Constellations Podcast

Episode 74 – The Ground Station As-a-Service, Smallsat Growth and Cloud Security

Guest: Brad Bode, CTO, CIO and Founder, Atlas Space Operations – 20 minutes

John Gilroy: Welcome to Constellations, the podcast from Kratos. My name is John Gilroy, and I'll be your moderator. We are here to discuss how cloud based solutions are changing the space industry. Our guest is Brad Bode, CTO, CIO and founder of Atlas Space Operations. The company provides satellite communications as a service to operators. We will discuss how the increase in demand for smaller satellites has changed the industry, the opportunities and challenges brought on by cloud based solutions, and how the increase and availability in data traffic from space has changed the current landscape. So Brad, communications as a service that's kind of a new phrase, isn't it?

Brad Bode: Well, I wouldn't call it new. We started about five years ago with that idea. This was probably at a time period where people weren't really approaching it that way. Although it had been a term that was widely used in business to business or consumer to business models in the overall internet, but not necessarily in space because the problems in space are a bit more complicated than exchanging business to business data.

John Gilroy: Like a name and email address on Salesforce. That's a software as a service and you're applying it to a different world here. So, tell us about your approach to selling communications as a service.

Brad Bode: Well, first we looked at the problem in our experience across military and commercial because that was our background. The founders, Sean McDaniel and I in particular come from Northrop Grumman and TRW, which were large aerospace companies. So we had a lot of experience integrating antenna systems and scheduling on government assets. So at that point we took our experience there, which was admittedly what I would call painful and started to look at the problem from a commercial side because at that point commercial launches of satellites were growing, and it was clear that the government wasn't going to be the one launching the most satellites after a certain amount of time. So we asked ourselves if we could do something today with modern technology without the shackles of the requirements of the aerospace industry via the government, then we would be able to do something unique and offer satellite communications as a service. Now, that was only possible through cloud based technologies, that's what enabled it. And it took 10 years for that to reach maturation before you could really start to consider to use it for satellite communications in terms of reliability and global reach.

John Gilroy: Yeah, there were many initiatives about 10, 12 years ago about cloud first and move to the cloud, but really I think it's in the last four or five years that Amazon

web services and Microsoft can add enormous amounts of storage and enormous amounts of power. All of a sudden you have the possibilities of putting those bricks together.

Brad Bode: Correct. Right. And doing it at a cost that was affordable for pretty much anyone. Amazon, Microsoft, Google, they support everything from websites to Netflix, and Netflix streams more data via Amazon than we'll probably ever stream via satellites.

John Gilroy: Oh, it's amazing. So why do you think the service is growing so much? The communications as a service just adds flexibility or why is it growing so fast?

Brad Bode: Well, primarily because the interest in data has increased. So someone told me that in artificial intelligence, that since the early onset of artificial intelligence algorithms or data science algorithms even, there hasn't been much change in those algorithms. What has changed is the amount of data you could feed into these algorithms. So you think about it from that perspective, it's not about the technology being inactive or the software being inadequate algorithmically, it has been the amount of data.

Brad Bode: And so Google and companies that make money off of analyzing data need more data. And guess where that data's going to come from? It's going to come from space. It's going to come from imagery collection. Every type of sensor that they can put in space to collect more data is going to be used to fuse with other data to make decisions about what's going on in the world. And it's really a business to business service, meaning companies will consume that data to make better and more informed business decisions. Whereas consumers, regular people, it's not as relevant to them. They will see the impact of it in their daily lives. But primarily it's about ingesting more data. And one place where you can ingest more data that is the wild West still is space.

John Gilroy: There are some constellations that produce 11 terabytes of data a day. How could you even control that? There has to be some kind of flexible virtual system over to control that.

Brad Bode: Yes. And there has to be cloud based systems that can harvest that much data and scale to meet that demand. If you were to build a data center that housed 11 terabytes of data per day, the cost of that would be unreal. And now you have to build all the infrastructure around it. So, infrastructure as a service, which 15 years ago was a discussion and then it has now really you can't do anything without it at this point.

John Gilroy: IAAS it's in the dictionary now, I think infrastructure as a service. And so let's contrast this with maybe the traditional ways of doing things. So how was your approach different from traditional ground system operators?

Brad Bode: So that's a good question. There are different ways to solve the problem of making space more accessible, and I can step through a few of them. So one way to make space more accessible is to have the same ground systems equipment at every ground site. Okay? So once customers integrate with that equipment, they're done. And that is an admirable solution and it does solve the problem to some degree, but it does levy the complexity of integrating with that ground system onto the customer. So now you're taking complexity and you're saying, "No, this is going to be your responsibility. And if you want a different modem, you can't have it. You just have to integrate it our way and only our way."

John Gilroy: And then you get bottlenecks.

