Company Participants

- Anand Srinivasan, Senior Technology Analyst
- Geetha Ranganathan, Senior Media Analyst

Other Participants

- Amine Bensaid, Analyst, Media
- Julie Chariell, Analyst, Fintech
- Woo Jin Ho, Analyst, Senior Networking

Presentation

Anand Srinivasan {BIO 16652971 <GO>}

Good morning and welcome to the Bloomberg Intelligence Webinar on dissecting Apple in the post-COVID era. Today is Wednesday, May 26, 2020. And my name is Anand Srinivasan, I am the primary Apple Analyst, and the Semiconductor and Hardware Analyst here at Bloomberg Intelligence. I have with me four colleagues who will be bringing their expertise to bear on the subject. Geetha Ranganathan is our Media Analyst; Julie Chariell is our FinTech analyst; Amine Bensaid also covers media, specifically opining on music and Woo Jin Ho [ph] is our expert in semiconductors and networking, and will be talking about 3D frequency front-ends.

We have a packed call. So why don't we get started. Administrative items to begin with. Today's presentation will be recorded, and will be available for playback. You can access the replay via the link sent to you in the email from Bloomberg webinars that email will come from Bloomberg webinars. At the bottom of the slide window, you can adjust the volume and maximize your screen and you can also ask a question. I would strongly urge participants to use this method. You can ask a question by submitting one to the right of the slide, there is an area where it's called questions and answers.

We will address questions at the conclusion of the presentation and then the copy of the slides being used today will be distributed in a post event email. As I mentioned, we have a packed agenda and we've stored -- divided the discussion points on the call into these areas. One is we want to talk through the short versus the longer term. We want to talk about two subject areas in depth. The two vectors which we think are drive the investment thesis on Apple. One is the iPhone install base. And within that we will talk about the iPhone-12 launch, about the effect of 5G. We think pricing is going to change in 2021. We'll talk about that.

And the second golden egg in this case would be the services business. And within the scope of the services business, we will talk about not only the subdivisions of services that we have laid out that we have spread out. We have estimated each of

those businesses, but we will talk about the outsides opportunities. In media, both on the streaming side as well as on the music side, we will talk about FinTech which we think principally [ph]. We will also discuss extensive the Apple's chip ambitions. And last but certainly not least will address valuations and leave some time in the conference for Q&A.

With that, let's get started. Talking about the near-term versus long term, obviously the near term calendar year 2020 -- fiscal 2021 in the case of Apple is impacted, is COVID impacted. Surprisingly the near term is less or more shallow in its weakness than it's -- than we had first foreseen. In the long term, we think that there is substantial opportunity to expand the install base, but also drive a mix shift that from an ASP perspective raises number one and number two, also drive services. So one of the things that I want to convey and we have assumed Apple coverage recently and is the fact that Apple has both the benefit and the burden of scale in terms of market share, you can see that it's a substantial owner of market share from with 191 or so million units, certainly not the biggest but from an ASP perspective, it's skewed pretty far to the right, but it certainly has scale from a smartphone volume perspective.

The second part of it is if you look at consumption of semiconductors. For example, Apple is a substantial consumer of both DRAM, NAND as well as logic chips. Some of which are merchant silicon from third parties such as Qualcomms, some of which is internally designed and made by TSMC. So we'll talk through the effect of scale. We think that a singular vector of growth in the longer term is the China and India expansion, obviously from an ASP perspective and the Android penetration versus the iOS penetration, particularly in PRC and in China, it's multiples in terms of ASP, it's multiples in terms of each Android phones sold versus each iOS phone.

And, but we believe that these two countries will represent the long-term growth opportunity for the iPhone relative to Android. And we wanted to spend a little bit of time on this virtuous cycle where the install base, where you have a new iPhone sold, you have new adding to the install base, slowly expanding it, you have dramatically new content via the App Store, which in turn drives more content-enabled devices in the adjacent products and then which again proliferates wider content through the new platforms that Apple has and this cycle continues.

If you look at the iPhone, we are paranoid and obsessive about the install base, and the install base doesn't change drastically in the near term, we think that there is about a 1.3 billion [ph] units if you consider the iPhone, the iPad the Max, et cetera, across all of these platforms. We think there is about a 1.3 billion installed base. And if you look at 1Q '18 through 4Q '19 the installed base has rapidly grown. There are substantial vectors of growth in terms of the installed base potential. One is not to be discounted is the financing angle. And also the trade-in program. We help potentially drive a higher ASP product dramatically (Technical Difficulty) to grow than they would have had they not been financing didn't have a trade-in program.

So we have estimated sort of a small bleed in iPhone installed base but shockingly after the last quarter's trend, we are surprised that the impact of COVID is much

shallower than we had anticipated. As a result, we have dramatically changed our March and June numbers prior to the print. So they printed roughly about 37 million units. This is an estimate from IDC. We think that it goes down to sort of the 28 million units in the June quarter, but the rebound through the calendar third and the fourth quarter to 43 and 72 million units for the iPhone is pretty substantial.

