



**Akoustis Technologies Inc.**

**Third Quarter 2019 Investor Update Conference Call**

**May 13, 2019**

## C O R P O R A T E P A R T I C I P A N T S

**Jeff Shealy**, *Founder and Chief Executive Officer*

**Ken Boller**, *Interim Chief Financial Officer*

**Dave Aichele**, *Vice President, Business Development*

**Tom Sepenzis**, *Vice President, Corporate Development and Investor Relations*

## C O N F E R E N C E C A L L P A R T I C I P A N T S

**Cody Acree**, *Loop Capital Markets*

**Anthony Stoss**, *Craig-Hallum Capital Group*

**Harsh Kumar**, *Piper Jaffray Companies*

**Suji DeSilva**, *ROTH Capital Partners*

**Jaeson Schmidt**, *Lake Street Capital Markets*

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## P R E S E N T A T I O N

### **Operator:**

Good day, ladies and gentlemen, and welcome to the Akoustis Technologies Third Quarter Fiscal 2019 Business Update Conference Call. As a reminder, this conference call is being recorded. At the conclusion of the Company's presentation, Akoustis Management will take questions. To ask a question, please press star, one on your telephone keypad to be placed into the queue. We ask that you please ask one question and one follow-up question to allow as many as possible to ask questions. A replay of the call will be available on the Investor Relations section of the Akoustis website.

I would now like to hand the call over to Tom Sepenzis, Vice President of Corporate Development and Investor Relations. Please go ahead, sir

### **Tom Sepenzis:**

Thank you, Operator, and good morning to everyone on the call. Welcome to Akoustis Third Quarter Fiscal 2019 Business Update Conference Call. We are joined today by our Founder and CEO, Jeff Shealy, interim CFO, Ken Boller, and VP of Business Development, Dave Aichele.

Before we begin, please note that today's presentation includes forward-looking statements about our business outlook. All statements other than statements of historical facts included during this conference call, including statements regarding our strategies, operations, costs, plans and objectives, estimates of market size, and guidance regarding expected revenue for the current fiscal quarter are forward-looking statements. Such forward-looking statements are predictions based on the Company's expectations as of today and are subject to numerous risks and uncertainties. The Company and our Management Team assume no obligations to update any forward-looking statements made on today's call. Our SEC filings mention important factors that could cause actual results to differ materially. Please refer to our Form 10-K for the 2018 fiscal year filed with the SEC to get a better understanding of those risks and uncertainties.

I would now like to turn the call over to Jeff Shealy, Founder and CEO of Akoustis.

**Jeff Shealy:**

Thank you, Tom, and welcome everyone to our third fiscal quarter business update call. I believe I can say that the past month has been arguably the most exciting time for all of us at Akoustis since the founding of the Company. Quite a bit of this excitement has related to the two announcements we made over the past week regarding our first 5G mobile handset development order with a Tier 1 wireless company and our first preproduction order for our new second iteration 5.6 GHz Wi-Fi filter. I will speak more about each of these market opportunities later in the call.

With respect to the call today, I have organized my comments into five sections: first, technology overview and market focus; second, a brief recap of the highlights of the second half of calendar 2018; third, March quarter achievements and commentary; fourth, June quarter milestones; and finally, milestones beyond the June quarter.

I will start with a technology overview and market focus. Akoustis was founded in 2014 on the premise that by utilizing advanced single crystal piezo materials, we could create a unique manufacturing process to produce a new class of high performance BAW RF filters that would exhibit differentiated and superior performance in the high frequency spectrum. What differentiates Akoustis is our high power handling wide bandwidth BAW RF filter technology, which we have branded and trademarked XBAW. Our products currently target applications operating in the 1 GHz to 7GHz frequency spectrum in the growing Wi-Fi wireless network infrastructure, mobile handset, and defense markets, each application requiring characteristics that could include high power handling, wide bandwidth, reduced form factor, or any combination of all three when compared to existing incumbent filter technologies.

Since the very early days at Akoustis, we have been amassing what we believe is both a substantial and valuable portfolio of intellectual property which as of April 30 includes 21 patents granted to the Company, a license or option for three more third party patents, 41 patents pending, and numerous proprietary unpublished trade secrets and know-how based on a novel combination of high purity piezoelectric materials combined with a MEMS-based wafer manufacturing flow.

Next, I'd like to briefly summarize highlights pertaining to our XBAW technology. First, XBAW is a unique and flexible RF filter wafer process which can address a broad range of applications and frequencies. Our XBAW resonator process delivers wide bandwidth and low loss, supporting true coexistence performance at the high frequencies required for Wi-Fi and 5G. Second, our single crystal XBAW exhibits up to 2.3 times higher power handling capability over the same filters constructed using polycrystalline piezo material. Higher power handling is important because it translates into higher reliability, and it can enable new applications for micro-filter technology. Third, XBAW is compatible with various package technologies, including conventional die-on laminate for Wi-Fi CPE applications, die-in ceramics for military applications, and wafer level package or WLP, which is required for small form factor applications such as mobile handsets and other devices.

