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PRESENTATION

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

(foreign language) Good afternoon, everyone, and welcome to TSMC's Fourth Quarter 2021 Earnings Conference Call. This is Jeff Su, TSMC's Director of Investor Relations and your host for today.

To prevent the spread of COVID-19, TSMC is hosting our Earnings Conference Call via live audio webcast through the company's website at www.tsmc.com, where you can also download the earnings release materials. If you are joining us through the conference call, your dial-in lines are in listen-only mode.

The format for today's event will be as follows: First, TSMC's Vice President and CFO, Mr. Wendell Huang, will summarize our operations in the fourth quarter 2021, followed by our guidance for the first quarter 2022. Afterwards, Mr. Huang and TSMC's CEO, Dr. C.C. Wei, will jointly provide the company's key messages. Then TSMC's Chairman, Dr. Mark Liu, will host the Q&A session, where all 3 executives will entertain your questions.

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 call over to TSMC's CFO, Mr. Wendell Huang, for the summary of operations and the current quarter guidance.

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Thank you, Jeff. Happy New Year, everyone. Thank you for joining us today. My presentation will start with financial highlights for the fourth quarter and a recap of full year [2021] (corrected by company after the call). After that, I will provide the guidance for the first quarter 2022.

Fourth quarter revenue increased 5.7% sequentially in NT dollar or 5.8% in U.S. dollar. As our fourth quarter business was supported by the strong demand for our industry-leading 5-nanometer technology. Gross margin increased 1.4 percentage points sequentially to 52.7%, mainly due to the continuous cost improvement efforts. Operating margin increased 0.5 percentage point sequentially to 41.7%, slightly ahead of our guidance as we enjoyed higher operating leverage and a portion of the vaccine donation expenses got pushed out to the first quarter. Overall, our fourth quarter EPS was TWD 6.41 and ROE was 31.3%.

Now let's move on to the revenue by technology. 5-nanometer process technology contributed 23% of wafer revenue in the fourth quarter while 7-nanometer accounted for 27%. Advanced technology, which are defined as 7-nanometer and below, accounted for 50% of wafer revenue.

On a full year basis, 5-nanometer revenue contribution came in at 19% of 2021 wafer revenue. 7-nanometer was 31%. Advanced technologies accounted for 50% of total wafer revenue, up from 41% in 2020.

Now moving on to revenue contribution by platform. All platforms increased in the fourth quarter. Smartphone increased 7% quarter-over-quarter to account for 44% of our fourth quarter revenue. HPC increased 3% to account for 37%. IoT increased 3% to account for 9%. Automotive increased 10% to account for 4%. And digital consumer electronics increased 2% to account for 3%.

On a full year basis, all 6 platforms experienced year-on-year growth. HPC, IoT and automotive saw strong growth of 34%, 21% and 51%, respectively. Smartphone also increased 8%, and DCE increased 2% in 2021. Overall, smartphone accounted for 44% of our 2021 revenue. HPC accounted for 37% and IoT accounted for 8%.

Moving on to the balance sheet. We ended the fourth quarter with cash and marketable securities of TWD 1.2 trillion. On the liability side, current liabilities increased by TWD 84 billion, mainly due to the increase of TWD 22 billion in accounts payable and the increase of TWD 61 billion in accrued liabilities and others. Long-term interest-bearing debt increased by TWD 150 billion mainly as we raised TWD 157 billion of corporate bonds during the quarter.

On financial ratios. Accounts receivable turnover days remained at 40 days, while days of inventory increased 3 days to 88 days.

Now let me make a few comments on cash flow and CapEx. During the fourth quarter, we generated about TWD 378 billion in cash from operations, including TWD 80 billion prepayment from customers; spent TWD 236 billion in CapEx and distributed TWD 71 billion for first quarter '21 cash dividends. Bonds payable increased by TWD 157 billion due to the bond issuances. Overall, our cash balance increased TWD 211 billion to TWD 1.1 trillion at the end of the quarter. In U.S. dollar term, our fourth quarter capital expenditures totaled USD 8.46 billion.

Now let's look at the recap of our performance in 2021. We saw a strong growth in 2021 as our technology leadership position enabled us to capture the industry's megatrend of 5G and HPC. Our revenue increased 24.9% in U.S. dollar terms to reach USD 57 billion. In NT dollar terms, revenue increased 18.5% as the NT appreciated by 5% during the year. Such unfavorable foreign exchange rate also impacted our gross margin by about 2 percentage points. In addition, N5 dilution also created a headwind to our margin. However, as we continue to drive cost improvements, we were able to achieve gross margin of 51.6% and operating margin of 40.9% in 2021.

Overall, full year EPS increased 15.2% to TWD 23.01, and ROE was 29.7%.

On cash flow. We spent TWD 839 billion in CapEx while we generated \$1.1 trillion in operating capital and TWD 273 billion in free cash flow. We also paid TWD 266 billion in cash dividends in 2021.

I have finished my financial summary. Now let's turn to our current quarter guidance.

We expect our business in the first quarter to be supported by HPC-related demand, continued recovery in the automotive segment and a milder smartphone seasonality than in recent years.

Based on the current business outlook, we expect our first quarter revenue to be between USD 16.6 billion and USD 17.2 billion, which represents a 7.4% sequential increase at the midpoint.

Based on the exchange rate assumption of USD 1 to TWD 27.6, gross margin is expected to be between 53% and 55%, operating margin between 42% and 44%. Lastly, our 2022 effective tax rate is between 10% to 11%.

This concludes my financial presentation. Now I will move on to key messages. I will start by making some comments on our 2022 capital budget and depreciation.

Every year, our CapEx is spent in anticipation of the growth that will follow in the future years. We are witnessing a structural increase in underlying semiconductor demand underpinned by the industry megatrends of 5G-related and HPC applications. In 2021, we spent USD 30 billion to capture the strong demand and support our customers' growth. In 2022, our capital budget is expected to be between USD 40 billion to USD 44 billion.

Out of the USD 40 billion to USD 44 billion CapEx for 2022, between 70% and 80% of the capital budget will be allocated for advanced process technologies, including 2-nanometer, 3-nanometer, 5-nanometer and 7-nanometer. About 10% will be spent for advanced packaging and mask making and 10% to 20% will be spent for specialty technologies.

