us via the conference call, your dial-in lines 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 first quarter of 2016, followed by our guidance for the second quarter. Afterwards, Ms. Ho, and TSMC's two Co-CEOs, Dr. Mark Liu and Dr. C.C. Wei will jointly provide our key messages. Then we will open both the floor and the line for 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. 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. Thank you for joining us today. My presentation will start from financial highlights for the first quarter, followed by the guidance for the second quarter.

First-quarter revenue came out slightly better than we have expected. Although the February 6 earthquake caused some delay in wafer shipments in the first quarter, we saw business upside resulting from demand increases in mid and low-end smartphone segment and customers inventory restocking. Therefore our first-quarter revenue was essentially flat from the fourth quarter last year compared to about 2% decline we guided three months ago.

Our first-quarter gross margin was 44.9% and operating margin was [34.6%].(corrected by company after the call) Both are 3.7 percentage points lower than fourth quarter last year due to lower utilization and the negative impact from the earthquake, which I will provide more detail later. Overall our first-quarter EPS was \$2.50.

Now let's take a look at revenue contributed by application. During the first quarter, communication and consumer increased 4% and 15% respectively, while computer and industrial/standard decreased 7% and 9% respectively.

Now let's take a look at revenue by technology. 16- and 20-nanometer contributed 23% of our total wafer revenue in the first quarter. In addition, 28-nanometer saw a nice rebound in demand and contributed 30% of our total wafer revenue. Together, these three advanced technologies accounted for 53% of total wafer revenue.

Now moving into the balance sheet. We ended the first quarter with cash and marketable securities of TWD648b, an increase of TWD62b. On the liability side, current liabilities increased TWD24b. The increase included the reclassification of TWD10b bonds payable from long-term to current. During the year of 2011 and 2013, TSMC issued corporate bonds totaling TWD211b to support the capital expenditure. These bonds will gradually become due starting from this current quarter.

On financial ratios, accounts receivable turnover days remained at 41 days. Days of inventory decreased by 8 days to 54 days, reflecting more shipments from finished wafers and earthquake impact.

Now let me make a few comments on cash flow and CapEx. During the first quarter we generated about TWD122b cash from operations and spent TWD38b in capital expenditure. As a result, we generated free cash flow of TWD83b this quarter. And overall cash balance increased TWD55b to reach TWD618b at the end of the first quarter.

I have finished my financial summary. Now let me turn to the second-quarter outlook. We expect our business in the second quarter will benefit from continued inventory restocking and the recovery of the delayed shipments from the earthquake. Based on our current business outlook and exchange rate assumptions of \$1 to TWD32.30, we expect second-quarter revenue to be between TWD215b and TWD218b, which represents 6% to 7% sequential increase. Gross profit margin to be between 49% and 51%, and operating margin to be between 38.5% and 40.5%.

In the second quarter, we will begin -- we will again need to accrue the 10% tax on undistributed retained earnings. As a result, our quarterly tax rate will be about 24% in the second quarter. The tax rate will then fall back to 11% level in the third and fourth quarter. And the full-year tax rate will be about 14%.

Now let me give you some comments about the earthquake impact and this year's profitability and CapEx.

On February 6 this year, an earthquake of 6.4 magnitude struck southern Taiwan and caused damages to certain parts of our tool in our manufacturing site in Tainan and disrupted production. As a result of wafer shipment delays, we have pushed out deliveries off about 90k 12-inch wafer from first quarter to second quarter. The financial impact of this earthquake to TSMC is as follows.



First, it reduced our first-quarter revenue by about TWD7b and lowered first quarter growth margin by 2.2 percentage points. About 1.1-percentage-point reduction is due to the losses associated with the property damage and the wafer scrap net of insurance claims. Another 1.1 percentage point is contributed by the loss of productivity. The impact to our first-quarter operating margin is about 2.4 percentage points. And the negative impact to first-quarter operating income in dollars is about TWD7b.

Wafer shipments that are delayed to second quarter will benefit our second-quarter revenue by about TWD7b and contributed positively to second-quarter gross margin by about 0.7 percentage point, to operating margin by about 0.9 percentage point. And the positive impact to second-quarter operating income in dollars is about TWD5b.

On a full-year basis, overall impact from the earthquake reduces our gross profit and operating profit margin by about 0.2 percentage point each and reduces our 2016 operating income by TWD2b.

Now let me say a few words about 2016 profitability and capital expenditure. Regarding our structural profitability, as you may know, in the past six to seven years we increased our structured profitability by 4 to 5 percentage points, to the upper 40% range. We are optimistic that we can maintain that level in 2016.

My last comment is about 2016 CapEx. In the last investor conference three months ago, we have stated our 2016 capital budget to be between \$9b to \$10b. We maintain the same guidance range today.

This ends my remarks. Now I would like to turn the podium to our Co-CEO, Mark Liu.

Mark Liu - TSMC - Co-CEO

Good afternoon, everyone. Let me start to give you a report on our new turn demand and inventory outlook.

Our 1Q 2016 revenue is essentially flat from 4Q 2015, however, exceeding our February 17's revised guidance. This result was helped by an increase in smartphone demand for China and emerging markets, pull-in from second quarter and faster recovery from the earthquake, which offsets the weakness and seasonality in the high-end smartphone sector.

We estimate our fabless income days of inventory to increase from 2 days below seasonal, exiting 4Q 2015, to about seasonal level ending 1Q 2016. Looking ahead for 2Q 2016, we forecast a growth of 6% to 7% quarter to quarter in NT dollars or 8% to 9% in US dollars. Most of our fabless customers may see an above-seasonal growth in 2Q 2016, driven by OEMs' new product launches and inventory restocking in the supply chain. We estimate days of inventory will still be close to seasonal level exiting 2Q 2016.

Due to the world macroeconomic uncertainties, we reduced our estimate of 2016 smartphone growth from 8% to 7%, PC from minus 3% to minus 6%, tablet from minus 7% to minus 9%, while maintaining digital consumer electronics growth rate at minus 5%. In spite of the reductions of these growth rates, there are still growth areas in smartphones, broadband network, wireless infrastructures and gaming.

For smartphone growth, momentum comes from China's 4G+ deployment, through increases of operator subsidy and the continued 3G-to-4G upgrade in emerging markets. These factors will also drive the associated infrastructure growth. Recently we also see good demand from gaming GPU and game console processors for VR applications.

For the whole year of 2016, we estimate the growth of world semiconductor to be about 1%. We maintain our estimate for the foundry market growth of about 5% and TSMC revenue growth of 5% to 10% this year.

