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Troy Jensen:	All right. Thanks, everybody, for making it. I'm Troy Jensen. I'm one of the analysts at Cantor. I follow the quantum computing space, luckily. It's going to be a good year for -- good decade, right, for the quantum sector.
	But lucky enough to have Inder Singh, CEO -- excuse me, CFO/COO of IonQ.
	I know Inder has got a few slides he wants to go through first. And then I've got some queued-up questions. But if anybody has questions in the audience, just raise your hand, try to get my attention and we'll definitely open it up for Q&A.
Inder Singh:	It might be hard to see anybody with these bright lights.
Troy Jensen:	I know, right? Yes.
Inder Singh:	So thanks, everybody, for joining us today. It's great to be with you. And thank you, Troy, for having us here at the company, at your event. And our company is, of course, a close follower of your points of view and what you put out there in terms of what the future holds.
	So I thought I'd just share a few slides, for those of you who don't know the company, to explain the company. Because it's changed dramatically from what it was just a year ago. And I've been with the company now formally for about 2 quarters, and I was on the Board of Directors of the company when it first went public back in 2021, I was CFO of Arm, and we were working on the sale of that company at that time.
	This slide that I wanted to share with you is only 3 slides, I promise. One of them just sets the, I'll call it, sort of baseline for where we are today versus where we were a year ago and, frankly, where most of the industry still is. So this slide shows you, on the bottom left-hand corner, quantum computing.
	So if you follow quantum, you'll first come across computing, of course. So most of the companies that are trying to create a computer or have one or are deploying one are in that bottom left-hand tile on this page. That's the TAM, if you will, that we were part of also 1 year ago.
	And we had built, at that time, the fourth-generation quantum computer, and we're deploying it. We have now built the fifth-generation quantum computer. Later this year, we'll be finalizing our sixth-generation quantum computer for next year customer deployments. Seventh-generation will be on the books already later this year, et cetera, et cetera.
	So a lot of innovation for us in the bottom left-hand corner of this page alone. A very large market, a vibrant market. Lots of companies, some private, some public, some about to go public. But we are innovators in that area in a way where we think we have a sustainable advantage and a road map that goes out 5 years, which we intend to execute to, which will keep our machines in the leading-edge of what the world has to offer in terms of quantum computing capability.
	We appointed our new CEO, Niccolo De Masi, at the beginning of last year. And as he took the helm, he took the company that has succeeded in that first quadrant already and started expanding it to the right, and creating basically the first and only, so far, quantum platform company that now has the other elements of what you see.

So quantum networking is about connecting quantum computers to each other, whether it's our quantum computer to someone else's, or ours to ours, but building the connectivity that, for example, a Cisco built in its early days as well.

Quantum cybersecurity was a reflection on the fact that quantum machines, as they become more capable, will be doing things that I think will start to threaten quantum -- traditional cybersecurity. And we will need -- the world will need quantum cybersecurity at that point in time. And that future state is getting closer and closer. So we acquired a company in Switzerland that is the #2 company in the world in quantum key distribution, and started announcing, as you've seen in the last 12 months, a number of wins with customers around the world.

Quantum sensing reflects on the fact that, if you are building quantum solutions, they need to be in space as well because quantum solutions that are deployed by other countries, in some cases, adversaries, are jam-proof. GPS can be jammed. Quantum offers an opportunity to have something that is either impossible or very, very difficult to interfere with. And then quantum in space gives you the platform to actually deploy some of those solutions in space.

So we are, still at our heart, a quantum computing company, of course, but we can now bring together solutions for different kinds of customers, and I'll show you in a minute what sort of applications, that take advantage of the entire platform.

This just shows you some of the key things that happened over the course of the last year. Some of the customer names up on top there are partners that we've worked with together. Our CEO is shown here as well. But year after year, and I've watched it from the Board for the first 4 years and then from the company for the last 2 quarters at least, we continue to execute on what we say, and have the balance sheet that we need behind us to be able to invest for the long term and not worry about where the next investment dollar is going to be coming from.