So the -- obviously the product re-freshes, everybody obsesses on it. If you look at the 8 plus, the SE, the 11 Pro Max, across the board and you compare that relative to the previous renditions of the iPhone, as well as to comparable products from Samsung, and Huawei, you will -- I mean on a technological basis, these aren't necessarily -- every feature set isn't the leader, they not the leader in camera resolution or from a processor density, et cetera, but a closed ecosystem, coupled with the strong tie-in of the device with the services dramatically expands the ecosystem as the revenue potential relative to Android.

So as a result, we are continuingly focused on installed base expansion rather than any given quarter's shipment. And we'll talk about ASPs at nauseam towards the -- as we go through the presentation. 5G is a particular enhancer, obviously the value of 5G from a customer perspective is that it brings higher speeds and lower latency of app experience, but it also drives newer apps and richer videos, 4k content, enhanced music, et cetera. And this in turn leads to a wider app development, but the benefits from a carrier perspective is that you can also customize this delivery of applications and the -- you can tailor the content and the tailor the delivery mechanism based on user history, location, interest, et cetera. So effectively giving carriers a sharper monetization mechanism for devices that are on the 5G network. So and this in turn brings in wider interest for the apps and services, wider from a customer perspective because it's higher speeds and lower latencies, richer videos, et cetera, from a customer perspective. And wider from a carrier perspective because you can slice and dice the user pool better, and so you can tailor the content and monetize it in a much more sharp fashion than you would have been able to do in 4G or 3G.

And this in turn drives the cycle wide the 5G adoption could be wider. Again taking out the effect of COVID here and we're talking a little bit over the long term. In the near term, I want to step back for one second and look at the near term. If you look at it. We've done 2020 model where we actually done month by month analysis, and effectively track the disease and potentially overlaid spending inclinations as a result, across region by region by region.

And that's how we came up with those unit numbers that I highlighted earlier. The second part of it is 5G phones are going to be expensive in 2021. We think that Samsung had a little bit of a failed experiment in trying to raise prices and they didn't go over so well, so which they had to discontinue later. I think Apple may have learned from that and I don't think that the flagship prices are going to increase in 2020. The introduction of the iPhone SE or the rebranding or the re-launch of the iPhone SE, actually brings in a new lower ASP product into the mix and the -- if you look at the bar bell curve of price distribution of the iOS from 2007 to current, yes, it has two peaks. One is in the 750 to 800 range and the other one is in the thousand

plus range. We think that the -- regardless of how the iPhone SE increases the first bump, we think that it has the potential or the -- raise prices in 2021 have the ability to push the second peak of the barbell at pretty aggressively. The interesting thing about the chart that you're looking in front of you is that if you look at the white and the blue columns of Apple, Samsung and Huawei, both from a units and a value perspective, you can see that the white and the blue is substantially a bigger piece for Apple even versus Samsung and Huawei and this goes to show that Apple has a substantially richer Q mix relative to Samsung and Huawei. Apple is not trying to be the market share leader in from a unit perspective but by selling more expensive phones, it has the ability to drag in a much wider services business.

So, the installed base is going to be steady, and growing much more slowly potentially, than a lower end the product could have from an ASP perspective, but the services mix that it drags in is going to be richer and remember that the services margin is almost to X [ph] that of the product margin. So this is a barbell curve that I was talking about earlier, which is this double bump that you see, one is in the 750 to 800 range, and the other one is in the thousand plus range. This goes to show that regardless of the iPhone ASP starting price, a bulk of the units that are sold actually carry a value that is substantially higher, right.

And we think that even though the iPhone SE is going to drag this to the left from an ASP perspective, we think that 2021 is actually going to enhance the SKU mix on the right hand side of the graph. We think there is an opportunity for Apple to raise prices effectively potentially not optically, they might introduce one or two SKUs at the -- at the higher end of the spectrum and thereby the weighted average price of the platform goes up. I want to spend a little bit of time on services, obviously, again, I want to refocus on two vectors of growth. One is the iPhone installed base, we have laid out the case where 2021 could see improved units as well as wider ASPs couple that with 5G, and which should all drive services.

Services is the other golden egg. This is diverse, fast growing, and margin enhancing, obviously you wouldn't know any of that. I have a quick question here, which is on the optics of it which is that the slides apparently are blurry Angela, can anything be done to improve the eligibility, very difficult to follow the data. Can we do anything? Or is that a ISP sort of thing from the client's side. Okay. I have a question. So we'll have to -- for the client that asked the question will be happy to send the graphs in an email, following the conversation. So services. So we have specked out in detail. We think there are at least 11 sub-segments of the services, and you can see that this is roughly a $48 billion business from a trailing 12-month revenue perspective. We think that this is very diverse as I mentioned, but there are certain elements that might be more popularly known versus certain others, we will run through it in quick detail, but we'll also talk about potential areas of growth across each of those.