Our depreciation expense is expected to increase by low to mid-teens percentage year-over-year in 2022 as newly incurred depreciation will be partially offset by other nodes rolling off depreciation. With this level of CapEx spending in 2022, we reiterate that TSMC remains committed to a sustainable cash dividend on both an annual and quarterly basis.

Now let me turn the microphone over to C.C.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Thank you, Wendell. We hope everybody is staying safe and healthy during this time. First, let me start with our 2022 outlook. We expect 2022 to be another strong growth year for TSMC. For the full year of 2022, we forecast the overall semiconductor market excluding memory, to grow approximately 9% while foundry industry growth is forecast to be close to 20%.

For TSMC, we are confident we can outperform the foundry revenue growth and grow between mid- to high 20s percent in 2022 in U.S. dollar term.

Our 2022 business will be fueled by strong demand for our industry-leading advanced and specialty technologies, where we see strong interest from all 4 growth platforms, which are smartphone, HPC, IoT, and automotive.

Entering 2022, we expect the supply chain to maintain a higher level of inventory as compared to the historical seasonal level given the industry's continued need to ensure supply security. While the short-term imbalance may or may not persist, we continue to observe the structural increase in long-term semiconductor demand underpinned by the industry megatrend of 5G and HPC-related applications. We also observed the higher silicon content in many end devices, including automotive, PCs, servers, networking and smartphones. As a result, we expect our capacity to remain tight throughout 2022 as we believe our technology leadership will enable TSMC to capture the strong demand for our advanced and specialty technologies.

Next, let me talk about TSMC's long-term growth outlook and profitability. We are entering a period of higher structural growth. As the technology becomes more pervasive and essential in people's lives, and the digital transformation accelerates, the semiconductor industry value in supply chain is increasing.

As we embark upon the 5G era, an intelligent and more connected world will fuel massive requirement for computation power and prepare greater need for energy-efficient computing, which demand greater use of leading-edge technologies. The multiyear megatrend of 5G and HPC-related applications will drive modest volume growth and more importantly, spur substantial semiconductor content enrichment in HPC, smartphone, automotive and IoT applications to address the structural increase in the long-term market demand profile.

TSMC is working closely with our customers to plan our capacity and investing in leading-edge and specialty technology to support their demand.

At the same time, we are committed to achieve a sustainable and proper return that enables us to invest to support our customers' growth and deliver long-term profitable growth for our shareholders.

Over the last 3 years, we have raised our CapEx spending from USD 14.9 billion in 2019 to USD 30 billion in 2021 as we invest in anticipation of the growth that will follow. During the same period, our revenue in U.S. dollar term has increased from USD 34.6 billion in 2019 to USD 56.8 billion in 2021 or 1.6x and our EPS by 1.7x.

Looking ahead, as the world's largest, reliable and effective capacity provider with our technology leadership, manufacturing excellence and customer trust, we are well positioned to capture the growth from the favorable industry megatrend with our differentiated technologies. We expect our long-term revenue to be between 15% and 20% CAGR over the next several years in U.S. dollar terms, of course, fueled by all 4 growth platform which are smartphone, HPC, IoT and automotive.

With the increasing need for computation, HPC will be the strongest driver of TSMC's long-term growth and expect it to be the largest contributor in terms of our incremental revenue growth with the CPU, GPU and AI accelerators as the main growth area for our HPC platform.

As we invest in leading-edge and specialty technology to support our customers' demand, we continue to face manufacturing cost challenges due to increasing process complexity at leading-edge node, new investment in mature node, expansion of our global manufacturing footprint and rising materials and basic commodity cost. We are continuing to work closely with our customer to support their growth, and our pricing strategy will remain strategic, not optimistic, to reflect our value creation.

We will also work diligently in our own fab operation and with our suppliers to deliver on cost improvement. By taking such actions, we believe a long-term gross margin of 53% and higher is achievable, and we can earn a sustainable and proper return of greater than 25% ROE through the cycle. Thus, even as we shoulder a greater burden of CapEx investment for the industry, we can continue to invest to support our customers' growth and deliver long-term profitable growth for our shareholders.

Now I will talk about N5 and N4P and N4X status. As our N5 enter its third year of ramp, demand continues to be very strong, driven by smartphone and HPC applications.

Our N5 has proven to be the industry's most competitive leading-edge technology. To further enhance our N5 family's performance, power and density improvement for next-wave 5-nanometer products, we also introduced the N4P and N4X technologies.

N4P offers 11% performance boost as compared to the N5 with 22% improvement in power efficiency and 6% density gain. N4P is designed for easy migration from N5 with its products tape-out schedule for second half 2022.

We also introduced N4X as an offering especially optimized for workload-intensive HPC applications. N4X will offer much more circuit performance boost over N5 and we expect it to enter risk production in first half 2023. With our continuous enhancement of our N5 process technologies, we expect demand for our N5 family to continue to grow in the next several years, and for N5 family to be a large and long-lasting node for TSMC.

Next, let me talk about the N3 and N3E status, our N3 technology will use FinFET transistor structure to deliver the best technology maturity, performance and cost for our customers. Our N3 technology development is on track. We have developed complete platform support for both HPC and the smartphone applications. N3 production will start in second half of 2022. We continue to see a high level of customer engagement at N3, and expect more new tape-outs for N3 for the first year as compared with N5.

N3E will further extend our N3E family with the enhanced performance, power and yield. We also observed a high level of customer engagement at N3E, and volume production is scheduled for 1 year after N3. Our 3-nanometer technology will be the most advanced foundry technology in both PPA and transistor technology when it is introduced. With our technology leadership and strong customer demand, we are confident that our N3E family will be another large and long-last node for TSMC.

Finally, let me talk about our mature node capacity strategy. TSMC's strategy at mature nodes is to work closely with our customers to develop a specialty technology solutions to meet customers' requirement and create differentiated and long-lasting value to customers. We expect the multiyear industry megatrend of 5G and HPC and the higher silicon content in many end devices, to drive increasing demand and mature nodes for certain specialty technologies.

We forecast 28-nanometer will be the sweet spot for our embedded memory applications and our long-term structural demand at 28-nanometer to be supported by multiple specialty technologies. In support of our specialty technology strategies, we are expanding our 28-nanometer manufacturing capacity at sites in China, Japan and Taiwan.