So a very strong cash position. No debt. My philosophy is always have like multi-year financial firepower to be able to do anything that you need to do for your customers, frankly, and then for your shareholders, of course.

And then I also get the question around, okay, so what are these being used for? And what we wanted to do was to demonstrate to you and show you on one page, candidly, all the different kinds of applications that exist today. Some of these we build ourselves, and we'll continue building ourselves. Some of them we do it in partnership with our customers.

But you see the use cases in the middle around life sciences, around energy, logistics, finance, cybersecurity. There are about 7 areas we're going to focus on ourselves as a company. So in addition to building the quantum computers that power the future of quantum, we're building the applications that run on top. It's nice to have the iPhone; it's better to have the App Store with it. It's nice to have the iPod; it's nice to have the music store with it. So we're making sure that at every generation of the computing journey, that we are building the applications that are most needed, and then allow others to build on top, of course, as well.

And then the customers that you see there are names of the customers that we've announced. There are many that we haven't announced that we're working with as well, of course, and applications we can't announce yet. But we are building the roadmap for all things quantum, whether it's on the ground in terms of computing, in space in terms of sensing, under the water in terms of helping underwater vehicles navigate more effectively, et cetera, et cetera, et cetera.

Those are the 3 slides I thought I would share. And then we can have a dialogue, if that makes sense.

Troy Jensen: Perfect. All right. So I'm going to start with a quick audience participation question. Who in the audience thinks quantum will be commercialized in the next 3 years?

How about 5 years? Inder, you don't believe it? I didn't see your hand go up.

Inder Singh: Well, I voted with my career decision. I was happy being on the Board of this company and watching it for actually over the last 4 years become a market leader or the market leader and then watching it do these things that are up on the slide.

These are things happening today. These aren't like 5 years from now. These are things today. Five years from now, there'll be a much, much longer list, I think, of what this technology can do, right? I joined when I was at Arm, having sold Arm to NVIDIA, by the way. That transaction, obviously, didn't go through, and then we announced the IPO of Arm. But to me, this was the future of computing. And that's why I joined this company's Board.

Troy Jensen: So I'm a big believer too within the next couple of years we will see applications and problems getting solved with quantum, maybe hybrid networks, hybrid kind of computers solve them. So what I'm getting to is if we're that close, why is post-quantum security not like accelerating right now? If you're a bank or any type of government agency, do you have to be worried about quantum cracking your security systems?

Inder Singh: Yes. And I think it's happening already, right? And I think it started with -- outside the U.S. initially, to be candid, with countries starting to sort of batten down the hatches, realizing that, at some point, encryption, which underlies all things that we know, can be broken. And you don't have to like break everything instantly, but you start chipping away at the different RSA protocols or the ECC protocols, which is not hard to do. It's getting closer. It's not like 20 years away, which everyone thought.

And so I think I would encourage everyone to put like a $0.01 notification on your bank accounts as well. But we're starting to see financial institutions get ready for it. We're starting to see governments get ready for it. We're starting to see more and more commercial customers realize that if their business model depends on anything digital, they want to be protected now.

There are a few flavors of quantum cybersecurity that people can choose, and we offer it all. One of the advantages that I think IonQ has established is we'll meet you where you are if you're a customer. So if you want PQM, we're there for you. If you want QKD and really want to have physical security that is very difficult even for a cyber -- future sort of quantum computers to break, we can deliver that now.

But I think more and more people realize you need application-level software security and hardware security at the same time.

Troy Jensen: Yes. So I'm going to go back to your slide, this one right here. So when I think about kind of the cycles of deployment of your platform, I mean, I think the systems to me are 3 to 5 years out, there's a lot of development names, can you talk about do you expect to see inflection in other areas of the business first, like we talked about post-quantum security, or like atomic sensors -- to me, atomic clocks and sensors make a ton of sense right now. We don't have to wait for development. So do you see different parts of your business inflecting at different rates?

