Kuehne+Nagel's **Inside Semicon**

Episode #6

The impact of servers

Tom Mulders & John Desmond (00:03) Intro

Welcome to our podcast series Inside Semicon and in today's episode, we'll be discussing the server industry and what this means for the future of data and the environment. Hi, John, good to see you again. Thanks, Thomas, for having me. Yeah. Thanks everybody for tuning in again. My name's Tom Mulders, I'm your host for today. I'm here with John today. John, today we're going to talk about servers, correct? Yeah. So what exactly do we mean when we say servers? OK, so I suppose I'd have to tie servers in with the the semiconductor industry. And as usual, I have my little bag of tricks, Tom. So I'm going to dive into my bag of tricks here. One second. I'm start pulling things out here.

John Desmond (00:55) Different types of memory devices

So what I have here and what I show is basically this is an old drive. So you can see this Tom, just as you can see that you can feel the way yeah, yeah. And basically this is it's an old drive. And the size of this is 120 gigabytes. So on, on something this this large. So it's probably, I don't know what would that be in terms of inches, but in terms of centimeters is maybe, you know, 2020, yeah, 20 by 10. That's quite a large a large product, as you can see. So that's what data was was stored in and I'm going to, you know, build up the story here. So just give me one second. So and then obviously as semiconductors improved, we then went to the famous thumb drive, you know, which is basically again, something this small and this one has my site is failing me is I think that's a 16 gigabytes Tom. So that's 16 gig, Yeah you know, you can see that the difference between the thumb drive, which is literally the size of your thumb from the original, you know, drive, we're now getting smaller and smaller again. This is all driving semicon. And then the last one then is probably the latest one in terms of, you know, where we're getting to, which is why semi con is inherently tied into servers. So then you have something this size, it's basically a little SD card that you put into your camera, your, you know, your home security system and that is 64 gigabytes and either taking, you know, that's so you can actually get larger than that.

So if you then kind of put that side by side to the first item that I took out, this is the size of your fingernail, literally the size of your fingernail. And when you compare that to the first one of ten years ago, you can see how semiconductors has driven the server industry in terms of space. Wait, so the the first one you pulled out, that's only 10 years old. It's about 10/10/15 years old. Yeah. So that that's a massive difference. It is. And you can see then what happens then is that semiconductors, because they're getting smaller and smaller and smaller, it actually means we can store more and more and more.

John Desmond (03:11) Data is driving the increase in servers

But then the inverse question is, well, what are we putting on that, you know, how is that affecting the the supply chain? How does that affect our customers and our consumers? And it's been driven by the amount of data that we consume as individuals, as human beings, but also electric vehicles. I mean electric vehicles are generating, you know, an an awful lot of, you know, terabytes of data. Tesla does something like 3 or 32 terabytes a week and Facebook as one social media platform does 52 thousand data points per person. And if you multiply all the people just on, you know, Facebook and then you cut across TikTok and Instagram and various others, you see that we become really data hungry. And that's what's driving the servers because this has to be stored somewhere. So if you want access to understand, you know, what makes the car better to drive and how it can distinguish between a cow and a cat or, you know, a truck and a train and a car, then these data points are needed continually. And this is what's driving the servers because they need to store that that data.

John Desmond (04:00) Heat generation and the environmental impacts

But then that inversely, well, it needs space. And then if it needs space, it generates heat. Yeah, yeah. And that's one of the things then as well. That's also a byproduct. And I was reading it that in Ireland from the Central Statistics Office in Ireland, that 21% of the National Grid energy, like 21% is now being used by data centers in Ireland. So that's like just a fifth of all the, you know, the energy produced from the greatest being used for data service. Wow. And that's, that's just for data service, right? Yeah. And that's, and and then those data takes everything from it houses everything from, you know, the Facebook data points, 52,000 data points through to the electric vehicles. And if 11 Tesla has so many terabytes, I think it's it's 32. I could be wrong here, but since 32A week, sorry, two terabytes for one car a week. Imagine how many different electric vehicles are out there continually uploading and downloading, updating and you know, and then and all of this as well as pumping into to AI, which is also driving it further. But the power consumption needed is also means that it's environmentally is a sustainable. And that's kind of in the next question is, you know, how do we get into a sustainable area with semiconductors? And as long as we keep requiring more and more information, we're going to keep requiring more and more space, more and more semiconductors, more and more heat, more and more electricity being generated to power these devices, these servers, these big server firms. Wow. OK.

Tom Mulders & John Desmond (05:53) Logistical needs for the server industry

So tell me a little bit more about the logistics side of servers. So how does a company like

Kuehne+Nagel deal with these companies that run these? So you probably have maybe I'd say, you know, at the moment it's probably 5. Everybody would know, you know, the big 5 names of you know, what they do and you know, and who they are because they're probably household names. They would have originally started out in the laptop industries. They'd originally have started out as like, you know, business machines. And basically they have gone into this area because it's a big growth area. I mean, and to be seen this explosion in terms of, you know, data points being collected and and electric vehicles is actually driving this. The next one that's driving it is, is AI. Obviously you need a lot more processing power, but in terms of logistics, you know, we need to move the servers from point A to point B because they're manufacturers somewhere, then they need to go into a data server firm and that can be quite a complex supply chain in terms of handling. It would not, you know, need the same, you know, amount of how to say touch points as we say semiconductor where you have different, you know, light, heat, humidity, etc etc. Because you're still shipping a rack, but you are shipping, you know, quite heavy and quite power hungry devices. And you know, they while they are robust and they're inside in the in the case, you still do have to watch, you know, the heat. That's why heat generation is, is so important.