The first is AppleCare. AppleCare is we think were modelled around roughly at about 26% of the of the services business. It's a substantial piece of the pie. Number one. Number 2, it's a sticky piece of the pie and it's substantially different than any maintenance program that we have seen. This is -- a strong attach, and it's got

monthly fee of somewhere in the $6 to $15 would conservatively assume the $12 to $13 price point but the fact that it brings out roughly about a fifth of the attach rate of new phones, that's pretty staggering and so we think that this is a business that is a steady-eddie business and we think as phones get more and more expensive the attach rate potential is higher. The second is the App Store business and this is a popularly known piece of the business. But the interesting piece is the division between free apps and the paid apps and then potentially in app monetization. So obviously there is a game downloads where you pay for -- for the app. Apple takes a 30% cut of that and for continuing revenue Apple takes 15% of that. So there is a substantial monetization potential, a bulk of the apps here are third-party apps.

These are not Apple native apps. So, and we'll talk about why that's important, even if you buy a Netflix subscription or a third party subscription through Apple, you pay Apple 30% in the first year, and 15% in the second year but a bulk of the Apple are -- a bulk of the apps are third-party apps. So there is remarkable potential for potentially native apps, native content and obviously which are -- with a wider revenue structure as much as a richer margin mix. This is an interesting business. The fact that it's getting paid by Google to be the default search engine on all iOS products is incredibly high margin piece of the business. We've modeled this out at roughly about $8.8 billion in 2019. We have had some inclining of this from litigation between the two when they finally settled to be the default search engine, but it's a staggering number, number one. Number two, it's near 100% margins. And number three, it's sticky. And we think that this is a piece of the pie. We actually modeled it by modeling every other business very conservatively. And the leftover revenues relative to the reported revenues is the licensing fees.

We've been rather conservative than I think relative to other broker estimates we've seen there are - that have been mentioned in the popular press. We think that our numbers are more conservative relative to that. I want to switch gears here and talk about Apple's media aspirations. We will talk about the different pieces of the pie in the services business as they exist now, but I want to switch gears with Geetha Ranganathan, who is our Media Analyst on the call and see what they could do with the media franchise if they wanted to.

Geetha, you want to give us a quick screening [ph] of the media business, and what, Apple could be interested in doing here?

Geetha Ranganathan {BIO 15007716 <GO>}

Yes. Absolutely. Thanks Anand, and hello everyone. So streaming has become an extremely crowded space with all the major media companies launching what is called their direct to consumer platforms over the past few months. In fact you have HBO Max, which went live today. Apple TV plus actually launched back in November of 2019 with a fairly ambitious goal. They wanted to create Apple's own HBO. But what's happened is a little over six months later, Apple TV plus is really not part of the streaming conversation. So I kind of want to give you a sense of where we are in terms of subscribers.

So most signs indicate that the Apple service is off to somewhat of a slow start, a few reports suggest about 10 million subscribers, which actually seems like a decent number. The caveat there is that nobody is really paying for the service. Even though it is a compelling 499 price point, which is one of the cheapest services out there, but you have to remember, almost 100% of those subscribers are free and so six months from now, Apple probably will have a tough time as those free trial start to run out.

So if they want to catch up to a service like a Netflix or a Disney from a subscriber standpoint, it's going to be a real tough slog. So why is this? So, of course, they are a bit late to the game and it is a crowded market. So, you do need a differentiated product. But if you kind of look at Apple and Disney, they launched their services at the same time in November last year. So it kind of really then comes down to content. So, Apple TV when they launched, they had nine original shows, so far this service has about anywhere from 23 to 25 originals, and that's really a very slim offering compared to some of the heavy weights that are out there, especially if you look at Netflix, which is kind of become this force in the original space with close to almost 1200 titles.

So if you kind of look at the Apple TV plus service there just isn't enough to keep people coming back day after day and off the offerings that are available. I mean, you have a few of their shows that did win some acclaim, but very few are really kind of provoking the water cooler type of conversation. So what's really been the stumbling block here? So you look at HBO. You look at Netflix, they didn't start out being originals powerhouses. So HBO made its entrance playing old movies and classic sitcoms that they syndicated. Netflix built its initial subscriber base by offering an exhaustive amount of licensed TV shows and movies that people wanted to watch.

Disney Plus, for instance, owes most of its success to its kid focused back catalog. So the bottom line is that Apple needs more content, and it needs a library. So the question is what do they do next? So obviously money is no object for a company like Apple. They can obviously afford to put a lot of money for -- of course, paying for some of these shows, and so I kind of put this slide up here to just show you the per episode costs for some of the shows that are out there and just kind of take a look at how Apple TV has really not held back when it come to spending on some of its bigger shows, the Morning Show for instance $15 million per episode.

