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Table of Experts

DATA CENTERS

How Data Centers Are Powering the Valley's Future

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TABLE OF EXPERTS
PANELISTS

DAVID DUNN
CCO, **H5 Data Centers**

David Dunn, COO of H5 Data Centers, has nearly 15 years of experience managing significant growth and delivering outsized returns on investment in the internet infrastructure space. Dunn most recently served as vice president at the Zayo Group, where he was responsible for managing the wavelength and mobile infrastructure business units.

MARK BAUER
Managing Director & Co-Leader **JLL Global Data Center Solutions Group**

Mark Bauer is a managing director and co-leader with JLL's global Data Center Solutions group, a real estate practice that focuses on representation and execution of data center deployments, relocations and expansions. Bauer has over 28 years of commercial real estate experience and knowledge in the growing multi-tenant data center environments.

CLINT POOLE
Manager of SRP Telecom **Salt River Project**

Clint Poole is manager of SRP Telecom, one of the largest dark-fiber network's in the Phoenix area. SRP Telecom is a division of Salt River Project. He is responsible for all business-related activities associated with SRP's commercial fiber network. In this role, he conceived of the DataStation concept, an innovative data center solution.

MODERATOR

MODERATOR
Editor-in-chief, **Phoenix Business Journal**

All photos by Paul Hubbard, AZ Photo Works

Moderator: I have a ton of questions because there are some Phoenix Business Journal readers who don't know much about the data center space.

For those of us who aren't tech-savvy, can you talk a little bit about the difference between the Cloud and a data center - some definition that could help readers understand why we're talking about this.

Clint Poole: Being at a power company, I use some analogies, but it's a little bit like power generation in the power grid. People turn their lights on and really don't give much thought to where the power comes from. They know there's wires and they know that there's a power source out there, but it has become such an ingrained component in our lives that we just turn the lights on and we don't give much thought. If you start talking about different components of the power grid, it's perfectly natural for people not to understand all the components of it.

The internet is comprised of fiber optic cables and data centers, and the data centers are the physical facilities in which computers sit in, which provide services. Cloud is more of a term that refers to where your data is stored, and more of a service offering of type.

When people say 'Cloud', it's really a reference of 'Okay, I'm not going to subscribe to servers or my own IT department for certain things, we are going to subscribe to a service that sits out on the internet'. Of course, that service resides inside of a data center.

David Dunn: Maybe one perspective might be it's simply a matter of who owns the equipment. What's used is a multi-tenant data center or an outsourced data center, the tenants, the users, the customer of records, so to speak, the companies, will own their own IT infrastructure and house it in a third party data center or maybe they own that data center.

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The Cloud, as that term is used I would say most often, is someone else owns the computer equipment, and companies merely have a software relationship, a data relationship, with someone else who owns the actual gear, but it's all sitting in a data center.

Clint Poole: Email is probably the best example of a Cloud service that we've all subscribed to and we've had for a very long time. Email, Yahoo!, Gmail, probably some of the first examples of a Cloud service, because it was not email that was on your property, it was out in the Cloud, and you were subscribing to it as a service, so it was Google's or Microsoft's actual physical infrastructure that was providing you the service, and there's an array of different Cloud providers.

The term does get broad or tight depending on what type of Cloud service you are referring to, but generally it refers to someone else's equipment that you are subscribing to.

Mark Bauer: You may very well have a server sitting in the back here, and you decide not to have that hardware anymore, so you may go to an Amazon, or you'll go to a Microsoft or an Oracle, and say 'We want you to take over', and you'll just have your data transferred over into one of their own servers. You may never know where that server may reside, it may reside at any one of their data centers across the country.

David Dunn: Essentially. If you own your own data center, you know where that data resides. If you use the Cloud, you may not initially know where that resides, but it's all sitting in a data center on some computer somewhere.

Moderator: Phoenix has emerged as this national hot-spot for data centers. We've heard this and we've written about it a lot. We know some of the reasons, but what would you attribute that to? Our environment is obvious.

Mark Bauer: Yeah, you can start with the environment. You can talk about cost. Cost of power, the network that comes through this city and then goes to the rest of the world is very strong, but I think the lack of natural disasters and your cost of doing business here are probably the top reasons.

Clint Poole: Access to the major western markets.

David Dunn: Proximity of California is huge. Just the cost of doing business in California is much higher from an IT infrastructure perspective than it is in Phoenix. Also, the Governor recently signed an amendment to a bill providing tax incentives for large scale data center employments in the state of Arizona, and so that's a huge benefit relative to California or some other western states that Arizona competes with.