Akoustis operates an integrated device manufacturing, or so-called IDM business model. Our model allows cost effective turnkey integrated RF BAW filter solutions to be developed quickly, without margin stacking, or risky supply chain delays. Our ability to deliver product with short cycle time is a key attribute in our business model. Our products are sold both directly and through distribution channels.

Next, I will summarize our end market focus. As I noted earlier, we are currently targeting applications in the growing Wi-Fi customer premised equipment, wireless network infrastructure, 5G mobile device, and defense markets. Our product focus resides in the sub-7 GHz band where we can provide superior performance using our RF filter solutions. Our market model has not changed since last quarter, where we estimated our total addressable market was approximately \$3.7 billion in 2018 and is expected to grow to \$5.4 billion by 2021 per Mobile Expert's 2018 report, ABI's 2018 report, and Akoustis internal estimates.

The BAW filter market remains dominated by two multi-billion dollar RF module companies which together have controlled 4G LTE wireless. However, it is worth noting that we are currently the only company in the world which is providing BAW RF filter solutions in several of the challenging 3 GHz to 7 GHz bands.

Next, I would like to take a moment to recap some of the important milestones achieved during the second half of calendar 2018, as we continue our transition from an R&D Company to a commercial stage product Company with multiple attractive markets requiring premium performance RF filters. In August of last year, we received an order to develop 3.6 GHz infrastructure filters for the unlicensed Citizens Band Radio Service, or CBRS spectrum. CBRS is expected to play a significant role in the U.S. for last mile connectivity for the emerging 5G wireless network. One of our most important milestones was achieved in September when the Company generated its first commercial revenue from the sale of its 3.8 GHz filters for a military radar application.

Also, in September, we received our first pre-production order for our 5.2 GHz Wi-Fi filter from a global distribution customer. In November, we received a second order for our 5.2 GHz filters from a multi-billion dollar global SOC vendor for the development of 4x4 and 8x8 multi-user MIMO reference design. Last December, we started sampling our first iteration of our 5.6 GHz Wi-Fi filter, which works in tandem with our existing 5.2 GHz Wi-Fi commercial filter product. I will discuss the progress we have made with the 5.6 GHz filter in a moment. Overall, as of today we are tracking 10 priority filters through our new production introduction system, which is an increase from seven priority filters last quarter.

Next, I would like to move on to achievements during the March quarter. For the March 2019 quarter, we previously highlighted the following five milestones: first, for our Wi-Fi coexistence filters, we stated that we would expand beyond our first Tier 1 SOC customer and deliver an additional SOC RF front end manufacturer OEM or ODM customer in the March quarter. We were able to complete this milestone early in January with an additional leading SOC vendor choosing our 5.2 GHz Wi-Fi filter for possible inclusion in a 4x4 and 8x8 reference design for customer premise equipment.

Second, we stated that we would ship our 5.2 GHz XBAW filters in the March quarter to both an SOC customer and our distributor after supply chain issues kept us from delivering the product in the December quarter. I'm happy to report that we were able to deliver 5.2 GHz XBAW filters to our first Tier 1 SOC maker during the March quarter for possible inclusion in a 4x4 and 8x8 Wi-Fi multi-user MIMO reference design. We were also able to fulfill our distributor order for 5.2 GHz filters. In addition to hitting these 5.2 GHz Wi-Fi filter milestones, I am pleased that we were able to ship pre-production XBAW filters to a second leading SOC Wi-Fi customer for inclusion in a 4x4 and 8x8 multi-user MIMO reference design as well as a major new supply chain partner, to whom we delivered over 80,000 filters in the March quarter.

Our third objective was to expand sampling of our 5.6 GHz Wi-Fi filter product to a broader set of customers. The 5.6 GHz filter is a key component of our Wi-Fi opportunity because when paired with our 5.2 GHz filter, we will provide the industry's first tri-band Wi-Fi coexistent BAW micro filter solution at 5 GHz, offering a significant advantage of up to 23 times smaller footprint over incumbent diametric resonator filters. During the March quarter, we provided a live demo of the first iteration of our 5.6 GHz filter to multiple target customers during the 2019 Mobile World Congress held in Barcelona, Spain. Since then, our engineering team has developed a second iteration of the 5.6 GHz architecture which has multiple advantages over our first iteration design. These advantages include superior performance, reduced die size and complexity, and offers the identical footprint and package as our 5.2 GHz Wi-Fi filter. As outlined in the press release last Tuesday, we have received our first pre-production order for our 5.6 GHz Wi-Fi filter.

Our fourth milestone for the March quarter was the delivery of our 3.8 GHz filters against two production orders from our military customer. As we announced last quarter, we have been working with a new outsourced packaging supplier to improve the speed and scale at which we can deliver the 3.8 GHz filter product to the customer. The timeline to transfer our packaging supply chain and complete the design pushed the delivery of our 3.8 GHz filters into the June quarter.

Our last milestone for the March quarter involved receiving a new order from our military customer for a new band. As commercial shipments of our 3.8 GHz filter were pushed into the June quarter, we did not receive any additional orders from our military customer. The relationship with our customer remains very positive, and we expect a new order for at least one new band in the current quarter.

