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John Moore: Hello, welcome, everybody. I'm John Moore, happy to be here with Akash Palkhiwala who is the chief financial officer of Qualcomm. Thank you, Akash, for joining us.

Akash Palkhiwala: Thanks for having me, Joe.

John Moore: So, I wonder if we could just start out. Seems like one of yours and Cristiano's focus areas has been this kind of revenue diversification or maybe just expanding avenues for growth. I don't want to get into some of the specifics of what you're doing in automotive and IOT and RF, but just generally can you talk about the philosophy and kind of what's driving your decision making around this? You know, I don't know if it's a diversification effort is the right word, but around the expanding scope of your business?

Akash Palkhiwala: Yeah. So, you know what we've seen over the last couple of years, and especially with the pandemic, we've seen an acceleration of digital transformation happening. And it's really a start of something much bigger that's going to – we think are going to be relevant over the next several years. And as a result of that, we're seeing everything trying to get connected to the cloud. And so, this is true not just for cars, but also various segments within IOT. And you can pick your industry of choice, whether it's retail or transportation or utilities, manufacturing. And when you see that trend happen, it really – it is something that works in our favour. It automatically demands technology that have been created for the phone because phone's the first device where everything's connected to the cloud and so you're seeing all these devices that are asking for connectivity, whether it's 5G or Wi-Fi, they need AI at the edge, they need processing. And the company that we think is best positioned to provide that technology is Qualcomm. And so, we feel like we're in a fortunate place because the industry is transforming in a direction that favours us. And so, we're seeing demand for mobile technology and the cars we're seeing demand in various IOT and segments. And we feel like this, at the front end of a

transformation, digital transformation change that is happening that will carry us and grow our revenues for the next several years. And then you're seeing the benefit of that show up in our fiscal 21 results. But we feel like there's a long way to go.

John Moore: Yeah, and you mentioned this, but I mean, 5G technology is kind of disruptive across more than just smartphones. It gives you kind of a wider breadth a longer tail in terms of the type of things you can attack. How does that change things? The fact that you guys are sort of the dominant 5G baseband vendor, you know, how much you think that opens up new opportunity for you?

Akash Palkhiwala: Yeah. So, you know, if you think about how 5G was designed following up on 4G, which was primarily designed for the phone, it was designed for more bandwidth and faster data rates, when 5G was designed those were still key requirements. And you're seeing the benefits of that in 5G performance. But it was also designed for things that 4G failed to have or did not have, which is very low latency, very high security and the ability to change the mix of all these vectors to get different performance metrics that are suitable for various different applications. And so, as an example, if you think about health care and the need to connect various health care devices to the cloud, security becomes one of the key applications. And it's very important that we can do that in a secure manner. Well, 5G is inherently designed to be more secure than previous technologies. The second example is cloud gaming. Clearly, that's something that companies like Netflix and Microsoft and others are investing in aggressively for those technologies, as well as for those applications. One of the key things that's required is very low latency, especially for gaming.

You're going back server and coming back in a very fast manner. And it's something that 4G could not handle, it's something that even Wi-Fi cannot handle. And 5G is perfectly suited to handle the low latency. And so, when you think about how 5G was designed, it was designed for these new use cases, for new industries, for new applications. And that's the thing that's exciting

to us, because when we're – we're going to see a lot of 5G in phones and we're at the front end of it, we still have several years to go in terms of growth within phones. But when you combine it with a commons, the first question that you've asked and the digital transformation that's happening, you combine that with the power of 5G and the advantages 5G brings. The two combined are just a tremendous opportunity for us in other areas. And that's why we're excited that there's a need in the market. And then there is a technology that meets that need, which is 5G, obviously, and then that's going to help our financial performance.

John Moore: Yeah, that makes a lot of sense. So maybe if you could talk about, we can go to the QCT business a little bit and talk about your sort of chipset business. And maybe before we get into some of the specifics, if you could just talk about the overall supply chain environment and obviously not unique to Qualcomm, but there's a number of constraints that you guys are seeing with the whole industry has seen really across frontend and backend like where – how are you guys managing through that? And, you know, where are the constraints potentially more severe?