Mark Bauer: The tax bill that was signed a couple of years ago, it actually does benefit smaller companies that have at least 500kw, wherein some other bills that were passed with other states, you had to spend $50-150 million in order to get any tax break. We went from in the top 40 to the top 10 in terms of our environment from the tax bill here.

Clint Poole: Mark, how much would you attribute to available land?

Mark Bauer: We've got a lot of land and so it's an attractive thing. Most of the data centers that are being built today are being built in a campus style, so they're not building a million square feet, they'll build 100,000 square feet buildings. Having availability of land and the cost of land, we're very affordable.

As you get into other urban areas, such as Chicago, northern California, your cost of land is outrageous, but there are certain companies that just have to be there, so they'll be there, but they'll grow their footprint in Phoenix. We're seeing a lot of that happen here.

Clint Poole: You've got two utilities here that understand the data center environment and understand the importance of having them here in our geography. Both utilities have a focused effort of trying to make sure that they are meeting the needs of utilities and bringing them to our service territory. There's a value behind why we need data centers in our community.

Moderator: What is the average size of a data center and how many employees would a data center have? What would be the salary of those employees?

Mark Bauer: I'll give an example, you go up the street and eBay, Paypal have their facility up there and they probably have less than 10 actual employees that are Paypal employees that run that data center or eBay, but on any given day, they've got 70-100 people working in that facility that provide support for that data center.

I think the indirect jobs are what you really look for in terms of a data center.

We'll have customers move in, and maybe that customer, whoever it might be, they've got other third party people in there every day loading software, putting in additional cabinets.

Clint Poole: You can't measure a data center's value in jobs though. It's not like bringing a commercial business here and 'how many people are we going to employ?' It is a key component of infrastructure, which is the foundation of economic development, and they need to be looked at as such.

Mark Bauer: The engineering teams, the R&D teams that come with it, eBay came here before they brought people. I've told this story a number of times. They (eBay) now have 3,000 employees here in this state. They've got engineers up in north Scottsdale. They weren't here until the data center came first.

Moderator: So you have to put those two things in perspective and say, 'Well, wait a minute, the call centers, the data centers, the infrastructure, that's what makes that business run, and so it is important' - and we talk about that when we send that message out to readers and to customers.

David Dunn: Also the construction costs and associated value of data centers is disproportionately high, so it generates a lot of property tax base for cities and counties.

Mark Bauer: The data centers are supported by the software companies, the vendors that are going to sell them equipment, they like them to be close. If they have a problem, they want them to be able to be on site, so having people that will come with that data center (is key) because they have to be located near where their customers are.

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David Dunn: Some data centers have probably helped build city infrastructure from a water perspective. Some data centers are constructed in a way that they consume a lot of water, so they'll help build some of that infrastructure, maybe to areas that didn't have it, as well as bring fiber optics to the area. We live in a very digital economy, and if people don't have access to fiber, either at their home or businesses, you're not as effective or as productive as you could be.

Moderator: Okay, so let's talk about choosing a data center. If you're a company and you're selecting a data center, what kind of questions should they ask if they're putting together a proposal to get those services?

Mark Bauer: I think you're talking to the colocation industry, because the colocation industry is where many of the companies are looking. There's not a lot of new builds out there. Ten years ago, we were doing national site selection for everyone from American Express to Scottrade. Everybody wanted to build their own data center because of the security of it. They wanted to keep it in their office building so it was close, then they said, "Okay, we're going to build our data center." Now it's like the evolution of the colocation operators, they've matured. That's all they do every single day is run critical facilities for multiple tenants within their buildings.

Moderator: First, describe colocation to our readers. What is it?

Mark Bauer: The best definition that I've used would be an office suites operator. If you're looking into an executive suite, you go in and here's your office, but all the services around you are provided. It's kind of like that, where you're going to go into a large facility, you're going to take the amount of space and power you need, and you've got a landlord that's going to provide all of those services for you: making sure your power, your fiber, and your environment never goes down.

In terms of selecting a data center operator, I guess look at the history of that data center operator and their operations. I think every data center developer operator is a little bit different. They may be more geared towards a Tier 4 type of an operation, where other data center operators can build at a lesser reliability, but it's perfect for a lot of companies too.

As a customer, I'm looking for a data center operator that's going to provide me flexibility to be able to deploy in a timely manner and to be able to grow with me as well as be able to allow me to shrink back if I need to.

