VISASQ / COLEMAN

Data Center Market

Expert :
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- Owner, President, Advisor at TDP Telecom Advisors
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Tim holds over three decades of leadership experience in the Data Center, Telecommunications, and Information Technology sectors. He spent more than 5 years at Flexential which operates 40 data center facilities across 20 major domestic and international markets. As a senior leader, he drove their network connectivity and Edge strategies and was in charge of establishing Flexential as the default partner for network-centric companies. Prior to this he held roles at ViaWest, Go Daddy, and PayPal. Currently he serves as an advisor to data centers for attracting hyperscaler and AI customers.

Moderator:
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- Founder & Managing Partner at Rosemont Legacy
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Expert Insights On:

- The current state of the data center industry
- The difference between public cloud and co-location, and the different models that exist
- Key players and involvement within the value chain
- Data center deployment and build
- What are the workflows that are better suited for on-prem versus in the cloud?
- How the market is measured and the current size
- Energy usage and importance of dense performance vs sheer size
- What are the sectors driving that demand right now? Key companies involved
- Challenges the data center market is facing
- Upstream considerations and limitations of transmission infrastructure
- Value proposition for a community building a data center
- Liquid cooling innovation with the expansion of GPUs
- Environmental considerations and reducing the carbon footprint
- Renewable energy types and impact
- Key players in the overall Data Center market
- The value chain and model of the market
- Projected growth and demand of the entire market
- Distributed layouts and latency

Max: My name is Max and I'll be leading this call on behalf of Coleman Research today. As you know, the purpose of the discussion is to learn about the data center market including key players and trends in the industry. Before we begin, I do need to remind you that we are in no way soliciting any material non-public information or information that is confidential and related to any company or organization you are currently or have ever been affiliated with. If you believe the answer to any question involves non-public information, please tell me right away, and I'll take us in a different direction. Any questions before we start?

Tim: None.

Max: Okay, perfect. Here's an overview of today's agenda. I think the first topic is an industry overview of data centers. And so, maybe we can start there. How would you describe the current state of the data center industry?

Tim: Yeah, I think right now is a great time to be a data center provider. I don't think has ever seen the amount of excitement and the amount of interest as it has recently. With GenAI coming on board, with the hyperscaler still expanding, and with other large enterprises moving in, especially even some of the chip manufacturers that are moving some of their key deployments back into the states and some of their technologies back in, the data center market has just exploded. The biggest challenge for the market right now is the seeking out power. Power's been our toughest, hardest thing to find and to be able to build around. And that's where I'm doing some advisory with a couple different customers. If you'd asked me three years ago, it would've been the combination of power and interconnection. And right now, you see power. I mean, you see Applied Digital's building up in the Dakotas, because they could get power there to build a 200 to 400 megawatt facility that you can't get in most of your areas.

Atlanta sees a great strength right now, because Georgia Power can provide a significant amount of power to the customers there in the data center environment. And so, that Douglasville, Lithia Springs area is exploding. But, it's shifted from where if you'd have said right around two years ago, three years ago, or pre-pandemic, I skipped that one pandemic year, because it was a weird year for everybody, you had people able to come in and really negotiate prices. Nowadays,

Tim:

it's more a seller's market. Whereas, if you have the power, if you have a 10 megawatt power deployment for some of the GenAI, you can almost set your prices. And I know of several operators that have actually turned away hyperscalers, which are the Amazons, and the Microsofts, and stuff, because they could get a better price from the AI players right now, and it's better for their margins, and better for their business.

So it's a fantastic time. But it's challenging too, because you have more demand than you have capabilities. So trying to build data centers fast, trying to find the power, trying to find a community that is actually receptive to it, and then trying to compete in those areas where there's things like tax abatements, and some of the other positive things that helps people build in is this whole secret sauce that you've got to figure out what works for you and whether you're a small data center operator in that 10 megawatt range, or you're one of these guys seeking out the 50 to 100 megawatt builds, your key resource right now that you're looking for is power, and then try to figure out everything else that goes around it. So that's the challenge that we see in the data center industry.

Max:

Super interesting. Thanks, Tim. I want to circle back to power. But before we do, I want to lay the land a little bit more with regards to the industry generally. So, can you describe the difference between public cloud, and co-location, and the different models that exist?

Tim:

Yeah, we break them into, what we call, retail, which can still be up to a five megawatt deployment and hyperscaler. And then, the AI players are sprinkled in between, because they're looking at 10 to 20 upwards. Your wholesale markets, which are your hyperscalers, are the public clouds that are going out there and really building these large data centers. And, I would say that if you're building for them, you're going to get very small margins, and really what you're doing is funding the capital to build that data center with a small margin behind it. Some of the operators out there, of data center operators, just don't have these capital raising machines. Right now is a little better time, because there's a lot of private equity trying to get into it. And then, you have the retail, the smaller operators that are looking at the three to five megawatt builds, and they're going out there looking for enterprises that still need the 250 KW up to a 1 meg deployment. And there's plenty of those. And, there are a lot of the tier two markets out there.