Our capacity expansion is based on customers' need, business opportunities, operating efficiency and cost economic considerations. We believe the expansion of our mature node capacity will enable us to better serve our customers' needs and reach global talents, and our differentiated specialty technology will enable us to capture the demand generated from the industry megatrend and deliver long-term profitable growth for our shareholders.

This concluding our key message. Thank you for your attention.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Thank you, C.C. This concludes our prepared remarks. (Operator Instructions) Should you wish to raise your question in Chinese, I will translate it to English before our management answers your question. (Operator Instructions)

Now we will proceed to the Q&A session. Our Chairman, Dr. Mark Liu, will be the host.

QUESTIONS AND ANSWERS

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman

Hello, everyone. This is Mark Liu. I want to send my regards to every one of you during this pandemic and wish we have a happy and a successful 2022. Thank you.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Thank you, Chairman. Let's begin the Q&A session now. Operator, can we please proceed with the first caller on the line?

Operator

First to ask questions, Randy Abrams from Credit Suisse.

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

Okay. Yes. Congratulations on the results and the outlook and margins. First question on the growth outlook. When we compare the growth expectation mid- to high 20% versus if I roll up the fabless and IDM customers, they're about mid-teens growth. So your outgrowth looks much wider than most peers. Could you break it down a bit more, the factors between share gain, pricing moves? And also if there's any component of inventory build in there?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Randy, let me summarize your first question. I believe your question is referring to the 2022 growth outlook. And Randy...

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

That's right.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Right. And so Randy is saying, TSMC's guidance of mid- to high 20s percentage, his calculation show that the fabless industry is growing maybe around mid-teens. So we will outgrow the foundry -- sorry, the fabless. And so he is wondering what is driving this outgrowth. Is it share gain? Pricing? Are there other factors, such as inventory build, into this? And if we can share.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Okay. Let me answer the question. This is C.C. Wei. Actually, the growth in 2022 is all the above you just mentioned. It's a share gain, it's the pricing and also its a unit growth. Did I answer your question?

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

Yes, mostly. And maybe just a quick -- two quick follow-ups to that. If you could break the growth by platform and if you could indicate just how much -- like how much do you think your customers want to put in place for inventory? Like how big a component do you think that factor is?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Randy's follow-up is, can we give our 2022 growth by platform outlook? And then how much of a role is inventory build plan in this growth?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Randy, this is Wendell. Let me answer the platform question. In 2022, we expect the HPC and automotive to grow faster than the corporate average. IoT, similar. Smartphones close to the corporate average. That's the platform growth.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

And then Randy's second part is how much of a role is inventory build playing in this?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Well, Randy, as C.C. mentioned at the key messages, we expect the inventory level to remain high, higher than before for a longer period of time, but we're not able to quantify that factor.

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

Okay. No [I understand]. If I could ask a second question, you disclosed about the -- you're getting more prepayments, and a lot of customers have been disclosing those. If you could talk about the strategy behind this as far as the main objectives of the program and the protection you're looking for if we go into a downturn, what the scenario would be? So if you could disclose kind of that -- the strategy behind that.

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Randy, the prepayment, yes, we work closely and diligently with the customer to plan the capacity, including receiving their prepayments for capacity support. And we will continue to work with them to determine the best way to support them. Such commitments or prepayment will strengthen our cash position and help mitigate our capital risk in capacity.

Now talking about securing commitment, we always work closely with our customers, and we believe that technology leadership, manufacturing excellence and earning customer trust are a -- the best -- or the most effective way to secure customer commitments. So as far as we plan our capacity well based on the structural increase, in the long-term market demand profile, we believe our utilization and profitability can be well protected.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Wendell. Randy, does that address your second question?

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

Yes. It's more about in a downturn, I guess, is it also a -- could it be assurance in terms of volume or still some cash flow, like to protect the amount you have to outlay, so it is also kind of an insurance policy of some sort?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Well, yes. Randy, I think, as I just mentioned, the best way is to work with the customers and gain their commitment through our technology leadership, manufacturing excellence and therefore, earning their trust. So if we plan our capacity well based on the structural demand in the industry, then I think our utilization and profitability can be maintained. Thank you.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Yes. thank you, Randy.

Operator

The next one to ask questions, Bruce Lu from Goldman Sachs.

Bruce Lu - Goldman Sachs Group, Inc., Research Division - Research Analyst

Congratulations on the great result. I think management mentioned about a \$1 trillion semiconductor market size in 2020 -- by 2030. So can we have more color about the foundry market size by then? Or for the key growth drivers, such as HPC, can TSMC provide a more quantitative forecast? For example, like what is the addressable market for ARM-based CPU in 2025 or 2030?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Bruce, let me summarize your first question. So Bruce is saying we have talked about a \$1 trillion foundry market by 2030. So he wants to know what can be the key drivers here, and also the role of HPC, including ARM-based in this outlook.

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman

okay. Bruce, this is Mark. We don't have a very specific forecast for 2030 to share with you. \$1 trillion is our model and so has been quoted by general industrial comments.

However, we do believe that high growth approach to the number is happening. We believe the semiconductor industry growth will continue, fueled by the -- C.C. just mentioned, structural megatrend 5G and high-performance computing. And also, our leading-edge technology provide the most energy-efficient technology for computation and accelerate the digital transformation for the next several years.

So -- but if you look at the -- if we -- want me to comment on the foundry industry, it's pretty clear. The foundry industry growth will be higher because, in addition to a fabless company, IDM outsourcing will continue increasing in a fast growth rate. And most importantly, system companies will grow, particularly faster during this period of time.

So in that sense, we believe the foundry growth -- foundry industry growth will have a good year better than other sectors.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

And then Bruce also asking about the role of HPC in this growth outlook, including the ARM.

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman

Well, ARM is a new phenomenon. I think the CPU architecture no longer been dominant by 1 architecture. Multiple architectures provided their better integration with software, provide a much wider application of CPUs. And that no matter what the CPU, which architecture they are, currently, we are engaging to all CPU architecture customers.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Bruce, does that answer your first question?