Brad Bode: And then you get bottlenecks. So say for instance you have a site, an antenna somewhere that does not have that exact same solution. Now that customer can't use it, right? So that's one way. Another way is an approach that Amazon has taken, which is we will not deliver you anything but digitized RF and you will never touch our ground stations. Okay, we're going to deliver you digitized RF. And that works too, because that puts an abstraction. It says this is what we deliver, this is how we deliver it, period. Okay? That puts still burden on the customers to spin up modems and FEPs, and all of these different things that actually create those cells. And now you're shoving the complexity off to the customer. Now, Amazon's business model is fine. They can do that because they want your data through their cloud. And if you're spinning up a modem in their cloud, you're spending money on their cloud, it's not a big deal.

Brad Bode: So that's the second way. Now there's a third way, which is to have a unified interface no matter what the hardware is at the ground site, and only one way to talk to that ground site. And that solution abstracts away all of the connections to the ground site and all of the connections to the modem and the data delivery from the modem. So that you don't care which modem, you don't care which antenna, you don't care which HPA, you don't care which RF switch, none of that should matter to you. That's our solution.

John Gilroy: When you walked around the show floor here you had people talking about small satellites, I'm sure hashtag small sat is what the show is promoting here as well. And so what are the issues you see with more and more small satellites being up in the air?

Brad Bode: That list is long. Obviously frequency deconfliction that's handled mostly through the FCC, but then you're talking frequency deconfliction on the ground with multiple antennas trying to talk to different satellites. For us looking at it from the perspective of a ground systems operator, more automation is one of the biggest things that need to happen. Everybody needs to embrace adopting satellite communications as a service and not rolling their own everything. Do what you're good at. Build your satellite and integrate with somebody who can manage the link to the ground site and manage that ground site. Don't write software that is supposed to configure a modem. You shouldn't have to do that anymore. Because if you're doing that, you're spending your time and your resources and incurring risk in solving problems that have already been solved, right?

Brad Bode: If you have to interface with a modem directly, you better have a good business case for it. And I suspect that if we can move towards a more common interface like ours, that if you can capture 90% of the cases of customer needs, that will be in a good position where the large constellations won't have a problem operating. It's when you have to get specific, you incur a lot of risk. And the reality is there's multiple business models that can be supported in this industry. You can have that 10% who need really custom hardware and really custom solutions, and that's fine. They're going to have to pay for it. But if you just need downlinks whenever, wherever you can get them, you have to start looking towards infrastructure or software as a service and satellite communications as a service to get more passes.

John Gilroy: So tell me about sustainability and space debris when it comes to these small satellites. We know when going up there, there's challenges in communications in there, but what about sustainability and space debris?

Brad Bode: It's not a hot topic for me, sustainability and space debris. I think that when it becomes an issue, and it is an issue, but it is the moment we see an expensive satellite get hit by space debris is the moment we will solve that problem. I think it's a solvable problem and I bet that we will solve it, but we'll need a crisis first, and that crisis will happen. I can't predict when, but it will and then we'll solve it.

John Gilroy: Sounds very human, doesn't it? Put in the back then all of a sudden give us some attention.

Brad Bode: Exactly.

John Gilroy: If you look around the room here, I'm sure in other rooms as well, there's many small sat operators that aren't very profitable yet they are getting attention

from venture capitalists. So, why would people put money into something that is kind of questionable?

Brad Bode: Yeah. I think Elon Musk said it yesterday on the... What was it? On his keynote that the number of LEO communications satellites that succeeded was zero, or went bankrupt. What is it? Iridium bankrupt, Globalstar bankrupt, and he went down the list. The point is, it's a difficult industry but it goes back to data, everyone wants data. And the venture capitalists, I know a lot of them, all recognize that data is more valuable than oil. The currency of the world is data now. While oil is a commodity, data is more valuable. And you can go out and take a look at the articles that talk about how data has surpassed value the value of oil. So it's a gamble and it's a risk that venture capitalists are willing to take because the value is so high. All you need is one and it will be $1 billion company.

John Gilroy: Oh, yeah. Brad, thousands of people from all over the world have listened to this podcast. All you have to do is go to Google, type in Constellations Podcast, you can get our show notes page. Here you can get transcripts from all 71 interviews and also you can sign up for free email notifications for a future podcast about communications as a service, all kinds of topics really to the satellite world. Well, give us an example here. Can you tell us how cloud based solutions are being used to connect infrastructure on the ground?

Brad Bode: Sure. So I can talk about it from our perspective. Again, there are different solutions to this problem. The most obvious solution is that you... Well, even traditionally, and let's walk it forward. Traditionally you would put for each customer a firewall at every ground site and they would connect directly to that firewall, then connect to their equipment. So now with the cloud you can take that concept and stick it in the cloud and have one connection to your ground site. And it's all addressable through the cloud.