See, which is another science fiction show a similar amount. So you look -- just look at per season costs. Those are pretty, pretty high from an industry perspective, almost 150 million or so. But I think Apple was probably hoping for a much better reception, after kind of heavily investing in such star powered shows, they really haven't made that much of headway. So the question is what do they do, what do they do next? And again, here I just kind of wanted to give you a sense of what the big media operators are spending annually on content.

So if Apple really wants to be taken seriously in the media space, it's -- we're looking at anywhere from about $20 billion to $25 billion for some of these bigger

companies by 2023. So rather than spending on shows that don't necessarily have a proven track record and with uncertain ROIs, I guess the big question is why not invest in a library and this has kind of been the eternal question with investors, where you can invest in a library, you can buy a catalog, you know what you're getting, but they've always hesitated. When it has come to build versus buy, they've always kind of gone with build as far as media is concerned. And then finally, here I just kind of wanted to show some of the studios that are out there in the marketplace, which could be potential acquisition targets.

So we just kind of looked at Sony, Lionsgate, MGM. These have all been rumored in the past to be potential acquisition targets for Apple, you either take them individually or you can kind of cobble them together and it's still a pretty manageable price tag, maybe $35 billion, $40 billion. So the question is should Apple be going after a studio?

Anand Srinivasan {BIO 16652971 <GO>}

Geetha, we get investor questions on two subjects. One is what about Disney, right? In this -- it's been talked about, it's not out of the realm of possibility, we've have actually addressed that in our in our Apple Prime. So one is that I want you to talk through that perhaps maybe there is hair on that given the acquisition of theme parks, et cetera. And the second part is Apple still clipping a coupon for content that you potentially buy through third parties, via the iOS platform.You know is what is the risk of being just a distribution mechanism rather than a content owning -- owners less distributor.

Geetha Ranganathan {BIO 15007716 <GO>}

Yes, sure. So first, going back to the Disney question. So the upside from acquiring Disney would obviously be securing their content streaming strategy, and obviously the potential synergies from adding all of that Disney IP to the iOS platform. The problem right now and especially with COVID-19. I mean, even pre-COVID-19, a lot of Disney's businesses especially their TV networks business is really kind of in secular decline and I'm especially referencing ESPN and the whole cord cutting phenomenon.

And now with the COVID-19 pandemic, we're finding that almost all of Disney's legacy businesses and so that we go to theme parks, we go to TV networks, even there is studio, it's kind of really getting battered up by the pandemic. And so I'm not really sure whether Apple would kind of want to deal with so many of their businesses that are in secular decline.

So that's as far as the Disney part is concerned, I mean other than streaming, really nothing is working right now. In terms of owning content, I think, they ultimately have to be able to own that library, because what's happening for them is if they really want to be a media player as such, they really need to be able to have their own shows, they need to be able to have a huge licensed library and because that hasn't happened so the TV plus service itself, hasn't really taken off. So in terms of being a

media powerhouse themselves. I don't think that's really going to happen, unless they are able to get access to a whole lot more of licensed content.

And so it ultimately kind of, yes, they are a very effective distributor. And so, it kind of depends on what they really wanted to, if that's the game that they want to keep playing. I think, they obviously have been very successful so far. And they will continue to be successful there.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. So if I want to expand the services business at a clip faster than the teams that we are seeing right now, it requires a major stake on the battlefield, which one way of doing that is by acquiring content.

Geetha Ranganathan {BIO 15007716 <GO>}

Exactly.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. Thank you, Geetha. Switching gears now into a little bit more successful piece of the business, which is Apple Music. The interesting part of it is Apple's musics library is larger but the users are best advised Spotify. So this is a hardware they have been such as a splash, they have such a big content here and I really want to understand the dynamics of this business and see where this could go and for that I have, Amine Bensaid. Amine, what's your take on the music streaming business, and potentially where Apple is potentially strong and potentially weak relative to Spotify?

Amine Bensaid {BIO 18756763 <GO>}

Thanks, Anand and welcome, everyone. So I think the trends we see today for audio like you mentioned, and also as Geetha mentioned, I think they are similar to what streaming video experienced, two, three years ago. So what I mean by that is on one hand we have music streaming. I think, growing around 30% in the past two years, but margins have remained relatively low at around 20% to 25%. So I think now we have entered the phase of where the narrative has started to shift from traditional to digital, which is like the slide you see here are worth pointing to the right side.

So (inaudible) everything that is traditional meaning like broadcast or satellite radio which is more exactly like HAM [ph]. But now as viewers and audience is starting to shift to over the top or streaming audio. The demand has surged, especially with COVID-19 and that is expected to accelerate due to this pandemic we are experiencing. So but what I mean by that is the narrative is going to change, not only it's going to be focused on music, but it's going to be focused on audio, in general. That means -- meaning only content is probably going to get focused in the next few years. So -- and the reason for that if we can shift to the next slide. When we look at a traditional audio versus digital, we see that the declines on traditional audio were

already expected to happen this year. And the chart on the left, this is basically radio versus digital audio and what's interesting here is this was done pre-COVID-19.

