Episode 40 – Software Defined Capabilities, MILSATCOM Capacity and Commercial Opportunity

Speaker: Brad Grady, Senior Analyst, Northern Sky Research– 23 minutes

John Gilroy:	Welcome to Constellations, the podcast from Kratos. My name is John Gilroy and I will be your moderator. Today we have Brad Grady on the podcast. Brad is a senior analyst with Northern Sky Research. After several years of stagnation, the MILSATCOM market is growing. Its $5 billion revenue in 2017 is expected to double over the next decade. What's causing this change, and what technology are the government and military interested in?
John Gilroy:	To answer our questions today, we have Brad Grady on the podcast. Brad is a senior analyst with Northern Sky Research, which recently released the 15th edition of the Government and Military Satellite Communications Report. You know, Brad, talking about military and the DOD, the DOD doesn't seem ready to adopt LEO, large, or mega constellation architectures for future DOD-owned constellations. Do you think the nascent LEO mega constellation such as OneWeb will be successful in proving out that model?
Brad Grady:	Yeah, it's great to be here. You know, I think there's a lot of challenges when we start talking about adopting mega LEO constellations, or those non-GEO HTS constellations. I think when you look at players like OneWeb or SpaceX or Telesat, there's lots of challenges, and not only just flying the constellations and all the satellites that are being launched just on the ground. I think one of the things that we've, pretty surprisingly, found in our latest report and some of the latest thinking that's come out of the DOD through the wideband AoA is just how many issues are happening on the ground in the terminal segment. I think one of the latest reports was like 17,000 terminals over hundreds of programs. Just trying to build and consolidate those terminal programs is really a difficult task.
John Gilroy:	So people are looking up at the sky and they should be looking at themselves.
Brad Grady:	They should be looking down at the ground. Yeah, right? Just building those architectures and those networks is just a very complex task, and trying to figure that out and all those other kinds of things, not only just on the commercial side of trying to finance these things, build them, and find the money and find the market and all those other kinds of things, it's pretty difficult.
John Gilroy:	I don't want to use inside baseball terms here, but this is commonly called the non-GEO HTS world, non-GEO HTS revolution. So it really is impacting the whole ground market, isn't it?

Brad Grady:	Oh, yeah. No, absolutely. I think I have a foot in both camps in the commercial and the government side. On the commercial side, we heard a lot of these non-players going, "Oh, I need a flat panel antenna, I need some kind of really new, sophisticated ground infrastructure that is in the process of being developed in order for you to use my system." And now, you hear some of these conversations today and they're like, "No, I can do it with traditional parabolic antennas, existing infrastructure." So there's kind of evolving business models and practices.
Brad Grady:	You know, we expect to hear that conversation on the government side as well, but traditionally government has never been a ... Government, and I say government as the U.S. government, has never been a early adopter on those kinds of technologies. It's always been, "Let's wait and see how that works," and there's various reasons for that. But I think we'll expect to see the same behavior on the non-GEOs.
John Gilroy:	Your LinkedIn profile shows that you focus a lot on DOD, and so you got a good finger on the pulse of what's going on there. What is the role for non-GEO satellites for this military market? Anything at all?
Brad Grady:	Yeah, no, I think there is. I mean, it's not going to be a year one opportunity, but I think in year two or three definitely. You know, I think it's important to make that distinction as well between the LEO players that are coming and the existing player with O3b and MEO right now. So with O3b, MEO, now with some by SES, already has a player in this market. They're providing connectivity, providing services to the U.S. DOD across a variety of applications and doing things that you wouldn't necessarily expect them to be doing, like airborne communications and those other kinds of applications. They're already in use today through O3b and MEO. It's just really a question of how LEO is going to be integrated into that network design.
John Gilroy:	When you look at the technologies on the ground, eyes back on the ground now, talk about terminals, waveforms, command and control, even policy, it seems like some of these could be lagging, putting stumbling blocks in front of the space segment. Do you see that?
Brad Grady:	Yeah, absolutely. That's not even just a DOD trend. That's just across the satellite sector in general of issues of, how do we take advantage of next generation networks, of new technologies that are being developed, new space technologies, and integrate that into our network? We're seeing this resurgence, or emergence, now of multi-band antennas being able to integrate multiple frequencies, multiple architectures, into the antenna itself and build that network and simplify the ground infrastructure. When you go onto a Navy ship, for example, you don't see this big antenna farm of various bespoke antennas that are just doing one thing. Maybe if you're on an aircraft carrier,

