Constellations Podcast

Episode 37 – New Space Collaboration, Creating Standards and Sharing Assets

Speaker: Katherine Monson, Director of Business Development USA at Kongsberg Satellite Services– 24 minutes

John Gilroy: Welcome to Constellations, the podcast from Kratos. My name is John Gilroy, and I'll be your moderator today. We are recording this podcast from the SmallSat Conference in lovely downtown Logan, Utah. Our guest today is Katherine Monson, the head of U.S. operations for KSAT. She is here to discuss satellite ground services and the development of ground station network capabilities, the future of small satellite operations, how they can be optimized, and crystal ball time: where the future is heading in this business.

Katherine Monson: That's right, John.

John Gilroy: Prior to joining KSAT, Katherine ran the ground station department at Spire, where she was responsible for building up the team that moved Spire's ground station network from zero sites to over 25. At KSAT, Katherine works with the majority of new space companies to design and implement ground station architecture.

Well you spent some time in Washington, D.C., and here we are in Utah, lovely downtown Logan.

Katherine Monson: Lovely downtown Utah.

John Gilroy: You live in Silicon Valley, so a lot of people in Silicon Valley, I mean, they probably don't even have newspapers there since they're changing so fast, you know?

Katherine Monson: It's true; you've got to keep up on Twitter.

John Gilroy: So how do you keep up with the technology in Silicon Valley especially in regard to ground stations?

Katherine Monson: Yeah, that's a good question, John. One of the things that I really like about the new space industry is there is so much collaboration. Especially in the Silicon Valley with so many companies all within a few blocks of each other. I'm looking here, there's Planet within two blocks of Capella within a few blocks of Spire. That creates a really interesting ecosystem for people to meet up more socially to share ideas and really make sure people are standing on the shoulders of giants. With this new segment, folks have done a really good job of making sure they're not reinventing the wheel, and that's something I think that helps the

industry move quickly, using solutions that already exist rather than starting from the top.

John Gilroy: It's interesting how social media works into this, because two days ago Payam from Capella had a LinkedIn status update we talked about. This morning you had a Twitter status update to talk about. I guess this is how you keep up; it's changing so fast you got to use Twitter and social media because it's a blur.

Katherine Monson: And it's great. It allows ideas to change and evolve real time, which helps us move even more quickly. In an era where folks are launching full constellations in a year, two years, we're not talking in decades anymore, so having that interchange of ideas move on a day-to-day, minute-to-minute basis I think is really what allows all of us to move forward.

John Gilroy: Well, years ago when I was back in high school with Ben Franklin. No, years ago the space industry, I mean it was kind of, a lot of the funding came from the federal government, we know that. Now we see a big transition, a lot of the funding is coming from your neck of the woods in Silicon Valley. So in the software world, Silicon Valley wants technology that's efficient with made off-the-shelf parts and its called "COTS" in my world and hopefully reusable. Same themes running around the ground services?

Katherine Monson: Exactly. I think that it goes back to that theme of really not re-inventing that wheel. One of the things we've done at KSAT is work really closely with new space companies to understand what the needs are, and then build that network so that we don't have folks going out spending years building a separate network. A great example of that is we have just released this morning, so hot off the press, a great partnership with Hiber. So we're building a network for them that's called "Hiberland" to support that constellation. And that's a really good partnership for us because it allows us to move forward in a very quick way with an innovative partner who really understands that what they need to do at the end of the day is make their end customer happy, so all of the energy and innovation and engineering can really go into that value add of pushing forward in the internet of things world.

John Gilroy: You know when you lived in Washington, D.C., there's a company there called Silo Smashers. You can see it right from-

Katherine Monson: I love it. I spent my time at OSD, so I can appreciate a good Silo Smasher.

John Gilroy: And so maybe your job should be, instead of Director of the US Operation, Silo Smasher, because there's a lot of silos in this world. And really, that limits communication. Silo communications can be extremely terrible.

Katherine Monson: I think that's so true. One of the things that we have the luxury of doing at KSAT is that we're a 50-year-old company, so we are able to think in a long-term perspective. And I think that's really helpful to us because it allows us to say, "Let's win in the long run." What do we need to do that's going to help the industry move forward in five years and in ten years? We don't have to play these short month by month games, to be gimmicky, to prove to investors that we're going to be profitable this quarter, and that allows the opportunity to really sit down with folks and build expensive infrastructure, and work with people to figure out, "where does the industry need to go? What does the industry need to be successful?" That's one of the things I really love about KSAT, and in particular our US operations, is that we get to live in both worlds. So we get to live in the speed of the valley but we also have all of the institutional expertise of being a company that's done 24/7 operations for 50 years now.