Now I move on to leading-edge technology. Let me give you first on N10 update. We have received N10 customer product tape-out in 1Q 2016. We are actively preparing for more customer product tape-outs in the following quarters. Most of our N10 users are for mobile products. We will put this technology in production in two of TSMC's 12-inch giga-fabs. Those tape-outs will drive a sizable demand starting from 2Q 2017 through 2018.

Our 7-nanometer technology, N7, the technology development is well on track. N7 is a further extension of N10 technology, with more than 60% in logic density gain and 30% to 40% reduction in power consumption. N7 fully leverages N10 learning and shares more than 95% of common tools.

We have expanded our N7 design ecosystem development to include both mobile and high-performance computing, to enable our customers to deliver their first-to-market products. Our N7 adoption is very strong, with customers ranging from mobile GPU, game console, FPGA, network processors and other consumer product applications. We have more than 20 customers in intensive design engagement with us and expect to have 15 customer tape-outs in 2017. The volume production of N7 will start from first half 2018.

Now on EUV, we have made good progress in the EUV development with ASML. Recently EUV development gained quite a good momentum across the industry. Tool source power of 60 watts to 80 watts is capable of becoming operational in fabs now. We are working on the tool reliability under fab operating conditions. EUV photoresist mask fabrication, particle control and basic modules have all made good progress. We recently demonstrated a reasonable yield on our N7 yield vehicle, 128-megabit SRAM using one EUV layer. Currently development of a reliable EUV mask pellicle is another focus to enable a mass production operation.

Next I want to give you an update on growth drivers for our leading-edge technology, where the demand comes from for our leading-edge technologies. First, mobile. We see continuing technology advancement in baseband, application processors, RF transceivers and wireless connectivity to meet the demand of LTE-advanced specifications. The growth of 4G data rate through carrier aggregation and high-frequency Wi-Fi drives the need for more complex and larger chips. All the above drive the demand for our N10 and N7 technologies, which will enter production in 2017 to 2019.

The next emerging 5G standard also prompts our customers to develop state-of-the-art base station and baseband application processors to capture early business opportunity using our N10 and N7 technologies.

Second area is high-performance computing. We also work closely with our customers to address the opportunity in the high-performance computing market. We work with ARM to co-optimize its CPU cores with TSMC solutions to enable our customers to deliver their products in the cloud computing market.

Today our customers have only a very small market share in cloud computing, mostly in networking and storage applications. With TSMC's high-performance computing technologies, we will support our customers to participate in this fast-growing cloud computing market.

The last area is VR/AR, ADAS and so forth. VR/AR, deep learning and artificial intelligence, artificial AI are the emerging applications that will require leading-edge technologies. Consumer-oriented VR/AR products for immersed gaming and immersive video viewing experience have begun shipment in 1Q this year. The data transfer rate of VR/AR products in interactive design, remote training and multisite conferencing must still be enhanced by 10x from today's level in order to enable quality viewing experience. Thus all these applications require low-power and high-speed GPU and CPU and therefore requires our leading-edge technologies.

We see increasing demand also both in enhanced safety and improved infotainment system in automotive applications. The ADAS advanced driver assist systems include adaptive cruising control, emergency brake, collision avoidance, lane tracking and auto parking assistant. The advanced infotainment system includes both high-performance multimedia applications. Both automakers and tier-one module suppliers are defining the specs and increasing their adoption for ADAS and advanced infotainment systems. This trend will certainly also speed up the adoption of TSMC's leading-edge technology.

That is my report. Thank you. I will turn the podium to C.C. Wei.

C.C. Wei - TSMC - Co-CEO

Thank you, Mark. Good afternoon, ladies and gentlemen. Today I will update you on the status of 16-nanometers, 28-nanometer, InFO and specialty technologies. I will also talk about their role as a growth driver.



First on 16-nanometer. We continue to ramp 16-nanometer with yield and cycle time better than our target. Applications in mobile processors, cellular baseband, video game player, PC graphics will contribute significantly to our 16-nanometer shipment this year. Meanwhile we also begin shipment for other applications, such as the Ethernet switch, CPU, networking processor, programmable logic device and others. We expect 16-nanometer will contribute above 20% wafer revenue this year.

As I reported here last quarter, we have completed the development of a low-power and low-cost version 16FFC. I can inform you today that 16FFC is now the most adopted solution by our 16-nanometer customers and we have entered mass production since first quarter this year.

In addition to 16FFC, we also developed an ultra-low-power solution, with much lower operating voltage down to a level below 0.5 volts without too much sacrifice of the circuit speed. We believe this is a superior solution compared to other technology approaches available in the low-power area today and is ideally suited for the mobile and IoT market. Both mobile and IoT will be the main growth driver in the future.

Now let me move on to 28-nanometer. Since our last conference, we have seen strong demand for our 28-nanometer, coming mainly from the mid and low-end smartphone related applications. As a result, the utilization rate of 28-nanometer has remained well above 90%. We think it will stay at a high level throughout this year.

Key to this strong demand has been TSMC's 28HPC and 28HPC+. In addition to the mid and low-end smartphones, applications related to networking processors and consumer products also adopt our 28HPC and HPC+. Our 28-nanometer focus today is in the low power area and we developed a strong platform. Our 28ULP, ULP+ and 28HPC+ are very effective in addressing the needs for low power consumption, which is critical for the IoT market. Again, we expect IoT-related applications will become the next demand driver for TSMC's 28-nanometer technology.

We are confident on the competitiveness of our 28-nanometer solutions and believe we will hold our strong market segment share over the next few years.

Now let me update on InFO. Equipment installation at our Longtan site for volume production is almost complete. We expect to complete customer product qualification shortly and will be ready for volume production in this quarter.

Our expectation of InFO contributing more than \$100m per quarter in 4Q this year remains unchanged. In addition to high-volume preparation and product qualification, we are working on yield improvement and cost reduction.

Now let me make some comments on InFO technology. Compared to the conventional package, TSMC InFO has advantage in form factor, such as smaller area and a similar thickness, and also is power efficient. You can reduce the power consumption by as much as 20%. Meanwhile, InFO supports our memory bandwidth and therefore improves circuit performance.

With TSMC's InFO technology, our customers can integrate the multiple chip in the same package while reducing the overall cost. This advantage will enable InFO technology to play an important role in the chip partitioning, which can be one of the effective ways to reduce cost for products which utilize leading-edge technology, such as 7-nanometer technology and beyond. As a result, we believe InFO will be a powerful technology to capture the growth opportunity in both mobile and IoT market.