Tim: And so, you've got those two trains of thought. And, depending on who you're working with and which providers, it depends on what their business model is. And you've got a few providers that sit in between that try to accommodate both. And they're winning a lot of the AI business right now, because they do have the 5 to 10 megawatt deployments that some of these, the CoreWeaves, and the Applied Digitals, and others are out there are looking for to build that in between. But, from that standpoint, if you're really chasing the public cloud providers, you're looking at a large 100 megawatt deployment as almost a minimum.

Max: And just to be clear, you're quoting megawatts, because the size of the data center deployment is measured in terms of how much electricity it consumes?

Tim: That's correct, Max. I mean, it used to be people would get excited about square footage. Now, we're almost all focused on power. If you're working with the AI or high HPC guys, high performance computing, you need dense power. Square footage isn't near as important as being available to accommodate kilowatts of power per rack, maybe in the upwards of 50 kilowatts or more. Whereas, it used to be five to six kilowatts was fine. And so now, we've made this scalable jump from large data centers being in the 10 to 20 megawatt range, up to almost a minimum of 30 to 50 megawatt range, because of the power consumptions have increased so much and the power densities. And so, in the industry now, we really focus more on how much power can you bring. Square footage is important, but it's not critical like power.

Max: Got it. Makes sense. And from a "public cloud" hyperscaler perspective, we're talking about the AMP, like AWS, GCP, and Azure, and they come in, and build it, and run it? Or, does someone else build it, and then they lease it back to the hyperscalers?

Tim: Yeah. So, all three, and then you could throw in some of the others like Oracle and stuff. All of them are doing both. They'll build some of their own, they have their own teams that go out there and build them, but they have no ability right now even though they could throw tons of money at it. But, from a overall business model, they'll build and they'll also go out to Advantage or now Stack is in that market and a few others that'll build custom data centers just for them. That 100 megawatt, 200 megawatt data center. And it'll build it, operate it, and lease it back to them. And so, it's this balance of building some of your own and having your own teams build it, and then going out to providers that can do it. So it's a mix. They do both.

Microsoft probably does less of the wholesale buyback from providers than Google, or Amazon, or Facebook. But all of them are doing both. And so, in the industry, it used to be everybody would pursue the hyperscalers. And now, because you can get a little better margins, people are pursuing the AI guys a little more.

Max: Got it. I see. And, just to level set here, in the case of a smaller deployment, there's a data center company that'll build it, and then they look for tenants. Is that the right way to think about it?

Tim: Yeah. Clients or tenants. Yep.

Max: Clients or tenants. Got it.

Tim: Well, go ahead, Max. I didn't mean to interrupt yet.

Max: No, I guess, and then what's that relationship like with getting tenants into the data center? I presume there's a decent amount of hand holding that goes into moving things from on-prem to the cloud. For folks that haven't done that yet, can you explain a little bit the friction and how that works?

Tim:

Yeah, I mean, right around the time of the pandemic, we had this cloud-first mentality where a lot of enterprises wanted to move everything to the public clouds. Now, you have people talking about hybrid. And what that really means, from our standpoint, is the ability to move certain workloads to the cloud and certain workloads move into a co-location environment. It does take a lot of hand-holding. A lot of data center operators out there will call themselves managed services providers, because they'll manage your space and power, and they'll manage your migrations, your workloads, and they'll manage your connectivity back to the public clouds for you and help you navigate that whole process, because it only happens once every maybe five years for a lot of enterprises, if that often. And, therefore, having a data center provider that has on-staff solution architects or engineers that can help you do that is pretty critical.

Equinix has a full team, like Central, almost all of your operators have a team of highly skilled folks that can come help you manage how to do that. But it's stressful for a business, because you're now moving. The best time to do it is when you need to upgrade your infrastructure. So a lot of CIOs or CTOs will come to us at a point when their infrastructure is aging. Healthcare is a great example, because they can't turn anything off, because they're still managing all their patient, and the patient records, and everything. But they'll come and say, "We're going to upgrade and build this whole new infrastructure. We're going to do it in your data center. We need help. We need connectivity at public clouds. We need some private cloud. We need secure connectivity back to our old data center. And we need to help on managing the workloads and doing that." And, Central was really good at that. That was my previous company. And, they're really focused on having the teams that would go help do that.

And there's a lot of other providers out there doing the same thing, but that's the challenge that a lot of businesses have. They can't shut their business down overnight and wait two weeks to bring it back up at a data center. So, they pick that time when they need to do that big upgrade or they need to shift their technology stack. And then, they move at that point over to a co-location with the connectivity to public clouds.

Max:

Got it. What are the workflows that are better suited for on-prem versus in the cloud? Let's just describe it generally for now, and maybe we'll circle back to this too.