But with regard to data centers, so for us, we need to make sure that the products get there, that is handled correctly and that's unloaded correctly, that's put in place correctly. And then obviously we have to ensure that all the packaging and so on also comes back. So we do have a kind of end to end supply chain there that we look after it from point A to point B. But also we have to the ability to think ahead and not just say, you know, drop the server rack, which is it's just a big rack with one of those devices. I've shown, you know, a couple of 100 of them in there because obviously they're all packed and the packaging obviously needs to come back, which is the part of the sustainability element that we would also provide to our customers talking about sustainability, the environment. So these the server industry in general, but specifically, you know, moving these servers around, how do we try and mitigate the impact on the environment? The the best way for doing that probably is because you need to get the product from A to B. Then you are looking at how do you move it? So you have various, you know, methodologies of moving it.

So obviously at any point there are touch points, But then instead of saying, you know, air freighting it in, maybe you can do AC air or an air sea part, you know, within within the leg of the shipment. The last mile delivery, you know, it's often forgotten about because when it does land at an airport, it needs to be moved to the end location, which is nearly 100% of the times is on some sort of a vehicle. Better it's a, you know, a 40 foot truck, or it could be just, you know, spare parts or whatever. So to to be more sustainable in that area, then moving at the last mile, let's call it the last mile could be done with an electric vehicle. And then we are contributing now because we're using electric vehicles, which is using so many terabytes a week, we're now contributing to the need for extra data centers. So you can see that it's a chicken and egg situation. So we're kind of creating that as well. As you know, everybody has their phones, Everybody wants access to immediate information. So it's actually ourselves who are driving this need for data. Data servers.

John Desmond & Tom Mulders (09:17) What's driven the need for servers

I mean, go back in the 80s when I was growing up and they had didn't have a mobile phone. Data centers weren't really something that was talked about back then because there was no mobile phones. You just no need for it. There was no need for it. You went to the library, you know, you

basically walked or cycle to the library and then you came out. Now you've everything accessible on, on your phone, but to do that, that information needs to be stored somewhere electronically, right?Which is in a data centre,right? And just to make the connection with AI and with cloud computing and everything, that's all done in data centres, right? So these data centres, they're not only growing massively, they're also changing out their, their microchips, right? And from what I've read online, these new chips, they also require way more energy to run, right? Because there's more computing power that they're, that they're generating. How, how are these companies trying to offset that need for energy? It's, it's going to be kind of hard because you're done down to the fundamentals and the basics of how a semiconductor works. But in kind of layman's terms, we basically have like one layer. So we're not actually getting into the area of being able to stack these chips on top of each other, on top of a second device. So you just have, you know, 1 processor, which you can't stack 456 on top of each other within the design. So we're still limited and what we can do in terms of, you know, like 3D, we are researching it not, not, you know, not me personally, but there are companies out there that are really putting a lot of effort and money into this to, to reduce the power consumption because then you can actually go vertical in terms of just having everything on one level. So that's one. The second thing is to have low power consumption, but then there's new materials needed. And really it could be that we are over engineering. So we're using, you know, chips basically that are overpowered for what they needed to do. There's a lot of redundancy in there. So if we actually went the way of umm, having more AI to actually say, well, we don't need this part of the equation. We can focus on just what we want. And the other data can be kind of left to the side. It would then mean that it's less accessing of the, of the, you know, the hard drives on the servers. Umm, and if it's umm, got quantified better, like in a library, you know, you can imagine like if you want a book in the library and you end up walking around for 12 hours trying to find, you know, something you want to read a specific book. But if you know where it is, it's very efficient to go in, go to that section, put it out, take it and you have your book as opposed to actually walking down every single aisle looking for that one piece of information.

But that's something that we, you know, that the programming, the coding behind that is also why in the server rack, you not only have massive amounts of data storage, massive amount of hard disks storing, you also have coding behind that. So, you know, making it kind of easy and simple. You might have one hard disks that says, you know, this is a cow, 4 legs and a head, this is a dog. But this is this, this, these dogs are kept on this particular location. So then when it comes to someone says like, you know, I don't know what a cow is, it'll go straight to the, that section of the library where it knows where cows are as an example. It's probably not a very good one, but it's about the best I can put together in, you know, in layman's terms. But there's a lot goes on behind in terms of how the data is accessed, how fast is accessed, you know, and also how clean the data is. Wow. So actually they're using the new, the newest technology, the AI technology to make their own process for storing and making data accessible. They're making that more efficient. Yeah. The indexing of, I think it's the technical be the indexing of it. So, and that's where the AI can do the indexing better. So you don't have to. If you're looking for something on your, on your, your, your laptop, you just go straight to the folder. But imagine if you didn't have folders, it's on, it's on your hard drive somewhere, somewhere, and then you have to go access it. But if everything is indexed and folded, then you can see that you even that you're actually doing the AI element for your, your laptop. You're actually putting things into folders yourself and you know where it is. But that's why I can never work with somebody else's Excel spreadsheets, because their brain works that for them. And if I try to access something in their Excel spreadsheets, I can't follow their train of thought and it works vice versa. So you can see there that actually having that ability to index it and having a A1 overarching generic system controlling that would make it way more efficient in terms of where you get your data and where you get access to it.