Now I will talk about the specialty technologies. Currently specialty technology at TSMC includes embedded flash for MCU and automotive products, CMOS image sensors, image signal processors, data converter, display driver, touch controller, fingerprint and MEMS for smartphones and also high voltage for power management. These specialty technologies have contributed increasingly to our revenue in recent years and are now accounted for more than a quarter of our total wafer revenue.

We have many exploratory efforts unfolding at TSMC and I will first talk about the largest three sectors, the embedded Flash, the CMOS image sensor and MEMS.

We have completed 40 nanometer embedded Flash development and begun volume production. We are now developing 28-nanometer embedded Flash for automotive-related applications while working on other non-volatile memories for technologies beyond 28-nanometer.

For CMOS image sensors, we have completed a hybrid bonding technology which will enhance the connection between chips. This technology will push the image sensor performance to a new level and will be used by future smartphones. In addition to the mobile phone application, we are developing other CMOS image sensor technology to improve the safety feature in automobile and for use in the medical area.

Now let's move to MEMS. MEMS has been widely used as a motion sensor in mobile phones. We are also developing MEMS technology for environmental and biosensors for smart healthcare and medical IoT applications. In summary, we believe both automotive, medical markets and IoT present good growth opportunities for specialty technology in the next few years.

Thank you for your attention.

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'd like to remind everybody to limit your questions to two at a time to allow all participants an opportunity to ask their questions.

Questions will be taken both floor and from the call. Should you wish to raise your question in Chinese, I will translate it to English before 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 Q&A session. First we will ask Credit Suisse, Randy Abrams.

Randy Abrams - Credit Suisse - Analyst

Thank you. First question, just want to ask about the business outlook. For second quarter it looks like somewhat mild growth, so like mid to high single-digit growth. Just factoring in the earthquake, some shipments pushing out, smartphone lines chasing relatively lean inventory, could you talk about some headwinds you may be facing just to offset some of those positive drivers?

And then if we look at the second half, would that imply factoring in the 16-nanometer and InFO starting in second half? How do you feel about second half at this stage?

Mark Liu - TSMC - Co-CEO

Well the second half, the headwind is not much different than the first half -- the second-quarter headwind is not much different than the first quarter. But we do have -- we do see the customers and even the end market demand is increasing. The inventory restocking is still cautious. And going forward, we're still watching this month by month to see if demand will change or not. But this is currently our perspective.

Randy Abrams - Credit Suisse - Analyst

Okay. And if I could ask, for the forward technology, you're doing a much faster move to 7-nanometer, where it's a new bump every one year, where so many other foundries, like Intel, is going to an optimized, taking longer. And I'm curious on two fronts. One if there's any trade off or risk to your strategy moving faster.



And the 7, your density shrink is about a 60%, so not at full shrink. If, as we go through the node, if competitors could leapfrog with a full 7 nanometer or you can upgrade the process as you move through. So maybe talk about that strategy for what you're doing on 10 and 7.

Mark Liu - TSMC - Co-CEO

Well I cannot tell you all our strategy. But we think we are developing a technology fit for our customers' product announcement. So all this strategy and roadmap is collaborating with our customers at the shortest time to be able to reach the maximum technology development benefit for their products. So that has been the past two or three generations, but I don't see no difference going forward.

Randy Abrams - Credit Suisse - Analyst

A quick follow-up. Can you put EUV, and you gave the update, but could you bring that in partway through 7 to enhance the process, say, partway through? Or is it more targeted now for 5 nanometer?

Mark Liu - TSMC - Co-CEO

Yes. Our EUV, even though the recent progress is good, however, as you see, our 7-nanometer development is already in full steam and is getting to yield enhancement mode now. And production is imminent. It's beginning of 2018. So looking at this schedule, EUV is hard to reach for -- be able to contribute.

So for N7, it is purely a development vehicle for EUV. We do plan to use EUV on our N5. And that is our plan. And we will -- we look at the schedule here that will fit properly EUV. Given the margin, it still will fit. It depends on the following progress for EUV.

Randy Abrams - Credit Suisse - Analyst

Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

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

Michael Chou - Deutsche Bank - Analyst

Thank you. Regarding your comment on 10-nanometer, so you mentioned you have more than 20 customers for 10 nanometer. Am I right?

Michael Chou - Deutsche Bank - Analyst

Yes. So does that mean you actually see the stronger-than-expected 10-nanometer compared to six months ago based on your progress? Because in the past it seems that -- I remember management mentioned 10-nanometer will be smaller than 16-nanometer. So based on latest progress, are you seeing the better demand outlook for 10-nanometer?

Mark Liu - TSMC - Co-CEO

When I talked about 20 customers, it's on 7-nanometer. Okay? So 7-nanometer indeed, we see stronger adoption in the past quarters. So that's what we are -- I was addressing.



Michael Chou - *Deutsche Bank - Analyst*

Okay. Second question is for IoT. Is any way management can quantify the IoT sales portion or -- because it seems that a lot of people are saying IoT will be an important growth driver in the long term but we still cannot see a lot of IoT products coming out, and mainly for infrastructure buildup. So is there any way you can try to quantify?

C.C. Wei - *TMSC - Co-CEO*

Right. So we don't think that we can really quantify what is the IoT market today. But a lot of products that, for example, connect the sensors that essentially that IoT's most important product. One of the IoT's most important is the sensors, including CMOS image sensor and the MEMS that you can see today. But you want to quantify the whole IoT market? No, we cannot.

Michael Chou - *Deutsche Bank - Analyst*

One final question. Will some of the IoT use advanced nodes or will it -- they just use the 28 or 16 in the long term?

C.C. Wei - *TMSC - Co-CEO*

It should be because the IoT related to a lot of data transmission, data communication. So the computation, the high-speed computation is one of the essential parts of the IoT area.

Michael Chou - *Deutsche Bank - Analyst*

Thank you.

Elizabeth Sun - *TSMC - Director of Corporate Communications*

Next question will be coming from JPMorgan's Gokul Hariharan.

Gokul Hariharan - *JPMorgan - Analyst*

Thanks. My first question is on a little bit of granularity on the 2Q outlook. Could you talk a little bit about advanced node versus older node given that there is a lot of restocking at 28 and below? Is it fair to say 16-nanometer is probably weaker than other nodes in second quarter?

Elizabeth Sun - *TSMC - Director of Corporate Communications*

All right. I think you are asking us about the restocking in the second quarter, whether it is on 16 nodes or --?

Gokul Hariharan - *JPMorgan - Analyst*

If it's primarily on older nodes to date or 28 and above.

Elizabeth Sun - *TSMC - Director of Corporate Communications*

Whether the restocking is on the advanced nodes or across the board.



Mark Liu - TSMC - Co-CEO

The restocking is mostly on 28, 40, 65.