In addition to the five milestones for the March quarter, the Company delivered an important infrastructure milestone related to 5G as we shipped our first CBRS filters for 5G last mile applications. In addition, Akoustis continued R&D to develop its first massive MIMO filters for emerging 5G network infrastructure with a Tier 1 multi-billion dollar base station OEM.

I would now like to touch on our new investor milestones for the June quarter. At the beginning of each quarter, our Management Team assembles key objectives for the current quarter. Here are the top five objectives for the June quarter. First, we plan to deliver fully qualifiable 5.6 GHz Wi-Fi filters by the end of the June quarter. The 5.6 GHz filter remains the most important near-term product to position us to penetrate the Wi-Fi CPE market as the 5.6 GHz filter works in tandem with our existing 5.2 GHz Wi-Fi product. We have significant interest in our tandem Wi-Fi BAW filter solutions from multiple OEMs, ODMs, and SOC companies.

Second, we expect to ship our first pre-production order for our 5.6 GHz Wi-Fi filters by the end of the June quarter. As the release last Tuesday indicates, we have already received an order from our global RF customer which marks a transition from sample phase to pre-production phase and positions us for design wins with our Wi-Fi customer base. It is worth noting that we have been communicating progress with our customers regarding 5.6 GHz performance and mechanical requirements to minimize our time to market.

Third, we expect to fulfill all outstanding 3.8 GHz filter orders and book a new order with our existing military customer for at least one additional frequency band.

Fourth, we expect to sample our first wafer level packaging, or WLP design using our 5.2 GHz mobile Wi-Fi filter chip. This filter is expected to be the first 5.2 GHz coexistent micro filter on the market that would meet the size requirements necessary for mobile handsets and other wireless devices. This wafer level packaging design will provide the blueprint for future design across the full operating range of our XBAW technology for 5G mobile and future Wi-Fi filters.

Finally, we expected to receive a sub-6 GHz RF filter development order for 5G mobile handsets and other wireless devices by the end of this quarter. We are extremely excited to have already achieved this milestone, as we announced last week that we received a purchase order from a new multi-billion dollar Tier 1 wireless telecommunications customer to develop a coexistent BAW RF filter for 5G spectrum bands for mobile handsets and other wireless devices. This is the first purchase order the Company has received for 5G mobile RF BAW filters, and the 5G mobile market represents the largest future opportunity for Akoustis, both unit sales and revenue.

Akoustis was chosen by this new Tier 1 customer due to our unique ability to provide BAW filter solutions up to 7 GHz. We expect to deliver first samples to the customer by the end of the current quarter. As the mid band 5G new radio bands reside between 3.3 GHz and 5 GHz, future filter solutions to resolve coexistence issues in 5G mobile handsets are right in our sweet spot. We have already developed commercial filter products at 3.8 GHz, 5.2 GHz, and 5.6 GHz, proving that we can produce BAW RF filters at the higher frequencies associated with 5G. As a result, we are in discussion with multiple large mobile handset companies seeking access to high frequency coexistence filter technologies.

Next, I will touch on our long range milestones. We are focused on initially ramping and achieving substantial revenue growth in Wi-Fi and network infrastructure filters with future revenue opportunities from 5G mobile handset applications in 2020 and beyond. First, we expect success in Wi-Fi by completing commercialization of our 5.2 GHz and 5.6 GHz filter solutions, which position us to address the tri-band Wi-Fi CPE market. We believe this will be the first tandem BAW micro filter solution available in the market. We plan to leverage our existing sales and marketing groundwork to secure one or more OEM product design wins later in 2019 and beyond.

Second, our path to succeeding in the 4G and 5G network infrastructure markets begins with execution of the ongoing customer funded filter development program. We have demonstrated success in small cell with the shipment of our first 5G CBRS filter samples in March. In addition, we expect to ship new small cell RF filters for other 5G bands later this calendar year. Beyond small cell, we are pursuing massive MIMO 5G base stations in the sub-6 GHz spectrum. Filters for these applications require high power handling performance and feature high average selling prices. Overall, we plan to leverage our product catalog and pursue a one-to-many strategy with Tier 1 and Tier 2 companies.

Thereafter, we plan to expand into mobile handsets upon successful demonstration of our wafer level packaging, or WLP, which is a micro package technology that addresses size constraints for mobile devices. We have several ongoing discussions with Tier 1 mobile handset OEMs for new and difficult 5G bands which require high frequency wide bandwidth and high power handling, all of which align well with our XBAW technology, and which we believe may be challenging for incumbent filter technologies.

To summarize, we continue to focus primarily on winning in Wi-Fi and network infrastructure while positioning the Company to compete in mobile handset and other wireless devices longer term.

Next, I'd like to mention select financials from the March quarter. Last Friday, we filed our 10-Q with the SEC for the third fiscal quarter ending on March 31. You can access the 10-Q from our website or at SEC.gov. From Management's perspective, we continue to control costs while investing in key RF filter product development and wafer fab capacity expansion to support expected future Wi-Fi and network infrastructure revenue ramp. During the March quarter, we reported net sales of \$237,000 and used approximately \$7.5 million in cash, including \$2.7 million of cap ex primarily focused on capacity expansion in our New York wafer fab. We ended the quarter with approximately \$34.6 million of cash on the balance sheet.

