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<<John Vinh, Analyst, KeyBanc Capital Markets>>

Hi, good afternoon everybody. My name is John Vinh. I'm the KBCM Semi Analyst. And we are pleased to have Thurman Case, CFO; and Carl Alberty, Head of Mixed-Signal of Cirrus Logic. Welcome, guys.

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Thanks, John.

<<Carl Alberty, Vice President, Mixed-Signal Products>>

Thanks.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

One of the first things that I'd noticed in your most recent shareholder letters, you had talked about moving into kind of mixed-signal opportunities outside of your kind of traditional core audio markets. I am wondering if you could just elaborate on what sort of opportunities those are.

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Yeah. Certainly, the fastest way to kind of illustrate what we're thinking about in terms of expansion beyond our core audio markets is the example of our haptic driver technologies. So moving into an adjacent space, leveraging a lot of the underlying core technology we developed for driving speakers to drive LRAs or actuators that provide tactile feedback in handsets and a growing kind of momentum around a variety of use cases for haptic technology.

So as we look into other opportunities to leverage a really broad portfolio of mixed-signal and high precision analog IP combined with the low latency, low power, design capability that the portfolio brings together and the 10 plus years, 12 years of the credible, predictable execution with major smartphone OEMs. It positions us well to take those together and identified new adjacent areas to go look into and investigate relative to bringing value into those spaces.

So we're excited to do more things in that category similar to haptics, where we're combining again high precision data conversion, closing the loop on driving some sort of transducer, rendering some sort of user experience to the consumer or the user of the device, and feeding back information to make the intelligent more smart by doing real-time measuring monitoring of what's happening to improved performance, right.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

I am wondering if you could just quantify how big this mixed-signal opportunity is in terms of what the incremental TAM is. And can you also just clarify what existing SAM are you building off of?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Sure. So, I mean, some of the things we've identified that we've already begun investing some of the R&D dollars into from a hardware and also algorithmic perspective, we'll drive hundreds of millions of dollars in incremental growth in the SAM. In total, when you combine that with some of the other emerging things in categories like edge processing, something doing more sophisticated on-device processing that kind of lends itself to techniques associated with machine learning and neural networks.

As again, more and more things want to be processed on device more and more things want to be processed all the time. So these always on use cases I think represent significant amount of capability within a device and lends itself to machine learning kind of applications. So in total, over the next four, five years, we expect the combination of these mixed-signal closed-loop opportunities and some of the edge processing things we're pursuing to add over \$1 billion of serviceable market, which takes it up to somewhere around \$6 billion in 2023.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great. Switching to voice biometrics, it sounds like you guys are making good progress there in regards to kind of meeting your milestones. Can you just update us on kind of the timing of your next set of milestones? In regards to customer feedback, how is this compared to what your expectations are at the beginning of the project? Has some of the feedback and requirements kind of change from when you started this project? And then – and what are customers' primarily vision right now? Is that the security aspect of it? Or is it the ability to support better personalization? What's the biggest driver there?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Yes. So I think relative to our expectations, a couple of years ago, they haven't largely changed from a requirements perspective. I think what we maybe underappreciated was the complexity and learning curve associated with introducing a new biometric modality. Clearly, a fingerprint has been around for quite some time, face recognition is becoming more and more prevalent. And with established modalities are common agreed upon principles and testing and standards for how do you test, measure, certify that something is in fact a secure biometric authentication.

So seeing as voice has not been deployed in a mobile kind of embedded application. There has been a significant learning curve with customers in terms of education around not just how do you build a board, but how do you take all of it and collect all the data and design, test and really make sure it's robust against hacking attempts and just all sorts of things that make the product

what it is, which is secure. And also driving some methodology and standardization around how you test it and how you would compare one solution versus another.

So this past quarter, we were the first supplier to have a chip that was certified by FIDO, which is an industry alliance that services user authentication. So we're the first one to have a voice biometric certified solution, which we think is, again, a shot in the arm in terms of customer confidence around, okay, we have a benchmark for how to test it, but also instilling confidence in them that you will be able to build a system that will deliver on the security.