John Gilroy: Head in the cloud, feet in the ground.

Katherine Monson: Love it. New tagline.

John Gilroy: Another business card for you. You got three so far today.

Well traditionally, what happens is these ground stations are set up to handle our satellites. All of a sudden, you got this big wave, look around you. We are at smallsat. Everything is going on here. So what do you do? Go home and cry? I mean how do you handle all of this crazy craziness?

Katherine Monson: Again, it just comes back to communication. So talking to people about what they need, building the things that they need, starting conversations early. Again we have the luxury of working with in this world where we're doing smallsats and you think smallsats, small antennas. KSAT light antennas are 3.7 meters. But we're now in a really interesting time in the industry where we have smallsats going into deep space. So, smallsats that need big antennas, so the future of this industry is only going to keep changing and keep growing. And I think that's what's really important about having everyone here in Logan, Utah, having everyone discussing, making sure that we're building infrastructure that's going to be useful, and that we're building infrastructure on the right timelines.

We never want to be the gating factor for our customers, so we need to be out ahead, making sure that the right infrastructure exists. So, I'm going to be a little cheesy with you John, I'm from Iowa, so I got to work this end if you build it, they will come.

John Gilroy: Oh no.

Katherine Monson: And I say that to my Norwegian colleagues and I had to explain a little bit of context there. So, KSAT: field of dreams.

John Gilroy: As long as they don't talk about dried fish, then you're even.

So, we're doing this podcast, bunch of people sitting around here, throwing marshmallows at you.

Katherine Monson: It's a rough crowd you guys.

John Gilroy: And so, someone comes up to you afterwards and grabs your arm and goes, "Hey, you know, I'm thinking about utilizing a ground station network." And so you get a piece of paper and a pen. So what kind of questions do you ask? How do you evaluate what the requirements are?

Katherine Monson: Oh yeah, I think one of the fun questions I get to ask now is, "How many space craft?" And it's a fun question.

It's a fun question, because in the past, folks were talking in the order of: one, two, three, four. And now, I'm really trying to make sure I understand, is it a hundred? Is it a hundred fifty? Are we doing this by next year? Are we doing this tomorrow? So those are the questions I always want to know, is how many space craft, what's the timeline involved? What is the mission? So, one of the things we do a lot of at KSAT is really help people architect what they need. What I really don't ever want to see happen is folks ending up in a situation where they have over-scoped a ground network. So any money that they're putting into ground that isn't necessary to support their end-customer goals is waste. So we really want to make sure we understand what the mission is so we can help design the best architecture for them

John Gilroy: Start off with listening, that's strange.

Katherine Monson: I know, crazy for the Valley especially.

John Gilroy: Oh I'll bet, yeah. They're too busy talking.

Your website KSAT has reputation for talking about reinventing the ground network. So you just go in and rip things up and reinvent it or what do you do?

Katherine Monson: Yeah, I think for KSAT Lite, the big reinvention was really the ... We had to draw a line to say, "We're going to create a standard product." So if you think about what's expensive about space, there is obviously a huge capital investment that goes into buying any space hardware. The antennas are exactly the same. Antennas, even the small ones, are quite expensive. But the surprising expense

factor is actually the people that are involved. We have really highly trained engineers across this business. So at KSAT Lite one of the things we did is, "Let's create a standard." We spoke very closely with a lot of the early smallsat constellations and a lot the smallsat owners and operators to understand what that standard needed to be, and now we really do stick to that standard. So, allowing ourselves not to introduce nonrecurring engineering into the architecting of ground stations is what allows us to offer a product that is more cost efficient than it's ever been available before.

John Gilroy: We were at Satellite 2018 and I walked on these booths, and I couldn't write down the number of booths and the amount of new hardware out there and new software. And so, it's almost at a point where your company has to hire an analyst to find out, "We want to standardize on product X," "Well, you have 10 choices." And the next trade show is going to be 15 choices. So, that's a challenge in and of itself.