While we have not previously provided guidance, we would like to provide a revenue range of \$500,000 to \$600,000 for the June quarter, given our current visibility. We believe the packaging challenges that



pushed out shipments are now behind us. We are confident with our growing product portfolio as highlighted by our most recent press releases, and our mid to long-term outlook remains unchanged. As we discussed in our previous conference call, in order to support other current engagements and emerging sales opportunities, we plan to increase manufacturing capacity by up to fivefold over the next 18 months.

In conclusion, we are working diligently to achieve our stated objectives, and we expect to update you on our execution against our objectives each quarter going forward.

I would like to thank all of you who have joined us on the call today. This month marks the five-year anniversary of the founding of Akoustis. We have built the Company on four solid pillars, including strong management, patented XBAW technology, large and growing markets with limited historical competition in the higher bands, and our qualified wafer manufacturing operation which is expanding to address high growth opportunities in our target end markets. Now, we are positioned favorably to penetrate the Wi-Fi market with the world's first tandem 5.2 GHz and 5.6 GHz high band micro filter chipset. Beyond, we have 5G engagements in network infrastructure and mobile handsets with global market leaders providing our Company with a tremendous growth opportunity in high performance coexistent BAW RF filters. We recorded our first filter revenue during the most recent September quarter and now expect to continue delivering market-leading products to our current and potential customers as we continue through calendar year 2019 and beyond.

Before ending my remarks, I would like to take a moment to thank our employees for their hard work and commitment to our mission, and to our investors who have continued to support the Company.

With that, I would like to open the call for questions from the investment community. Operator, please go ahead with the first question.

**Operator:**

Thank you. Our first question is from the line of Cody Acree with Loop Capital. Please proceed with your question.

**Cody Acree:**

Thanks, guys, for taking my questions, and congrats on the progress. As far as progress, the latest surprise being the mobile handsets order, the firm has been largely focused through '18 on Wi-Fi, obviously. How did the Wi-Fi, or the cellular progression, come to bear, and then is this really a splitting of your focus, and do you have the current bandwidth to manage both tracks?

**Jeff Shealy:**

Cody, thank you for the question. This is Jeff Shealy. Regarding the mobile handset, in the past we've stated that the designs we've been doing in these very high frequencies, we've had a significant amount of interest across the board from multiple markets in these designs. In terms of how this led up, we have sampled and have been vocal about sampling to a broad range of markets for our 5 GHz high frequency product in terms of—so how this came about was through sampling of current products. We have stated in the past that we expected—how we expected mobile to play out was we're going to have to continue to expand capacity, which we're already doing for the Wi-Fi and infrastructure markets, and we expected a relationship to have to develop in order for us to get into the handset market, so I would view this as really technical due diligence by a potential mobile handset partner, and then leading up to a potential relationship with that partner to pursue the mobile market.

So, no change in strategy, we've been very bullish on Wi-Fi. I think the announcements that we've made and the execution through the March quarter, and what we've announced publicly since are evidence of that. We've shipped all of the orders that we had open for the 5.2 GHz, we stated that publicly, and we made a really nice announcement on the 5.6 GHz.

In terms of split of resources, I don't view this as a dilution of resources for the 5.6 GHz. I would actually argue that we're on track on the 5.6 GHz of where we plan to be, and we also delivered on the infrastructure. We delivered a CBRS solution into the market we did not even put into the milestones. I think we've executed on the development, and this engagement has been in the making for some time and materialized into an order.

I'll let Dave add anything further to that.

**Dave Aichele:**

Hey, Cody, it's Dave. I do not have a lot more to add, other than, I guess, re-emphasizing that the technology efforts here were non-dilutive in some respects that we're utilizing, the core resonator technology, XBAW technology up at 5 GHz to do the due diligence with the end customer, and I think, which I've commented on, is that market is more strategic longer term for us, so we've got to be engaging now, but without, obviously, distracting from the focus on the Wi-Fi and upcoming 5G infrastructure as well.

I think the main thing that you're seeing in the 5G handset market is that products are coming out, but as far as requiring high performance sub-6 GHz coexist filters really won't, I think, be utilized in the market until 2020, 2021. That's what we're focused on.

**Cody Acree:**

Then just as a follow-up, the capacity, you mentioned, Jeff, the expansion of the New York fab. Where is your capacity footprint today? Are you still running a single shift? If so, when do you expect to be bringing on a second shift, or is it more about tool purchases? Then lastly along that line, maybe for Ken, as you add a second shift or more equipment, what does that do to your operating or your cap ex budgets going forward?

**Jeff Shealy:**

I'll address the first part of that, Cody. Again, this is Jeff. In terms of capacity, it's still a single shift. As we've also stated publicly on some long lead cap ex items, we've already ordered those, so there is tooling orders in progress, so those tools will come in over the course of this year. We're currently running a single shift. As I mentioned, we're in a transition point from tens of millions of filters a year to hundreds of millions of filters a year, we've stated that publicly, and in terms of the op ex, I'll hand that over to Ken.