Tim:

Yeah, there's some differences. We had a manufacturing company who had their own SAP environment and they managed all of that themselves. And so, they wanted that workload to stay local. And then, they did their development up in the public clouds. So they built their infrastructure there. A big brand name storage company worked with us where they wanted all their storage to be local and their front end processing for that storage, but all their development, all their front end processing was up in the public clouds, because storage hit a point where it was cheaper for them to run and maintain it themselves, versus having it up at AWS. And, it's that scalability where you get to a certain point where you look at the financials and you just say, "It's better for me to run that environment myself."
And then, there's a lot of small enterprises, they just like to have their servers close to their clients. And so, within state or region, that was probably one of the big wins for a lot of the distributed smaller data center operators is you have people that want to have their infrastructure there. And, it's a cost balance with what you want to do and what you want to put up in the clouds, but there's a latency hit when you go to the public cloud. So if you're in the central part of the U.S. and your closest cloud provider is either Ohio, or down to Texas, or something, you might not want that. And then, of course, government agencies. Government agencies, most of them want to stay within their own state. And so, you have that ability to work with them.

Max: Makes sense. What is a quantitative metric that the market uses to describe the size of the market?

Tim: Are you talking about the entire market or the customer levels?

Max: I'm taking a step back. I'm referring to the entire market here. How is it measured and what's it at today?

Tim: Yeah, right now, we're measuring it in how much power. I think, the market is currently around that eight gigawatts of power out there, with AI and the amount of power it's consuming, we expect that to double probably in the next three years to somewhere around 15 gigawatts of power. And so, if you think of that as being our measure, it's how much power is being built. You go out there and you look at any data center or site, they're going to tell you how many megawatts of power that they have available or that they have under contract. For instance, Central has about 300 megawatts. I think they say that in their website. Some other operators will tell you they have 500 with another 200 megawatts coming online in 2025. And so, it's all about that power again.

What I think that the big measure for us now in the industry is how dense can we get within a data center? So, it used to be, I could have a 10 megawatt data center with 5 KW racks. So I have a couple hundred thousand square feet of data center floor. Now, if you want to win most workloads, you've got to be able to accommodate 25 KW racks and above. So you're back to this dense power within your same footprint. But, our big thing is around power. And if you want to take that as an example to two things, I do a lot of different speaking at conferences. And so, if you take a 200 megawatt data center, you're basically able to turn around and probably power per day upwards of 3 to 500 households. So, that's the challenge that we have in some of these communities is there's a little bit of a pushback, but our big thing right now is power.

Max: Yeah. Okay. So, I do want to double click on that. But before I do, KW, just to make sure, what does that stand for?

Tim: Kilowatts.

Max: Okay. So, it's measured as megawatt for the entire facility, and then kilowatt per rack, the kilowatts for the individual racks?

Tim: Yes. Yeah. So, yeah. So, kilowatts, and then you get 1000 kilowatts, you get a megawatt, right?

Max: Yeah. Okay.

Tim: So, we work our way up from there. But, a typical enterprise is probably in that, consuming a good size enterprise or mid-tier enterprises, maybe 200 KW or kilowatts deployment. And then, you get into the wholesalers that'll do 10 to 20 megawatts.

Max: Yeah, yeah, yeah. Got it. And, you mentioned that to win deployments now you need to be at 25 KWs per rack and above. Why is that?

Tim: Because people are building these dense, high-performance computing environments that really need it. And so, we can use the NVIDIA example. Everybody's familiar with NVIDIA and how they've started to dominate the AI world. But, several years ago, we worked with them closely and they rolled out their first real AI deployment, the DGX platform. The DGX platform was 26 KW per rack. So, Flexential was able to win some business with NVIDIA, because they were able to go through and they could do 50 KW racks. And so, now all of a sudden, you had a shift, where people were having to go accommodate the AI workloads, which is the hot topic of the next two to three years, and will continue to be our bread and butter for a lot of the data center and co-location environments. But, they want dense powers as much as 80 KW per rack now.

So you've got to start thinking of delivering more power in a two-foot by two-foot square environment that you never thought about before. That, in some cases, 80 KWs, maybe a fifth of what an average enterprise would use in an whole cage of 10 to 12 racks.

Max: And, just to be very clear, the reason the dense computing guys need that level of power is because they're using different chips now, is that the right understanding?

Tim: That's right. Yeah. We shifted from CPUs to GPUs. And the GPUs use a significant more amount of power.

Max: Yeah.

Tim: And, they need more cooling. And we will get into liquid cooling or we can a little bit later about how that's helped data center operators be able to manage those high-dense workloads.

Max: Yeah, okay, perfect. So, that's great. I want to move on now to opportunities and challenges. And you've alluded to them already, but I want to formalize your answers. Let's start with opportunities. So it sounds like, the market is projected to double in three years, which is absolutely fantastic. And you've alluded to some of the sectors already, but I'd like to formalize the answer. What are the sectors driving that demand right now?

Tim: Yeah, the number one sector driving the demand is generative AI, and the AI and machine learning sectors, and that includes a hyperscalers, AWS and Microsoft all have their own deployments. Outside of those, you have the CoreWeaves, and Applied Digitals, and others out there that are growing like weeds. But, that is pushing the market now and is making it incredibly lucrative for data center operators. Just some generic numbers and stuff that I know. I would say that probably 30% of most data center operators sales right now are going to that AI market.