Akash Palkhiwala: Yeah. So, as we said on our earnings calls the last couple of times, we're seeing broad constraints across the board, across all technologies, and then frontend and backend, as you said, Joe. And also, it's not something as you said rightly, is not specific to Qualcomm. It's just a broad industry impact that we're seeing. So, our financial performance has been great, but we would have done even better if we had the supply that we need. What we've been doing as a company, obviously, over the last several months is putting in place actions that relieves our supply constraint as far as possible. And as Cristiano mentioned on the call last week, we expect a lot of the constraints to improve materially for us by the end of the calendar year. And it's really a combination of a couple set of actions that we've taken. Over the last year we've focused on creating dual sources for several of our chips. And this is not just for the modem and the application processor or Snapdragon chips, but also for RF chips, also for Phenomics, Codecs, where we're moving our ports to foundries where there might be additional capacity available,

we're moving it to nodes where there might be additional capacity available. And that allows us to take advantage of some of the capacity that foundry might have.

A key thing for us is scale, right? When you're the same – size as Qualcomm is, it allows us to leverage our relationship with the foundries to improve the situation as far as possible. I mean, we have a strong relationship, obviously, with TSMC and Samsung, but we also use GlobalFoundries, we use MEC, SMIC, UMC, all the other foundries. And so that has allowed us the ability to leverage all of them, has allowed us to address some of our concerns. The second set of actions we've taken is capacity that was previously planned for our expansion in certain nodes. We expect that to come online towards the end of the calendar year. And again, this was previously planned, already being put in place by our supplier partners. And so, as that comes online, that is going to tremendously benefit us as well. And then maybe the last thing I'll say is in terms of action the company has taken within the supply constraints that we have, I think we've done a good job of trying to steer the mix of what we are building towards the strongest margin products within mobile, we're focusing on premium and high tier, but then also focusing on IOT and auto where we can. And so being able to optimize the product portfolio within the existing supply is also something that has helped our financial performance.

John Moore: Yeah, that makes a lot of sense. Okay. Now we can start talking about some of the pieces. And I guess, first of all, I appreciate you guys' kind of giving us the clarity into RF autos, IOT, sort of the various sub segments, maybe we could start with RF a little bit. That business has more than doubled from last year. I think it's ahead of your sort of multi-year targets already above 4 billion business this year. And you've given us some colour on the breadth of that business. Can you talk about the growth drivers of RF and you know, if you expect to be a major player outside of your own baseband designments?

Akash Palkhiwala: Yeah. So, on the RF business, we're pretty proud of the journey we've been on, on that business. We as, you know, we acquired RF360 from PDK a few years ago. And at that

point that asset was maybe the fourth or the fifth largest RF player in the industry. Since then, our focus has been on really creating the strongest product portfolio. I mean, just like handsets, we think of the – having the strongest core product portfolio as the basis for the business going forward. And so, we've invested ahead of revenue, obviously, for that market. And we invested in new technologies that we think were needed to address some of the expansion opportunities that were coming up. So fundamentally, as we go into 2022, we think that we have a very broad product portfolio and each product individually by itself is competitive in the marketplace. So that's our starting point. Second is our relationship with the OEMs. We obviously, for all the handset OEMs, we are a key supplier to them, we have very strong relationships with them. And that channel is important and powerful and it allows us to leverage the channel to expand our business opportunity there. So that's the second part of our RF frontend success. The third is engineering wise, how we design the products is really we think of it as an end-to-end design that starts with the modem and ends at the antenna, and that allows us to focus on performance metrics that some of our competitors who only have a modem but don't have RF frontend or are competitors of RF frontend, but don't have the modem cannot focus on.

And so that end to end product leadership, product development approach is very critical in defining our position in the marketplace. So, all of this put together has gotten us to this point where we think we are one of the largest players, if not the largest RF frontend player within handsets. And really the question is where do we go from here? And maybe I'll outline three or four key growth drivers going forward. First is, as 5G goes into all the other volume of handsets that it has not yet penetrated, we will continue to have an advantage with our RF frontend solutions. One of the key drivers for our RF frontend growth has been adoption of 5G in the premium and high tiers. And as that happens in lower tiers, we feel like we're going to have an advantage in terms of expanding our position. So that's the first one. Second is when you think about 5G outside handsets going into telematics within cars, our plan going forward is to offer the 5G RF frontend solutions to that market as well.