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you have enough deck space to do that, but when you get down to smaller crafts, you don't really have the deck space to have four or five antennas, each with their own little purpose. You have enough space for one antenna to do multiple things.

John Gilroy: Do you think it's a matter of financial considerations, or is it a matter of too much to choose from? Is it just too many new choices now with all these advances?

Brad Grady: Yeah, a little bit of both. On the investment side, I think what we're looking at and the challenge is you already have investments today, you've already invested in the 17,000 terminals for the U.S. DOD and others across the world. What do you do with them when you're talking about adding new things into the network that weren't designed for these things? Maybe there's some additional investments or additional problems to migrate those terminals to new technologies and new infrastructures. So truly, what do you do with what's old? How do you bring that in to new networks and new architectures? And then, when you're looking at the new stuff, that's when you have the real chance for innovations in those kinds of technologies.

John Gilroy: Now, here's something that maybe is throwing confusion into all these segments and choices, the addition of more MILSATCOM wideband capacity. That's affecting all these decisions as well, isn't it?

Brad Grady: Yeah, absolutely. If you're a commercial player and you hear the recent allocation from Congress for WGS 11 and 12, you kind of have to worry a little bit of, "Hey, is that a sign of things to come in terms of the U.S. government investing in more wideband capabilities?" I think the answer is probably not. I think if there's one trend that we've seen, is bandwidth demand goes up, not down, and even with the creation of the WGS program commercial satcom leasing went up and is continuing to go up.

Brad Grady: One of the other results from the wideband AoA and just general conversations that's happening out of DISA and SMC and people in those circles is that we're going to need commercial. It's going to be designed in from the next generation architecture from day zero, instead of something that it's like, "Uh oh, we need 10 extra megabits, we need 100 extra megabits. Let's go find it somewhere." They're going to design that architecture in from day zero.

John Gilroy: In addition to new products, new architecture, increasing bandwidth, X band, Ka band, Ku band, are they evolving with all these new MILSATCOM systems?

Brad Grady: Yeah. What you really see is investments from players outside the U.S. in X band and mil Ka. You start to see some of the European countries investing in

new satellites, new proprietary military systems, upgrading their networks, upgrading their satellites. Skynet 6 is a good example from the UK of how do you recapitalize and re-engineer an existing constellation in Skynet 5 in the threat environment capacity demand paradigm that we have today?