Max: And when you say AI market, just to be clear, are we talking like ChatGPT, Facebook, NVIDIA? Can we get a little bit more specific in terms of who you have in mind when you say that?

Tim: Yeah. So, NVIDIA is probably the strongest GPU maker out there. And so, most of the folks out there are using the NVIDIA deployments and the GPUs, whether it's the new chips coming out or the H100s.

Max: But it's not NVIDIA buying the data center space, right, it's NVIDIA customers.

Tim: It's NVIDIA customers that are building a cloud-like environment that's dedicated for AI.

Max: Got it.

Tim: So, AI as a service, if you want to think of it that way. The Applied Digital and the CoreWeaves, they're going out and purchasing, or buying, or building data centers that are AI-centric, just like the public clouds are, where cloud-centric or server-centric, and then offering those services to customers. And for a customer, that's the best world, just like it was for cloud, because the chipsets are advancing and the technology's advancing so fast that it makes more sense to go lease that service and that processing power from somebody else and let them take the risk with having to replace and rebuild at the time.

Well, Flexential and a couple others have been fortunate to build for NVIDIA and have NVIDIA in their data centers. It's the cloud-like providers that are doing that, the CoreWeaves and stuff that are out there that are building these environments to serve their customers and bring those workloads to them. And that's why the hyperscalers are getting into the same thing. Amazon has a whole NVIDIA stack that you can go lease server time on, and do work, and stuff in there. And so, that is driving our industry. And, those GPUs are hundreds of thousands more powerful than the CPUs. But they also take a significant more amount of power and cooling.

Max: Got it. What about challenges? Tim, you alluded to one, let's talk about it, power. So, I understand power is a challenge, but is it a challenge in so much as it's solvable, you just have to choose a location based on power now, as opposed to based on whatever factor it was before? Or is there a potential dearth of electricity nationwide that represents an existential type of challenge?

Tim:

Yeah, let's walk our way through a little bit of where we are and where we probably need to go and some of the challenges. So, let's take our biggest data center market in the U.S., which is Ashburn Virginia. Ashburn Virginia served by Dominion Power. Dominion Power has overcommitted. They can't deliver the amount of power that is needed by the data center operators there. And so, now there's this big vacuum of more space than there is available power. And so, a lot of people that built in there are in that mode. Why? Because the market has grown so fast. There's areas like Duke Power, can't deliver power in the Carolinas enough to go build a large data center, but you do have areas in the U.S., like the Dakotas, like Wyoming and stuff, that are starting to get other power sources going that's starting to help and be able to do that.

And so, what the challenge is, is now do you build out into these areas like a Dakotas, and now you have to figure out how to connect back into all your markets where people actually need to use it. And it's very similar to what happened with the public clouds 10 years ago when they started building in the Eastern Oregon's, Eastern Washington's where they could get power, and cheap land, and build a 200 to 500 megawatt data center, and then be able to connect back into, what they call, on-ramps, which is where you connect to the public clouds. You're going to see that same thing happening as people are seeking out power. And like I said, Georgia Power is doing great. Why is Georgia Power doing great? Because they have an opportunity to do nuclear power.

And so, Richmond, Virginia has a commitment now to do nuclear power in conjunction working with one of the hyperscalers to put it in. And so, while we have that challenge, we do have solutions. As a society, we've got to get over the fact that we have all these fears about nuclear power and what happened in the '60s and '50s. And you got to remember that was '50s and '60s technology back then.

Max:

Yeah.

Tim:

So, now, we have modern technology, and we run our military on nuclear power. We run a lot of things that are self-contained and can help us. Microsoft's putting big investments in it, all of the folks that realize that that's our future and it's the cleanest most sustainable power is that. So let's move into that direction. And, I'm a big advocate of it, as you might tell by the way I talk about it, but I think it's the way as we consume more and more and we want to get out of fossil fuels and everything else that comes with it, it's probably our most sustainable, dependable power. We can do the wind farms, and we can do the solar farms and stuff, but they don't generate enough to power a 400 megawatt data center sustainably.

Max:

Can we talk a little bit more about the upstream considerations there? So, you say, Duke and Dominion aren't able to deliver power. What is the constraint there? And then, can you also explain why it's important to be close to power and what the limitations are on transmission infrastructure?

Tim:

Yeah. Let's just talk about Duke and Dominion. I mean, they've done a fantastic job in the past, but like everything else as it's grown, it takes a lot of money and a lot of time to go build the infrastructure to do the next couple gigawatts of power. And so, it's years of planning, years of work and effort. And so, when the market has grown and stripped expectations, they're behind the eight-ball of trying to build it. And, on top of that, power companies are very, very tightly regulated and very tightly managed. And so, there's a lot of processes, and rules, and regulations they have to abide to, to get there.