David Dunn: At H5, we often see questions that orient around total cost of ownership, security, reliability, expandability, and really expand that to flexibility. Being able to grow up but also potentially ramp down in the event of business unit changes, mergers and acquisitions . . . Corporate America is pretty fluid these days. Things change very quickly.

Moderator: Okay, so let's talk about security, because I would have thought that was the number one question that anybody would ask. I suppose cost is right up there too. There are new threats every day. We've heard about them, we've written about them. How do data centers address those threats? How do they stay on top of them? Talk a little bit about that security factor.

Clint Poole: I think when you're shopping for a data center you really need to understand the data that you are going to house, and you need to value that data because you can get the top security. You can get the top reliability, and you can meet all your requirements, but the big failure in a lot of businesses is paying for space that the data doesn't deserve. If you're just warehousing data, if you're just collecting data and you don't know what you're going to do with it, then you don't need a Tier 4 data center and you don't need a bunch of armed guards protecting that data.

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Mark Bauer: You've got physical security and then you've got your network security, and I think most of the data centers have fairly good physical security. All the data center developers, there's a certain guideline that they have for different levels of security to get to where the machines are. You talk about the network security, and that's where we're seeing a lot of the security breaches that are happening today.

David Dunn: Yeah, that's the headline on the Business Journal, the Wall Street Journal. Sony Pictures gets hacked and basically held ransom. Those kind of big impact (security issues) that can really affect company survivability. That happens at the logical layer. When you're in a multi-tenant data center, typically providers such as H5, we won't do anything that requires a password, so we're not the ones configuring your firewall or what have you. There are managed service providers, cloud service providers that do that, so it's very important for someone who's looking to outsource to the cloud to vet some of those questions, because that sort

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of purchasing of those services starts to open up your IT security to people that are outside your company. First and foremost, it's very important that companies have business continuity plans and IT security plans. That's going to run their business and keep it going strong for generations.

Moderator: You make a good point, because that's what people hear about. As soon as they hear about a breach at their grocery store, a breach at Target, that's what people hear and try to understand, but they don't understand it because they don't know how it happens.

David Dunn: Its hackers that sit tens of thousands of miles away that can compromise IT security protocols and get into systems.

Clint Poole: Physical data that is being stolen happens few and far between, just because in order to get a big quantity of data, you have to steal a lot of physical assets. Number 2, when it's on the physical device, in most cases it can be encrypted. If it's not encrypted, your data

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is spanned across multiple drives. If you pull out all of these drives, you would have to plug them in in the exact same order or they're going to be of no value. Cyber terrorists, cyber thieves, they apply business principles and they go after the low hanging fruit, where they can steal the largest amount of data for the lowest cost, and that's through the logical layer of the network.

I think it's important to point out that most commercial colocation facilities, that is not within the control of the commercial data center. The data center is mostly in control of bringing reliable power, physical security. They do a good job of having all of the networks available to sell their service to the people that are within the data center, but it's usually a transaction between the customer of the data center and the network provider.

Moderator: We've talked a little bit about the growth over the past few years. How have data centers evolved to meet the growing demand, and then what changes are on the horizon down the road?

Mark Bauer: The biggest thing is that the power that's needed to run these machines continues to increase. You're seeing software being designed where probably in the next 3 years we'll see the

average (today)of 5W per rack go above probably 10 to 12 KW.

The power is the most important thing in terms of being able to provide a ramp to be able to continue to provide more and more power over a longer period of time. We're seeing where data centers used to be a one off where you'd have one building built, but you'd be confined. Where's my next expansion going to grow? When companies are out there looking to move in with a colocation provider, they're going to look at what do you have today? What's your power capability going into the future and where's your next building or your next phase going to go?

Moderator: Clint, talk about SRP because you guys are obviously preparing the center for the future and we've done a couple of stories on that actually.

Clint Poole: If you think about the Valley over the past 100 years, SRP's role in bringing water was its first function, and water was instrumental in bringing agriculture to the Valley. Now our economy is going through another transition and as we all know it's becoming a digital economy. The water bringing agriculture, the power bringing

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industry, we feel that it's important that the digital layer gets addressed.

We consume an exponentially greater quantity of data today than we did 5 years ago and that's driving data center growth.

Data center growth today, or data center consumption today is estimated to be about 2% of the total US power consumption. That's quite a lot of power if you think about it going to one specific device. By the year 2030, EPRI estimates that 20% of our nations power is going to data centers. If you just think about physically what that does to our communities, and some communities are saying, "No more data centers. Data centers bring power lines. We're not interested anymore." That's short sighted. Data centers are absolutely vital to the success of the communities. Just like we needed telephone service, we needed powers, we needed bridges, we needed roads, we're going to need that connectivity.