And so, looking forward at our design wins. We are very confident that that's a growth opportunity. That's a very high probability for us. And we'll be able to grow into it. The next one is as 5G gets adopted in IOT and you're going to see 5G get adopted across just based on the discussion we had earlier in the conversation, across various different verticals, manufacturing, transportation, eventually enterprises. And when that happens, you're going to see a whole new set of devices demand RF frontend technology. That'll be another advantage for us. And then the last one is Wi-Fi. I mean, it's a market that we are obviously one of the largest Wi-Fi chip companies, but we've not yet focused our RF frontend development efforts on Wi-Fi. That's one of our next target areas. And so, we do feel like that's going to be another area where we'll be able to grow RF frontend. So, kind of stepping all the way back, we're in a great position. We've come a long way. We still have several more growth curves to go through, so pretty excited about what's in front of us on business.

John Moore: And I apologize, by the way, I shut off my video because I have not the best connection and I keep losing, I keep cutting out, so I want to make sure I'm not that –

Akash Palkhiwala: No worries. No worries.

John Moore: – and maybe in the context of RF you could talk a little bit about millimetre wave and what the opportunity is there and how you see that progressing across geographies?

Akash Palkhiwala: Yeah, well, millimetre wave is a technology we're very excited about. And, you know, we continue to have the debate with people in the industry, investors, as well as to how broadly it's going to get deployed. Our view is eventually millimetre wave will be very broadly deployed. It's just physics, really, because you're going to run out of spectrum in subsects across all geographies. And when that happens, we're going to have to deploy millimetre wave to increase bandwidth because we don't see the need for bandwidth, increased bandwidth going away any time soon. And so, when you draw a curve of need for increased bandwidth, you combine that

with a curve of available spectrum. And there's an intersection point where subsets is just not going to be able to offer up the spectrum, amount of spectrum required for wireless networks. So, we see millimetre wave being broadly deployed. It's going to be focused on certain kinds of deployments. It's kind of we think of it as a layered cake where millimetre wave sits at the top and so for dense environments, for hot spots, for enterprise and manufacturing environments, for private networks and in ports as an example, we see several applications where millimetre wave is ideally suited. It gives you the data rates, the latency, the security that those applications need. And we eventually see millimetre wave being brought to the product across everything. Now from an RF frontend perspective, we have a very significant advantage. I'd say most, if not all devices that support millimetre wave today use our RF frontend. And so, we're excited that as millimetre wave gets more broadly deployed first, the RF frontend market will expand. And then second, within that, our competitive positioning will become stronger. And so, both of those reasons, we're excited about what's in front of us there.

John Moore: Okay, great. Very helpful. And then maybe shifting gears to talk about autos, you know, it's a billion-dollar business for you guys, growing 80% last quarter. Can you talk about the aspirations in cars and maybe touch on the Veoneer announcement last week that proposed acquisition there and how that fits into your strategy?

Akash Palkhiwala: Sure. So, the way we think about cars is in addition to the physical chassis in the car, there's the concept of a digital chassis, which requires several pieces of silicon. It obviously requires a bunch of software on top of it. The first is telematics, and telematics just as cars get connected and we're seeing just an incredibly vertical ramp of connected cars, you're going to need 5G to connect all the cars, 4G today going to 5G tomorrow. And that just allows us to take the technology we've created for mobile and make it available for cars. So that's the first one. The second opportunity for us is digital cockpit, which is the dashboard within the car. The rear-view mirror, the side view mirrors, the rear seat entertainment. All these screens are being transformed. They're going from a monochrome black and white display, what it used to be, to

really becoming a smartphone. And as those devices become smartphones, as video and audio quality and display processing AI, all those things become more important in those devices. We have the ability to take our mobile chips and mobile technology and bring it to those markets. And so, we think that's the second market that's of tremendous interest to us. The third is ADAS, and it's an emerging opportunity for us. We obviously have all the right chipset technologies to pursue that market. And so that's been our core strategy is leveraging silicon from handsets into – expanding into the ADAS market. But then beyond that, what we think would also be additive to our business opportunity is to have a software stack for perception, for safety that we feel the Veoneer, the Arriver portion of Veoneer would bring to the business.