So, you're not going to expect a power company to be able to shift gears and deliver an extra two gigawatts in a year to two years, even though you may build your data center in that timeframe. And so, that's put the challenges and a lot of burden on people and planning. And, like anybody else, the power companies are out there, their for-profit. And so, they can't get ahead of the scaling business, because they are regulated on how much they can make, so they don't have the ability to go build something with taking a risk or a gamble that somebody's going to come use it. So, you're in that challenge a little bit, where you're there.

And then, the infrastructure, why do you want to be close to these power things? We used to always look for substations that were close, because it's millions of dollars to build that infrastructure to your data center. And so, you want to make sure that the closer you are, the more cost-effective it is, and that cost to build into you is going to get passed to you. So you've got to be able to look at areas where you can get close to the power, and you can manage, and own it. Now, there is a grid system and people go out there and they buy power from other states and they transport it and everything, depending on how it works. But it's still a challenge and you still want to be as close as you can to those substations and where that power is being generated, just like you would with any other commodity... Or, I'm sorry, other utility. The closer you are, the better your performance, the better your pricing, et cetera.

Max:

Okay, interesting. And so, if the data centers have to be built close to where the power is and the power is increasingly in these remote locations that aren't already overburdened with power requirements, then what about transmission of the data? Do we have the infrastructure and the fiber between data centers to ensure that the data centers can get built in Wyoming but service the appropriate urban areas?

Tim:

That's the next challenge that we have to face after we find it. And that's where a couple of the providers are working on that, where you work with a carrier. But think about it in this terms, if you spend $50 million to build a new data center, working with a carrier that's close to... And most of our carrier routes follow the major freeways or the railroad lines, but you can work with them for a million dollars to build into your data center, why not do it? And we did that at Flexential. We had some areas where it made more sense to work with the carriers to build the fiber access to us, and then capitalize that in the whole cost of the data center, and be able to manage it.

But it's a challenge, because just like everybody else, getting in front of that business case, getting the carriers to do that, and the time, and then they have to go get permits. And, right now, permits to dig up streets or to dig up around... You're not going to dig close to the roads most of the time anymore. It takes a lot of time, and effort, and a lot of challenges. So, it's, again, one of those secret sauce things, where if you are going to build in an area that's remote but has the power, make sure you're close to a major freeway or artery of some type that at least one provider of fiber probably has something there and can do an overbuild to get into your data center.

Max:

Makes sense. Sorry, go ahead.

Tim:

I was just going to say, so Max, when we're looking at new locations for data center, that's one of the things you look at. I mean, you're looking at the power, you're looking at the fiber and the connectivity, you're looking at the cost of the land of course. Any environmentals, there's a ton of other things that start to go into it, like tax abatements and friendly communities that'll allow you to do this and support you.

Tim: And, we were at one of the major conferences, so I was just talking with some peers about the fact that data center operators, the really good ones, and the ones that are really successful, they go out and get involved in the community, because you do get pushback from some communities, because they don't understand you coming in and taking more power than the whole community does, and what's the value there? So you've got to get that community... Build that relationships with those city councils, help support them, tell them how you're going to make it all work, because like anything else, it is still relationships that help us drive innovation and the ability to go out there and build these data centers in these smaller communities.

Max: What is the value prop for the community?

Tim: Well, there's the ability to go in and help them pay for a lot of new power infrastructure and be able to bring that in. You're not bringing a lot of jobs. You may bring a lot of services and folks into the environment. So, people still want to be able to accommodate their services close to them. So you have to be able to go do that. But it is a balance. A lot of communities don't see a big benefit from a data center operator being there. They don't realize that that's powering all their healthcare, all of their services, all of their internet. And so, you've got to go educate them on it, "That if you don't put the data centers somewhere, you're not going to have services that our lives depend on nowadays."

Max: Oh, I see. The argument is that this is going to power your healthcare system.

Tim: It's going to power your healthcare, it's going to power your social media, it's going to power all of the services nowadays that we need to actually live our lives. I mean, our lives are tethered to the internet and all the services that are online. And so, the key is that we're coming in as a data center operator, we're putting this in your local area. You're going to have great service and providers from that. And we're going to be able to deliver that to you. But, on the other hand, we're going to consume power, but we're going to pay for that. We're going to pay, and we're going to keep that going, and we're going to make sure your power company is able to grow and maintain because we're funding it.

Max:

That makes sense. Just last question on this topic, what is the current state of this community pushback? Are there communities that have taken a more extreme stance of like, "No, not in our community"? Do they have the right to do that? Or, generally speaking, there's a set of best practices which is community involvement. And, if you follow those best practice, you shouldn't really have much of a problem.

Tim:

Yeah, I think, if you follow them, you shouldn't have much of a problem, but you do see communities... You've seen some recent articles around Atlanta about pushing back on why we're allowing so many to come in and not getting the tax base. I saw one recently for Myrtle Beach area, which has a landing station there in a great data center, a pushback from a community member that's saying, "Why are we letting folks come in, and consume our power, and the transmissions? And, we'll raise our rates." So there's a lot of questions. I don't think it's from a standpoint of... It's more emotional than it is truly objectional, and having the right arguments. But, of course, we as humans live on emotions and you start getting people riled up, and then you get some pushback, and then the city council and stuff starts having to make sure that their constituents are appeased, and so they start asking the right questions.