Brad Grady:	The Australians last week also mentioned, "Hey, WGS is great, but when we're looking at next generation architectures we're going to have to evolve how much we own and how much we control." And sovereign capabilities is a little bit different in how they view things. Sovereign capabilities doesn't mean, "Ah, it's something that I own. It's a spacecraft on space that I have full hand over and control."
John Gilroy:	Sovereign capabilities. Sounds very Washington, D.C., doesn't it?
Brad Grady:	Yeah, exactly. Well, we're in that proximity.
John Gilroy:	Well, in this town there seems to be a push and pull. I think you know it, too. It's the commercial world and the federal world pushing and pulling, and each trying to take advantage of the other and learn from the other and then see who the leaders are. So, for example, there's greater capacity being offered from GEOHTS Ka band for the overall market, but is it changing the military folks? Are they falling in line?
Brad Grady:	Yeah, I think so. One of the interesting things about Ka band is that's what WGS uses. WGS uses Ka band. In certain countries, it's a dedicated military frequency; in other countries, it's just Ka band. If you look at a system like Global Express, for example, from Inmarsat or Viasat, toss it on Ka band, there's some compatibilities on the terminal side there of the terminal's designed to operate in Ka band so you can bring some of your existing ground infrastructure if you're Mr. or Mrs. U.S. DOD Customer onto these new commercial systems.
Brad Grady:	That's a really great selling point if you're a commercial satellite operator if, hey, you don't have to buy my terminal. You can bring yours onto my network and migrate, and we can talk about information assurance, all those other kinds of parameters that are involved around government programs and procurement and network operations.
John Gilroy:	Let's toss this to a different subject here. Existing low-cost capabilities are starting to meet the requirements for high bandwidth connectivity across all layers of military ground forces and deployment, your DOD folks here. Is there an opportunity for commercial providers to take advantage of this?
Brad Grady:	Yeah, I think so. This gets back to some of the conversation points that are coming out of U.S. DOD of commercial needs to be designed in from the

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beginning. There are certain capabilities and offerings that commercial providers can bring that we don't necessarily need to invest in as a government program or government infrastructure. And that's where we're starting to see those developments of maybe they have a certain way of designing and operating their networks from a capacity management or a cybersecurity portfolio or a terminal lifecycle program that we don't need to worry about as a government customer.

Brad Grady: I think one of the other conversation points that they're talking about is it used to be very much, when we'd talk about integrating these two networks, it was, "I'm going to take a widget from Company A, a widget from Company B, and I'm going to stitch them together and do all that kind of stuff." Now, they're not really worried about the widgets. They're focused much more on the IP layer, which I think is another opening for commercial providers to say, "Hey, I'll bring everything up to that IP ethernet port, and you can manage everything on the other side of that."

John Gilroy: I know you work here in the Washington, D.C. area. You've seen a lot of press releases out of the White House, I've seen them from OPM. Inevitably, every third press release talks about public-private partnership. I mean, it's almost like an acronym. I don't even have to talk about it, you know? I want to focus a little bit more on this. Do you see opportunities for commercial markets to engage with government end users?

Brad Grady: Yeah. In the government satcom world, the best example of a public-private partnership is Skynet 5, from the UK. There was a partnership between the UK government and Airbus to have a fully managed proprietary military system delivered as a service. There were some challenges there, but I think if you look at the UK think tank people, they generally agree that Skynet was one of the better-managed PPP programs that was in existence.

Brad Grady: But the consequence of outsourcing a lot of these capabilities is the brain drain, and if you ever wanted to go back to "sovereign capabilities", you need to hire new staff, you need to gear up, you need to learn how to fly a satellite, operate in the RF layer, manage the cyber security posture that maybe you're contracting out. There's still that management of what's important for a government customer to know and how to do and what can be outsourced. You have to walk that line, but there's definitely opportunities now that we're focused a lot more on IP, we're focused a lot more on bringing network services and throughput capabilities, not necessarily just, does your terminal operate with this specific waveform, this specific capability?

John Gilroy: Big changes just in the next six months.

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Brad Grady: Oh, yeah. No, I mean, the pace of innovation in government satcom these days is faster than ever before. If you believe the press release on WGS 11 and 12, the idea is that it's going to be delivered on commercial timeframes, which is like 36 months or something like that.

John Gilroy: If you believe the press release. Come on, now. They wouldn't put it on paper.

Brad Grady: No, absolutely not. I think it's still to be determined what those form and fashion really is. Are they delivering another version of what they've already done for the WGS constellation with 11 and 12, or are they bringing next gen capabilities? But depending on how that program goes, I think it's going to shape a lot of direction.