So we expect this actually works and what's key here and speaking to maybe at the iPhone demographic. The younger audiences are leaving the traditional ecosystem much faster than slightly older audiences. So for that the rest of [ph] content and I think it's going to be a focus in next few years, as I mentioned. So that's what we saw Spotify has been upwards of 100 of millions of dollars on content such as Podcast. And just last week, we saw a couple of reports discussing how Apple and Amazon are also thinking about investing in Podcast. So going back to your question. Who wins in this new era. And what -- who are the key leaders.

I think you mentioned Spotify is the largest or the platform today. I think, they have the upper hand because they did invest in Podcast way earlier and just recently a week ago, we did have the (inaudible) got the rights for Joe Hogan, which is arguably one of the top podcasts out there, but I think I am seeing, Apple, Amazon investing in content helps audio overall, and more specifically digital audio. So then traditional players are the ones who are at risk today meaning like the two sections of the world, which I think they probably going to keep losing more share in the next few years.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. So again, it comes back to a content story, similar to the video franchise, where they have to continue to invest in content and potentially acquire big content in the podcast space, is that the subscriber growth and all here as well, Amine?

Amine Bensaid {BIO 18756763 <GO>}

I think, it's stage one. The way I see it is podcast is the first step to reach both attractive margins of content, owning the content because when we think about music, music is -- it's kind of dominated by four major players. One of them -- they said today, they announced improvements for the IPO. So you have one, you know, Universal, you have Sony and Merlin. So those are the four -- basically the labels have almost complete dominance on the music aspects, so that's why margins have difficulty [ph]. So to answer your question, yes, I think, Podcast is the first stage, but when a Spotify on Apple did become big enough. I suspect that they are going to focus on everything that is audio related. I don't know if Music starting to make their own music or starting to get deals with artist is going to happen in the next two to three years. I think, it's unlikely. But I think the end goal is you are -- you've become big enough that you have the artist coming to you. Also you divest into other parts of the audio meaning like the other shows like for example, SiriusXM has great shows with Spark and Howard Stern.

So if you think of those shows starting to shift to digital, that's when we see the content margins really improving at the bottom line for Spotify and also for the major players like Apple and Amazon.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. Thank you, Amine. Now within the services piece of the pie, FinTech where Apple Pay, Apple Cards or associated businesses that could be and currently exist are not a big piece of the pie. But we wanted to highlight this sliver of a business because we think that it has incredible growth opportunity, number one. And number two, we think that COVID amplifies that growth opportunity, and with me on the call is Julie Chariell, who is our FinTech Analyst and to potentially run through some of the opportunity sets and what Apple is doing and could be doing and sort of inspirationally talk about the -- the expansive nature of this business. Julie, what's your take here?

Julie Chariell {BIO 17144999 <GO>}

Sure. Thanks, Anand. So the market opportunity that we're looking at now. We really have because of COVID sort of these three offsetting trends. On the negative side, we have this overall slowdown in consumer spending. All right. We know things are bad, especially in April getting a little bit better in May, but that's sort of the negative right going to recessionary environment. Consumer spending is slowing, which could hurt any kind of spending via Apple Pay or Apple Card. On the other side, there has been very strong uptake in electronic payments. People perceive them as safer than using cash everything is about contactless, no touch and electronic payments, whether it's with a contactless credit card or with a mobile phone through a wallet, accessing Apple Pay or others.

That's really begun to take off. The other positive has been its uptake in e-commerce, which also just necessitates the use of electronic payments. So the update in e-commerce has been very strong really actually growing even better -- at a better rate than before COVID. So far as physical stores are just closed. So those are the offsetting trends that we're looking at. Let me give you some quick numbers around this. On the consumer spending side, I am going to use MasterCard here as a proxy, they've been giving some good spending data. In mid-April, which is basically the bottom in spending on cards, spending was down 26% in the US and down 33% internationally. Now fast forward to mid-May. Things have gotten much better. Still down. So spending in the US was down 6% by mid-May and down 19% internationally.

You have to kind of ask here, then we think about how sustainable is this? Right. Why the difference? Why is international still down so much compared to the US when many countries around the world have begun opening up ahead of even the US. So in this case, we have to look to stimulus. By mid-May about 75% of the stimulus checks were already distributed and so we think that has given a bit of a bump to US spending, which was a bigger bump, but a temporary one right. To keep that going, we need to re-openings to kick in -- to come online without a second wave of the virus really shutting things down again and perhaps even some more stimulus which the Republican and the Senate are now talking about and getting behind to keep that going.

Internationally, we see, not so much stimulus yet some on the way apparently with EU making some moves today, but the improvement in the international markets have been a bit slower, because it's just been about very slow and gradual re-openings. So keeping that in perspective, better than it was in April, but still something to be watched. When you look at the uptake. The positive side, electronic payments growing. We have some really interesting data points that we have just some -- just come out in the past week. According to MasterCard contactless card use grew 40% in the first quarter and is three times higher than the norm in US and two times higher in international markets.