And so, I think it's really important... And this is where the successful operators have gone out with community outreach, they get involved, they become part of the community, they build the trust. And I think that's important. And I think that gets dropped or ignored sometimes from some of our operators. And I think it's really important. B, a responsible steward of the people's data and the steward of the people's livelihoods now, but also be there in that community so they see, and they know, and they get to know you, and they understand. Invite them into things, show them the data centers. We used to do a lot of tours and stuff. Let people see the amazing stuff that's going on, and then show them the benefits to them.

Max:

Got it. Makes sense. Okay. You alluded to it earlier, but what about liquid cooling? What impact has that had on the space?

Tim:

Yeah, I don't think we could accommodate the GPU explosion without liquid cooling. And so, there is folks out there supporting immersive cooling and doing a lot around that, but I'm really high on the liquid cooling. And it's allowed us to take typical 20, 25 KW racks and be able to start to accommodate 50 to 80 KW racks, because the cooling is a major portion of the... Or major constraint when we're looking at be able to deploy dense compute environment. Those machines push out a lot of hot air. And so, you've got to do a lot of environmentals around them, but you can only do so much with pushing air through them and cooling them. So having that liquid cooling that's actually sitting right there on the GPUs and being able to keep them cooled down to a certain percentage is huge for the industry across the board. And so, it's making a big win.

I mean, Nvidia had it years ago, where they started coming out with high-end gaming systems that had some liquid cooling in them, and you started seeing development systems out there and stuff that had it in these high-end compute systems. And now, it's mainstream. Everybody that's doing high-end GPUs is using liquid cooling. And so, it just allows us to push that air through a cooling mechanism, just like it is in a car. Your radiator, you don't put water in there anymore, now you put coolant in there. And it's that same mentality, it allows you to operate at a higher temperature and a better performance, without overheating or causing damage to your processors and everything that's in there.

Max:

Got it. Makes sense. Are there other environmental considerations when talking about data centers?

Tim:

Yeah, let's talk a little bit about that. I mean, I was part of the ESG committee and I'm an iMason. And, our focus there was how do we get to carbon-neutral? And how do we work on being good stewards out there in improving the way that we approach it? I think, data centers are better than a lot of industries, especially a lot of the manufacturing and some of the things out there, but there is still a lot of improvements that can be made. And it's everything from moving away from fossil fuels to run the generators, even though those generators only fire up once a month or whatever, they do take a lot of diesel and a lot of fossil fuels.

Tim:

Using one of our most precious assets, which is water, and using it efficiently, making sure that we're not consuming... A lot of data centers use chillers. And the chillers actually take the water, and use it to cool areas, and trying to make sure that you're in the process of being... We talk PUE, which is power use equivalent or effectiveness, and it's the same thing with water. How can we get to zero water or we're wasting zero amounts of water?

So, there's a whole group of key data center executives and strategy people that are working around how to make it better and how to be great stewards of our environments by reducing our carbon footprint. Even a peer of mine who talks all the time about producing the cement to build the data centers on-site for these large data centers, versus having trucks bring it back and forth. And all of that stuff that can help. It's a little bit of a challenge, because while everybody asks you for it, and they want to know what your ESG program is, and how you're being part of the community, and how you're reducing your carbon footprint, rarely do they want to pay any extra for it.

So, it's that balance that you have to fit that you as a co-location provider, and if you wanted to really be a leader in the industry, you've got to sit out there and have that program in place, because some companies just won't do business with you if you don't at least have something in a plan. And, you're not going to retrofit older data centers to do it, but at least all your new data centers can use technology now to get your carbon footprint as close to zero as possible.

Max:

Got it. You alluded to it earlier, but renewable energy.

Tim:

Yeah.

Max:

Is it part of the solution here, or not really because the density isn't there?

Tim:

No, it is. And it's not the full solution. So you got to remember the density isn't always there, the dependability isn't always there. You've got a lot of other factors in there, but everyone in the industry now, especially anyone that's building larger data centers is looking at how they can use renewable energy. I spoke about how one of the big data center or AI folks is actually building out in the Dakotas,

Tim: because they can get wind energy out there, and there's a lot of renewable energies. And so, it's a balance of trying to figure out how much can I use? And, while as an operator, you're always looking for two sources of energy, now you can actually sit there and say, "I can do three sources. So I can do hydro, I can do nuclear possibly, and then I can go out and do wind or solar." So, Flexential, we used to always try to make sure that we started looking at using solar to run all of our operational stuff that's outside of the data center, offices, all of your non-mission critical stuff is running out of sustainable energy.

Max: Got it. Makes sense. Okay. I want to talk about the competitive landscape for a bit.

Tim: Yeah.

Max: Can you help just level set who the key players in the industry are? And then, are there challengers or new business models emerging and proving to be successful?