So very, very important for us to be able to take the Arriver software that's a part of Veoneer and take that perception, safety software, combine it with our silicon and offer an integrated solution to car makers. So those are the really the three parts. It's telematics, second is infotainment or digital cockpit and then the last one is ADAS. The business today is primarily telematics growing into digital cockpit and infotainment and also of revenue. When you look at the design wins, those are the two that make up the \$10 billion design win pipeline that we've talked about. The opportunity for us is significantly, significantly beyond that. And it really goes – comes through those first two ways expanding, but then also ADAS expanding. Maybe the last thought, maybe the last two points I'll make is as I mentioned in my script, we had set out a revenue target at Analyst Day last year. We think like that we are significantly ahead of the targets. So very happy with that. And then also when we looked forward, the design win pipeline and the opportunities in front of us, we think positioned us to continue to grow auto for the next several years. This is, again, not a two, three-year growth curve for us. This is a five-to-10-year growth curve for us. And it's a lot more predictable than the existing business we are in and it's a lot more longer term. So, we really like how it also mixes in our portfolio. It leverages the technology that we have, but it also gives us long term growth and more predictability than our existing business portfolio. And those are all attributes that we like.

John Moore: Yeah, that makes a lot of sense. And I think the value proposition of the Arriver business makes a lot of sense. But I guess where does your aspiration carry you? I mean, you're acquiring essentially a tier one. You know, does that change the nature of what Qualcomm does? And how do you think about that with regards to, you know, working with other tier ones, besides Veoneer?

Akash Palkhiwala: Yeah, so of the asset that Veoneer has, what we are primarily focused on is the Arriver asset, which is the software stack. We don't plan to be in the tier one business. And so that's something that is not going to be a part of our portfolio once we're on the other side of the transaction.

John Moore: Yeah. Okay. And then within automotive, and you've sort of talked about this \$10 billion backlog. You know, I guess is it as incremental to that you think? And, you know, I get questions about how you define that backlog, is that, you know, over what timeframe and how are you sort of judging, you know, customer forecasts? Are you discounting things that are further out? How does that \$10 billion factor in?

Akash Palkhiwala: Yeah, so it really – the 10 billion is driven by the first two markets we talked about, ADAS could be incremental, both the hardware piece and the software piece. It's really driven by telematics and digital cockpit or infotainment, whatever term you use for it. In terms of the second question, Joe, was related to the growth?

John Moore: Yeah, no, I – just how are you measuring that 10 billion? I mean, is that – are you – you know, is that entirely from sort of what customers are forecasting? Are you discounting at all? And is there anything that you're sort of probability adjusting that you're thinking, what is it? Is it also –?

Akash Palkhiwala: Yeah. We're definitely looking at the total size of the market and forecasting based on it. I mean, as I'm sure you know, that if you look at every customer's forecast and you added up, it usually adds up to a multiple of the market size. So, we are definitely calibrating it to what we think the market is and what we think the real opportunity is. And then in terms of timing of that revenue stream, if you – we haven't specifically said – talked about the timing, but if you just kind of generally step back and think about the industry, typically when you win a design, the launch happens in about three or four years and a car has a new model and the car has another three or four years of life after it eventually gets replaced by another model. So, when we think about our design win pipeline, it's more in the kind of that timeframe that I just outlined for new cars. And it's just a point in time that you're seeing 10 billion today, right? Two quarters ago it was 8 billion. Last quarter it was 9 billion. Today it's 10 billion. I think one of the key messages that we'd hope investors have taken away is that our design win pipeline is really accelerating. This is not a mature design win pipeline. We feel like we're really at the frontend of it. And ADAS is going to be tremendously lucrative when that comes in. And so, they'll be very quickly additive to this product line.

John Moore: Okay, that's helpful, thank you. So then shifting again to the internet of things, becoming a large business for you guys, over 5 billion this year, growing 60%. On the earnings call you gave us some colour on intelligent, connected and digital transformation and the changing piece in landscape. Can you just elaborate a little bit on, you know, what IOT encompasses for you and what the objectives are here?