So relative to what the primary desire is already use it. It does range from personalizing a user experience based on knowing, who's speaking to it, in terms of smart devices. But for certain, there's a strong desire to have privacy and security related to allowing a mobile device to do something useful when you unlock it using a digital assistant, which today is pretty limited, if you haven't otherwise authenticated your phone using fingerprint or face. So we'd like to enhance that user experience and security as a huge part of that. So that continues to be a big thrust behind our R&D is ensuring the baseline security is there, but ongoing improvements related to attacks and other things of that nature.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great. And then timing?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

The timing, we're on track relative to where we were. Last time, we spoke about it publicly, which is we have it in the hands of a couple of key customers in the android ecosystem and we're proceeding up that hill, which again is a steep hill to climb, but we do. We do expect for the momentum through the back of this year such that we can see some products next year.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great. Growth drivers this year, you guys – it sounds like in your shareholder letter, really have a lot of confidence around haptics and amplifiers. Is there a way to think about what sort of penetration you've achieved thus far and how much more of an opportunity this represents for you?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Yeah, I think our transition to 55-nanometer BCD on the amplifiers was a really big one in terms of being able to leapfrog solutions in the market, in terms of size, power and overall functionality. I think the testament of that is with that platform investment, we're not shipping in the top four smartphone OEMs in the world. We had engagements and/or shipments with most of the top ten. And I think there is still a sizeable amount of shares to be gained and growth to be had just in the audio amp space.

As more and more phones migrate to stereo as more mid-tier devices in the upper end and also the kind of middle core of the mid-tier priced phones adopt higher voltage boosted amplifiers, it's really – our portfolio is really in a good position to continue capitalizing on the momentum we've built in the last 12 months and really continue driving growth for the next couple of years.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Okay. Do you have any sort of just industry metrics on what the penetration of stereo and just high-performance speakers are in handsets and....

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

I want to quote something specific off the top of my head, but at this point, most flagship phones are stereo. So across all the major, the top three smartphone OEMs are all stereo, mid-tier still largely unpenetrated. So that that for sure represents a sizeable portion of growth and that represents a lot of the design activity in the China market. So the China OEMs often deliver phones with features you would find in flagships, but they're priced much more competitively for the mid-tier. And that's certainly where a lot of the design momentum is occurring.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great. Next I wanted to talk about MEMS. I don't know if this is within your purview Carl or maybe Thurman you can talk about this, but it sounds like the ramp of your MEMS business, you've made some really good progress, but to get to the billions of microphones that you had been targeting, it sounds like that's taken a little while longer. Can you maybe just talk about what the challenges are there? Is this technology issues, just a manufacturing yield issue or something else?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

I mean I would characterize it as a combination of a bunch of challenges. I mean, unlike some of our traditional audio CMOS products where you could ramp like significantly very, very quickly. I mean, obviously, the MEMS business for Cirrus is so relatively immature and young from a total volume perspective. I mean, shipping in the tens of millions is good, but relative to the total market is still really small. And so if you're fast forwarding and wanting to engage in really high volume market opportunities, you need to have the supply chain in place that we'll be able to support that scale. And the unfortunate reality is our position as it was a few years ago was just not where we needed to be to support that kind of scale.

And so for us to move into the supply chain that could support significant kind of smartphone type volumes, we really had to get into a supply chain that was more – that had more flexibility and for us that meant a redesign, a lot of the underlying core transducer IP. So we've been in parallel driving the supply chain initiatives, which involves a bunch of research and development around the MEMS devices themselves. And being really deliberate around where we're targeting in the market. We're certainly not trying to address the mainstream part of the MEMS market. We're trying to strategically look at where we can look at supplier or where we're supplying

other components, be that a codec with a DSP or the amplifiers with haptic drivers and look at the system holistically.