John Gilroy: You know, Brad, thousands of people from all over the world have listened to this podcast. If you are listening and would like to get alerts when new episodes are available, then simply go to Google and type in Constellations podcast. The first website that pops up is Kratos, so you go there and you give us your email and we keep you informed with everything Brad has to say and many of our other guests. Let's bounce back to satellites here. Talk about the future and next generation military doctrines, what they talk at the DOD. Satellite communications, it's going to be right in the center of this. I mean, how can it not be in the center of this? Who's going to be designing those? Where do you get that talent?

Brad Grady: Yeah. Well, that's, I think, the trick, especially when you look at some of the recent cloud applications, some cloud programs that have been talked about, how the U.S. DOD is acquiring a Google cloud services for image processing. And all of a sudden, Google employees are going, "Hey, we really don't like the fact the U.S. government is acquiring our services and our knowledge."

Brad Grady: There's a big challenge, and I think, not to throw another wrench in the thing, but Space Force, one of the things I think that could be possible for Space Force is the development of this technical capabilities of building satellites, designing satellites with a more military government focus. So commercial innovation only goes so far, commercial thoughts and commercial practices. So I think eventually you still do have to have that government focus, and how and where and what that shape is still yet to be determined.

John Gilroy: Yeah, and there's not much talent out there. If they can take advantage of commercial talent, they really have to because it's a scarce commodity.

Brad Grady: Yeah, absolutely. I mean, there's only so many people focused on space, although it's becoming a lot more appealing these days.

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John Gilroy:	Back to our commercial folks, commercial satcom providers want to offer managed services to the government similar to the way a consumer would buy an internet service. However, the DOD, your friends right down at the pentagon, they want flexibility to buy from many different vendors, multiple vendors. How does the DOD seem to be addressing this push and pull?
Brad Grady:	On the surface, there's two ways. One is the DOD is still what I would call a service provider. When they buy raw-ish capacity, they're going to a satellite operator and say, "Give me a percentage of airtime. I'm going to build the network, I'm going to connect people, I'm going to do that." So they're acting like a "service provider". That's like the bulk leasing market, which we have seen a lot of resurgence. Traditionally, it's been kind of in decline, maybe there are some troubles there, but in our recent report we've seen a lot more optimism there. Even with falling capacity prices, all kinds of other market dynamics that are occurring, there's a lot more optimism there because there are certain inherent benefits of security and ownership and sovereignty that you can't get away from.
John Gilroy:	I think we can title this podcast, because on the one hand, on the other hand, you're going back and forth commercial and federal. I got to go back into the government requirements to commercial companies. The government looks at this and it wants a long-term enterprise approach where resilience ... Oh, they love resilience at the DOD ... resilience is built into the architecture, baked into the architecture of the satellite network. Now, the other side of the table, commercial providers, they want steady cashflow and indemnification. So it's a push and pull. What's the possibility of both working together to make long-term plans and decisions? How is this affecting DOD purchases and satcom services? It's like the McCoys and the Hatfields. It's feuding here.
Brad Grady:	Oh, yeah. Yeah, to some degree. I think there's a little bit of a meeting in the middle of, "I'm going to agree that maybe I'm going to change my acquisition reform, I'm going to look at consolidate approaches across military systems and commercial systems while I'm making investment choices." Some of that is a legal procurement challenge that's being worked through, but on a technical level I think there's a lot of optimism to be had. Some of it's being developed by the people that's kind of like in the room right here in Kratos in terms of flexible modem interfaces and other new hardware integration capabilities between military systems and various commercial systems of bringing that technology to market. That's really what's going to be required to go forward.
John Gilroy:	I talked to one of the IT folks, and many times when a new CEO comes in or a new director comes in, they'll do a survey of what's on their network. A lot of times, they don't know what's on their network. If you apply this to the Air Force, the recent Air Force study identified various types of wideband terminals across military inventory that are not compatible with commercial networks.

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We just talked about public-private partnership. This could be a problem, couldn't it?