**Ken Boller:**

Morning, Cody, this is Ken Boller. Just to follow up, the headcount adds, we're going to time with our revenue growth projections; however, I'd like to add to that, similar to the cap ex run rate, there's a three to four month run rate for headcount where we have to train our employees before we actually see that capacity come on board, so we're certainly going to time any increase in headcount to also increase in revenue, which therefore also has a marginal decrease in our operating cash flow spend. The operating cash flow spend, we certainly are managing it being just stewards of our cash, and we're holding our operating cash flow spend relatively constant with what we're seeing currently, which, if you look at the average, there's some quarter-to-quarter variations depending on one-time items of cash, but on average,



it's been about a \$4.4 million, \$4.5 million operating cash flow spend, and we hope to hold to that relative level with some small increases over the next time period, until we see that revenue need grow, we'll add headcount, and costs and cap ex accordingly

**Cody Acree:**

Great. Thank you, guys.

**Jeff Shealy:**

Thank you, Cody.

**Operator:**

The next question comes from the line of Anthony Stoss with Craig-Hallum. Please proceed with your question.

**Anthony Stoss:**

Morning, Jeff and crew. Congrats on the announcements last week in the 5.6 GHz and the Tier 1. Jeff, can you help us out a little bit more on the Tier 1 announcement? Is that just one frequency band, or could there be more than one frequency band? Also, longer term, what kind of quantities do you expect this customer to potentially need?

Second part question is on the \$6 million in cap ex planned for this year. How much of that will go for wafer level packaging, and have any of your potential customers approached you for guaranteed quantities and are paying for that cap ex? Then I have a follow-up after that.

**Jeff Shealy:**

Okay, good morning Tony. I'm going to attempt to address everything you said. If I miss something, please follow up. In terms of the Tier 1 customer, I want to be explicitly clear. They're using our standard, what we call XB1, which is our first generation XBAW process, so it is our standard process. In terms of what we've been contracted for, was the development of—it was one filter band. In terms of while there's been some discussions regarding potential quantities, we're not going to go on record with those quantities until we get any firm forecast going forward. You can imagine for that market, the quantities would be consistent with what you would expect for that market, but right now the discussion's been really around—I would characterize the development, number one, as we have said, a sub-6 GHz coexistence filter. I would also view this as the customer taking us for a test drive and doing technical due diligence on the technology as well as our ability to meet their specifications, and also what I'll reiterate there is what I mentioned in the prepared comments, was we're expecting to deliver the first filters for this customer against that order this quarter, so I want to leave that there.

In terms of WLP, the way we're looking at cap ex for the Company is where do we add value, and where we believe we're value-add is in the XBAW core resonator and filter process. We're looking at WLP, as I did mention before, through a third party Asia packaging house that has standards MEMS-based WLP processes. Quite frankly, we're evaluating that, and we're also looking at a combination with that partner where we do a portion of it, a portion of the process before sending it to them. There's reasons, technical reasons why we do that.

In terms of WLP, we will try to stay as asset-light as we can on that process. If we have the opportunity to outsource that, we will, and I would say the bulk majority of the cap ex, we've given no breakout, but

again the management mentality is we're going to invest that cap ex where we're value add, which is going to be really at the core resonator filter wafer process.

In terms of—and I think that's all I had, and you're welcome to follow up. I'm sorry if I missed something.

**Anthony Stoss:**

No problem. Just on whether or not you've had any interested customers willing to, I guess, pay for guaranteed production or their own production lines, and then my last question would be, in your Tier 1 press release from last week, you talked about talking with several handset makers. When will you be sampling to those other handset makers?

**Jeff Shealy:**

Well, we're going through—okay, in terms of customers which have paid for production capacity, I think was one aspect of your question, we've not announced anything there. I think there's a process, which you can appreciate, we would go through in an engagement of a partner. As I have stated publicly in the past, we have been asked to model our factory for what capacity limits that our facility in New York would be able to produce, and we've been public with those estimates. I'd be happy to reiterate those or point you to where we've published those. So, nothing that we're stating publicly regarding customer paid for production capacity. Whenever you're talking about mobile, capacity is always a subject, and we've also been quite forthcoming where we're investing in capacity, and where we think that takes us and where we believe a partner would need to engage us to step in.

Did I answer your question there? I think you had one other piece there, which I didn't catch. Please go ahead with the other piece.

**Anthony Stoss:**

Just regarding the comment in the press release, other handset makers you're engaged with, when will be you be sampling?

**Jeff Shealy:**

We've been doing technical due diligence. We've announced previously four customer engagements in the mobile space, so I think it would be natural to draw from that, that we've already been sampling. We continue to sample. I think with the 5.6 GHz, we're extremely excited about that product because of its ultra-wide bandwidth at very high frequency. That is very difficult to obtain, and we believe we're first in that market. We will continue to expand sampling where it makes sense.

Dave, if you've got anything you want to add to that, how you're thinking about sampling?