Gokul Hariharan - JPMorgan - Analyst

Second, I think that you mentioned about cloud computing, high-performance compute as a potential market and you're working with ARM on 7-nanometer high-performance compute product as well. I think here, a couple of years back, you mentioned that software ecosystem readiness has still been an issue for this market. Any thoughts on what you're seeing from your customer side on this front? How far they have gone and how is this market likely do more given that -- as you said, right now it's not really interested in the meat of the market, which is servers; it's primarily on the periphery.

Mark Liu - TSMC - Co-CEO

Their momentum has collected quite a bit recently. As you hear from Red Hat, with the software developer and from the -- some of the customer software alliances, as you know, has collected quite a bit. And there are services, cloud services for application software development on several sides. So the application software development also are progressing. So those part of the momentum we see increases.

And for TSMC, of course, we will support our customers in that high-performance computing platform. For us mostly it's the technology development, technology development also including the interface circuit development with our customers, also including the packaging solutions for that application. So I think that compared with a couple of years ago, indeed you are seeing a lot of reports that momentum is collecting quite a bit recently. So all the parts, we see the drivers for that into the high-performance computing market.

Gokul Hariharan - JPMorgan - Analyst

And just one follow-up. If you have to take a guess right now, is that going to be mostly merchant fabless or system fabless, like you mentioned as the potential growth driver in the last couple of calls.

Mark Liu - TSMC - Co-CEO

We see both. We see both. Including the service providers. They participate too.

Elizabeth Sun - TSMC - Director of Corporate Communications

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

Roland Shu - Citigroup - Analyst

Thanks. Good afternoon. First question is for the second quarter guidance now is TWD215b to TWD218b. So if we exclude the push-out, push-out should be -- the shipment pushed out from first quarter, that should be about TWD7b. Right? So that actually is about TWD208b to TWD211b. So that actually is much smaller. Then if we take March, March multiplied by 3, that's TWD219b. So therefore the growth in the second quarter, for this growth, I think it's this -- what you expected early this year or are you going to see -- because of some weakness on the demand?

Lora Ho - TSMC - SVP & CFO

There's a factor that affects our second quarter. One second. It's exchange rate. We're using TWD32.30, which is very close to today's market. And in first quarter our exchange rate was TWD33.1. So there's a 2.2% depreciate -- appreciate. So that affects 2% of the revenue.

Another reason is what Mark was mentioning, that we see the inventory restocking continues throughout the second quarter. So that's another factor that we have kind of weaker-than-expected second quarter.

Roland Shu - Citigroup - Analyst

Okay. And also for the shipment delay, I think that according to your news release previously, you said about 100,000 of 12-inch wafer shipment had been delayed. And however, I think earlier you said you probably shipped about 90,000. So why is the difference between this 10,000, because they were cancelled by customer or we are going to further delay to 3Q?

Lora Ho - TSMC - SVP & CFO

No. Our fab people work really hard to recover the customer shipments. So actually we do better. I think we have announced 120,000 in our press release and it came out around 90k. So it's about 30% lower.

Roland Shu - Citigroup - Analyst

Okay. And I think my second question is again Gartner just reported for TSMC last year, the overall foundry market share was about 54.5%. So I think for this year, we are recovering 16-nanometer market share aggressively. And also -- we are also going to production in 10-nanometer, with very high market share next year. And I believe for the 7-nanometer production in 2018, that that will be much ahead of the peers. So question is actually the three-year technology leadership, what do you think your growth -- your market share will be?

Mark Liu - TSMC - Co-CEO

Well, the battle is ahead -- still ahead of us. So I cannot claim any territory yet. So we try to improve our market share just according to what you mentioned, the factors.

Roland Shu - Citigroup - Analyst

Well is 60% of market share achievable?

Elizabeth Sun - TSMC - Director of Corporate Communications

Anything is achievable.

Mark Liu - TSMC - Co-CEO

Of course.

Roland Shu - Citigroup - Analyst

At least 60%?



Mark Liu - TSMC - Co-CEO

That's not what I said.

Roland Shu - Citigroup - Analyst

Okay. Okay. Thank you. I think with this three-year technology leadership, are you going to have an upside for your PBT target? I think now you said for five years the PBT target to grow by 10% in CAGR. So with this technology leadership, any upside on this PBT target?

Mark Liu - TSMC - Co-CEO

Well the competition is still ahead of us. Right now it's just not the time to talk about what the trophy is.

Roland Shu - Citigroup - Analyst

Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Next question comes from Daiwa's Rick Hsu.

Rick Hsu - Daiwa - Analyst

Yes. Hi. Good afternoon. Just one question from me. About your second-quarter guidance, I think it looks to me it's a bit below seasonal in terms of sequential growth momentum. And you also mentioned that the demand is mainly from the 28-nanometer, 40- and 65-nanometer, not much for the 16-nanometer. And you also mentioned that you 16-nanometer for this year, the full-year revenue contribution will come to above 20%. Can I take that as a -- your Q3 momentum is going to be really strong and likely above seasonal?

C.C. Wei - TSMC - Co-CEO

Yes.

Rick Hsu - Daiwa - Analyst

Can you elaborate a little bit more?

C.C. Wei - TSMC - Co-CEO

Actually the high-volume ramp we expect in the second half of this year for the 16 FinFET. That's because of leading-edge or the high-end smartphone. And other applications actually in the 16 FinFET continues on and we saw a lot of tape-out since last year. So the momentum accumulated and I believe in the second half of this year we will see higher growth.

Rick Hsu - Daiwa - Analyst

Thank you so much.

Elizabeth Sun - TSMC - Director of Corporate Communications

We -- I think we need to go to the line for some questions. So, operator, could you please have the first caller on the line? We'll take the next question from the call.

Operator

Donald Lu, Goldman Sachs.

Donald Lu - Goldman Sachs - Analyst

Good afternoon. I have two questions. One is on InFO. I think C.C. just commented that you package more chips and the cost will come down. And in what year, which year do you think the InFO cost will be similar or even lower than the conventional packaging? And also assuming it will happen with 10-nanometer, 7-nanometer then, will TSMC expect your mobile market share to increase significantly at 7-nanometer versus 10-nanometer or 16-nanometer global market share? So that's question number one.

Question number two is on the -- in second quarter, TSMC's 16-nanometer utilization is going to decline from Q1. Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

So Donald's first question is if we can package multiple chips in InFO, which is the chip partitioning and reduce the cost, he asked which year we will begin to see that the cost on InFO is lower than the cost from conventional packaging. And if we can apply this very useful technology on 10-nanometer and 7-nanometer, does that mean that our mobile market share will be higher at 7- and 10-nanometer compared to our mobile market share at 16-nanometer? That's first question.