Bruce Lu - Goldman Sachs Group, Inc., Research Division - Research Analyst

Yes, but I try to ask a follow-up for the -- addressing for HPC. I mean within that HPC, we understand that this is the fast growth effect. Can you provide some more like different like growth magnitude within the HPC? Which part of the HPC is growing faster? And how big could that be in 3 to 5 years?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well Bruce, this is C.C. Wei again. No, we cannot disclose all the details on each segment. for example, CPU, GPU and AI accelerator, which one is more -- what kind of percentage. In fact, they are all growing, but for the specific percentage, we don't comment right now.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Bruce?

Bruce Lu - Goldman Sachs Group, Inc., Research Division - Research Analyst

I understand. Yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. do you have a second question?

Bruce Lu - Goldman Sachs Group, Inc., Research Division - Research Analyst

Yes. The second question is regarding to the 28-nanometer, actually know that 28-nanometer is the biggest node among all the process node within TSMC, and which suffered low utilization rate in 2018 and '19. So with the recent announcement in Nanjing or Japan or even in Kaohsiung, it suggests another 50% of capacity growth in 28-nanometer alone in TSMC. Not to mention like your industry peer are all aggressively in expanding the 28-nanometer.

Can you provide like more like growth driver? And how can you feel comfortable to expand the capacity in this magnitude in the coming years when a lot of like financial industry we're talking about, like down cycle or a cycle peak or oversupply in 2023?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Bruce's second question is on 28-nanometer. He notes that we are, as C.C. said, expanding our capacity in 28-nanometer in various locations, but he also notes that other foundry peers in the industry are also expanding as well. So he wants to know the risk, I guess, of oversupply.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, good question. As you pointed out in 2018, 2019, we have a lower utilization rate. It's just a little bit above 80%. But right now, we do observe that our long-term structural demand at 28-nanometer was to be well supported by multiple specialty technologies such as CMOS image sensor for multi-camera trend and better non-volatile memory application and other specialty technologies. To be in 1 word, actually, the enrichment in the silicon content in many end devices that develop in recent years helped to support this demand.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Bruce? Thank you.

Operator

Next one to ask question, Charlie Chan from Morgan Stanley.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Charlie, are you on the line?

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

Yes, yes. Hello? Can you hear me okay?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

We can hear you now. Please go ahead.

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

Okay. Congratulations for a good results. So to management, my first question is about the macro economy risk, right? For example, inflationary pressure on the consumer tech demand. And also, work from home demand has been strong for 2 years. Will the management consider that could fade away and impact your PC, TV or the semis.

And also lastly, the crypto mining demand has been very volatile, right? And now it seems like crypto price also falls down. So we'd like to know whether you consider those kind of macro risks into your full year revenue growth forecast?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Charlie's first question is related to the macro outlook, looking at concerns of inflation, work from home fading, consumer demand and also crypto volatility. What impact could this have on end demand for PC, TV and semiconductors? And have we considered this into our outlook? Maybe C.C. can address this.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Yes. Well Charlie, we expect the supply chain to maintain a higher level of inventory for a longer period of time given the industry's continued need to ensure the supply security. But then we also observed the end market momentum in certain segment may slow down or adjust in terms of units. But the increasing silicon content in many end devices is a more important factor in supporting the strong semiconductor demand and will continue.

So even if there's a correction were to occur, we believe it could be less volatile for TSMC due to our technology leadership position, and the structural megatrend demand of 5G-related and HPC application, the substantial increase in silicon content, that will make sure we expect our capacity to remain very tight throughout 2022. You also mentioned about the crypto currency. Yes, we have factored that one in.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Great. Charlie, do you have a second question?

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

Yes, if I may. So a second question is maybe to Wendell that our first quarter revenue see a great sequential growth, right?

So may I know that -- those price hike benefit mostly reflected in 1Q? Or there will be still some price hike benefits in the second quarter? And also, can you please repeat the depreciation growth guidance year-on-year for 2022?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Charlie, let me summarize your second question. So this question is directed to Wendell. In terms of the first quarter revenue sequential growth, how much of the -- a price hike is reflected in this? And will a price hike be reflected in subsequent quarters?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Charlie, we're not able to break down those numbers for you. But we continue to work closely with our customers, meet their demand and also sell our value. That's what we are focusing on.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Yes. And the depreciation guidance, Charlie, this year is low to mid-teens year-on-year increase. Thank you.

Operator

Next one to ask questions, Gokul Hariharan from JPMorgan.

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

First of all, could you give us an update on how we think about CapEx going into next couple of years as well, given the growth expectation is also now higher in the 15% to 20% range? Do we expect CapEx to peak out this year? Or should it continue to grow into next year? And maybe Wendell, could you also talk a little bit about how we think about capital intensity? When do we expect that to peak? And what is more like the steady-state as we get to the end of this particular growth period 2020, 2025? That's my first question.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Gokul, let me summarize -- allow me to summarize your first question. Gokul was asking about our CapEx outlook. He notes that we -- our growth is now higher at 15% to 20% CAGR for the next several years. So his question is, how should he think about the CapEx. Is 2022 the peak? How does CapEx look for the next few years, and also in terms of the long-term capital intensity?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Okay, Gokul, this is Wendell. Regarding CapEx number. This year, we guided \$40 billion to \$44 billion. Now remember that we spent CapEx in the given year for the growth prospect in the next several years. So whenever there is -- we think the growth outlook is good, we will continue our disciplined investment going forward. We're not able to give a guidance on CapEx beyond 2022 today.

And also the capital intensity. Whenever we enter into a higher period of growth, like today, the capital intensity will be high and which is appropriate. Now if the growth were to slow down, the capital intensity will decline accordingly. From what we can see at this moment, longer term, maybe mid-30s remains appropriate level.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you. Does that answer your first question, Gokul? Hello, Gokul? Are you on mute?

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

Yes. Sorry. My second question is about one of your IDM customer, which has been a top 10 customer for TSMC, but now they are also re-entering the foundry market aggressively and wanting to compete head to head with TSMC.

How does TSMC navigate this situation, given the market is also expecting this customer to be a bigger revenue contributor for TSMC in the HPC area over the next couple of years? Just wanted to understand how management thinks about this business relationship, given that for some of the other IDM customers who are foundry competitors, TSMC doesn't do much business with them.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Gokul, let me summarize your second question. Gokul's second question is in terms of a specific IDM customer of TSMC, but this customer is also entering foundry and also -- so his question is how do we navigate the relationship given that in the past, we do not really work with IDMs who compete with us?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay. Gokul, This is C.C. Wei. Let me emphasize that we always operate in a good faith and support all our customer opening and fairly. And the IDM customer has been the same. That's also that TSMC's good customer. We also understand that the IDM customer has their own plans for future insourcing, and we already have taken this into our capacity planning consideration. Did I answer your question?