**Dave Aichele:**

Yes, I think the other thing I'll comment on, Tony, it's Dave, is that a lot of our previous customer engaged with sampling were in the 5 GHz, demonstrating the technology above 3 GHz, so sampling the 5.2 GHz and now the 5.6 GHz. In addition to, we commented on that we'll be sampling a WLP version of the 5.2 GHz which is showing the form factor reduction, which is critical for the handset market, so that's a technical milestone that they've been driving us to hit. That milestone, we expect to get complete, and then what you can see, obviously is us focusing on some of the other difficult 5G spectrum that has coexist requirements above 3 GHz, and that's an area that we're focused on as well.

**Anthony Stoss:**

Thanks. Congrats on the progress, guys.

**Dave Aichele:**

Thank you.

**Operator:**

The next question is from the line of Harsh Kumar with Piper Jaffray. Please proceed with your question.

**Harsh Kumar:**

Hey guys. You had a lot of stuff, exciting stuff going on last week, Jeff and team. I just wanted to ask about the 5.6 GHz, the significance of getting that out, in your opinion, towards the future of the Company. How important is this for your second half numbers and financials, and where are you exactly, do you think, relative to your long-term goals, call it mid-term goals, for back half of this year, getting this out and getting to the next phase for this particular product?

**Jeff Shealy:**

Okay, good morning, Harsh, and thank you for the question on the 5.6 GHz. In terms of the significance of getting this out, what we've stated previously is that the 5.2 GHz was already at pre-production, and I just want to recap for everybody, we've talked about moving from sampling to pre-production to production, that is a sales cycle for our Company. Just to kind of recap where we were a quarter ago, we had announced sampling of a first iteration of our 5.6 GHz, and we had announced a shipment of pre-production units of the 5.2 GHz, so the significance of the 5.6 GHz order last week is really—it marks two things. We described in the release a second iteration design which is higher performance, smaller form factor, and uses the same supply chain and exact package footprint as the 5.2 GHz, so that makes some things easy on our supply chain. The significance is we have now moved from sampling to pre-production of the 5.6 GHz, and that matches the pre-production of the 5.2 GHz, and so we have now positioned ourselves to be able to supply both those parts in tandem to the market.

If you look at how important for the second half, as we will reiterate once again, is Wi-Fi is where we're focused. We think we're first into this market. We think having both those parts in pre-production is going to allow us to accelerate our penetration into the Wi-Fi, and in terms of changing of mid-term or long term goals, we don't see any change—we don't see anything in the market that makes us think that our strategy or our goals, mid-term or long term, are going to slip with respect to the Wi-Fi, because ultimately we targeted having a 5.6 GHz all ready to go by the end of Q2, so the 5.6 GHz that came on, we put a significant amount of emphasis on getting that put into place, and we feel we're on track with the 5.6 GHz, having that available with the 5.2 GHz.

I'd like Dave just to comment on in terms of how he sees the customer engagements there moving with the Wi-Fi now.

**Dave Aichele:**

Yes, hi, Harsh. A couple comments I'll make. The adoption rate of the 5.2 GHz by itself, I think we've highlighted that on the past, almost every client that I've talked to, they want the tandem. The news of the recent data that I've been sharing has been well-received. The advancements that Jeff highlighted from first generation to second generation and planning to lock down by the end of this quarter will accelerate

the adoption rate, and I think our mid-term goal as you highlight the second half of this year, I think we're positive on seeing the increase in design activity, both with the SOC providers and also with the OEMs. As you can imagine, we're going to be doing everything that we can to support that adoption rate with pre-production parts and hopefully ramping up production in the second half of the year.

The other thing I'll highlight is longer term. This development of 5.6 GHz being the wider band design showed some significant technical milestones to our client base that looking at the new 5 GHz and 6 GHz spectrum, which they're starting to work on chipsets, and that is even more difficult from a coexist filtering requirement, and we think that the competitive technology out there, LTCCs and DR filters, will struggle, so obviously our advances on 5.6 GHz shows that we can do this and increase the bandwidth of the filters, the BAW filters, so we're looking forward to that long term as well.

**Harsh Kumar:**

Got it, thanks, guys. My second question was a more general question. In your view, you guys know this market better than most of us as analysts. In your opinion, how long of a lead do you have, technologically, and who else is kind of in the hunt for greater than 3 GHz filters?

**Jeff Shealy:**

Okay Harsh, this is Jeff. In terms of lead, most companies don't publish their technology roadmap, and so I think it wouldn't be appropriate for us to speculate that. What I'd like to really comment on there is at this point in the customer accounts, we're not seeing any competition at all for 5.6 GHz, and also 5.2 GHz in terms of product available to the customer. I think our intelligence is pretty good there. In terms of what technology lead, it is---I'm not going to speculate just because it's not appropriate for us to comment on other companies.

In terms of other companies that would be pursuing greater than 3 GHz, I would say this is more speculative, but I would expect that the two incumbents in the LTE market for BAW are certainly going to do everything they can to push their technology above 3 GHz, and I would expect those efforts are ongoing. In terms of new entrants beyond that, I'm just not going to comment on who may be doing R&D in the background. Certainly, there is other public announcements, but I'm going to focus my comments on where our Company is, our technology, what we've demonstrated, where our products are, and how our engagements are looking. Just going to stay off of what other companies are doing, is I think the best position for us to take.