Katherine Monson: It's so true, and I think that is one thing that I really love about this industry, is that its small, people know each other, they've worked together in the past, they continue working with each other when they move to new roles. And that tight community allows people to share information really cleanly. So we hear about products through this network, this space ecosystem. And I think the other really nice thing about this industry is that people want it to work. So everyone is invested in making this hardware successful. I think that's something that we really should appreciate and pull our heads up and understand that it's a really beautiful environment to be here in Logan right now. And see so many different people in the same room, working together. The CSSMA is a great example of that, Commercial Smallsat Spectrum Management Association. You have folks who are competitors, for example in the Earth observation segment of the business, who are actively working together to build a better regulatory environment for the industry. So, I think that type of collaboration is what I'm really proud that we as an industry have accomplished.

John Gilroy: I was in the Market Café getting a cup of coffee about an hour ago, and I was sitting there and there's a table next to me with six students. And it was amazing, they were excited, I mean this wasn't like, "Oh, we got to go to calculus class." No, it was, "Guess what? We can do this. Did you hear that booth? What about that? What did Katherine have to say?" I mean, there's a lot excitement in this business. So does innovation come from students in the cafeteria there? Is innovation in Silicon Valley? Where does the innovation come from?

Katherine Monson: Oh, it's coming from everywhere. And I think that's the other really magical thing about this industry, is we have folks who are right out of university, who are contributing in the industry, coming up with new ideas, keeping everyone on

their toes. We have folks who've been in the industry for 50 years who are still contributing, bringing that expertise, bringing that experience. And that's a really amazing thing too, John, if you look around right now, how much diversity is in the room right now, is another thing I'm really proud of in regards to the industry. We got folks from all walks of life, all countries here, and all of those places are where ideas come from.

John Gilroy: Amazing, that's really amazing.

Well back when I was in college, many, many decades ago, I took biology.

Katherine Monson: With Ben Franklin, that's right?

John Gilroy: Yeah, with Ben Franklin. He was the ... No, I was the teacher, he was the-

Katherine Monson: Oh, I see now.

John Gilroy: They used the phrase, 'interdependent ecosystem.' Now let's take these words and just bolt it right on to KSAT. 'Interdependent ecosystem,' is that fit for KSAT?

Katherine Monson: 100%. This smallsat world, but the aerospace world in general, is a very interdependent ecosystem. We rely on our customers, who are smallsat owners and operators, who are bigsat owners and operators, to be successful. And who do they rely on to be successful? They rely on all the launch vehicles to get them to orbit. They rely on all of the hardware subsystem providers to build hardware that is going to last for the mission duration. And this is an interesting thing about this industry as, it is very expensive, there are only so many players, and we do all rely on each other to be successful. So I think that is one of the things that is great about working in new space in particular. Just seeing how everyone is connected, and how everyone does rely on others to make it even work, to make those business cases close.

John Gilroy: When I think of the word constellations, I close my eyes, I think of the Big Dipper. When you think of constellation, close your eyes, you probably think of smallsats.

Katherine Monson: In the hundreds.

John Gilroy: In the hundreds, right. Right. Same word, different meanings. So what role does a commercial ground provider play in this world of constellations?

Katherine Monson: Yeah, and that's a really good question, John. So, at KSAT, we engage in so many different ways. KSAT Lite is one of those ways ... We made another big

announcement yesterday, so KSAT Lite is now its own business unit at KSAT, that allows us to be more nimble. So that's one way that we engage with customers, but for folks who have these big telecommunication constellations, they need a different solution. And so for that type of mission, we work pretty closely with them, to make sure we understand again, what is their end-customer requirement? What is going to allow them to make money? How do we make sure that we're helping them achieve their latency goals? That were getting all the volume of data down? So, across the industry, based on the mission, based on the team and their needs, we really do engage in different ways. So, it's very consultative, which is a very fun thing to get to spend my day going around and helping different people architect different missions. Dream job.

John Gilroy: When I parked a car this morning, walked out, we saw the football stadium over here, in the car park, and I want to talk about football now.

Katherine Monson: I'm from Iowa, I can roll.

John Gilroy: So football players, they're like 6'5, and 280 lbs. , and they can run a 4.9" 40. So they want them big, but they want them fast. They want them big and also agile. And when you look what's going on in our business here, they want to have space base information accessible with wider impact, but it's got to be most reliable. So we got to have both that combination, that's hard to recruit.