Tim: Certainly. Equinix has always been the leader in the industry. They built a footprint, they built the connectivity, the carrier hotels, and they've always been in the forefront, and they're the most profitable out there, and they have a good global footprint, and a brand recognition. Not always the most accommodating for some customers. So, there's been some opportunities. Then you get Digital Realty Trust, DRT, that's come in behind, and is actually gobbled up a lot of operators too, like Telex, and DuPont Fabros, and it's built a huge environment. And those are probably what I would consider the top two. And then, you have a large number of still large data center operators, like QTS, or Vantage, or Aligned, or some of these that are out there building, and are starting to move into that space considerably. And they're still very large. Cyrus 1. There's a number of them out there. So, those are the dominating or dominant data center operators in the environment.

And then you've got a good number of up and comers that are starting to gain a lot of momentum. One was my former employer, Flexential. They've got a good number of data centers throughout the U.S. They're starting to win a lot of business and building 30 to 50 megawatt data centers. Stack is really strong. They're starting to build a lot into that environment. Small companies start out doing just small 5 to 10 megawatt data centers. I'm a big fan of them. DC Blocks. They built a cable landing station, Myrtle Beach, and then they now are building a big data center for a hyperscaler in the Atlanta area.

Tim: And, the key for a couple of those is once you get a client base that's going to need that, the client base just keeps coming back for more, because it's easier than trying to do the three to six months of MSA negotiations, and working out contracts, and getting all the legal involved. So once you have all that paperwork, it's easy to hone that and continue forward. And then, in the retail side, there's a lot of smaller operators that are gaining momentum on the retail side, and those are the 10 megawatts and smaller, and a lot of private equity companies looking at buying and trying to get into that business, because it's an easy way to make money for the next three to five years from a standpoint of a good sustainable business that's going to be strong for, I say, three to five years.

Max: So, the data center company is in charge of building the site, ensuring there's sufficient fiber, and then contracting the power. And then, the customer buys the chips. Is that the right way to think about it?

Tim: Well, the customer buys the compute to put into that data center and lease the space and power from the data center.

Max: Got it. Even for small customers, even for the retail segment, they'll buy the chips, they'll buy the compute?

Tim: Yes. For Flexential, that was majority of our business for several years is they bring their own compute and they put it in there. And then, we manage the space, and power, and connectivity for.

Max: Is there a model where the data center buys the compute too and leases it out or no?

Tim: Not for small retail. We toyed with that a little while and did it with a couple of... I'll call them VARs, the big VAR names that are out there that actually managed that and trying to do the lease back. But, you get into a lot of challenges that's really beyond the scope and the staffing of a data center operator.

Max:

Got it. Okay. So, I want to take a second to push back on a little bit of what you said. So, the market is going to double in three years. What is the outlook for years 5 to 10? Is that pace going to continue? And, the follow on question is, are we sure that GenAI is going to consume and require all that we think it's going to consume and require? I know the markets have been volatile very recently with regards to Nvidia, and it's seemingly not so easy to price in how much people are actually going to use GenAI in the near term. And we've seen this playbook before the telecom industry overbuilt fiber when the internet was becoming a thing. And then, had a really difficult 10 years until internet usage caught up to the capacity that had been built. And so, how does the industry think about, yes, playing catch up, but being able to underwrite that demand as being real and avoiding the trap of overbuilding?

Tim:

Yeah. There's a lot there to unpack. I'm going to start probably at where I... And this is my opinion, but I think it's based on a lot of facts. So, let's take the public clouds. The public cloud providers were out there... I was at GoDaddy at the time, and we were a cloud hosting provider. We didn't take them very serious, because we're like, "Is it going to be something that's not going to be sustainable? Is it going to grow like they expect?" And that was in 2009, 2010 when Amazon just started growing like crazy. But they've been around for a while, and look where they are now. They haven't dropped off. We're still using them, still growing, still growing faster than ever, because we realized that as a society now we need that development. Everything is now on the internet. We live off the internet.

So, if you think about AI, and not just generative AI, think about AI from how we want AI to run everything, from healthcare, and health services, and wearables, to managing smart cities, to managing everything we do day in and day out. There is still hundreds of thousands of use cases that are just barely being touched on that. And so, we've got a good ramp up period that's going to continue to grow and the amount of data... The data lakes are growing tenfold every couple months. And so, we've got to be able to manage that data and do something with it. And then, we've got to start to look at how do we build around it? Are we going to see a plateau? Certainly. Is it going to climb again as the next technology hits probably in three years? Probably. Can I tell you what that's going to be? I can't.

Tim:

But I can tell you from using past context and the things that have happened in the past with different industries, it's going to continue to grow there. You use the telecom example. Telecom example is a great example where the environment's overbuilt. People got out there and realized that technology changed fiber. So, we're going to narrow in on that for a minute. And I'll talk about a couple of great examples, but I'm going to talk about subsea cables. So, I've done a lot of subsea cable development. And, our subsea cables as early as five years ago when we did an 80 terabit system coming from Asia-Pac, and we were able to do 10 terabits per fiber. Now, we're able to do 20 terabits per fiber, and less than 10 years later.