Inder Singh: Yes. Look, when I see this chart, I remember my days at Cisco Systems where we became sort of the one-stop shop for all things networking. And we were agnostic. We were willing to connect anything to anything. That's what this company is doing at the same time as well.

So you'll see that at any point in time, any one of these levers that we have, product families, if you will, can be firing, and others can be firing as well. It gives you the ability to leverage different revenue streams, of course. But also it gives you different entry points. So in some cases, our customers may want the network before they want the computer. And there's been cases of that. In other cases, they buy the computer first and they say, "Well, what good is this if it doesn't connect to anything? Help us do that."

This morning, we announced an investment, with Cambridge University actually, which involves a quantum computer and a network, connecting 2 rival universities, Oxford and Cambridge, which I

thought would never be bridged, but they are. So more and more we're starting to see people starting maybe with cybersecurity, to your point, and saying, "If that's going to be broken first, I want that," and then running the network as well.

So look, I think the quantum computer heritage that we have and future roadmap that we have that we're executing to is without compare, absolutely without compare. And so the 100-qubit machine that is being deployed this year, the 256-qubit machine being deployed next year, the 10,000 machine after that, the 20,000 after that and so on, that roadmap is unmatched. And it becomes a question of execution and leveraging that semiconductor ecosystem, which we're doing more and more of.

Troy Jensen: All right. Since you brought it up, I did want to talk a little bit about Oxford Ionics and that product road map, or the road map, the technical milestones you expect to hit. So Oxford Ionics is at what qubit count now? Is it...

Inder Singh: Well, 256 is going to be our first Oxford Ionics based system.

Troy Jensen: Yes. And that comes out when exactly?

Inder Singh: It's in development right now. The chip has gone through, I said on the earnings call, tape-outs A, B and C, D is going well. So customer deployment should begin, the CEO of that business will tell me, early next year. I think it can be done perhaps even sooner. But yes.

Troy Jensen: And is your confidence on the road map, for a company that's at 256 qubits today to talk publicly about 200,000 and higher, and can you just -- the conviction that you guys have on hitting that road map?

Inder Singh: Yes, I think it's a big step-function change from where we were 2 years ago, and frankly, where a lot of other quantum companies that are trying to do trapped ion, still are, which is using lasers to control the ions. And you can imagine that as you use more ions, you need more lasers. So the more powerful the machine, the bigger the machine potentially, the more energy consumption, et cetera.

With Oxford Ionics, we're able to switch to electronic control of trapped ions rather than lasers for doing that. And that allows us to use an ecosystem that already exists, foundries that already exist, a chiplet strategy for -- starting with 1 chip and scaling it up that already exists, but use it in a quantum sense. And that's what gives us the confidence to go from the 100 we are today, the 256 that we're going to be delivering and the 10,000 beyond.

Troy Jensen: Yes. Okay. Perfect. How about just a little bit more on how about networking, right? When I think you guys -- I guess, my Cisco legacy, I think about switches and routers. Is it going to be different equipment? And how come the existing networking guys aren't talking about this yet?

Inder Singh: Look, I think we're happy to be the evangelist of it. My former company, Cisco, is waking up to it as well, as you can imagine. It's an opportunity that people maybe didn't think about a year ago and are thinking about it now. So some of our customers actually wanted the quantum network first, but to use it over existing fiber, dark fiber, high-quality fiber, but light it up and then set up a quantum communications network. And we did that.

And then more and more, we're seeing people starting with computing and saying, "Okay, I want to connect it to things." As I said, we will meet the customer where they are. And across Europe, we've announced at least 3 deployments already of networking. And in some cases, networking with post-quantum cybersecurity.

Troy Jensen: Perfect. Okay. One thing I forgot to say on the Oxford Ionics, I know that was part of the -- like a short thesis on you guys, right? To me, I think what you said was so critical. You guys were previously trying to control the qubits with lasers, and that's extremely hard to scale, correct? And

moving to more of an electronic approach is going to provide better scalability for you guys? So the Oxford Ionics I could see more of a catalyst, a positive, not as much as negative.