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

Is there any way for you to protect your longer-term growth when you deal with this kind of a customer? Just wanted to understand how it differs from your traditional fabless customers where I think that insourcing question is not really on the table?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, as I said, we have already taken into -- this into our capacity planning consideration. And our capacity planning is based on the long-term market demand profile, underpinned by the industry megatrend of 5G and HPC and the semiconductor content enrichment in many end devices. And we do not depend on any one single customer or product. Okay?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Gokul? Yes. Thank you, Gokul.

Operator

Next one to ask questions Roland Shu from Citigroup.

Roland Shu - Citigroup Inc. Exchange Research - Research Analyst

Congrats for your very good results and good outlook. First question of me is you also mentioned you always build your capacity according to customers' long-term demand profile. But in the past, from time to time, you overbuilt capacity for some nodes due to customers' forecast always change. So how confident you are this time to [comfortably] spend a huge CapEx from 2021? And why do you think customers' forecast this time are more real than any time before? And also, what's your take of this semiconductor cycle? Will this cycle change risk your CapEx spending plan going forward?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Roland. So Roland's first question is really C.C. said that we build our capacity according to the long-term demand profile. His question is, though customers' forecasts can change. So how confident can we be? And how do we see this current cycle playing out? Is that correct, Roland?

Roland Shu - Citigroup Inc. Exchange Research - Research Analyst

Yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay. Let me answer this question. For the difference, actually, this time, we see a structural increase in long-term market demand due to the multiyear industry megatrend of 5G, HPC and digitalization as well as some of the short-term imbalance that interruption of the supply chain brought about COVID-19 and geopolitical tension.

Let me say that how confident we are, very confident because, as I said, long-term structural increase in the content and in the unit. This time, we add the content increase as one of the important factor which we never reported before, and it was driven that semiconductor industry to -- at a higher utilization rate because we have a very good technology leadership.

Roland Shu - Citigroup Inc. Exchange Research - Research Analyst

Yes, I think I have also a question, part of the question is for the cycle. What's your take of the semiconductor cycle now?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, we cannot predict the cycle, right? But even if there is a cycle coming, we do believe that TSMC with its technology leadership and excellent manufacturing and the customers' trust will be a better position in the upturn or downturn cycle.

Roland Shu - Citigroup Inc. Exchange Research - Research Analyst

Okay. Understood. Now for my second question. With your faster revenue growth and better margin going forward. For TSMC, apparently needs capable and experienced management and employees for continuous growth going forward.

However, some of your senior management are approaching legitimately retired age. So how are you going to retain the experience and the valuable management going forward? And also, by the way, what's the progress of your talent recruiting for your R&D and the manufacturing fab worldwide?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Roland's second question is that -- his question really is around our talent. Part of it is our senior management. How do we keep our experienced and senior executives? And also as we expand our global manufacturing footprint, what is the progress of our talent recruitment of engineers and R&D?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Roland, this is Mark. You're right. Our capable executives are our treasurers and they will bring the company forward. And as long as they are energetic, and they will want to contribute for this company, there's no forced retirement. For those top-notch executives, we will work with them if they want to stay. Yes.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

And then also, how about our talent recruitment globally as we expand.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Oh, yes. Talent recruitment, it is currently our focus as the company deal with this fast-paced expansion, and we recruit particularly emphasized on the overseas recruiting. And as you can see, our expansion into U.S. manufacturing and also in Japan manufacturing and -- are the vehicle that we will be able to reach for more global talents through those operation, and may extend to local R&D. So that is a part of our strategy.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Roland.

Operator

Next one, we have Brett Simpson from Arete Research.

Brett Simpson - *Arete Research Services LLP - Senior Analyst*

My first question is for Wendell. Wendell, can you share with us how much prepayments and government subsidies TSMC received in 2020? And how we should think about prepayments and subsidies in 2022? And also, how do you account for this, particularly the subsidies, how do you account for this in the P&L going forward?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Oh, sorry...

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Yes, go ahead.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Sorry. Just to summarize Brett's question. So first question, he wants to know how much prepayments and government subsidies that we received in 2021. How many -- how much do we expect in 2022? And how do we account for these in our financial statements?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay, Brett. Let me talk about the prepayment first. At the end of last year, we have received a total of USD 6.7 billion in prepayment, and you can -- those are included in the financial statement as temporary receipts from the customers. So going forward, you can look at our quarterly financial statement and find that numbers.

As to subsidies, different country have different incentives and they come in different forms. So they are -- some of them are related to asset reduction, some of them offset expenses and some of them tax reductions. And we follow that -- we use different accounting treatment to record that in the financial statements.

Brett Simpson - *Arete Research Services LLP - Senior Analyst*

Okay, Wendell. I guess the prepayments this year will be higher than '21? Is that a fair statement?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Well, I cannot share with you the details, but we expect that there are more.

Brett Simpson - *Arete Research Services LLP - Senior Analyst*

Okay. And my second question, looking at the smartphone segment of your business, it grew 8% in 2021, which is well below some of your big customers. Can you talk about silicon content drivers? 5G has been a really big silicon content driver in 2021, and it will continue to -- in 2022. So I'm just wondering, can you maybe just share with us your perspective on happened in 2021 in smartphones? Why only 8% growth? And how should we think about smartphones and the positive silicon content drivers from 5G this year?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Brett's question is focused on the smartphone. He notes that our smartphone platform grew 8% in NT dollar terms year-on-year in 2021. So his question, I guess, Brett, if I'm hearing you correctly, your question is sort of what is driving the slower growth in the smartphone, despite the higher silicon content?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Well, let me answer the question. I mean that's -- in terms of NT dollars, of course, it's only 8%, but in terms of the U.S. dollar, it's much higher. All right?

And then the silicon content is continue to increase every year. So we expect that will be one of the major contributor to TSMC's growth continuously.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Yes, I think -- let me add. The global smartphone unit growth last year is about 6%. So some of the -- you see some of the company smartphone revenue may grow, it could be due to the pricing. But we -- our pricing strategy, as you understand, is strategic, not optimistic. So we'll grow with the smartphone units in our business.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Brett.