How do you grow data centers from 2% to 20%? How do you create a community that can ingest that kind of growth and do so in a sustainable way? We've been looking at the role SRP can play in supporting the data center industry. That's where we landed on the data station project. It's basically, instead of bringing power lines to data centers over the long run, start encouraging data centers to be brought to the power lines. Data station does a number of very interesting things, but when you plug in the data center to the power line, and you change the building to a modular, you're able to do a couple of things.

Today we follow industry standards so Uptime Institute tells us how to build our data centers, and based on the engineering we put into our data centers, we get a certain reliability threshold. We spend a lot of money to meet that standard and that standard is based on treating the building like an island. We're not giving any consideration to your environment or the power grid. If you put onsite generation, and your switches,

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and your UPS's, you get a Tier 4. It doesn't matter if you're in Hong Kong, the Middle East, or Phoenix, you're going to have the same rating on that building wherever you go. We're able to do that because the modular data center is not a building. It's a piece of equipment. Our role is how do we support the industry? How do we leverage this now proven technology to support the H5's, the other data centers throughout the Valley and give them a way to grow business in a different way? It's a disruptive way of doing it and it's an option for the industry to consider as a way of growing and accommodating this

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future data power load that's coming to our valley.

Then the network. The network is obviously very vital to cyber security. People get hacked usually because they have their racks, they have their data centers, they go out to the public internet, and then they go to another location. When you're crossing the public internet, you have all sorts of bad things that could potentially happen to you. What we are able to do going forward is leverage one common network that interconnects all the commercial data center facilities, all the telecommunications pop, and future data stations, and have a secured network that sits in a private layer underneath the internet. You can travel between all the data centers. It will be protected. It will not be exposed to the public internet.

Moderator: It sounds expensive.

Mark Bauer: What the data station is doing is it's eliminating a couple levels of

the redundancy of the power coming in, they're doing away with the generators.

David Dunn: Data Centers enable the efficiency of a company. They enable the ability for employees to do more with less. You don't have reams of paper being stored up somewhere else. It's the digitization of our society, or our species, really.

Mark Bauer: What we are seeing is these costs are going down. The cost to build, the cost to operate. We forced software and hardware providers to come around and allow us to operate these machines at a higher level. We used to go out and build 300,000 square feet and wait for everybody to come. Now, they're

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building it out modularly. They will build a 100,000 square foot building and then build the first 20,000 square feet, and then they'll build the next 20, and it's an as needed basis. These buildings used to take 2 to 3 years from start, design, to construct and build. We're now building buildings in 12 to 18 months, very conservatively, in that time frame because they're built up modularly.

Clint Poole: To look at data centers and look at their cost only, but not attribute the benefits that we've had as a society to them, we are experiencing a rapid rate of innovation, unlike we've ever had in our history in mankind. Who would've thought that we would be considered driverless cars right now. We have to understand where something like that comes from. It's a couple of things. It's a shared resource, right? If you're able to have access to computing resources that are shared, and not have to invest in them as individuals, you have a young aspiring college student who is able to go and spin up compute resources, super computing resources, and develop without the investment of a Fortune 500 company that maybe locked in their ways.

Data centers, I think, can be directly attributed to the rapid amount of innovation that we are seeing. iPhones certainly wouldn't be possible without data center support. You try to take an iPhone away from somebody and their life fundamentally changes socially. They are disconnected.

Moderator: What types of companies use the most data?

David Dunn: Financial institutions have a very large IT footprint. Clearly, internet companies, and I use that term kind of loosely, but companies that are based online, solely, like without the internet they wouldn't exist such as Amazon is a good example. Google's the best example probably. Those have massive amount of data center footprint. Energy companies, healthcare companies, science based companies, clearly. Super computing, universities, they all have very large IT footprints.

Companies with a lot of employees, relatively high revenue, companies that work in industries with a lot of regulations - these companies tend to require storage of data, security of data, silo of data, business continuity plans,

and all that generates more and more data that's either replicated or housed to be available, secure, and reliable.

Mark Bauer: The government. Also retailers. With retailers, your buying habits are being tracked. You ever wonder, "How did they know I was looking at . . . ?" You go to these stores and they print out these coupons because they know this is what you buy. The airlines, they're watching you, and you've gone online and you're looking at this trip…well, they know you're interested and it's the data that's stored that begins to watch your buying habits. That's just

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one part of the retail industry. It's all about that data storage and the analytics behind it.