Inder Singh: Well, I mean, I'm not sure what the short thesis. I mean for me, sort of like this industry was nascent and didn't exist when I joined the Board of this company, candidly. And 4 years later, we have the world's largest quantum computing company in this company.

The guidance we've given for this year has a midpoint of $235 million. So the upper end is almost $0.25 billion, rounds to, whereas it was like less than $2 million 4 years ago. So the numbers speak for themselves.

Once you start having repeat wins, once you start having a customer say, "Okay, I own your fourth-generation, I want your fifth-generation computer, and by the way, I want access to your sixth-generation when it's ready," that's the flywheel effect that Cisco probably experienced 25 years ago, 30 years ago. Early days, right?

And so I think you start to see a customer that buys your road map on computing and then says, "I want the other things as well." And having like dozens of products instead of one product -- like in that bottom left-hand corner, we had a product, a product with a great trajectory, but a product. When you have the rest of this, you can now build a solution. To your point earlier, sensing is a solution. Having a sensor alone isn't enough. Having a platform to put the sensor into, having the atomic clock that's considered the most accurate in the world to add to that, that's what creates a solution for a, let's call it, national security concern.

Troy Jensen: Yes. Perfect. All right. So now IonQ has consistently argued that trapped ions offer superior fidelity and conductivity compared to superconducting approaches, probably most approaches. From a scaling perspective, how confident are you that that architecture will remain competitive as these systems move towards fully fault-tolerant?

Inder Singh: Yes. We feel very confident with the decision made, I guess, 30 years ago, by the original founders of the company, right? So whether lucky or smart or some combination thereof, they picked a modality that doesn't require that you cool things down to like absolute 0, at which point like everything stops moving, so you have to go just a notch above that.

Maintaining -- I'm not knocking any technology, mind you, but like maintaining absolute 0 degrees Kelvin or like less than 0.2 degrees Kelvin is hard. Creating material that operates like a circuit at that temperature is hard. Scaling that is hard.

It's kind of like the laser thing I was talking about. The more powerful a superconducting thing becomes over time, the more cooling needs, the more difficult it is to maintain in that steady state, the harder it is to connect any-to-any qubit to each other.

So there are a number of things that, I'm not saying it can't be overcome over time, sure, they can be probably. But if trapped ion gets you there first, and it's cheaper by orders of magnitude, then I think you start to see customers choosing actually.

Troy Jensen: Yes. Just for the audience, so there are kind of 2 technologies, photonics and trapped ion, that you don't need refrigeration, I guess maybe neutral atoms too. But superconducting, you need these dilution refrigerators that are like millions of dollars. So arguably, if trapped ion can scale, it will be a much cheaper solution than superconducting from the grand scheme of things.

So I guess a question for you, do you think we're headed towards one dominant architecture technology? Are there going to be heterogeneous ecosystems or hybrid deployments or?

Inder Singh: Yes. I mean look, I'm an engineer also. So I believe many can coexist over time. But frankly, a few, 1 or 2 maybe, become most relevant over time, right? And I think those are -- and I'm not going to try to say which ones they are. I think trapped ion is of course of them. And whether the other one is photonic or superconducting or something else, it really just depends.

A lot of quantum depends still on science and scientific breakthroughs. And with trapped ion, for us, at least, those are behind us. Starting with a natural advantage of having few errors to correct, higher fidelity, longer coherence times, gives you the ability to get to fault-tolerant computing more easily. And I think that's the holy grail for this industry, is to get to fault-tolerant computing.

We announced recently that we've achieved 99.99% fidelity, which is like the last thing that we needed to have, candidly. Oxford Ionics helped us get that, of course. And now we're leveraging Oxford Ionics roadmap to actually scale the machine to logical qubits. You can pound your chest and say we have millions of qubits 1 day, et cetera, cetera. That's great. But if you're using like 99% for error correction and like 1% are actually usable, that's not that helpful. In our case, we're starting with fewer errors to correct, and therefore, it's a question of now just scaling the machine to get the logical qubits.

Troy Jensen: Yes. So ions are natural, right, so they're more pure. Fidelity is better...using the ion.

