

**Qualcomm  
Analyst Day  
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**Presenters**

**Mauricio Lopez-Hodoyan, Vice President of Investor Relations**

**Steve Mollenkopf, Chief Executive Officer**

**James Thompson, Executive Vice President of Engineering, and Chief Technology Officer**

**Alex Rogers, Executive Vice President and President, Qualcomm Technology Licensing**

**Cristiano Amon, President**

**Akash Palkhiwala, Executive Vice President and Chief Financial Officer**

**Moderator**

Ladies and gentlemen, please welcome Executive Vice President and President, Qualcomm Technology Licensing, Alex Rogers.

**Alex Rogers**

Good morning, everybody. Thank you for being here. So, I could actually stay here for five seconds and leave and simply reference back to what Jim just said. If you want to understand why the licensing business is foundationally strong, just go back and listen to what he said. That is the basis of the licensing business.

But, it is good to be here. And for me, it's actually personally interesting because I sat in my seat over there, and I could look through the windows of the New York Times building to the ancestral home of the Rogers family business. So, my father and my grandfather owned a bowling alley and a bar in the Port Authority. And unfortunately, they wouldn't let me take over the business. So, I did what any of you would have done, I packed up and moved to California. But, that business unfortunately is--is no longer there, but you can still go bowling. But, we don't own it.

All right. Let me talk about the licensing business. There are three key attributes--\$60 billion investment. Jim talked about this a little bit. The focus is that we develop technology that enables cellular. And the focus of that is systems-level innovation. We have been doing it for 30 years, and we continue to do it.

We're good at translating innovation into legal property rights, into a patent portfolio--140,000 patents and applications pending worldwide. And we're good at the mechanics of getting deals done--13 billion devices licensed. But again, the bedrock is what Jim said, enabling technology. We create enabling technology that the industry wants and that the industry uses.

So, let me dive into it a little bit more--so three timelines here that matter. There's an R&D timeline, there's a standards timeline. The R&D timeline is in the blue shading. The standards timeline are the steps that you see across left to right, rising up. Those represent individual standards as they are promulgated by the--by the standards industry--by the standards organization.

And then, there's a commercialization timeline. And each of these timelines is important to the licensing business because each of these timelines, and Qualcomm's activities in these timelines, creates strength in our intellectual property portfolio.

So first of all, R&D. And Jim mentioned this--I'll just refer back to it. It's really critical--ongoing, early investment. And he described to you how the machine at Qualcomm works--very theoretical to begin with but very practical, okay, at the end of that R&D timeline. And so, we create enabling technology, and we create the technology before the standards are contemplated. Before a requirement is set, we're years ahead, improving cellular systems, so that we have something to bring to the standardization process. That foundational technology creates IP strength.

Then the standards timeline--we have tremendous experience, continuity--and participating in the standardization effort. There's a skill set involved in participating in the standardization effort, and we're very good at it. When you bring technology to a standard, it can't--shouldn't be merely theoretical. We're very good at building the technology before we bring it to the standard organization.

We're very good at testing and simulating and proving the technology and proving its merit. So when the standards organization--when the industry--adopts Qualcomm technology, it adopts technology that the industry can have confidence has merit, including as compared to other alternatives. That creates IP strength in that technology and the IP associated with that technology.

And then finally, there's a commercialization timeline. And this is very important. Qualcomm is unique in the industry. We understand the technology at a very, very deep level. And then, we work with the entire ecosystem to enable the roll-out, the implementation of the technology. We work with mobile device manufacturers, we work with infrastructure equipment providers, and we work with operators, so we work with the entire ecosystem.

And we work across all geographies. There are very few companies in the world that can take this technology and work as broadly as we do to implement it that also have the depth in research and development that we do. And so, this also creates IP strength because we bring to the industry technology and associated intellectual property that actually works--and works very well. So, our IP is foundational, it's relevant, it's adopted due to its merit, and it's useful and therefore valuable.

So, let me talk a little bit about culture. I think Jim said more about culture than I can say and spent--I think gave you a great overview of Qualcomm's culture. But, when you walk into the front door of Qualcomm's main building--and I know a number of you have been there--this is what you see. You see a two-story wall of patents. These are actual Qualcomm patents. And it reflects our culture. It's not just a culture of innovation, but it's a culture that prizes novelty, getting out ahead, creating technology that is groundbreaking. And there's a tremendous focus on being an inventor and being an inventor that matters.