And really target like – when we acquired Wolfson of the MEMS assets the vision was long-term, how do we collaborate and design a system such that the microphones and the codecs add value together that they couldn't otherwise independently. And so, we've been continuing to work on that and being very careful around customer engagement, just given the supply chain constraints. So we're getting there on the supply chain front. We're getting there on the maturity of the technology and have had some strong customer pull, which also reflects changes in markets and changes in the market requirements, which are never exactly aligned with what you have in the portfolio. So it was really about getting to a mainline technology platform we could build from and then adapting that to the customer needs knowing we have a supply chain that could help us scale to meaningful volume. And we're still in the early stages of that, but we're feeling good about where things are at today.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Questions? Questions? Great, maybe we could talk a little bit about R&D at this point. Thurman, you've always talked about investing for the longer-term and really looking past any sort of near-term volatility and cycles that we're going through, but have noticed your head count is down by over a 100 people from a year ago. How do you reconcile the moderation of your R&D investment versus kind of all the different opportunities that you guys have kind of laid out in front of you?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Well, when you look at where we were last year in terms of head count and where we are today, lot of different things happened, one of them, we did, I think, Carl alluded to that earlier. We did some organizational improvements and enhancements where we were able to better align our development work, our hardware, software and even from a logistical standpoint find efficiencies there. And then what happens is when you have your normal voluntary and involuntary attrition, we took a good hard look based on those efficiencies on whether or not we needed to fill all of those positions as they left the company. And then just in general have paid attention and closely monitored how we can do better and how we can manage our resources.

But all of that said, we'll continue to fund key projects. We'll continue to hire key people in R&D roles as we feel necessary for our longer-term development because nothing has changed in our overall business model. We have to invest in projects today that are not going to deliver revenue for two to three years. So we'll continue to do that and we'll continue then to manage it as efficiently as we can.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great. Gross margins, you've done an excellent job in gross margins they are currently at their highest levels that they've been in about four years. Can you talk about how you've gotten them back to these levels and how sustainable are these new gross margins going forward?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Well, just to start that off from a long-term basis, we would still say that 50% type of range is something that is sustainable for us in the long term. I mean there are a lot of different things, they can affect margins and we feel good that that's a sustainable level. Certainly, we're always trying to improve margins and trying to improve our earnings. So in this particular case no one likes to hear the term, well, a lot of that was mix because it's such a nebulous term. But we really do have, we have ramp some products that have higher margins and we do have a different profile almost every year.

And right now, we are seeing a good mix of products with higher volume products with better margin profiles today and also though we shouldn't forget that we've done a good job in our supply chain in terms of managing our costs and really being able to get some leverage on the margin line from those efficiencies also. So it's a combination of those things that have taken us to where we are now. We'll maintain that or improve that if we can. But when you're looking at a long-term model, 50% is what we feel is sustainable.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

And what is helping you right now is the ramp up 55 nanometers, is that a tailwind for you on gross margins as you ramp those products?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Not necessarily, because 55-nanometer, the margins really aren't any better. That's not something that drives lower costs necessarily. I think it's more around supply chain efficiencies. The 55 nanometers really allows us to do more things from a product development state and do more things with different products than it does to lower our costs.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

I wanted to maybe talk about the topic of verticalization. I some of your – several of your peers in the mobile supply chain over the years have been kind of victim of kind of virtualization. Carl, you have oversight the company's largest customer engagements, there has been this trend towards verticalization with some of the larger OEMs out there. Can you just talk about this risk in general? Is this something that you actively track? And what are the things that Cirrus is doing in order to kind of mitigate this risk longer term?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Yes, I think at the end of the day the thing we do most to mitigate any risk, we perceive in that verticalization category is really just to drive the roadmap at a pace that's faster than it's comfortable because if we're not challenging ourselves and we're not delivering really compelling innovative technology, then we become irrelevant reasonably quick. The demand for audio and voice and some of these emerging closed loop control system applications is super

strong. And the risk relative to kind of integration or verticalization from our perspective relative to the role that our components play in a given system, we view that risk to be reasonably low just given it's important to have audio subsystems and haptic drivers closely kind of mapped in terms of system design and it helps to be able to like define upfront interfaces between components that our devices hook up to.

But, at the end of the day there is more independence in how they operate at the system level than say system power management. Whereas in system power management devices the co-development of that plus an AP, or a modem is hugely critical towards system performance, battery life and so the strategic nature of developing those kind of components together is very high and will be sensible then to drive an integration and kind of ownership of that entire ecosystem. Whereas it's an importance in our system, but it doesn't drive the same level of system level kind of optimization and performance that other kind of sub-converters do.