**Harsh Kumar:**

Fair enough. Thanks guys. Congratulations on execution.

**Jeff Shealy:**

Thank you, Harsh.

**Operator:**

The next question is from the line of Suji DeSilva with ROTH Capital. Please proceed with your question.

**Suji DeSilva:**

Hi Jeff, Dave, and congratulations on the progress here. Maybe following up on the Wi-Fi questions, for the pipeline customers in Wi-Fi that are, you know, what's the ratio that are moving forward with 5.2 GHz

versus waiting—the ones who have waited for the tandem, what's your sense there? Towards the end of '19, how many Wi-Fi customers do you think could be ramping range-wise, just to get a sense of what your expectation is?

**Jeff Shealy:**

Good morning, Suji. I'll let Dave address that, and maybe I'll follow up with anything.

**Dave Aichele:**

Yes, Suji, the clients that we've been engaging with are, I think we've talked about this in the past, this is the chipset providers and then enterprise and retail clients. We also have some adoption outside in other applications that are not tri-band related that use the unlicensed spectrum, so the adoption rate on the 5.2 GHz is less than 20% by itself, and it's something that I think we've commented on in the past. Obviously, you have to get those to transition into a design win and into a product, so we have some line of sight of several activities going in that direction.

Then with having the tandem part, that definitely is going to increase significantly as far as the number of vendors that are interested in, obviously, utilizing this for tri-band applications. I think right now, we've got greater than 20 customers that we have been sampling to, so you can estimate that if you can increase that to a percentage above that 20% guidance, obviously the number of clients is going to increase significantly.

As far as estimates right now, we can give guidance in the next calls as to what that adoption rate looks like, as we have success with the 5.2 and 5.6 tandem in the market.

**Suji DeSilva:**

Okay, fair enough.

**Jeff Shealy:**

Suji, this is Jeff. I'll just follow up, just to reiterate what we said in the prepared comments, which was we expect to deliver fully qualifiable 5.6 GHz Wi-Fi filters by the end of the quarter and also ship our first pre-production order for 5.6 GHz. I would say the interest—there is new interest, there is existing interest, and it is a significantly wider band solution than is out in the market, which also generates interest from other companies, whether it be in the handset or other, that's looking for wide band filter technology. We've got a product they can sample and evaluate the technology with, so I think the interest is not only in Wi-Fi, and we're going to continue focusing our efforts, I think Dave quoted a number of engagements that's growing, but I also see some of this bleeding over into some of these other markets of interest because of the wide bandwidth nature of the filter.

**Suji DeSilva:**

Okay, great. Helpful color, Jeff. Then switching over to the infrastructure side for 5G in particular in the base station market, is it just one customer that you're engaged with for now, or is there a pipeline, do you have multiple customers, multiple Tier 1s you might be engaged with through your pipeline, or is there one you're focusing on for right now?

**Dave Aichele:**

Suji, it's Dave. I think publicly we've stated we've got three customers on the infrastructure side that we've engaged with, and one of them is on the 4G LTE and then the other two are in the 5G spectrum. We're more focused on the 5G from an infrastructure standpoint, both in the small cell and the massive MIMO. I think we've got a unique opportunity ahead of us right now in the 5G small cell right now, particularly with the 5G rollout and looking at the spectrum there, depending on which network provider you look at in China with 2.6, 3.5, and 4.9. All these slots are looking for small form factor, high performance coexist filters that can handle the higher power for a small cell, and particularly if you look at the 4.9 spectrum, that lines right up with the work that we've done in 5.2, so there is a huge pull in that market over there, and that's obviously going to be with Tier 1 providers focused on that market segment.

I think the opportunity ahead of us is, in some respects, greenfield because there's not much competitive technology out there that's going to meet the performance. Then on the massive MIMO side, it's pushing the technology in to handle higher power, which, again, is a very unique position for us, so we are going to continue to stay engaged with the one Tier 1 guy that we've announced in the past, and as we have success there, expect that to expand with others.

**Suji DeSilva:**

Okay. Thanks, guys.

**Jeff Shealy:**

Thanks, Suji.

**Dave Aichele:**

Thanks.

**Operator:**

Thank you. The next question is from the line of Jaeson Schmidt with Lake Street Capital. Please proceed with your question.

**Jaeson Schmidt:**

Hey, guys. Thanks for taking my question. I know, Jeff, you've outlined sort of the sampling/pre-production/production timeline, but just wondering if you've seen that timeline condense at all over the past few months here.

**Jeff Shealy:**

Good morning, Jaeson. In terms of the timeline condensing, I don't view it as anything condensing. I guess, what I would state is that what I believe, is that Dave and team have done a really fantastic job on the Wi-Fi front of doing everything we can with what we had in the 5.2 GHz with customers being in a position to—where we hit the ground running with the 5.6 GHz, but in terms of anything condensing, any pulling, we're not providing comments to that extent. What we have done is, the fact, we have been able to provide customers mechanical footprints, so they can accelerate their evaluation of the 5.6 GHz, and we think that's going to help us overall.