Second question is do we have a utilization decline at 16-nanometer in the second quarter.

C.C. Wei - TSMC - Co-CEO

Okay. Let me answer the first question on the InFO. I mentioned that the InFO [was] of the chip partitioning and that will serve reducing the cost. Actually this kind of thing will incur the design architecture difference and changes. So we are working with the customer. I cannot give a very certain date and which year that it will be in the market and then compare with the conventional packaging method.

But our analyses show that in any year when we introduce this kind of technology and this kind of new approaches, it certainly will be better in performance and in cost as compared with conventional packages. Whether it will help us to increase market segment share in mobile, certainly we hope so. But I cannot give you a number.

Donald Lu - Goldman Sachs - Analyst

But if you could -- sorry. Just particularly at 7-nanometer would you see new customers will adopt TSMC's 7-nanometer together with InFO at this stage?

C.C. Wei - TSMC - Co-CEO

We are working with customers. That's all I can answer your questions.

Okay. So the second quarter our utilization rate for the 16-nanometer decreasing?

Elizabeth Sun - TSMC - Director of Corporate Communications

Decline.

C.C. Wei - TSMC - Co-CEO

No. That's it.

Lora Ho - TSMC - SVP & CFO

Hi. I can add some comment on 16-nanometer. We are ramping at a very fast speed on 16-nanometer across the whole year. So the second-quarter utilization for 16-nanometer will be much higher than first quarter.

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. So we will go to the next caller on the line. Operator, please help.

Operator

Brett Simpson, Arete.

Brett Simpson - Arete - Analyst

Yes. Thanks very much. I just had a quick question on 28-nanometer. We saw a nice recovery there in Q1, but you have a lot of 28-nanometer customers migrating to 16-nanometer going into second half 2016. So how do you see 28-nanometer outlook as you start to see this big shift in mobile, low-end smartphones, gaming? What impact do you think that has in your 28-nanometer outlook and what it is might backfill that 28-nanometer node? Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

So, Brett, your question is even if we are seeing very good recovery of 28-nanometer in the first quarter, but thinks a lot of the customers' products will be migrating to 16-nanometer in the second half. You are asking us what kind of applications or business we can have to sell 28-nanometer in second half of the year. Is that your question?

Brett Simpson - Arete - Analyst

That's right. And whether you think 28-nanometer can maintain these revenue levels.

C.C. Wei - TSMC - Co-CEO

Okay. Let me answer the question. Actually, he asked whether this 28-nanometer, the strong demand can continue or not because of smartphones adopting the 16-nanometer technology quickly. Actually that in the smartphone we have high-end smartphone, mid and low-end smartphone. For the high-end smartphone moving to the 16-nanometer, it's a natural choice and they are moving very fast. Yes. But then the mid and low-end

smartphone, that demand increases, so a lot of them adopting TSMC's 28-nanometer technology. That's where the very strong demand comes from. And we see that strong demand throughout this year.

In addition to that, I just mentioned that we also have the networking processors, consumer products. They are all adopting TSMC's 28HPC/HPC+. Furthermore and in the future, we saw that IoT mobile applications for the low power consumption is very important. And TSMC offers a very competitive platform in this area. So we believe that 28-nanometer demand will continue to be strong. Thank you.

Brett Simpson - *Arete - Analyst*

Thank you. And I just had an industry question as my second question. There's a lot of talk about the rising cost of developing chips at the leading edge. How much do you think it costs your customers to develop chips at 10-nanometer and 7-nanometer compared with 28?

And I think you mentioned 20 customers are -- you're engaged with 20 customers on 7-nanometer. Can you talk a bit about how big the customer engineering teams are that you're engaging with at these nodes? Thank you.

Mark Liu - *TSMC - Co-CEO*

Well I cannot comment on the exact number of the NRE engineering expense for the new N. Of course, each node, the development cost is higher. And -- but on the other hand, the chip integration is also increasing. Where it used to be several chips, right now is being developed by one -- in one chip.

So secondly, actually, although we have -- I've mentioned 15 tape-outs, typically the first tape-out incurs the highest cost and the following tape-out doesn't -- it can be synergistic. So indeed, customers see the 7-nanometer is a longstanding, long node. Therefore I think the customer is willing to put into their investment resources in it for the -- for many years to come.

Brett Simpson - *Arete - Analyst*

Thank you. And could I ask a third question?

Elizabeth Sun - *TSMC - Director of Corporate Communications*

All right.

Brett Simpson - *Arete - Analyst*

So maybe just -- I wanted to ask on graphics, because you talked a number of times in your prepared remarks about VR and graphics and game console. And there's quite a big performance jump coming as some of these customers go to 16-nanometer later this year. What sort of growth are you seeing in gaming and graphics specifically at the moment this year? Thank you.

Mark Liu - *TSMC - Co-CEO*

VR and AR, it still is an emerging application. So the growth rates come from very small number. So probably I cannot put into accurate number. Currently this application, this product is under the application software development, I think is being tried, several VRs and AR products. Many of the application software is a demo software. And both -- all the producers of the chips right now create their software development platforms. So this is at this stage. So in terms -- we just see it starting shipment, but it's yet to be a volume quantity this year for this application.

Brett Simpson - *Arete - Analyst*

Okay. Thank you.

Elizabeth Sun - *TSMC - Director of Corporate Communications*

All right. We will continue to have the next caller from the line. Operator, could you please have the next caller on the line?

Operator

Mehdi Hosseini, SIG.

Mehdi Hosseini - *SIG - Analyst*

Yes. Thanks for taking my question. Going back to your prepared commentary where you describe smartphone unit growth, which is going to be less than your prior expectation, which is also, in my opinion, is having an adverse impact on your assumptions for semiconductor revenue growth. How is it going to impact your revenue expectation growth for this year?

Your -- the range of 5% to 10% has remained unchanged. But the largest end market smartphone you have down-ticked. And then the semiconductor industry revenue is also going to be up by only 1%. So in that context if you could help us understand how this downtick is impacting the range. Do you see your revenue coming to the low end or the high end? Or are you still on track to hit the midpoint of the guidance given all the programs that are coming to the fruition?

Elizabeth Sun - *TSMC - Director of Corporate Communications*

All right. I think the question was that since we have revised down some of the growth rates, like smartphones and semiconductor revenue, etc., how would TSMC still keep our revenue guidance. So he was saying whether we are on the high end of the guidance range or low end of the guidance range, etc.