Akash Palkhiwala: Yeah, so in IOT we have some great metrics. I mean, we did \$1.1 billion in revenue in the March quarter, we guided 1.3 in the June quarter and we beat it by \$100 million. So, we came in at 1.4 billion and then we talked about a sequential growth in the September quarter. So, it really is a business that's very, very strong, growing extremely fast. I think we said on the call that the businesses outside handsets within QCT now account for 10 billion of revenue. And also, these businesses are growing 1.6 times faster than the handset business, which in itself is

growing very strong. So, pretty strong portfolio. Going back to IOT, what we like about the IOT business is that it's highly diversified. I mean, we – the handset business, as you know well, is relatively concentrated across a few OEMs. The auto business is concentrated as well, less so than the handset business. But you still have similar metrics. IOT is highly diversified. And we have – we've said we have over 13000 customers in IOT, and that's an attribute that we like a lot about the market. If you break down our IOT business, I'd say it's three parts. The first part is consumer devices and consumer devices are really – it includes tablets, variables, hearables and then PCs and XR.

And these are all devices that look different than a phone, but demand the same technologies that are in a phone in different form factors. Maybe I'll highlight two things that we're very excited about. First is XR, we see that as kind of the next paradigm of computing. And as that happens, what those devices are going to need is very low latency connectivity, very nice resolutions and displays and video capability and audio as well. And these are all things that are in our portfolio and we have an advantage in. And so that's a market frontend of the growth curve. And so, we have – we feel like we have a long ways to go there. The second market is PCs, as you're well aware Joe, we just – we bought this company called Nuvia, which does very high performance, low power, arm-based CPU course. And we're very excited about bringing their technology over to the PC industry and becoming the alternative for the PC ecosystem to compete with the Apple and one processor. And so that's an area that we're pretty excited about. So that's the first category of IOT. It's consumer devices. The second category is edge networking. And what this includes for us is Wi-Fi access points, as you know, we're the leader in Wi-Fi access points, retail consumers and retail enterprise and carriers and so we're seeing a tremendous increase in demand there as homes become enterprises and then enterprises start getting ready for a scenario where people are sitting at different locations all the time and wireless networks are going to become more important than wireline networks.

And so that's a use case that's driving demand in enterprises as well. The second market for us in edge networking is 5G broadband. A lot of the operators, as they deploy 5G, they're thinking of that as a way to offer broadband services into the home. So, this is relevant in rural markets in developed countries, and then it is very relevant in emerging markets as well. And so, we feel like that's going to be an area where there is going to be tremendous demand for 5G broadband devices. And we have the ability to take the technology we have in phones and bring it to those devices. So that's the second category within IOT, it's edge networking. And then the last one is really industrial devices. And as we discussed earlier Joe, this would include all kinds of industries retail, manufacturing, utilities, transportation, health care and the adoption of 5G and really processing, Snapdragon processing in these industries. So those three make up the IOT revenue stream for us. And as I said earlier, very diverse and lots of growth curves in front of us to take advantage of.

John Moore: Great. And I will get to smart phones because I'm getting questions on the webcast about that, but I think, you know, these initiatives are pretty important. So, I guess the last question on the diversification, I mean, how does all this play into your margin structure? You know, you have good technology reuse across all these segments when I think about the baseband investment and the RF investment across autos and IOT, you know how much of that is a driver across the margin leverage that you guys are seeing?

Akash Palkhiwala: Yeah. So, as I outlined earlier, the premise of our diversification strategy is being able to leverage technology from mobile. And so, you're seeing really three things play out that's helping margins. First is revenue scale. As we grow the business, and especially in IOT and auto, we're able to take advantage of our investments and grow earnings much faster than revenue. And you've seen this metric show up in a very significant way in this fiscal year. The second is our gross margin improvement. As you've seen a trend now over the last several quarters, our gross margins have been extremely strong and it's partially driven by actions we've taken to use the supply base that we have for higher margin, more accretive products. And so,

you're seeing the benefit of that. And then the third is the premise of our business, an expansion of reusing the technology from mobile in auto and IOT. So, when you look at the operating margin level, those businesses become accretive to overall QCT margins. And it's a combination of these three factors that really is the cornerstone for our operating leverage, priority and focus. And you're seeing that show up in our numbers.

John Moore: Okay. Great. Thank you. So maybe shifting to smartphones then, you've talked about a 50% increase in content on kind of a like for like basis and you know, that business is growing over 50% on kind of, you know, 500 million 5G phones. So, I guess the question to me comes up a lot. You know, how much content growth can there still be? Is there still room for kind of further increase in dollars per phone as 5G becomes more pervasive in kind of the mid-range and low-end phones?