Tom Mulders & John Desmond (14:00) Delivery and installation of servers

So I was just wondering recently, let's say Kuehne+Nagel delivers one of these servers, server racks to a data centre. Yeah. Is it simply plug and play or how does that, is there a certain install time? Yeah, correct. I mean, it wouldn't be as bad as say with a semiconductor piece of Capex. However, you know, when you do actually bring it in, there will be the engineer from the server company there. So obviously then they have to to build it up, they have to run it up, they have to check all the connections. So depending on what they're putting in and how complex it is, because they also have to network it because you're putting in one server into a Bank of servers. So now it now needs to start sharing data as well across other servers and be accessible. So you have the whole networking, you have a going on, you know, and then you have the power to it. So there's quite a large element of manual, if I can use that turn like manual labor to go. And it's not just a plug and play because you still have to, you know, check all the data connections, make sure everything is running. I was, I used the word spin up, but that's an old term when you actually had a hard drive that had a magnetic disk and you it was like a record player and you had a over the hard disk was a little, you know, reader and it actually spun and, you know, you could read from it, but you would actually boot up as supposed to be the proper terms today. You would boot up that server and then run your checks and make sure that everything is working and that you know the, the heat and so on is, is good because you can never tell exactly when it arrived to the location and things are plugged in. Sometimes you, you may, you know, things don't always go right, right. But these, these engineers are these technicians they're, they're waiting there right. They're waiting for that server rack correct. So that just emphasizes how important it is for us as a logistics firm that we're making sure that that specific server is on time and it also arrives in good condition.

So we're monitoring that shipment constantly. Am I right there? Yeah. So like from point A to point B. So when it's, you know, order to delivered, you mean you you need to be there. You can't be there ahead of the engineer because then you know it's going to sit there and wait. And engineers time is installation, engineers time is actually time is money. And the company who was ordered wanted in as soon as possible. So we really have to ensure that the, the logistics also takes into account it the human element, which is, you know, can we get this to the correct location on the correct street? Or if it's up, you know, one or two or three flights, sometimes it could be a research lab in, you know, a university, which needs to be, you know, 3-4 flights up, you know, and something as simple as is the elevator big enough? You know, these kind of things then come into effect. So not only putting them into data centers, but you're putting them into research labs and you really need to understand, you know, what the customer requirements, but what the end game is. So where will it actually sit? If it's just going into a data center, they probably are pretty smooth in terms of their, you know, they can just do it on wheels, they can literally wheel it in, plug it in. They've done it a couple of 100,000 times, no issues. But if you have a research lab that's suddenly coming up to speed, then you have to figure out logistically, you know, it's easy to get it from the plane. It's easy to get it onto the truck, it's easy to get it off the truck. But how do I get it up for flights? And there's no lift because somebody didn't actually look at the intent supply chain, which is why it's so important.

Tom Mulders & John Desmond (17:14) Recap of the episode

So recapping what we've discussed, right? We've discussed, you know, a link between the server industry and the semicom industry. We've discussed the importance of logistics just in time and also monitoring those shipments, right, when it comes to humidity, temperature control, that kind of stuff if needed. We've discussed the environmental impact and the way we're trying to, you know, to get that alongside the, the server industry, which are doing their own thing. Have have we missed anything, anything else that people listening in should, should realize about the server industry?

John Desmond (17:50) Final thoughts - the need for information

I think the, the one thing that people need to be aware of is we are generating this, you know, our need for information. You know, it's not a good thing, it's not a bad thing. It's just, you know, where we are at this point. Our need for information and our need to have access, immediate access to everything is what's actually driving the need for these huge data centers. And like I said, just, you know, on Facebook alone, 52,000 data points per person for every person that's on, you know, on Facebook. And that's just one media. And again, the EV care. So, you know, we're actually contributing to this, you know, massive growth in, in, in the, in the server business and we're contributing to these data centers. So it's, it's our use of, of equipment all the time. We wanted to be online all the time. So it's how we're evolving, it's how we're progressing. And technology has to keep up and it has to actually overtake us to to mitigate, you know, the heat, the power consumption and everything. That's a bad side effect of having such a large consumer of electricity. Yeah.

Tom Mulders & John Desmond (18:53) Outro

All right. Thanks for thanks for coming today. Really appreciate your your insights on this. Thank you. I'll see you next time. All right. See you next time. Thanks for listening to today's podcast Inside Semiconductors and the Semiconductor Supply Chain. If you found any of the topics we discussed interesting and you want to find out more, you can find me on LinkedIn at John Desmond or go to Kuehne+Nagel's website.