So from our perspective, it is certainly a risk we do, remain paranoid about it to keep us on our toes. But at the end of the day we just have to keep executing the roadmaps. We've got strong, strong customer pull for things years in the future across most of our product categories. And if we just do what we've done for the better part of 12 years, executing and being predictable with compelling technology, we frankly don't see customers having much of a need to go, try to service that demand elsewhere or from within.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Great, thanks. Wireless earbuds is kind of a market opportunity that's gotten a lot of attention as you know over the last several years. Maybe what I do better understand, how meaningful of opportunities do you guys view this as? And I think one thing investors have noticed is, I think, Jason's come out a number of times kind of dispelling the possibility of adaptive noise cancellation codec is showing up in wireless earbuds anytime soon.

Is the point that you're trying to make here is that this is going to take a lot longer given the limitations in technology battery form factor? Or is the point that it's unlikely to be a meaningful significant opportunity for you going forward?

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Well, I think there is certainly a lot of excitement and growth within the truly wireless earbud form factor. It helps buy some really compelling products introduced that drive really great user experiences. I mean Cirrus has been investing in headsets for quite some time where the lion's share of that investment upfront was really centered around accessories that would ship in a box with a smartphone just given the magnitude of that market size. And that ultimately did materialize in the way that we thought it would or at the pace that we thought it would, which was disappointing. But I think it gave us an underlying good feel for the market and how things will evolve.

So again, there is a lot of excitement around true wireless. We do have designs that are in the market today. We have things that are forthcoming that we're excited about that really are rooted

in our core low-power, low-latency analog technology and some of the voice technology that we've brought to market. Our perspective and with Jason's commentary, I suspect was related to ANC, not being here and ready now, it was really a reflection around how precious every micro amp of current is in the battery life of a truly wireless earbud, just given how tiny that battery is.

And so there is also a trade off between power, and functionality and layering on features. And from our perspective in our portfolio today, our solutions were really tailored around wired or over-ear kind of bigger battery designs, which we love the products that are in the market and that are forthcoming with that. But for us to get to a point where we have a compelling high performance audio solution with adaptive ANC, represents another leap forward for us on the technology side to get that into a power profile that we think would enable a compelling user experience that's not degraded from where things are at today.

So from our view, that's still several generations ahead of us. And so we're building up to that point with, like I mentioned, some of these building blocks across the headphone drivers and basic smart codecs that can serve as the products today and not compromise battery.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

And then to also be a meaningful player in this space, you also need to have Bluetooth Low Energy integration as well, I know some of your peers and some of the OEMs have the integration with the Codec.

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Yeah, I mean, it varies. I mean you've got different chipsets and different integration partitions in various chipsets that service Bluetooth accessories. The Bluetooth Low Energy spec that could support audio seems to always be six months away. And certainly Bluetooth Classic is not going anywhere, there'll be a long life for Bluetooth Classic and the big power gap has narrowed between Bluetooth Low Energy and Bluetooth Classic such that it's become less of a – it's become less of an impedance to getting truly wireless headsets that can deliver good battery life.

So we don't see it to be a critical component that we have to have in order to succeed. I mean, we're frankly much more excited about some of the disruptive technology that we are investing in that just augments the user experience wearing these headsets. I mean, the underlying foundation is a good, reliable link between the device and the phone, which comes with Bluetooth. But we think the user experience is much more interesting when you start being able to seamlessly interact with the people around you without having to take your ear bud out, or know if they can – know that you're talking to them with this kind of awkward social stigmatism with wearing an ear bud all the time.

But be able to again, sense things going on around you and pipe those into your experience, lower the music and just drive the user experience, it's much more interesting and allow for other enhancements around security, and authentication and coupled with things that are running on the host device that we think are significantly interesting and would for sure warrant having that kind of component sitting alongside any sort of radio chip in the market. Thanks.

<<John Vinh, Analyst, KeyBanc Capital Markets>>

Questions? Okay. Well, thanks guys.

<<Thurman K. Case, Chief Financial Officer and Vice President, Finance>>

Thank you, appreciate it.