So people are using contactless cards and what we call tap to pay. In the second quarter, Visa said that 60% of face to face transactions were tap to pay or contactless and that could very easily include a mobile wallet or tap to pay. So 60% of those face to face transactions which have to pay and that growth is 40%. So we're seeing very clear increases in use of these electronic contactless payments. The other positive on the e-commerce side these trends have been really, really impressive.

We have some numbers from Visa, what they refer to as card-not-present transaction essentially online transactions. The spending was down 10% in the first half of April, up 10% in the second half of April. If you exclude travel, the spending was up 10% in the first half of April, which was sort of the worst of it and then by the second half of April, it was up 30%. And that's better than what it was before. So these trends are really driving some important shifts in the way people behave, they're moving away from cash faster to cards and to mobile payments like Apple Pay and that should rethink in the case of well positioned companies like Apple should help to offset the slowdown in consumer spending overall.

Anand Srinivasan {BIO 16652971 <GO>}

Julie, what's the -- I mean sort of the case for Apple Pay and potentially the expansion there is obvious, but the one thing is that the growth rates are staggering number one. But what does Apple want to do potentially with Apple Card and compare and contrast this with where Apple could take its -- is it trying to become a financing engine, is this their leasing business equivalent of a Dell or an HP that provides customer financing, what does it want to do with Apple Card in your mind. And how does that compare and contrast to its peers, potentially?

Julie Chariell {BIO 17144999 <GO>}

Yeah. So we have sort of the near-term picture and the longer-term picture. Near-term picture on Apple Card, a little bit tough, they've offered deferrals on payments to customers in March and April. We've heard about 20% of cardholders taking advantage of this. So we'll see some loan loss reserves, but ultimately, we think there's lots of opportunity with the card. They are already offering incentives for holders of the Apple Card to use the Apple Card in their mobile wallets. So with Apple Pay, right and give it in extra cash back as incentive to use it. So that's the way to start, it can use Apple Pay to driving more usage of an Apple Pay.

So that's one benefit of Apple Card. Over time, the company is accumulating data on its consumers, right. It's accumulating data on the credit worthiness of them, who -- how much credit are they taking on their available -- on their available balances? How well are they paying? Are they paying on time? Are they paying more than a minimum payment and they could use that data to do more potentially in the consumer loan side likely with a partner on the bank, whether it's Goldman or another partner. They can look to do other things in digital banking like offering savings or offering investment accounts.

This by the way works with Apple Pay as well, right. Apple Pay extensively is a wallet. There's a lot, you might want to do with your wallet. So there are a lot of opportunities that we see there down the road and it comes from the data that the Company is gathering. They've been one of the pioneers in offering installment payments. So you can buy your Apple products in installments, pay over 24-months and installments have been used elsewhere in the world, but haven't been that popular in the US, but they seem to be gaining some nice traction for Apple as sort of the unique thing that they can do with the data that they have and helping to support general purchases of Apple products. One more single add on the card that I think could be interesting is the rewards -- points kind of opportunity. If you think of the hiring nature of the Apple user, and let's say an Amex does bringing in retail partners that if those retail partners can offer incentives.

So that an Apple cardholder can get -- can earn points to use with those retail partners, could be a very powerful ecosystem for the Apple Card.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. And the interesting thing was, this is both the financing angle as well as the breakup of payments or the partial payment plan has a dramatic impact and their trade-in program has a dramatic impact on helping iPhone shipments. So, and -- yeah, so that -- that has some value. Thank you, Julie Chariell.

Julie Chariell {BIO 17144999 <GO>}

And keeping -- keep along the iPad. Yes. Thank you.

Anand Srinivasan {BIO 16652971 <GO>}

Exactly. And it's a closed ecosystem.

Julie Chariell {BIO 17144999 <GO>}

Keeping, keep along ecosystem, right on the users of Apple keeping the stickiness and use on the platform. Yes, thanks.

Anand Srinivasan {BIO 16652971 <GO>}

Got it. Thank you, Julie. We're going to dive deep a little bit and go into the supply chain, little bit and talk about Apple's chip ambition. The interesting is very quietly Apple is already a top 10 semiconductor revenue company with only one customer. It's a closed ecosystem. It's a captive silicon provider, $8.5 billion of revenue in 2019 quote, unquote revenue and that compares very favorably to something like an AMD for example, and you can see that it stacks up pretty nicely against the other leaders in this space, obviously it makes very few kind of chips mostly focused on -- exclusively focused on Logic or not exclusively, because there is the power management which is technically analog.