Operator

Next one is Charles Shi from Needham & Company.

Charles Shi - *Needham & Company, LLC, Research Division - Associate*

Just a very quick clarification. C.C., I think you mentioned about the N3 number of tape-outs in the first year, you expect that to exceed the number of N5 tape-outs in the first year. Since now you have both N3 and N3E, is that a comment on the original N3 alone? Or N3E family, which includes both N3 and N3E?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Charles' first question is that he wants to clarify in terms of tape-outs. When we say N3 tape-outs are greater than N5 in its first year. Is this N3E alone or N3 plus N3E?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Well, it's N3 for right now because N3E we are -- technology will be ready soon, and the mass production will be 1 year later. So now most of that tape-out, all of them, are N3.

Charles Shi - *Needham & Company, LLC, Research Division - Associate*

So now I want to ask my question on potentially the gross margin profile for the N3. I know it's going to start to meaningfully contribute to the revenue next year. You've said in the past that the newest process node will take about 7 to 8 quarters to reach the corporate average. But now this time, I think one difference about N3 is that you have both smartphone and HPC being supported at the right -- at the beginning of the launch of the N3 node.

So my guess is that the revenue for smartphone and HPC ramp could really go parallel instead of one after another and which could really help your volume, your revenue. And could you comment on whether that 7 to 8 quarter of the margin dilution of the newest process node, maybe starting from N3, it will become shorter. That's my question.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Thank you, Charles. Please allow me to summarize your second question.

So Charles' second question is looking at the N3 profitability and gross margin. He observes in the past, and you know typically it takes 7 to 8 quarters to reach the corporate average, but at N3E, we have both -- developed both smartphone and HPC platform. So these ramp in parallel, could N3E actually reach the corporate average in a shorter duration of time?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Charles, this is Wendell. It is too early to say when N3 can reach the corporate average gross margin at this stage as the volume production has not started yet. However, the initial outlook for every new node always looks challenging, and the increasing process complexity of leading nodes, such as N3, brings even greater challenges. We will continue to work on selling our value and cost improvement to ensure that we earn the right profitability and returns.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay, Charles? Does that answer your second question?

Charles Shi - *Needham & Company, LLC, Research Division - Associate*

Yes, indeed.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you.

Operator

Next one to ask question is Mehdi Hosseini from SFG.

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

Yes. The first one actually is a follow-up on the gross margin. For the March quarter, you're guiding to 53% to 55%, but your longer-term gross margin is around 53%.

So does that mean that as we look beyond the Q1, there is a downward trend in gross margin? And also, how should we think about the long-term operating margin? And I have a follow-up.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Mehdi's first question is around gross margin. He notes our first quarter gross margin guidance is 53% to 55%. But Mehdi, let me clarify, our long-term gross margin guidance is 53% and higher gross margin. But nonetheless, Mehdi is asking, therefore, are we implying saying the margin outlook for the rest of the year will come down or decline?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Mehdi, this is Wendell. We're not prepared to talk about gross margin outlook for the subsequent quarters of the year. But please be reminded that there are 6 factors affecting our profitability. Those factors include the ramp and development of our advanced technology, price, cost, mix,

utilization and foreign exchange rate. The foreign exchange rate is something that we cannot control and hard to predict. So you -- these -- summarizing all those factors together, we're saying that long term, we expect our gross margin to be 53% and higher. As to our operating margin, we're not giving out the operating margin guidance as of now.

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

Okay. And a quick follow-up. Can you also help us understand how the mix of revenue by process technology like 7, 5 and 3 will change in '22 versus '21?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Mehdi's second question is asking revenue contribution by node. He is asking that N7 and N5 and N3, how -- what contribution will that be in 2022? And how is that different versus 2021?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Mehdi, we're not prepared to give the breakdown for the revenue contribution by node today. But the N5 will continue to ramp, so we expect the revenue contribution to continue to rise throughout the year.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Yes. And I think we have said before, Mehdi, that N3 will begin the volume production in second half '22, and you will start to see the revenue contribution in 2023.

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

Okay. Great. Congratulation on great execution.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Mehdi.

Operator

The next one to ask question is Sunny Lin from UBS.

Sunny Lin - *UBS Investment Bank, Research Division - Director & Associate Analyst*

So my first question is on N3. So you mentioned that the number of tape-outs for N3 is higher than N5 in the first year. So now that we are getting pretty close to the mass production, I want to get your sense on the overall capacity outlook for N3 compared with N5.

And also, if we could -- if you could give us any sense of N3 revenue contribution in the first year of mass production?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Sunny. So let me -- please allow me to summarize your question. Her first question is on N3. Will N3 have a higher capacity than -- or scale than N5?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, this is C.C. Wei. I would like to say, I'm not able to comment on the specific capacity by node. But with a strong level of customer interest and engagement, N3 will be another large and long-lasting node for TSMC just like our N5 and N7.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

And then Sunny is also asking about the revenue contribution of N3.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

It's still too early to talk about.

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

Sure.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Yes.

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

No problem. So a follow-up will be that if we think about the N5 ramp-up, I think the second wave customer adoption seems to only occur in 2022, which is about 2 years after mass production. Looking at N3, with higher contribution and faster adoption of HPC, could you help us think about what the ramp-up could be like? Would the scale pick up a bit faster because of HPC?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Sunny's second question is also on N3. And she notes -- her question is that in N5, the second wave of adoption occurred 2 years after the initial production, but with N3 and the higher and greater interest from HPC customers, would N3 see a faster ramp-up?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, all I can say right now is our customers engaged with N3, N3E are quite more than what we observed in the N5. However, how to quantify that ramp up, it's too early to say. The engagement is very strong. All I can say that.

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

Sure. Maybe a very quick follow-up in the equipment supply. Are you seeing any potential bottleneck for you to ramp up a larger capacity for N3 the next few years, especially considering potential disruptions for ASML's EUV tools?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So last question from Sunny is that, in terms of our capacity expansion, are we seeing any bottlenecks or potential bottlenecks in our capacity plans, particularly in terms of ASML's EUV tools?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Sunny, this is a very good question. All I can say right now is that 2022, we are okay. And now we are working on 2023 so that we can ramp up capacity to meet customers' demand.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Thank you, Sunny.