Mark Liu - *TSMC - Co-CEO*

Well on semiconductor growth, we forecasted 1%. And part of it is memory market appears to be shrinking this year. Excluding memory, will be about 2%. But our system is very complicated. It's very difficult for me to describe everything for you here. But the smartphone growth this year is mostly from the mid end and the low end in terms of unit growth, so is that one to reconcile for your numbers.

Our number for this year, we maintain 5% to 10%. That is nor aggressive nor conservative. It is still the same number.

Mehdi Hosseini - *SIG - Analyst*

Sure. Let me rephrase the question. Historically you've had more content in high-end smartphone but the growth rate for low to mid range is much higher than the high-end smartphone growth rate. Would it be safe to assume that if the growth rate for the low to mid range is offsetting lower growth rate for high end, even though the high end gives you higher content?

Mark Liu - TSMC - Co-CEO

It's possible. We see the over-TWD500 phone is reducing, but the \$400 phone is increasing quickly. And both high end and mid end silicon content are increasing with high single digit. But the unit of the mid-end phone increases and high-end unit number decreases this year.

Mehdi Hosseini - SIG - Analyst

Okay. Then I have a follow-up -- I have a follow-up to my second question.

Elizabeth Sun - TSMC - Director of Corporate Communications

Yes?

Mehdi Hosseini - SIG - Analyst

So there's been a lot of emphasis on this, on 7-nanometer and your progress. It's great to see you have maintained your lead. But in that context should we assume that the 10-nanometer will be a shorter node? And if so, what happens to backfilling? You mentioned the 90% of the equipment for 10 and 90% of the 10-nanometer equipment could be used for 7-nanometer. Is that going to have an impact on your spending which ties into backfilling? Any comment or any color there would be great.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. Mehdi's question is that he's happy to see that we have a leadership in 7 -- at 7-nanometer. However, does that mean that we will have a short node for 10? And if it is a short node, what would happen to the common tools, this equipment being 90%-plus common? What's the impact to our capital spending?

Mark Liu - TSMC - Co-CEO

I think this 10-nanometer will ramp very fast, but it appears to be a shorter node than that of 7-nanometer. So the picture could be similar to our 20 and 16. And also we anticipated before enough that we try to maximize the common tools from 10-nanometer to 7-nanometer. Therefore this is 95% is in -- is by design so that when the 10-nanometer, after three years, it reduces, the tool can be readily expanded into the capacity for 7-nanometer ramp.

Elizabeth Sun - TSMC - Director of Corporate Communications

The impact to spending.

Mark Liu - TSMC - Co-CEO

The question is impact spending?

Elizabeth Sun - TSMC - Director of Corporate Communications

Impact to our capital spending.



Mark Liu - TSMC - Co-CEO

That has been -- long been planned into our capital expense. It's an integrated number what we offer to you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. So now we come back to the floor. And the next one will be from UBS, Bill Lu.

Bill Lu - UBS - Analyst

Thank you very much. Going back to InFO. I'm trying to figure out when this might broaden out. And I've spoken to a couple of your customers and maybe some of the backend players. And what I'm hearing pretty consistently is cost and the fact that this is TSMC-proprietary. Other than that, people seem to love it. I know you're working very hard on cost.

In terms of this being TSMC-proprietary, I'm wondering what you are telling your customers to convince them. And I think it looks to me like it's going to be TSMC with InFO, everybody else with some sort of other planar technology. Is that the way that you see it developing?

And number two is would you consider possibly licensing InFO, because we've certainly seen success stories in terms of licensing in semiconductors. I think that would help out your customers. Do you just want to give your thoughts on that? Thanks.

C.C. Wei - TSMC - Co-CEO

Okay. We developed InFO technology that -- with much lower cost than the CoWoS that we introduced earlier. And InFO give advantage, as I said in the presentation.

We have mentioned in the last quarter that we only focus -- right now we only focus on the few high-volume customers because we start to ramp it up. And I also said in the presentation that we are working on the yield improvement and the cost reduction, thus meaning that today we still have some improvement ongoing. And once we complete it in our volume production this year, we believe it will be very competitive.

However, in every technology node we work with OSAT people and to better serve our customers. For now we also see that the cooperation between TSMC and backend people. But for this year, before we complete the volume production and ready for other consideration, this year we only focus on our own -- bringing up this InFO volume production.

Bill Lu - UBS - Analyst

Yes. Thank you. That's very clear. I'm guess I'm just wondering what happens beyond this year as you start thinking about more customers.

C.C. Wei - TSMC - Co-CEO

We will tell you that next time.

Bill Lu - UBS - Analyst

Okay. So my second question was what Mehdi just asked, but maybe I'll just follow up. If it turns out that -- 10-nanometer turns out to be a little bit smaller than what you expected previously but 7 turns out to be much bigger and you only spent TWD1b in the first quarter this year versus your guidance for the year, \$9b to \$10b, is it a possibility that maybe the CapEx becomes very backend-loaded or some of it gets pushed out into 2017?

Lora Ho - TSMC - SVP & CFO

It is true and we spent much less in the first half. And this year the CapEx will be very much backend-loaded, the reason being because we are preparing the capacity for 10- and 7-nanometer, so spending gets mostly spent in second half of the year.

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. The next question will be coming from Morgan Stanley's Charlie Chan.

Charlie Chan - Morgan Stanley - Analyst

Thanks for taking my question. So a very quick follow-on on Bill's question on InFO. So what will be the margin impact to your corporate margin from the InFO business when you get to a mass production?

Lora Ho - TSMC - SVP & CFO

Since the InFO volume is still small for this year, and as C.C. was mentioning above \$100m by the fourth quarter, compared to the total revenue it's still small. So it will have very small dilution to this year's corporate average margin.

Charlie Chan - Morgan Stanley - Analyst

Okay. So as yet the margin is slightly below corporate average, even it is small?

Lora Ho - TSMC - SVP & CFO

It is below.

Charlie Chan - Morgan Stanley - Analyst

Okay. Thanks. And my second question regarding the EUV adoption. So is it like it is already a done deal that you will adopt EUV at 5-nanometer, so the production timing is sometime like 2020? So from now to 2020, do you think the capital intensity will increase? I know the Company gave guidance before that the new node will be 30% -- 35%. But in terms of the ratio, how do you think your growth, especially when you mass produce 7-nanometer? Thank you.

Mark Liu - TSMC - Co-CEO

Well I'll try to answer what I heard from you. Yes, we plan to use EUV on our 5-nanometer. And we have already three EUV tools on the floor and the fourth is coming. So all these are using actively for the development. So until 2020, when N5 is currently planned into production, yes, it will be adopted.