So logic and secondarily analog, but the one thing I want to point to is one, Apple's chip ambitions are going to rise and it's going to try and make a lot more chips part of its ecosystem, that's number one. Number two is those chip selections of which chips need to be made by Apple are not going to be necessarily a long cost savings lines exclusively. So the cheapest chips they're not going to be made by third parties and the most expensive chips are going to be made by Apple that's not necessarily of a constraint. And so we think that the vectors along which Apple is going to bring chips in-house are one of -- one tightness of integration the potential feature set that Apple can enhance by making its own chips, number one. Number two is potential cost savings and number three, not to be minimized is the cadence. I remember when we were talking to companies that made WiFi chips and made cellular chips or this was 15-years ago and they both had separate cadences and as to why there was no integration potential between a cellular modem, and a WiFi chip outside of the design constraints. And the answer for that was each one operated on a different cadence, cellular refreshed less or less frequently than WiFi and people have been wanted to have -- trade one benefit for the other.

And as a result, WiFi still has integrated with Bluetooth, and FM stereo, but still hasn't integrated with cellular modems. This is a quick breakdown of the billing materials for the iPhone Pro, iPhone 11 Pro Max and you can see that the App processor is at the high end of the stack from a price perspective or cost perspective. But the PMIC, the power management chip for the App processor as well as for the audio is at the low end of the stack. There are potentially higher ASP products that could be brought in-house, the display, the cameras, et cetera, but those are unlikely to be brought in-house only because the cadence of that is different and you have a specialty supplier that does very few things, but does those things well and it's not in the best interest of Apple to potentially bring that back in-house.

If you look at the supply chain, talking a little bit more extensively as well. And looking at the US supply chain on the left. The supply chain is volatile. We've been through multiple iterations of everything from the TouchPad on the iPod, which had the track wheel to power management to audio codecs, where suppliers have been changed willy-nilly or supposedly from the outside in and it looks that way but Apple has a process where it changes suppliers, once every two to three years, and that has dramatic consequences to the supply chain because those suppliers over the course of a year or two have become substantially wedded to the Apple business to the point where it's nearly 80% of Cirrus, it's 20% of Broadcom, it's substantially 7% of Intel.

So it has substantial consequences but for Apple, Apple is starting to either be very specific about the design or is going in for a cheaper price. And as a result, makes that swap, which has consequences. The one critical partner for Apple in our minds is TSMC, and even though it's a small partner, it enables the manufacturing of Apple's in-house design chips and this is a critical partner. So given the drama that is going on trade war part 2, if you may, and TSMC's involvement as a pressure point for Huawei's manufacturing. This could be -- this could have some consequences where the US and China use TSMC as a pinch point. And the third point I would make here is, this is not going to drive the margins in the near term. The -- even if Apple were to bring a substantial portion of its chip manufacturing in-house or its chip design in-house, the mix between the product business and the services business is a bigger driver of margins relative to the impact of chip in-sourcing versus not.

And on that subject. So I -- I want to be clear, we actually have gross margins potentially weakening. And I want to have Woo Jin Ho come in and talk about why that might potentially happen and -- prices are not likely to change in '20 calendar year 2020 and you've introduced a low-end priced phone. So you have price pressure on the numerator, you have cost pressure on the denominator which weakens product's margins and -- so the services improvement is the key driver of gross margin improvement on the Apple business, but I want to talk a little bit about potentially the iPhone franchise and why specifically there could be pain points or the costs or the billing materials for future generations of the iPhone, specifically on 5G.

Woo Jin, what's your take here?

Woo Jin Ho {BIO 15225630 <GO>}

Great. Thanks, Anand, and hello everybody. So, I do want to further the silicon discussion for Apple, from a merchant silicon perspective and then touch on 5G radio frequency chip and it actually goes beyond the chip itself that would potentially basically our billing materials. So we are on the billing materials page. And as you can see that Apple has aggressively spent on certain areas number one, application processors and modems that went up, the battery that went up as well as RF mixed signal that went up and I want to throw in the Apple chipmaker into three big buckets.

One, they want to differentiate from an operational and performance perspective. Now some of these include faster download speeds which may sustain radio frequency chip improvements in every generation, better battery life, which means better PLICs [ph] and newer architectures to support more Subpmex [ph] over time and this is what I'd like to call the under the hood chips. Number two. They want to differentiate from the user experience or sensory experience to support some of these services. Think of their audio chips as Anand said an amplifiers in the phone, EarPods and AirPods to complement their music services or to the camera image sensor to complement their video and photo applications. So these -- Apple is always going to invest in these kind of chips. And then the last bucket is bringing in new technologies to support existing or upcoming services.

Now some of the specs on the iPhone may lag. Some of what Samsung may provide, but they also introduced some really cool things and newer chips that other vendors did not provide. Number one, think about the near field communications for Apple Pay that helps. Think about the Touch ID for a single touch and that evolved over to Face ID to the Face ID module and that will potentially provide augmented reality applications. So from an Apple perspective, it's always looking to innovate the iPhone and the iPhone ecosystem and it's going for the best of breed chips.