And so, fiber took the hit because the technology to drive more data across that fiber increased significantly. And so now, you had capacity that you didn't quite need as much of. Still a great market, it's still great to be in the telecom world and own fiber, but your expectations had to be reset. But there's still a lot of development in fiber, because all of that data that we transport is still highly dependent on fiber. That is the most critical asset for the internet. Let's go back to machine learning, back to AI, and everything in there. The most critical aspect for that is GPUs. It's critical that it's out there. Is there issues? I mean, Nvidia marks it up significantly, because they have the demand. But that's not going to last as the hyperscalers with a lot of money start investing in their own chipsets, and start doing that, and they will continue to drive. And that's why I said earlier that the hyperscalers will still be in this industry and they will still have AI development processes out there.

Do I think it'll grow past five years? Technology changes so fast that I wouldn't bet on it being the same in three years from now. But I do think it's going to be three years before we hit maturity and before we hit that plateau. And so, I think, now's a good time for at least the next three years to see that. It will continue to grow, but it won't grow at double-digit rates possibly. Maybe it'll drop down to single digits as the next technology comes in and changes things. But, we're just on the cusp of it. And I think, you just look at the amount of OpenAI and the amount of... We went from a couple hundred thousand processes, to now we're up into the millions of processes going on, and that's just going to make it faster, and more attractive, and our lives as humans, we're going to start to depend on it a lot, and we're going to start need it, just like we did on the internet.

Max:

Got it. Got it. Makes sense. Tim, is there anything else with regards to the industry that you think is worth touching on here in our last few minutes that we haven't yet talked about?

Tim:

Yeah, I think there's one thing that I'm passionate about. I think it's this on-ramp mentality. So I think, as we talked a lot about AI and everything else building into these areas, I think you're going to see the same, interconnection is going to become just as important to them and latency. So, we were fine with the public clouds being out in these remote areas. We didn't care about latency at first. We just loved the ability that I could go spin up environments and have that scalability without having to spend a lot of capital of my own. And then, we started worrying about, "Man, it's slow though. And I got to travel 2000 miles to get my data back and forth." And so, what happened? All your public cloud providers started building Amazon's local zones and environments in region, and then they started building more of the actual cloud regions, but they did smaller deployments up to 10 megawatts in your backyard. And I think you're going to see the same thing.

So I think the interconnection tie-in for those tier two and tier three markets, especially as we start to invest in smart cities and smart healthcare, you can't have latency, you got to be able to respond immediately, and so you're not going to want your data going round trip 2000 miles before you get it back, because that's going to add a couple seconds to the response. You want it in your backyard. And so, I think that's going to be the future. And that's why I think, smaller data center operators, you'll have people pushback like, "Oh, you got to build 20 or 50 megawatt data centers." I think, smaller operators have hope in the fact that they can attract those small regional workloads in these smaller tier two and tier three markets that will actually become extremely lucrative in that environment.

And it's an area that, as you can tell, I have a lot of passion on. I did a lot of edge deployment and edge compute strategies in the past. And I think it's still in that same thing that hyperscale... I'm sorry, that hyper-intense, GPU-intense edge deployment is really important in our world coming up, as the AI environments grow.

Max:

Interesting. No, that's great. Yeah, a more distributed layout makes sense in order to reduce latency. That makes sense. What about in that smaller segment? What are the barriers to entry? If you're able to buy some land and negotiate power, can you become a data center provider?

Tim:

If you have the right talent to build it and you can go out and do that? I mean, the biggest barrier to entry is really the trust. Building the trust with the big players out there is one thing that you're going to have to do, and operations, and management, and no outages, and be able to effectively utilize your power is all important. And so, there is a limited number of highly skilled individuals out there that can build these infrastructures for you. And so, I think it's extremely important to build that trust. The DC Blocks guys, I'll use their example, they went out and they built trust with Google. And, from that standpoint, when they built the cable landing station, they're going to then be able to have that. And it was the same thing with us. Once you get ingrained with them, and you have the trust, and you have the relationship, they'll come back to you again. But that's going to be the tough part.

If you're a new player in the industry and you don't have a proven track record and you don't have the relationships yet, it's hard to break into the industry, when it's just like a car manufacturer. A brand new car comes out, you have no idea what that car can do or perform. Me, as a consumer, I'm going to buy somebody who has a proven track record that I know that the reports tell me that it's always up or it's always available and low maintenance. You've got to break into it. And so, that's the biggest barrier, is just getting them to trust that you can do it. You're in a little better space nowadays, because of the fact that power is such a high demand, and people are willing to take a little more risk. But it's still that trust and that relationship that is that barrier that you have to get over.

Max:

Got it. Makes sense. Well, listen, Tim, thank you so much for your time today. This was super insightful. It's exactly the stuff we were looking for. You clearly are an expert on the topic, so thank you so much for sharing your time with us today.

Tim:

Yeah, thank you. And I enjoyed it, so thank you very much.