Brad Bode: So rather than have equipment put across the globe for each customer and increasing the risk and the security risks at each one of those sites, now you can put that in the cloud and you can manage the risk much better in the cloud than you can at the ground sites. So if there's one entry point into each ground site and that entry point is controlled and managed by us, then we stand a much better chance of defending against security risks. Also, we can do interesting things when we have a layer between the customer and the ground equipment. Our customers don't touch our ground equipment, they don't touch the antenna, the modems, none of it. We stream the data through a patent pending cloud piece of software or a software as a service that moves data through it, but also does some interesting things when necessary to the data. And I'll reveal that at a later date.

John Gilroy: Great. With all these always small sats and all these constellations going up there, there's an increase in accessibility to data traffic, you don't have to wait a month anymore. And so that really is changing the way businesses run, isn't it? Impacting the companies directly?

Brad Bode: Oh yes. It's really the most urgent thing for almost everyone I talk to is about latency of the data. Especially in the earth observing market, they need data as quickly as possible. And when you're talking about this problem of data trafficking, from our perspective it's about getting contact with a satellite sooner, right? So you can get that data down, traffic it across the globe and get it processed and the product delivered. So take for example if you have a hurricane, hurricane systems need data as quickly as possible. So it really matters from time of collect to time of ingest at the customer, with the end user how quickly you can get them that data.

Brad Bode: And there really are just two areas in which latency is important in the ways in which you can solve the latency problem. It's more antennas on the ground and faster delivery once it hits the ground. More antennas on the ground is an expensive problem. And at Atlas we take the approach that we're going to integrate as many third party antennas as well as our antennas as possible. So we will be integrating Amazon's antennas soon. That will give us more access to space. And we're in talks with other providers and third party antenna owners to integrate theirs. We actually already have three antennas that we don't own integrated through partnerships with, in one as even Rocket Lab's. So it's important that we look at it from the perspective of not whose antenna or exactly what equipment, but can you deliver the data and can you get me the data quicker, period.

John Gilroy: When I think of risk management for some reason I think of financial risk management, but it applies to the satellite business as well. One of the greatest risks to the small sat industry is the ground system could be hacked and it's data accessed. So what steps can operators do to improve security?

Brad Bode: So I mentioned it earlier that none of our customers actually directly use our equipment.

John Gilroy: You did mention that.

Brad Bode: They don't even have a firewall at our ground site. So nobody has access to our equipment except us. And we can defend it better through our cloud presence. Because the cloud leverage is, in particular we're using Amazon right now. Amazon has a lot of accreditations that already support higher security standards. So once the data is in the cloud, it's at much less risk of being

retrieved, assuming that you have a good design in terms of the intercommunication between your services.

Brad Bode: Once it's in the service, Amazon has a certain amount of, not guarantees but accreditation there. So I think it's important to isolate your ground sites as much as possible from access to anyone. It doesn't mean that you can ignore the ground sites because they are still a vector for someone being able to get access to data. And I said on a panel yesterday, please encrypt your data. Either way, it doesn't matter, encrypt your data. Because really on the ground site, if they do end up with access and it's encrypted, it's not that much of a concern. The data will likely not be worth anything by the time they do figure out how to decrypt it.

John Gilroy: Brad, people are going to hear all the noise in the background. We're recording this from the floor of Satellite 2020. I walked the floor this morning, I'm sure you have to. Anything stand out as something distinctive, innovative in the floor here at Satellite 2020? Well, I guess they better get to work across the way here.

Brad Bode: Nothing really stood out, no. I think a general observation is that what I see is a lot of companies that are targeting very specific solutions. And while like I said earlier, roughly 10% of the market needs these very custom solutions in these very specific business areas. But what I'm more interested in is that 80% to 90% who just need their data and need to have a solution that is common across the entire globe, right? The more specific we get, the more difficult it is for software satellite communications as a service. So I'd like to see more generalized solutions. And I know that a number of people here are certainly working on that, but it is up to the software layer to make that happen. So I think what I'm trying to say is I'd like to see more software companies here.

John Gilroy: So you disagree with the fact of the riches are in the niches. You wouldn't go with that one, would you?

Brad Bode: They probably are. And we will charge more for the US government when they want one very, very specific thing. But that's just the nature of business. You have to do that. You have to look at your business model and consider where you want to put your resources and if it makes sense. And the government comes to us and says, "We want you to put up a ground station with NSA type 1 encryption." Yeah, we'll do that. But that's more expensive because the security audits and things are astronomical.

John Gilroy: Well, Brad, unfortunately we are running out of time. I'd like to thank my guest, Brad Bode, CTO and CIO and founder of Atlas Space Operations.

Brad Bode: Thank you. Good time.