Operator

Next one, we have Sebastian Hou from Neuberger Berman.

Sebastian Hou - Neuberger Berman - Senior Investment Analyst

Hello. Can you hear me?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Yes, we can.

Sebastian Hou - Neuberger Berman - Senior Investment Analyst

Hello. Yes. I only have one. This is more of a mathematic question. So if I look past on TSMC, your -- how long did you translate your CapEx to your revenue? It looks around like 1.7x, which means that you double your CapEx in 3 years. You'll probably double your revenue in 5 years -- or triple -- or more similar to that kind of equation.

So I'm curious about, this time around, whether that kind of relationship or translation time you'll hold. And then if I look at your CapEx numbers in 2018, is where -- 2019 is where you start to move your CapEx aggressively. And in 3 years, you triple CapEx. In 4 years, you quadruple your CapEx.

So if that equation continue to hold, then does that mean that you're -- by 2023 or '24 your revenue will be exceeded USD 100 billion? And by 2025, your revenue will be around USD 130 billion to USD 140 billion, which means that your long term over the next 3, 4 years' revenue CAGR, not just 15% to 20%, but actually 25% to 30%.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Sebastian. His question really is about the relationship between CapEx and revenue. He's asking on his calculations, of course, how long does it take CapEx to translate into revenue? He observed in the past that the CapEx doubling in 3 years led to revenue doubling in about 5 years. So now he wants to apply it to this time to say, well, if CapEx has tripled from 2018, then can he expect TSMC revenue to be \$100 billion. Sebastian, you said in 2024?

Sebastian Hou - *Neuberger Berman - Senior Investment Analyst*

2023 to 2024.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Oh, 2023 to 2024.

Sebastian Hou - *Neuberger Berman - Senior Investment Analyst*

Yes, around this level. And -- yes...

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

so \$100 billion level in kind of 2024, \$130 billion to \$140 billion in 2025.

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Sebastian, this is Wendell. Well, frankly, speaking, we didn't do that kind of math ourselves. But what our guidance is, as C.C. mentioned earlier today, it's 15% to 20% CAGR in the next several years.

So with CAGR, it doesn't mean that every year will grow that kind of a numbers. And also, it's next several years is a longer-term numbers. So I would not try to use the mathematics that you just used. It's -- things are not that simple, I think.

Sebastian Hou - *Neuberger Berman - Senior Investment Analyst*

Yes. Definitely not that simple. But maybe let me simplify the question a bit or put another way is that the CapEx to revenue translation time, do you see any change on that now versus 5 or 10 years ago? If it is slower or faster or the same kind of the pace?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Yes. So I think Sebastian is asking, so to try to simplify it in terms of CapEx to revenue. Are we seeing it at the same pace as in the past? Is it getting longer? Is it getting shorter? I think Chairman can address this.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Let me answer this. I think because of the equipment lead time is much longer and also the technology complexity is longer. So that might increase a little bit in terms of the lead time leading to revenue.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Sebastian.

Operator

Next one, we have Laura Chen from KGI.

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

I have a questions on your overseas expansion. Just wondering, would TSMC consider joint venture in Europe, like what you announced in Japan? And what's your current preference? Do you prefer 100% owned? Or you would be more open for potential joint venture, like what TSMC did a long time ago in Wafertech and Singapore with NXP before? That's my first questions.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Laura, let me summarize your first question. It is about our overseas fabs, and she's wondering will we consider joint venture as a future model going forward, whether it's in Europe or elsewhere?

Is this something that we have done with Wafertech in the past and also recently with Japan. Is JV, the new model going forward?

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman*

Yes, Laura, this is Mark. To answer your first question about Europe, this is still very early stage we are assessing.

To start the overseas fab, there are many, many considerations. Among them, the top few is -- firstly is the -- our customers' needs. And so in this current planning in the Japan fab, indeed, it was a joint venture. We haven't done joint venture for many years. And we think this joint venture is a -- also a special case.

Typically, every TSMC fab, no matter where it's located, will serve all the customer from around the world. And this Japan joint venture will also the same.

However, with -- in Japan, we have a very large customer who is a -- have a single technology, and we can also leverage their operating and manufacturing experience in Japan, which help us ramp in the learning curve. So that made us make the decision of a joint venture fab with Sony, where we have a majority share. So this is a special case. And we -- typically, we are considered to proceed a solely-owned fab with 100% ownership. Yes.

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

That's very clear. And also, my second question specifically on the N6-based RF transceiver. I recall that in your symposium back in June last year, you mentioned that the N6-based RF transceiver for 5G.

Can you give us more update, as we know that there's not much expansion on 16- or 12-nanometer, which is the major technology node for 5G, the RF transceiver? And with the limited supply, just curious about the N6-based 5G RF transceiver, would that become the mainstream? Or what TSMC's capacity plan in this area? And also the client engagement for the N6-based RFs?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay, Laura, let me try to summarize. Her questions about RF transceivers for 5G. She wants to know, there doesn't seem to be any major capacity expansion. So what is TSMC's strategy for RF transceivers for 5G and also N6? You're talking in N16 or N6, sorry, Laura?

Laura Chen - KGI Securities Co. Ltd., Research Division - Research Analyst

The N6 because right now, most of are transceiver are in 16, from my understanding.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Yes.

Laura Chen - KGI Securities Co. Ltd., Research Division - Research Analyst

Yes. But there is not much difference.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So she wants to update on N6 RF transceiver strategy.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay, Laura. We always are working with our customers closely, right? And the customer makes their decision to choose which technology node and to match their product design best. And you are right. Right now, transceiver is starting moving from 28-nanometer to 16, and now moving to N6. We are expanding our capacity to meet the demand. That's all I can say. Did that answer your question?

Laura Chen - KGI Securities Co. Ltd., Research Division - Research Analyst

Okay. yes. I think -- can I follow up that will we expect that N6-based RF will be the majority sometime, say, in 2023 or '24?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So Laura's follow-up is, can we expect N6 RF to be the majority in -- by 2023 or '24?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, I should not comment on that. This is between TSMC and the TSMC's customers.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you. Operator, in the interest of time, I think we'll take the final two questions.

Operator

Next one to ask questions, Krish Sankar from Cowen & Company.