But just to remind you that in -- if you think about CapEx, don't think about everything we're going to change to EUV. There are 80 layers and only a 10 -- there are about 50/60 if you discount multiple patterning. Only the 10 of them roughly will use EUV. So a lot of tools still be able to common tools. So did I answer your question?



Charlie Chan - Morgan Stanley - Analyst

Yes. So I just want to clarify because I thought the quadruple patterning or multi-patterning will cause a lot of CapEx. But also you mentioned that you will use a common tool strategy to reduce the CapEx. So just mainly in terms of CapEx, in terms of absolute versus \$10b level or in terms of capital ratio versus 35%, in the coming four years do you think you will increase or decrease? So that was essentially my question.

Lora Ho - TSMC - SVP & CFO

Cannot be so specific as you said. But in general speaking, conversion of tool is cheaper than buying a new tool. So more conversion is beneficial to the CapEx.

Charlie Chan - Morgan Stanley - Analyst

Okay. Thanks.

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. The next question will be a follow-up from Credit Suisse, Randy Abrams.

Randy Abrams - Credit Suisse - Analyst

Yes. Thanks for fitting me back in. For the second half you mentioned a lot of the ramp will be 16-nanometer, which is still a relatively new node. In the second quarter you're already at 49% to 51% gross margin. I'm curious, with further growth to come from that project, if 16 is approaching corporate average and we could get further leverage to the model in the second half from that.

Lora Ho - TSMC - SVP & CFO

For this year, 16-nanometer profit margin is improving as we have much higher volume. But it's still below corporate average this year. We expect the 16-nanometer will get close to corporate average by second half of 2017.

Randy Abrams - Credit Suisse - Analyst

Okay. I guess for second half 2015, net out the ramp of 2016 still below corporate, can we get some incremental leverage from that filling up utilization that we normally see? Like from the first half to the second half if there's a potential for further margin expansion, would we normally get pick-up from utilization improving?

Lora Ho - TSMC - SVP & CFO

Our utilization will be better in the second half. That's number one. And we have other technologies who have high utilization with very good profit margins. So that's the next issue.

Randy Abrams - Credit Suisse - Analyst

Okay. Okay. Thanks. The second question I want to ask, you've mentioned, Mark, in your prepared remarks about the server opportunity and development moving on software applications. If you could think about for your technology when you think we start to get the first volume work and, say, get to 1% or 2% of revenue, if that's timed, say, around 7-nanometer or you think it'll take more time, it might be further out?



C.C. Wei - TSMC - Co-CEO

We think it's on 7-nanometer that we will see significant inroad.

Randy Abrams - Credit Suisse - Analyst

Okay. Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. We need to go back to the line. Operator, could you please have the next caller on the line?

Operator

Steven Pelayo, HSBC.

Steven Pelayo - HSBC - Analyst

Yes. Just first a follow-up there. On capital spending you mentioned it being backend-loaded this year. I'm curious, does that, from a run rate basis, really start to suggest that may happen in 2017 or do you think 35% of sales is a normalized CapEx level even though you're getting high reuse rate at 16 today but maybe not so high at 10-nanometer before 7 kicks in? So CapEx to sales next year, I'm seeing the 35% range. What do you think?

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. The question is this year's CapEx is backend-loaded like 35 to 65. Would the same pattern, a similar pattern in 2017? And what will be our capital to -- CapEx-to-sales ratio next year?

Lora Ho - TSMC - SVP & CFO

I probably cannot tell about the 2017, whether it's going to be frontend-loaded or backend-loaded. But in terms of capital intensity, we have gone through this high-intensity period since last five years and it has come down to mid-30 range. And we believe this 30% to 35% range will be for the next few years.

Steven Pelayo - HSBC - Analyst

Okay. Excellent. Thank you. In your 20-F filing this week we see that your largest customer fell from 21% of revenues to 16% of revenues. You obviously made it up with some other customers and with good growth last year. But I guess my question is expectations as you go through 2016, do you -- do we have to worry about that kind of significant decline in your largest customers continuing?

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. The question is we used to have a very big customer that accounted for 21% of our revenue last year and this year is probably in the mid teens. What will be in the future? What is the percentage drop? What's the impact?



Steven Pelayo - HSBC - Analyst

Yes. Just to clarify a little bit. I think it was in 2014 it was 21% of revenues. 2015 it was 16% of revenues. I'm curious if you've any concern over that trend continuing. Could they fall to single-digit percentage of revenues?

Mark Liu - TSMC - Co-CEO

Well we will support our customers fully and let them grow.

Elizabeth Sun - TSMC - Director of Corporate Communications

All right. I think, Steven, I think we have answered your questions. Thank you.

Operator, could you please have the next caller on the line?

Operator

Donald Lu, Goldman Sachs.

Donald Lu - Goldman Sachs - Analyst

Hi. I have a question on 28. I think the conventional wisdom is that 28 will be a long and a very strong node. But I checked in Q4 last year, 28, it's only maybe less than 5% higher than 65-nanometer at the same stage of the node. So my question is have you done any study to see how much bigger 28 will be for the next few years relative to 65? And the reason I ask this is a lot of your competitors are actually increasing CapEx this year for 28. So I'm afraid that we might have a price war.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. Donald's question is that 28-nanometer last quarter, 4Q 2015, which I think we said it was 25% of our revenue, and he said that this is only 5 percentage points higher than 65-nanometer at the same stage. So since many of our competitors are building up capacity for 28-nanometer, Donald is asking us how big can 28-nanometer really be and whether we will have a price war.

C.C. Wei - TSMC - Co-CEO

Well I cannot be too specifically for the quantity, but I say that we saw the strong demand that's due to TSMC's technology very competitive. And for this year that the mid/low-end smartphone increased a lot. And then we also developed a very competitive low-power technology which we think is much better than our competitor. And so we continue to have confidence that we will continue to have strong demand and hold our market share.

Donald Lu - Goldman Sachs - Analyst

But in the next two years, if you look out, compared to 65, do you think 25 -- 28-nanometer will have 10% more revenue than 65 at the same stage after launch, or it's 5%, 10% or 15%? Is there a number that we can use in our model, approximately?



Elizabeth Sun - TSMC - Director of Corporate Communications

Donald, this is Elizabeth. Let me answer your question. This percentage basically is not directly comparable because the base is different. 65-nanometer 30% back in, say, 2012 is a much smaller number than 28% -- 28-nanometer at 30% in today's number. In fact, if you look at same stage, say, 65-nanometer after five years and 28-nanometer after five years, 28-nanometer in terms of dollar is almost twice as big as 65 in terms of dollar

Donald Lu - Goldman Sachs - Analyst

Actually, I'm sorry, I was -- I'm comparing if I compared 65-nanometer revenue, absolute numbers of all the foundries I can find, versus the same foundries, total 28-nanometer revenue. So the total 28-nanometer revenue in Q4 last year was only 5% higher than 65-nanometer, total 65-nanometer revenue at the same stage after launch.