And when in the history of our company, we hear the words, "That problem can't be solved, you can't commercialize that technology, it will never be successful," it's like a call to action for Qualcomm. It's a rallying cry. It's just part of the culture of the organization. Everybody is familiar with this story relating to CDMA and Dr. Jacobs and the early engineers.

But, it happened again. If you talk to Roberto Padovani, a former CTO--had Jim's job some years ago--he'll tell you that when he first came to an industry organization to propose high data rate capability for wide band mobile telecommunications, wireless telecommunications--that is bringing the Internet to cellular--his response was not just, "You can't make it work," his response that he got from--from the industry experts in the room was, "We don't need to do that."

Think about that for a second, "Wire line is good enough. I've got voice, I've got text. Cellular is never going to enable Internet." And so, Qualcomm just kept pushing forward. And we have a similar experience that we're dealing with today, maybe not quite as dramatic as the first two. But, there's skepticism about mmWave--great, good, right up our alley. It's exactly what we want to do. We want to solve these problems.

What does it mean for the licensing business? If others want to clear the field and allow us to solve these problems with ground-breaking inventions, we're happy to do it. It creates strength in our patent portfolio, and that's a good thing. So, we build the portfolio to tailor it to a licensing business. And that involves a couple of things.

One of the things is that we have very broad geographic coverage. And so, what you see filled in in blue is the coverage geographically of our patent portfolio. Now, there are countries out there that don't even have a patent system, so there are some countries that aren't actually covered with--with patent filings.

But, we also have a very diverse portfolio. And I don't need to get into the details of that because, again, when you listen to Jim talk about what we do, you can see how much innovation we put into technology, aside from standard essential technology development. It's enormous. So, we're constantly harvesting and managing the portfolio for efficiency, coverage, and cost effectiveness.

Let me focus in on 5G for a little bit. What is leadership in IP in 5G? So, one of the basic points, I think, that you should understand--certainly is our view, we think it's technically true--is that leadership in IP relevant to 5G starts with leadership in IP relevant to 4G. As Jim mentioned, we have the same air interface.

There are some of the same features in 4G that carry over into 5G. There are dramatic improvements that occur in 5G, but there's a lot of commonality in technology that carries over from 4G to 5G. And when we look at our portfolio, we estimate that approximately 75 percent of our portfolio that is relevant to 4G is also relevant to 5G. So, there's a tremendous amount of depth there.

But on top of that, Qualcomm has been extremely prolific in driving new innovation into 5G features that will provide the performance benefits, the user experiences, the efficiencies, and the gains that operators want, very specific to 5G, very specific to Release 15, Release 16. And so, there's a tremendous amount of innovation that Qualcomm has been driving that we think is foundational, as Jim mentioned, to 5G Release 15.

And when we go over this chart that Jim went over, I can't come close to describing the particular areas of technology and their usefulness, why they are important, the way Jim did. But, I want to emphasize from a licensing perspective, that this provides strength to the licensing business because it's--again, the R&D efforts that are years ahead of the standardization activity, enabling fundamental benefits for 5G, massive throughput, spectral efficiency, network capacity, low latency, ultra-low latency, and tremendous reliability.

And having IP associated with these fundamental pillars of 5Gs is very important. And then, again, it's very important to the ongoing strength of the licensing business. It's a continuous process. And it's important that, for example, every data packet that's going to be transmitted in the 5G system has Qualcomm IP because of the channel coding that we've put into it.

It's very important, for example for the licensing business, that we solve problems to enable mmWave to be made mobile. It adds value to the patent portfolio. So, it continues to be valuable, and we see a long runway, going forward.

And then, as you move from 4G to 5G Release 15, we're pushing into finalization of the specification for Release 16, the second release of 5G, and we're continuing this never-ending process that Qualcomm has been engaged in of driving innovation to drive improvements, in this case dramatic improvements, into the cellular industry and then in this case, in particular, with Release 16 into other industries that are going to adopt cellular.