Akash Palkhiwala: Yeah, yeah. I think that's a great question. And I know a lot of exciting trends we're seeing that I think is something that I love to outline. The first is this year we're forecasting 450 to 550 million 5G phones. The total market is somewhere in the 1.3 to 1.4 billion range. So, we still have a long ways to go in terms of 5G penetrating across all tiers. And as we've said in the past, as 4G goes to 5G in the mid-tier than in the low tier, we still expect a 1.5 multiplier in terms of the opportunity for us. So, there's a long way to go just from a 4G to 5G transition that plays into it. The second thing we're seeing is as the market matures, we're seeing a mix of higher tier devices within the market and with through COVID as an example, if you're a student in an emerging markets in India and you are now going to school with online rather than in-person, that school is actually happening over a phone rather than over a PC in those markets. And so, we're seeing as people are going back in and buying new phones, they're buying higher tier phones. And that obviously increases the content for us. So that's the second one.

Third is within Rf frontend as we discussed earlier. You're also seeing more frequency bands being supported with millimetre wave also getting adopted. That is also a reason why the SAM

expands. And so, while the total unit growth might have slowed, there are several vectors within the handset market that is expanding the SAM that's going to benefit us. And then the last one, probably the most shorter-term benefit and the most significant benefit that we're seeing is the Huawei volume as that moves over to the other OEMs and especially you've seen Xiaomi now become the second largest OEM in the June quarter. And then I think in the month of July, they might have been the largest OEM in the world, all of our customers, Oppo, Vivo, Xiaomi and now Honor within China, they've picked up a lot of the share of what used to be the Huawei wanted. And so that's exciting for us. Huawei was using high silicon chips, as the volume moves over to these OEMs, we'll be able to take the existing design wins, the existing chips that we have and expand our revenue base within these OEMs. So that's definitely an exciting, more shorter-term opportunity for us, in addition to the other ones I outlined earlier.

John Moore: Yeah. And I think you've tried to size that opportunity in terms of the specific Huawei benefit, you know, how do you think you're going there? And I guess maybe that's a good segue way to sort of competition within MediaTek. You know, how did that go in the first half and what do you see happening in the second half?

Akash Palkhiwala: Yeah, so I think the Huawei really, we've sized it at 10 billion as the total chipset plus RF free market, we – we're thinking that market – that value, if it all goes to Oppo, Vivo, Xiaomi, most of it goes to Oppo, Vivo, Xiaomi and Honor, the value is going to accrue to us and MediaTek. And we so very much expect them to get a portion of it and we'll get a significant portion of it as well. And it's going to benefit both of us. I mean, we – there's enough margin, I think, for both of us to benefit from. And you're seeing that in our financial performance and theirs. From a competition perspective, as we look at our product portfolio and their product portfolio, we still think at the top of the market, which is the premium tier, we have a very significant product advantage. And if you look at the design win pipelines also in that tier Snapdragon 800 tier, we're continuing to win most of the designs. And that's an important market for us. Their technology leadership, Snapdragon branding, all of these things play a very key

role, especially in China. In 700 tier, we compete with what is their premium chip. And so, we still feel like our product portfolio is extremely strong. And then when you go below it, in the 600 tier and 400, 200 tier, that's where it's competitive between us and MediaTek. And they have picked up share through this year in those lower tiers because of supply reasons. Whereas for us, as I mentioned earlier, we prioritize the supply that we have to focus on premium and high tier devices and then also addressing the adjacent markets.

John Moore: I guess the question that comes up then is, you know, as you get supply back online, does that mean there's kind of more of a price aggressive market in those lower tiers? Or just how are you thinking about that?

Akash Palkhiwala: Yeah, I think the pricing is somewhat stabilized between us and them. And so, we're continuing to focus on the key metrics that our investors are interested in, gross margin strength, operating leverage. Those are important things for us. And you're going to see us continuing to focus on those metrics.

John Moore: Okay, and then on the topic of competition, you know, I don't – I won't to ask about specific customers because it's probably challenging in these environments. But, you know, you have Samsung has its own baseband. Apple has its own potential 5G baseband. Like, how do you think about competition with the baseband businesses of your customers?