Inder Singh: Bingo.

Troy Jensen: All right. Can we talk about your software strategy, right? I mean you guys have tons of hardware, obviously, there's software embedded. But like compiler applications. Do you have a platform approach to the software side of it?

Inder Singh: Yes, it's a great question. I think this again -- again, this is one of the smallest companies -- actually, the smallest company I've been part of directly. Most of them have been very large companies that know how to do this at scale. And what we're doing is making sure that this company also establishes that scale.

One thing that you need is software scale, to your point, the ability to have compilers that work with the machines that you create at the same time. And for IonQ, what I watched from the Board at least, was 4 years, 4 generations of creating compilers that work with each successive generation of quantum computer. With the acquisition of Oxford Ionics, we get the chip expertise, and then we use our compiler experts who've built this over time already, combine with that team to go execute on the overall solution.

The solution of a quantum computer involves software that manages the machine itself. Compiler is part of that. So we have that at scale. It involves physicists who understand how to make this work and to integrate the systems together. And then it involves, importantly, application developers. And almost no other company that I've seen is even talking about the applications themselves.

We are not just talking about it. We have, I think, one of the world's largest, if not largest, application development team. So the machine and the application that runs on it, like the ones you saw, that's the capability we're building right now. And so we will scale that, and having more than $3 billion of cash allows us to have comfort to be able to scale the software expertise just as much as the hardware.

Troy Jensen: Yes. Okay. And so for IonQ, is the focus for you guys really on the U.S. government and their allies? Because I know you -- there's a lot of talk about U.S. supply chain. You look at your acquisition history. Is that the focus of you guys, would be this U.S. supply, selling to U.S. administration and our allies?

Inder Singh: Look, I think we've rapidly become a very global company. So I mean, of course, we love our U.S. customers and value them over time. On the earnings call, I mentioned that more than 30% of revenues are actually outside of the United States now, 60% are nongovernment as of last year.

And as we think about further investment, yes, as you develop machines that become more capable and more powerful, governments start to take notice. And that's where 4 years ago, it was mainly labs looking at things. Even 3 years ago, probably labs looking at things. For us now, it's starting to be what you were seeing at the very beginning, which is actually deployment at scale.

And so what I'm -- the trend I'm starting to see, customers that we're starting to see, is data center operators, they actually are saying, "We have the GPUs. We love those. You need a TPU next to them to do different types of things that GPUs just can't do." And so that's when you start to get, again, this adoption effect happening.

Will the U.S. government be an important customer? Of course. Will they want us to help sell similar solutions to allies? Of course. But that's an and. What I'm seeing right now is like financial services institutions and others say we need to look at the ability for what quantum can do.

We're starting to see life sciences companies say, help us with drug discovery. How can we do that earlier? We're starting to see some early attempts at trying to understand protein folding, which we demonstrated last year. So great applications outside of government, great applications outside of what you would normally think.

Troy Jensen: Yes. Exactly. That's a good point, a lot of commercial applications. I do think those will happen first.

So let me see, is there any questions in the audience? If I can see hands? All right. Right here.

Unknown: [Technical Difficulty]

Inder Singh: Yes. Look, I think I'm not going to compare-and-contrast very, very different companies, right? I think I respect IBM for everything they've done over the past decades and they will do in the future decades. So putting aside kind of what their strategy may or may not be, this is a pure-play quantum company. And so for us, like this isn't -- quantum isn't in our other category of revenue. This is like our revenue.

And so what we're trying to do is make sure that we have the strongest ability to invest in a 5-year road map of technology solutions. Others will be in the market also. That's what makes the market.

One really good thing about this industry and is very different than any other industry I've been in, prior to this, which is in other technologies, you're trying to displace somebody else. At Cisco, we were trying to win against Ericsson and Lucent and Nortel. And we did. But it's hard because you're dislodging an incumbent and they don't want to be dislodged usually, right?