And so, aside from enhancing and improving the mobile broadband experience, Release 16 is directed towards very specific improvements that will enable cellular and other industries--and Qualcomm has, again, been extremely prolific in innovation in this space. And it's not a recent activity on our part. In these fundamental innovations that enable Release 16 and will enable

technology in the cellular space to move into other industries, we've been working for years to develop technical solutions and developing IP around these technical solutions.

And so, I could call Jim back up here, and he can go through each one of these for you in much more detail than I can. I'm just going to touch on them very, very briefly. High precision positioning, extremely important in the automotive industry. And the level of precision is mind-blowing, okay? The specs are really tight, the technology is difficult to do, and we've been working on this for years. And we brought to bear R&D and tested our technology to make this possible.

Unlicensed spectrum, really important to operators, okay? Bringing cellular technology from license spectrum--that operators own--into unlicensed spectrum and doing it in a way that doesn't disrupts the current technologies existing in the unlicensed spectrum space, we've been working on this for years, okay? And we're able to enable the industry to pick this up--increases capacity for operators and creates opportunity for private networks to adopt cellular.

So, there are a number of different things that we've done that we've been working on for years. And we've been very prolific in pushing technology into the second release of 5G. And, again, that is a strength of the patent portfolio, going forward, and fundamental to the licensing business.

So, increasing complexity is good for Qualcomm. The more complex, the better off we are because we solve complex problems. And that's good for the licensing business as well because the goal is to not simply bring technology to the industry and create a standard, the goal is to, then, drive the technology out into the world and actually build optimized mobile devices and optimized networks that actually deliver the performance that everybody expects--that users expect.

And in order to deliver that optimized performance, it requires implementation innovation. And Jim talked about a couple of these things. You have to optimize these devices for power efficiency. They are mobile devices, they are battery operated. So, you have to have innovation around that to ensure that you're continuing to drive commercial success. And Qualcomm is very good at doing that.

Again, we don't just bring technology to the industry and ask the industry to adopt it. We build devices, we test them, we conduct simulations. These are proven. And then, when the technology makes its way into the standard, and when the technology makes its way out into the market, we continuously work on optimizing the technology to ensure peak performance. And that's good for the licensing business because it creates more depth and breadth in our portfolio, so we have valuable implementation patents. And that process is a continuing process.

So, on this side of the--of the talk I'm going to give--this sums it up. Decades of R&D and standards leadership, fundamental, foundational, systems-level innovations, and IP across all of these generations of standards, continuing very, very robustly--very active innovation in driving 5G, Release 15, Release 16, and moving forward, and continuing very, very actively to drive innovation and implementation, which is good for the portfolio, good for the licensing business. So, let me talk about a timeline. So, for the last few years--maybe the last four years or so--there's headline news about this timeline. And the headline news has always been the challenges that we've faced. But, I'm going to step down and step back from that headline, which you're all very familiar with, and I'm going to talk about the story--I want to at least remind you of the story--underneath the headline.

And there are two critical stories about execution--continued execution. One is executing on innovation--continuing innovation. And you heard that from Jim, never losing sight of the fact that we're a technology company and that our goal is to develop enabling technology. And we continue to do it--never lost sight of that fact, and we never lost the execution edge.

And then continued execution in licensing--we actually continued to get to agreements. And so, when you look back towards the front end of this timeline, coming out of a China resolution, we've signed up over 150 Chinese patent license agreements. And then, after we announced--or after we disclosed our rates for 5G--we've now signed up in the last two years--I actually think the disclosure occurred two years ago today--over 75 5G agreements.

And then third, before, during, and after the FTC trial, we've signed what we refer to as anchor agreements--important agreements. And if you look at what we've managed to do under this timeline--under the headline news--if you look at what we've managed to do in this time frame, and you compare our execution in signing up 5G agreements to the same time frame when we first disclosed rates for 4G, the score is 75 to 7. That's how many we had signed up by the end of that two-year time frame in 4G.

So, we've continued to execute. So, key takeaways--unmatched patent portfolio value, continuous R&D and standards leadership, system-level innovations and foundational IP, and critically fundamental innovations and inventions enabling 5G--and continuing strong execution, 75-plus agreements to date and multiyear anchor agreements recently signed.

Thanks very much.