Krish Sankar - Cowen & Company, LLC, Research Division - MD & Senior Research Analyst

Congrats on the really strong results. My first question is on gross margins. Wendell, you said long-term gross margin about 53%. The last couple of quarters, you said it will be over 50%. So is it safe to assume that the price increases are the big reason for this increase in gross margin? And are these structural? Or are they cyclical?

And is there some other variable in play given in gross margin improvement, since it's interesting that CapEx is going up, but the depreciation is not having an impact longer term on the gross margins? That's my first question.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Krish, let me summarize your first question. So Krish notes that Wendell is -- and C.C. said our long-term gross margin target -- last time we said 50% and higher. Now today, we said 53% and higher.

So is this because of price? And is this a cyclical element only? Or is this something structural in terms of a higher 53% and higher long-term gross margin target?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Yes. Well, let me share with you that. We're talking about long term. So several years down the road. I think that shouldn't be a cyclical issue. So previously, it's long term, 50% and higher. Now it's long term, 53% and higher, okay? So that's the difference. And we are working closely with our customers and suppliers to both sell our value and drive our cost improvements. So those are the -- this is the result of all these efforts together.

Krish Sankar - Cowen & Company, LLC, Research Division - MD & Senior Research Analyst

Got it. Got it. All right. And then my second question is kind of a 2-part question. It's a CapEx and the OpEx question, you spoke about \$40 billion to \$44 billion CapEx.

Can you just tell us how much of the CapEx is going to be split between Taiwan and U.S. and Japan, like a geographic breakdown of that \$40 billion to \$44 billion? And the OpEx side, I understand you don't want to comment on long-term OpEx. But I'm just kind of curious, it's rising global inflation and your interest in recruiting talent in Arizona, how to think about OpEx growth relative to inflation growth?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Krish second question. First is in terms of the CapEx guidance that we gave this year, \$40 billion to \$44 billion. He wants to know what portion is for overseas capacity as compared to Taiwan?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Okay. For this year, out of the \$40 billion and \$44 billion, we really don't -- cannot comment on the split between overseas and Taiwan. We normally split or give the breakdown guidance between advanced and mature specialty nodes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

And then the second part is on OpEx. What is the impact? Although we're not giving an operating margin guidance, but rising global inflation, we're trying to recruit talent overseas. What is the -- sorry, outlook for our OpEx?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Well, we try very hard -- work very hard to control our operating expenses and to achieve operating leverage. You can probably see from the track records in the past few years and past few quarters that we're always able to achieve operating leverage, and that's something that we will continue to work very hard on.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. Thank you, Krish. Operator, in the interest of time, we will take the last participant's questions.

Operator

Last one to ask questions, Frank Lee from HSBC.

Frank Lee - *HSBC, Research Division - Head of Technology Research for Asia*

Just had a question, maybe if I can follow up on the CapEx. I think a year ago, you guys gave a longer term 3-year CapEx target. I understand at this time, your CapEx is only given for 2022.

Just wanted to understand, are there any -- is there more uncertainties about giving a longer-term CapEx that it is why you're not giving a longer-term target, being given? And I think last quarter, you guys have also talked about your CapEx intensity -- and it's going to be more than 50% in 2021. But long-term target, you said in the 30s.

But the last quarter, I think it was implied that it was not going to come down to the 30s in the next 2 or 3 years. Is that still the case? That's the first question.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Frank's first question is on CapEx. He said we had talked about \$100 billion CapEx in the next 3 years. His question is why are we not guiding for next 3 years CapEx now? Is there some concern we have?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Okay. Frank, we will not comment on the CapEx outlook beyond 2022 to date. Please be reminded that every year, our CapEx is spent in anticipation of the growth that will follow. So as long as our growth outlook looks good, then we will continue our investment approach, the disciplined investment approach, to support our customers and capture the growth opportunities.

And as regarding to the...

Frank Lee - *HSBC, Research Division - Head of Technology Research for Asia*

Okay and then I guess...

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Yes, the capital intensity. Yes. As I've said earlier that in the period of high growth, like today, it is quite normal or it is appropriate for the capital intensity to be high. And if our growth were to slow down, then the capital intensity is expected to decline accordingly. So from what we can see at this moment, you're asking several years from now or probably if a normal situation will probably in the mid-30s.

Frank Lee - *HSBC, Research Division - Head of Technology Research for Asia*

Okay. But is that likely in the next 2 or 3 years? Or it's going to be further out until we get to that level?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Long term, several years.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

I think we'll give you a year-by-year updates. Yes. Okay?

Frank Lee - *HSBC, Research Division - Head of Technology Research for Asia*

Okay. Great. And then I guess my second question is, I think, a consistent message on this call was really about the semi content -- structural semi content growth. I think you guys have mentioned this a couple of times in this call.

Over the past year though, I guess, just wanted to get your sense of -- semi content growth something that seems like it's been well understood. But has there been an incremental surprise in terms of the semi content for you guys over the past year that has a more positive structural long-term growth? And if so, can you share by what application? Or are we seeing content growth in mature nodes as well?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Frank's second question is on the semiconductor enrichment. His question is what are we seeing? Have we seen upside in the last year? And in terms of what specific applications are driving the semiconductor content enrichment. Maybe C.C. can address this last question.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Yes, sure. I will give you a lively example. If you look at the new car being introduced in the market, you will find out that the semiconductor content has been dramatically increased. And the same happened to data centers, server and et cetera, et cetera.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay?

Frank Lee - *HSBC, Research Division - Head of Technology Research for Asia*

Okay. Sorry, I just have to pop in. Is it fair to say then that the semi content growth is something that is structured across all nodes, including advanced as well as some of the specialty nodes?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So Frank's question then with the semiconductor enrichment, is this only for the leading nodes? Or is this also hold true at the mature nodes as well?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, it's across all the technologies that I can say. I'll give you one example, again. If you look at the ADAS that the leading-edge technology, if we look at the power management, that's a mature technology.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. All right, Frank? Thank you. Thank you, C.C. Thank you, Frank.

This concludes our Q&A session. Before we conclude today's conference, please be advised that the replay of the conference will be accessible within 1 hour from now. The transcript will become available 24 hours from now. Both are going to be available through TSMC's website at www.tsmc.com.

So thank you for joining us today. We hope everyone continues to stay healthy and safe. Happy New Year, and we hope you join us again next quarter. Goodbye, and have a good day.

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