Akash Palkhiwala: Yeah. So, Samsung has been doing their baseband for a long period of time. And we've been in a pretty stable situation with Samsung where they use our chip, especially at the premium tier they use our chip in U.S., China and Japan, and then they use their chips for some of the other regions. We've also seen them recently make decisions to use our chip on a global basis in the premium high tier and some of our advantages of end-to-end performance, 5G leadership, those things are showing up in the decision making that they're implementing. So, we feel very comfortable that with Samsung we have a stable relationship if we deliver, as we've

continued to do, very strong products, leadership products, it is something that will continue to have tremendous demand at Samsung. Apple, I think we are at the very front end of a long-term deal with them. So, we've launched one phone. And as we've said, it's a multi-year deal. So, we have some ways to go and we feel pretty comfortable that, you know, as long as modems matter and performance matter, we're going to continue to have the better product and we'll compete with their internal solution, just like we do at Samsung. And then finally, I think other OEMs, we really feel like it's mostly between us and MediaTek and we are investing in technology leadership, CPU. You're going to see us bring the newer CPU to phones after PCs. And it's going to be a tremendous vector for competitive differentiation for us. I think we have one of the best teams of our CPU development now and it's going to show up in our product leadership going forward.

John Moore: Great, it makes a lot of sense. So maybe you touched on the leverage that you've shown and the benefit of, you know, these new markets in terms of margins, but even margins have been a pretty good story for you guys. We've got 30% this quarter. I know that's a seasonal peak, so I won't look for that to necessarily be kind of a full year number. But, you know, how much more upside do you think there is on it? And, you know, how are you guys going to trade off the opportunity to invest versus the opportunity to [inaudible]?

Akash Palkhiwala: Yeah. So, I think, Joe, you're going to see us make decisions consistent with this year, right? It's really about striking this right balance between R&D investment for long term growth and creating it off with growing operating leverage in the shorter term. And I'll give you a couple of great examples where we chose to invest for long term growth. And we knew Nuvia is an acquisition that we did and we've said annual spend is approximately \$100 million. That's clearly an investment that we're making without revenues today. But it's an investment we're making to drive competitive differentiation against our peers. And so, it's focused on the long term. The second example is the recently announced bid that we made for Veoneer and really for the Arriver asset. Within auto we think that's critical for us. And so, we are going to be

investing for a couple of years before we start getting revenue from it. But it opens up a whole new area for revenue growth and margin growth for us in the long term. And so, we're going to continue to find those selective places where we invest while, as I said earlier, balancing it against the shorter-term financial performance and making sure we realize the operating leverage with revenue growth.

John Moore: Great. And then in terms of royalties, I guess the best news in royalties is that, you know, we don't need to talk about it until the last five minutes of the session, you know, because there's less divisiveness, there's less binary outcomes. I mean, you're basically collecting from everyone at this point. You know, we have total royalties of about 6.3 billion. How should we think about that number going forward? Is it sort of just essentially device growth that drives royalties from here in growth?

Akash Palkhiwala: Yeah, yeah. So, we had strong results in the June quarter. And so, I think you have those data points. When you look at the September quarter, we've given very specific guidance on what we think our revenue guidance range will be. And indeed, on the December quarter, we've said we expect to be somewhere in the 1.7 billion range. So those are all pretty reasonable data points to use to model the business going forward. The way we think about QTL is one, it provides – it's very stable. We have everyone licensed at this point in the handset industry. And so, we expect that revenue base to be stable. The second is it's a great source, obviously, of cash flow that allows us to return cash to the shareholders and invest in certain growth areas. And then finally, they're vectors for upside in QTL as well, right? As I mentioned earlier, we're seeing an upgrade in devices with people buying more expensive devices. That is definitely a trend that helps QTL. And so that could be an area of upside. The second thing I'd say is 5G adoption outside mobile. And we've talked through it in some detail as well. That's another area where as 5G gets adopted in these areas and we collect royalties on those devices, you'll see some upside in the QTL business as well. But again, I would rather plan for the base case, which is the existing royalty stream, and then look for upside opportunities on top of it.

John Moore: Great. Well, we'll go ahead wrap it up there, but thank you very much for your time tonight and thanks for delivering great results in a tough supernatural environment.

Akash Palkhiwala: Thank you very much, Joe, thanks for having me.

John Moore: Great. Have a good day, everyone. Thank you.

Akash Palkhiwala: Bye, everyone.

John Moore: Bye.