Right now, we're focused on getting the 5.2 and the 5.6 GHz samples to the market together, and we're very comfortable with where we are in that. We'll continue updating as we go forward here. We've got some very important milestones for this quarter with the 5.6 GHz, which I've mentioned previously.

**Dave Aichele:**

Yes, Jaeson, just to comment on what Jeff said about mechanical footprints, some of the customers we've actually given the layout of the 5.6 GHz to them, and they have laid out on their boards so that when we do have the parts available, they can drop it in. There may be an interest on their side, without knowing their product development cycle, of trying to accelerate. There's a strong interest in these smaller form factor BAW filters for the new 802.11 AX chipsets when they're going to the 4x4, away from the 2x2 and the 802.11 ACs, and there's even some architectures that I've seen on the on the 8x8 as well, so a strong desire and interest for the smaller form factor but also in the performance and the robustness from an SMD assembly and semiconductor side.

We can't really comment on their accelerating their product development cycle, but I can tell you there's a strong interest.

**Jaeson Schmidt:**

Okay. Lastly, did I hear correctly that you indicated op ex should remain relatively stable at this run rate going forward?

**Ken Boller:**

Correct, Jaeson. Operating cash flow and op ex should remain relatively stable, but as we see the revenue come onboard, you actually see the operating cash burn come down to a certain extent, with the recognition that we have to hire certain people three or four months before we actually see the revenue put into place.

**Jaeson Schmidt:**

Okay, thanks a lot.

**Operator:**

The next—I'm sorry, go ahead.

**Jeff Shealy:**

No, that was it.

**Operator:**

Thank you. Our next question is from the line of Rick Schafer with Oppenheimer. Please proceed with your question.

**Wei Mok:**

Hi, good morning, this is Wei Mok speaking on behalf of Rick Schafer. Congrats on the mobile handset win. In prior calls, you guys have indicated engagements with multiple handset OEMs and mentioned the potential win for second half of this year, so the timing of this announcement comes as a bit of a surprise.

Is this customer the same that you expected to win before the year end, and if so, can you tell us what the customer saw in your filters that allowed you guys to secure this win earlier than expected?

**Jeff Shealy:**

Hi, good morning, Wei. This is Jeff. In terms of mobile customer, we previously stated we've had four engagements. This would represent a customer we've previously sampled but has identified a specific opportunity, so we have had other customers that have taken product on technical due diligence and we believe have satisfied their technical due diligence. Oftentimes it can go beyond technical due diligence in terms of boxes they need to check before they engage, but the technical due diligence is obviously a key one, so this customer would represent the first order from this customer, and from that vantage point, they're a new customer.

Dave, do you have anything you want to add to that?

**Dave Aichele:**

No, I think, Wei, the guidance that we've given in the past is focusing on aligning with one of the four with specific products towards the end of this year, but this one did come in as a new opportunity, and it's something that, again, is leveraging the technology that we've developed for the Wi-Fi market, so it's technical due diligence, as Jeff highlighted. That could expand and fully expect it to expand because again the lack of high performance BAW technology above 3 GHz is obviously enabling us to engage with these other clients, and we just have to align our technology with their specific specifications and needs.

**Wei Mok:**

Okay, great. For my follow-up, can we just revisit the New York facility? With the recent design wins in Wi-Fi and mobile, how does this affect your revenue capacity at the New York facility, and what would it be at the end of the year? Thanks.

**Jeff Shealy:**

I'll start, and I'll see if Ken wants to add anything. From what we've said in the prepared comments, what we've been saying all along, is we've operating to a plan of increasing capacity from tens of millions of filters a year to hundreds of millions of filters per year. In terms of any one event, how that impacts it, we can't instantaneously add capacity. That takes 9 to 12 months, and I think Ken put some color on what we have to do in terms of the hiring shifts and that sort of thing a quarter ahead, so there's no change in the strategy. We've been ordering capacity, we've been ordering long lead items to add to that capacity, and those items are coming in.

What would potentially change with an agreement on the mobile front is we would have to expand capacity more rapidly. We've not announced anything there and would not announce anything there until such time we're announcing an engagement, and that's premature to insinuate anything is imminent.

But in terms of capacity in the New York facility, anything you want to add to that, Ken?

**Ken Boller:**

I'll just add, reiterate what we stated our last call in relation to the timing to get to the hundreds of millions of filters. We had stated that it will take approximately \$20 million over 18 to 24 months, and we're still holding true to that model, that we do plan on increasing from the tens of millions to hundreds of millions in the next two years, and the spend will be accordingly to when the lead time of that equipment is.

**Wei Mok:**

Fantastic, great. Thanks.

**Jeff Shealy:**

Thanks, Wei.

**Operator:**

Thank you. I'll turn the floor back to Management for closing remarks.

**Jeff Shealy:**

Thank you all for your time today. We're progressing towards the objectives we've announced for the June quarter, and we plan to update you on further progress as the quarter moves forward. We look forward to speaking with you during our next quarter update to discuss the current quarter execution against our milestones and future expectations. With that, we'd like to close the call.

**Operator:**

Thank you. Today's conference has concluded. You may disconnect your lines at this time. Thank you for your participation.