However, from a merchant silicon perspective, as Anand said, it is piece of famine. If you secured an -- content on an iPhone, it's fantastic. iPhone volumes are high, if you decide in to -- to the entire portfolio from the low end to the high-end ARPU represent $800 -- to 180 to a 200 million plus unit opportunity. So if you are a sole supplier that's quickly going to be $200 million of sales. If it's a $1. If the content is a dollar per chip and it's a high-margin sale at 40% to 50% gross margin. However, like Anand said, Apple likes dual source or multiple source vendors, but that's part of it trying to manage supply risk and the other is to manage pricing, but also as Anand said being over reliant on Apple does come with meaningful risk. There is replacement risk, the Apple -- the chip ecosystem is highly competitive and some of the more mature chips can be replaced by another vendor or by Apple month -- such as the case was dialogs main PEMEX being in sourced. Cirrus Logic displacing Maxim Integrated for audio chips and the technology risk some technologies don't have a long shelf life such as a Touch ID, ADI's Touch ID and 3D touch that was eventually displaced with Face ID and that was a to $600 million to $700 million sales opportunity that eventually was gone in the span of 2 years, now as we move forward from a radio frequency perspective, as I said, Apple has always emphasized performance other than the apps processor or modem, the architecture has been an area of emphasis.Apple has relied on the RF market leaders, Broadcom, Skyworks and Qorvo and as you could see in the billing materials where RF has always been the area that they will meaningfully invest in as the RF mixed signal chain investment bond increased 37 in the iPhone 11 Pro versus the 10 Max. Now we're all anticipating a 5G iPhone later this year and based on the chipmaker results call this prior quarter, Apple, should be shipping a 5G device later in 3Q or early in 4Q. IDC is forecasting roughly 36 million 5G shipments in 4Q and that supports what the chip providers are saying.

Now the 5G, the 5G requirements will need greater spectrum support. So 5 for sub 6 gigahertz, you'll need support for 5.2, 5.6, 5.8 gigahertz band as well as a 3.5-gigahertz band and that will create -- do still create power -- amplifier opportunities for Broadcom and Qorvo but the iPhone 5 G will also support millimeter wave spectrum and if Apple produces a global phone, it will be to support 24.25 to 29.5-gigahertz spectrum and that's going to create opportunity for Qualcomm, because Qualcomm is the only gaming tail for millimeter wave modules. So for standard 5G phones, the RF content opportunity increased for the front end goes from 18 to 25. Apple already has roughly $30 to $32 in its 4G devices. If you add sub 6 as well as way as middleware content that's going to yield roughly $45 or more right in RF content in a 5G phone. Now we're just talking about inside the phone because of the radio propagation properties of phone, your all class phone will actually need to have less aluminum on the housing and that's going to create opportunities for

Corning as well because you do need more glass to help the radio propagation around the phone.

So you -- there are incremental dollars to provide that premium connectivity experience for your devices. I'll stop right there. Anand??

Anand Srinivasan {BIO 16652971 <GO>}

Thank you, Woo Jin Ho. The one interesting thing about radio frequency is that this is not a chip that is likely to be made in-house now or later. Only because radio frequency uses specialty manufacturing is unlikely to be made on complementary metal oxide semiconductor, is typically made on gallium arsenide, built in relative to silicon phosphorus or boron or phosphorus and silicon, which are typical digital chips, if you may. So these are chips that are continuing to be made -- will likely continue to be made where Broadcom, Qualcomm, Skyworks, Qorvo. So this content increase is a benefit to them and will pinch costs. I know that we didn't discuss a whole lot of businesses with Apple, it's hard to given the timeframe of this call, we didn't discuss AirPods, we did discuss iPad, we didn't discuss, Mac.

Again we're seeing on those two vectors iPhone installed base and services, but I wanted to take a moment to talk about valuations. Obviously, we have seen dramatic inflection of valuations and if you look at the 24 times fee that we're at well above average, but we think that this is an anticipatory effect of potentially not only healthier iPhone shipments or iPhone installed base in the future number one, but also that the price point of the installed base and the technology behind the installed base in this case 5G that is going to buoy the platform, which again brings in the second golden egg, which is the Services business, we think that there is potential for inflection there.

Again, we have for calendar year 2021, our total revenue expansion that is notably above consensus and we would urge you to look up our -- both our model on VI space MODO. It has, or excuse me APL, US equity, MODO, it has the -- our model attached to it and also look at the -- our primer on the Bloomberg Intelligence System, you can do that by hitting BI go or you can look at the ticker and type BICO as a tail to that ticker. Last point on PEs, it's comparable to tech peers. So before we get away, we're saying dramatically expensive. Yes. Scale is an impediment. But we think that there is -- it is both a benefit and a burden and we are focused on the iPhone installed base and the drag of the services, the continuing attach of the services business.

With that, let's close up the presentation, I know we didn't have too much time for Q&A, but you have all of our emails up on the screen. The presentations will be shared and feel free to ping us directly with questions, we'll be happy to answer them. Thank you very much for your time and if you look at BI GO all of the information discussed can be found on there and you have our analyst emails as well. Thank you very much for your time, and have a great week. With that, Angela can we close up the call, please.