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Without ever connecting to the internet, you as an individual are generating data that's being stored somewhere everyday by walking into a grocery store, for driving down the highway, there's data points collected about you that are being stored, and there's benefit that comes from that. There's a lot of convenience when a retailer or a service provider knows more about the needs that I have. Freeways

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are starting to get more efficient because there's a lot of data being collected that informs us, "Hey, there might be a traffic jam. Maybe you want to take an alternative route." By you taking that alternative route, you are freeing up capacity on that freeway.

Smart cities is something that we haven't quite talked about. We're just beginning to think about what smart cities really means, but it's all of these types of things. Its traffic flow management, it's basically a bunch of sensors that inform us, the people that reside in the city, of what's happening so we can make informed decisions. You're driving downtown and you don't want to do 5 loops looking for parking. Your car is going to tell you, "A parking place just opened up at your destination point." We are going to start getting there. Our lives are going to become more convenient, but that's a lot of data that has to be stored somewhere, processed and stored.

David Dunn: Add to that, video's been the killer app, and it continues to be. A 4K video uses something like a gig of data for 2 minutes of video. It's really hard to merely have a minute long video on your iPhone and actually get it off your iPhone in an efficient way. That can be a challenge, but companies are going to overcome and new applications, new devices, new ways to store and transfer that data will exist.

Mark Bauer: It's all these new companies, I mean, just in the last 2 years look at the new companies. Take a look at Uber. They're utilizing the technology to start business, and a lot of it resides on the internet.

Clint Poole: They're utilizing the technology to start business, and a lot of it resides on the internet.

Moderator: Smart cities kind of leads into the next question. What growth areas do you believe will drive future data center design and development? What other markets are we seeing that might be competition for Phoenix?

Clint Poole: One driver is the access to open source code. You're getting rapid development of applications and new solutions being solved. Mobility is a key one, not just because we have more devices, but our consumption of data is much different. Back when we carried laptops, most of the processing and data storage happened on our laptops. In 2012, tablets outpaced PC's. That meant we had more devices, but it also meant when you're working on tablets and smartphones, that your data processing and storage is happening in a data center somewhere. That's a key driver - internet of things, smart cities, absolutely.

Mark Bauer: The major metropolitan areas will continue to grow. In Phoenix, there's a lot of area to grow here so if you take a look at the top 10 metropolitan areas, there is a large data center footprint in all of them. We're not seeing a lot of growth in LA from a data center footprint perspective, but what is there will stay there and the ability to grow will come probably to Phoenix or near here. Vegas is another market that continues to grow. There's only two providers in that market, but one is a major provider and controls much of the internet going in and out of that city, and they'll continue to build as long as they've got the land and they've got power.

David Dunn: Portland's a large competitor - Salt Lake City, Denver to some extent. Dallas - those are all competitors.

Clint Poole: Going forward you're going to start getting predictive analysis. I'm starting to see this trend. If you think about what that means this is important stuff. It goes from data, to information, knowledge, and wisdom. Wisdom is where you're actually making a difference. We are just storing data today but once we convert that data into other data that becomes available for us to do predictive analysis on it. We're multiplying it every single time and so that data gets more expansive, but it becomes more beneficial to us as a society. I think when you look at

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data centers you can't look at brick and mortar buildings or the power they consume you have to look at the value they bring to society.

Moderator: How are the data centers themselves evolving to no be just a brick and mortar?

Clint Poole: Phoenix is a great place to look at how data centers are evolving. You can go through and you can start at some of our first ones and walk all the way through. You have H5 doing some very innovative things. We're in this really cool period where innovation is happening in very different ways. Problems are being solved in different ways and forms and functions. I think that innovation is occurring and you can go out and get tours of these data centers and see really how they're augmenting and changing . . .

Mark Bauer: Again it's the innovation . . . the modularzation. You can go back and look at what IO did in 2008 when no one was building a thing. They went out and built a raceboard environment and filled it. If you walked through a Cyrus One and you look at some of their first suites that they built, they will look different from the last suites they built. H5 is coming out with something different than the first product they came out with three years ago. It's constantly being able to listen to what the customer's looking for and needing and making decisions to build differently.

David Dunn: Can you build it cheaper, build it fast, can you make it more energy efficient? For every watt consumed by a computer how do you reduce the amount of watts that go into cooling it and making available power to it? Then reliability. How many systems and components do you need to make sure that server stays available? If you can't buy on Zappos or Amazon you go nuts. You don't buy, you go someplace else. How do you make that fast? How do you make it secure? We as data center providers are always striving to make it better, faster, cheaper, stronger.

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