Katherine Monson: That is so true, John. And that's something that I am really proud of for KSAT, we've done 24/7 operations for 50 years. So, it's one thing to build a ground station network. I love traveling around the world. I love having hands on wrenches. I love installing hardware, and that is a really fun part of it. But the real challenge of being a ground station service provider is making sure you're keeping the systems online every single minute of every single day across 160 antennas, across 36,000 passes a month, across hundreds of different space craft. And every single one of these space craft is mission-critical for somebody. So, dropping a pass is completely unacceptable for us at KSAT, and that's one of the things, we really do need to hold ourselves to a very high level, because all of our customers rely on us, which means the people of the world are also relying on KSAT.

If you're looking at any of the imagery coming down, a lot of that is coming down through the KSAT network. If you're looking at weather data, we're a proud supporter of the JPSS. So the weather data that is crucial to save lives is coming from the KSAT network. So those are responsibilities that we hold very seriously. This data isn't just data. People talk about big data, a lot of buzz words in the Valley. But the data is what makes actionable decisions. And folks are looking at weather data to say, "How do we help people? How do we make sure we're making the right calls to evacuate people so that people aren't stuck in

situations?" Hurricane Katrina is a good example of that, where good weather data allows people to have early notice and get out on time. So that's a big responsibility and I think that's something in the space industry that we really do need to remind ourselves, is the space part is really cool, but what happens down here on Earth as a result is actually why we're all here.

John Gilroy: Well all good things have to come to an end. In a couple days, people will be dispersing from this conference, go down to the airport, and wait in the TSA line. And then some people think about football. And then some people are thinking about reducing the cost of ground systems. Maybe you, maybe me, maybe a lot of the people in the audience here. So, what do you think could be done to expedite this whole concept of reducing the cost of ground systems?

Katherine Monson: Yeah, it's all economy of scale, so it's infrastructure, ground networks, the more we can share infrastructure, the cheaper it is for each of those individual users. So that is what we've built with KSAT Lite, is the ability to share multiple missions on one network of antennas that is networked. And so, every time the industry can grow in scale, we can grow and scale that antenna network without, for example ... I'm looking here and we've got a viewer from Planets or, if Brian comes to me and says, "Hey, I need another antenna." That may work for Planet. But at a company that only has one or two spacecraft, they can't commit to a whole new antenna. But what we can do at KSAT Lite is say, "Well, you need a couple more minutes," someone else needs a couple more minutes and an aggregate. There is now a business case to build a new antenna. And every time we're optimizing our use of the network, we pass along that cost efficiency to our customers.

So that's how we are able to get to these very low prices with KSAT Lite, is a very rigorous allocation of time on this antenna network, and then, like we talked about earlier, John, making sure that we are not reinventing wheels. That we're not introducing expensive engineering time into problems, but instead, using a solution that helps everyone access a network and then share the cost among the industry.

John Gilroy: When you look at the smallsat conference here, you see tremendous growth. There's over 3,000 people here. Now this place wasn't designed to feed 3,000 people, so they have a big tent outside and it's like a big picnic, and it's wonderful because it's beautiful. It's sunny and clean.

So, let's take that and apply it to KSAT. Do you have enough infrastructure right now to handle the rollout of some of these larger constellations? Can you feed 3,000 people or less, there's 2,000?

Katherine Monson: We can, and we have great partners so I really should thank them for our ability to move quickly. We can build an antenna for KSAT Lite within six months. We don't love to be doing things under the gun, so I always encourage people to say, "Hey, let's sit down, let's do mission planning together. Let's make sure we understand what the next year looks like for you. Let's make sure we understand what the next five years may look like for you." So having that conversation early allows us to do things in a more measured approach, and that's the other thing I think that helps us with cost efficiency here, is that because we can forecast growth in the industry, we can build ahead of what people need. So that when someone comes up to me to say, "Hey, I have an emergency situation on my spacecraft. I'm going to need three times as many passes as I expected." We have the ability to be able to support them.

John Gilroy: Back to food again.

Katherine Monson: Love it.

John Gilroy: So, can you handle 2,000 people? Yes. Can you handle 3,000 people? Yes. What about 3,000 simultaneous people? What about communication from these, that are simultaneous in nature? Whole different question, you know?

Katherine Monson: Whole different question, and this is where we get into the new frontier technology. So, again, we have a really lucky position at KSAT where we are able to work with our partners, to explore new technologies. We're looking at all of the optical solutions that are coming online. We have some really great partners we've been working with there and I hope to be able to share some of their names here in the next year. That is another ... Going back to this field of dreams, this tagline here. With optical, we were in a situation where we knew there would be a future in optical. We were waiting to see from our customers when folks wanted that optical support on the ground. And what we've realized is actually we need to help be a standard-setter and work with folks to really shape the conversation to say, "What do you need?" Rather than being in a receive function, we need to go out and start asking questions and really be in poll-type interaction with our customers to say, "Hey, what would be helpful for you? And when would that be helpful? And when should we start building?"