Elizabeth Sun - TSMC - Director of Corporate Communications

So you are ask -- you are talking about market share percentage not revenue percentage?

Donald Lu - Goldman Sachs - Analyst

Exactly. Not the market share but also the total absolute amount. Because there I think TSMC has much more information than us in terms of looking forward, in terms of tape-outs, etc. So do you think 28-nanometer is a long node or stronger node than 65 and how much. And for the whole market and not just (inaudible).

C.C. Wei - TSMC - Co-CEO

Well let me answer the question again. It seems to me that you are not so confident on the 28-nanometers demand, but it is strong. And this is a very sweet node, offered with low power but very competitive performance. And the cost structure is also good. So I want to say again that TSMC, the technology is very competitive. And we will hold our market share and we have confidence on it.

Lora Ho - TSMC - SVP & CFO

Let me add some comment to this one. Donald, I think you are trying to figure out how big is 28 versus the 65-nanometer. Is that what you're asking for?

Donald Lu - Goldman Sachs - Analyst

Exactly. That is for the whole market. Yes. That's my question.

Lora Ho - TSMC - SVP & CFO

Okay. I think I don't know about the TAM, but for us, if I look at the number, 65-nanometer revenue versus 28-nanometer revenue, if you look at high -- the peak revenue versus 65-nanometer, I would think that 28-nanometer revenue is much bigger than 65-nanometer at the same stage.

Donald Lu - Goldman Sachs - Analyst

Okay. Yes, I will follow up with Elizabeth on the question. Yes, I think the 28 is ramped up very fast and dropped very quickly too for the whole industry. So the question is going forward it may -- whether it will be bigger, how much bigger it will be versus 65. But I will follow up. Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Thank you. Let's come back to the floor. Next question comes from Citigroup's Roland Shu.

Roland Shu - Citigroup - Analyst

Thanks. Yes. Just a follow up on the InFO question. I think I feel just ask about collaboration, with InFO, OSAT are likely candidates. But I would like to hear or learn from you about the competition for the InFO or InFO-like. Are you seeing -- is there any close competitor who can do InFO production as what TSMC is doing in the near term? Thank you.

C.C. Wei - TSMC - Co-CEO

Well there is a lot of fan-out technology available today. TSMC developed the InFO because of -- we developed technology that we have some certain advantages. Just like I mentioned, we have single thickness that's suitable for your smartphone, because today's smartphone needed to be thinner and thinner. And also that we found out our approaches can give benefit or advantage for the higher bandwidth that which is important for the smartphone for all the applications also.

So we believe among all fan-out technologies, TSMC's InFO is the best. And when we ramp it up, that will be the highest volume of fan-out technology in the industry. But our main progress is to hear about customers to gain -- to have their product into the market, with very competitive performance and cost.

Roland Shu - Citigroup - Analyst

Thank you. So the conclusion is I think that you think probably it's a little chance for any competitor to do a similar job at TSMC to compete with you at the same customer or same application. Am I reading you right?

C.C. Wei - TSMC - Co-CEO

I don't want to say that, but you might be right.

Roland Shu - Citigroup - Analyst

Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. A follow up question from Deutsche Bank, Michael Chou.

Michael Chou - Deutsche Bank - Analyst

Hi, C.C. Is there any way you can mention what other modules be using InFO as well, after transceiver, this kind of product?

C.C. Wei - TSMC - Co-CEO

Yes. To answer your question, today we're focused on a very limited customer with a high volume. But in the future, of course, it will be adopted by a lot of customers in a lot of different applications. That we expected.

Michael Chou - Deutsche Bank - Analyst

Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. I think in the interest of time -- sorry, there's a question. Sebastian Hou, in the back, from CLSA.

Sebastian Hou - CLSA - Analyst

Hi. Thanks for taking my questions. So my first one is if you look -- based on the inventory cycle, so we started to see some rush orders towards the end of last year. And first quarter we also have some business upside because of the inventory restock. And now the second quarter will continue to -- you just comment that you continue to see some inventory restocking into second quarter. So that's about -- this is the fifth month or fourth month of inventory restocking. So where do you think that most of your customers are now in their inventory cycle? So apart from your largest customer, which are starting to bill soon, but apart from that, what about the rest of your customers?

Mark Liu - TSMC - Co-CEO

Well what we see, the fourth quarter last year, if you remember, is people drastically reduced their inventory. We only see the restocking almost after the Chinese New Year. So that's where you count the cycles. And what -- I don't see very, very -- I don't see signs of overbuild at this point. People are still cautious. So that's what we see, the cycle.

How long it will last, I don't know. Depends on -- I just mentioned -- I addressed on my prepared message: even to the end of Q2 appears the inventory was still above the seasonal level. It's restocking, but at above the seasonal level of the end of Q2. So that will be four months into the building. But it's still a cautious condition.

Sebastian Hou - CLSA - Analyst

Thank you. My second question is on your revenue application side, because you break down revenue into four parts. And one of that is the industrial and slash standards. And we've seen very strong growth for the past four years, a 27% CAGR, very similar growth to the communication category. So I wonder, can you provide some of your expectation for the CAGR for the next couple of years? And if you can talk about what the specific driver inside that industrial slash standard and what kind of probability is above Company average or above the other application? Thank you.

Mark Liu - TSMC - Co-CEO

Actually the industry -- industrial standard, for example, including the MCU, we include in that category. But -- and power management in that category. Both of those components still also used in smartphone. So when we talk about smartphone growth in the past few years, it includes some of the -- what we categorize into the industrial and standard. That's the reason you see the growth. Part of it is contributed from the smartphone.

Sebastian Hou - CLSA - Analyst

So what's the growth outlook for the next couple of years?

Mark Liu - TSMC - Co-CEO

I cannot forecast into the exact number for you. But it will be a growth situation. It will be still growth pattern, I think.

Sebastian Hou - CLSA - Analyst

Will it be continuing similar to the communication application growth or will it be higher or lower?

Mark Liu - TSMC - Co-CEO

That's hard to predict. I hope the communication grow faster, but that's hard to predict.

Sebastian Hou - CLSA - Analyst

Okay. Thank you.

Elizabeth Sun - TSMC - Director of Corporate Communications

Okay. So before we conclude today's conference, please be advised that the replay of the conference will be accessible within three hours from now. Transcripts will become available 24 hours from now, both of which will be available through our website.

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

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