In quantum, there isn't an incumbent. And so like people ask me, like, do you think about your competition? No, not really. They actually use components from us in some cases. I'm not naming anyone. But we make components that other quantum companies use today. It's in our interest for the industry to actually grow. It's not a zero-sum game. We're not taking food out of somebody else's mouth. This is about creating a capability that simply doesn't exist.

And so the more companies that succeed at it, the higher the odds that this becomes an industry at scale itself. But we're not standing still, right? On this slide, you see at the very bottom the quantum application layer. That's really important.

So having all the products is important, having the software, the hardware integration, expertise, the best physicists in the world, and even creating the ecosystem by investing in some universities that will create graduates of quantum, that don't exist today in some cases, right? So having all of that knowledge base, having an ecosystem is important, applications are very, very important. You have to have not just like proof-of-concept things, but application development at scale.

Imagine like a quantum hedge fund one day against a classical machine. Which one do you think you'll bet for or against, right? I think I know which one I would bet in favor of, right? Those are the types of things we want to build, the cutting-edge applications that simply don't exist.

Troy Jensen: Any other questions?

All right. How about one more for you here. When investors look at IonQ over the next 5 years, what are the 2 to 3 milestones that will define whether your company has truly been successful?

Inder Singh:	Well, I think that, to me, putting up the numbers, right? Showing the revenue growth, showing the repeat customer, showing the adoption, showing the globalization, showing the entire solution. And it's nice to have a machine that's much better to have like a road map.
	Most technology customers lock into our road map. So any company that has a road map that says, "I'm going to sell you this today, this next year, this 3 years from now, this 4 years from now," you have to execute, of course, right? And now customers can lock in and say, okay, so how easy will you make it for me if I commit to be with you on a journey?
	And so I think what we have to do now is keep executing on that road map that I talked about: The road map in quantum computing, the road map in networking, the road map in sensing, and not just be a one-trick pony. So super important for this company to execute that.
	And you're starting to see that flow through our P&L. You're starting to hopefully see that in the confidence in which we describe our business, because our customers are not labs-only anymore, we can actually see it being deployed in the real world.
	The second thing I think is establishing scale within the company, the ability to, yes, acquire some things, but quickly integrate them. And so like 2 quarters ago, I mentioned that was going to be a focus for us. I reported recently that we have now successfully integrated the things that we acquired, at least from sort of a common denominator standpoint. And then the engineering integration begins after that to create those solutions.
	So I think those 2 things we have to execute on, for sure. It's also an industry in which we have to maintain very sharp focus. And it's a technology that can do amazingly powerful good things and amazingly powerful not-so-good things, just like AI. And so we have to be very conscious of how we balance for our customers, protecting against the inevitable misuses of technology versus just the use of it. And so having quantum cybersecurity today is one way for us to show that responsibility.
Troy Jensen:	I'm glad you brought up the integration comment because, to me, I've seen companies struggle doing one acquisition. You guys have done about 8 now or so, right? So I'm glad to hear you guys are focused on the integration.
	But I would just end it, we got 30 seconds left, when do you think IonQ will crack encryption codes, if you had to put a time line on that?
Inder Singh:	Well, the only thing I can say publicly is what the Department of War has said themselves, which is they expect it to happen in less than 3 years. So it ain't 20 years away, for sure. As these machines become, in logical qubits, useful qubits, much more powerful, and this is public, like, sure, the algorithm takes 4,000-ish plus or minus qubits, for RSA-2048, you can look at our road map and do your own math on how many years away that might be.
Troy Jensen:	Okay. 4,000 logical to crack...
Inder Singh:	Well, that -- you can Google it and you'll see that that's roughly what it is, plus or minus, right? And like you do it rapidly or you do it over a year, that makes a difference, of course. But we think as these machines become more powerful, and you have quantum cybersecurity -- or regular cybersecurity companies here, just want to be respectful for everyone, but I think you need to have an awareness that encryption is at risk.
Troy Jensen:	Awesome. We're out of time, Inder. Thank you so much.
Inder Singh:	Thank you.
Troy Jensen:	Appreciate you coming here.