John Gilroy: If you look at all the exhibitors here today and keep up with trends, listen to the constellations podcast, and find out what's going on. The value change in this business is changing. Small satellite companies are proposing global solutions, and the ... Disruptive. Disruptive. Disruptive. We all read Clayton Christensen. He started that word. Everyone's using disruptive. Disruptive. Disruptive. Well, disruptive is great. Prices turning downward. So what markets are feasible with all these changes?

Katherine Monson: Oh, and I think that's such a great question, John. So prices' trending downward is a something I really want to latch onto here. In the situations where that's occurring, my question would be why? Why are prices trending downward? And what I hope the answer is, is because the cost basis is coming down. So particularly at KSAT, that is how we've enabled KSAT Lite to occur, is trying to say, "Hey, what are the levers that make ground stations expensive? And what can we do to bring some of those costs down so that we can pass that along?" And I hope that's what we're seeing on the spacecraft side as well.

So folks are saying, "Hey, rather than using rad-hard hardware, can I go out and get a similar type of hardware at 1/10th of the cost? And if that works for my two year mission cycle, that's great." That's a huge saving on the cost basis that allows them to create data and access to data platforms that they can then pass along to, maybe it's the government end-customer, maybe it's creating a new commercial market for data. So prices coming down is a really good sign, when it's being driven by folks figuring out more efficient ways to solve the same problems. Or new ways of solving new problems.

John Gilroy: Let's go back to field of dreams. It's the ninth inning, two outs, and this is the last question. You're last at bat.

Katherine Monson: I'm at bat.

John Gilroy: You're at bat, okay.

Katherine Monson: No strikeouts.

John Gilroy: And I'm drawing into some of your earlier ... in the Washington, D.C., the old FCC. So the FCC is proposing some new rules, to lower the regulatory burden. And D.C. is kind of good and bad news. Do you think that maybe some of these rules can be handled more efficiently than the FCC?

Katherine Monson: I think that's a really good question. I do want to say very clearly that the FCC has been a very strong partner of the New Space Segment here in the United States. I am so impressed to see folks from the FCC at many industry events. They're very proactive. They reach out to folks. They try to understand the missions. They try to understand the pain points. Just recently, there was a call for public comment for a proposed rulemaking. I think that's a really, really, healthy thing that we're seeing in the US, is a very strong partnership between government and industry.

We've been throwing some ideas around with different folks, with the FCC, with some of our partners, working at the ITU level. And one of the things that we are really excited about talking in the future is how do we use spectrum more

efficiently. So, we've come from a world where things were done on a human level. So people assigned channels, people reviewed applications. And we're moving into a world where people are running their constellations through software optimization. We can be doing the same types of things with software to make sure we're better using spectrum.

So a good example of that is, right now, we can share load on the KSAT Lite network by understanding which satellites can be supported on which ground stations. With all of those TLEs in a database, we're able to map the most efficient use of that network in any given day. The same can be said for spectrum. So we know ahead of time through our database, we have the TLEs, so we can do the conjunction of that analysis. We can say, "Oh look, we do have a conjunction of that. These two space craft do have similar frequencies that they are using, but oh, both of these satellites have software defined radios, so they have the capability of supporting a wider band of frequencies." So in the future in hope we can move to a model where we can say, "Hey, in a conjunction event, let's actually just command those satellites before the conjunction event occurs, to move to channels on separate sides of the band." And that allows us to use the spectrum in a more efficient way, because it allows us to open up way more opportunities to avoid those split-seconds where we would have conjunction events.

So, I hope we'll get there; I'm a technologist, so I always believe in the technology. And we've got a lot of really smart people here in Logan right now, so I think together we'll be able to work to make sure that spectrum is accessible to all and that no one is blocked from having a small satellite constellation because of concerns about spectrum availability.

John Gilroy: Well, we have just witnessed a conjunction event, because you hit a home run.

Katherine Monson: Oh, thanks John.

John Gilroy: Well, unfortunately, Katherine, we're running out of time. I'd like to thank our guest, Katherine Monson, head of US Operations at KSAT.