Brad Grady: Oh, yeah. Absolutely. I think it was maybe not an astounding revelation, but it was a little bit of a surprise to a lot of people how many terminals there were out there.

John Gilroy: 17,000, is that what the number is?

Brad Grady: 17,000, yeah.

John Gilroy: I'd lose that on Jeopardy.

Brad Grady: Yeah, right?

Brad Grady: But not even just the terminals, but the different programs where people can acquire these terminals, over 100 different ways, different programs, which has an entire different staff around people acquiring these capabilities. If you were a commercial provider, if you were a cruise ship company or an oil and gas operator, this would be silly. You would not operate in this way. So I think they're going down the road of identifying that this is a problem, we need to invest here, there's still friction and inertia behind that mindset, but there's a lot of positive changes.

John Gilroy: I wrote down two words that you said about 10 minutes ago, and these words would get many people upset in Washington, D.C. The two words are: acquisition reform.

John Gilroy: Don't say that.

John Gilroy: We'll have to cut that out of the podcast. Don't say that.

Brad Grady: Well, there's a certain crowd in D.C. I'm sure that would love that, right? All the lawyers.

John Gilroy: The lawyers would love that. Case Street would take you out to lunch when you get that. This is the Acquisition Reform Podcast brought to you by Big Law Firm on Case Street. I mean, joking aside, there's incompatibility there. So what's the military going to do about this incompatibility?

Brad Grady: Well, one of the first steps they've done is that they've decided to put the people who buy MILSATCOM systems alongside the people who buy COMSATCOM systems. So the people who are building WGS are sitting alongside the people who are buying transponders and buying managed

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services and those kinds of things, which implicitly helps the problem. If you have two people sitting in the same room, they can talk to each other. They're not on different coasts, they're not hoed into ownerships; they're all being incorporated into SMC.

Brad Grady: The next step there is they're really, again, designing from day zero to have commercial capabilities. Because they're doing that, there's providers that are investing, going alongside and saying, "Hey, I know you're going to be investing these technologies. We're focused on integrating at that IP layer rather than the RF layer or the hardware level," so I can bring my commercial best practices in to solve government problems.

John Gilroy: About two weeks ago I talked to a guy named Dr. Ian Buck from Nvidia. He was talking about graphics processing units and how quickly they're changing. I mean, this guy's got a PhD. I don't know if he can keep up with it. So what about the poor hardware purchasers out there who are buying this hardware and it changes? So there might be a trend toward building specialized terminals; we know that. But specialized terminals that just work with the military equipment? That's not going to respond to development of hardware these days. It's changing too fast. You can't have specialized.

Brad Grady: Yeah, I know. I think one of the buzzwords is software defined. Software defined with a blank, whether or not that's terminals or software defined networks. Anything software defined is really a hot topic, and for a lot of reasons. It brings a lot of flexibility into the equation. You can imagine a war fighter out there in the field, and all of a sudden the satellite they were going to talk to is not available. Again, that resiliency, redundancy. They need to go talk to somewhere else or they're positioned somewhere else. They only have one terminal, one modem. If they can just iteratively upload a new waveform, a new capability, that's really the holy grail of where they're going.

John Gilroy: I think about six months ago we did a show about satellites that are in orbit right now, and upgrading the hardware. I mean, that's the whole idea behind software defined networks, is that no, no, we can just update the software from here and it updates the system. Now, there's limitations to that, but it seems like that has to be an approach people can take with this rapidly changing technology.

Brad Grady: Yeah, no, absolutely. And we're seeing that on the commercial side as well, these entirely flexible satellite architectures and infrastructures and just the amazing power that software can bring to redefining networks on the fly is really impressive. And I think government is really looking to take advantage of those capabilities.

John Gilroy:	We began this podcast by looking up at the sky, then looking down on the ground. It seems to me a person could listen to this and go, "You know, satellite services are being driven more and more on the ground rather than way up there in space." This key of flexibility and adapting, it's one thing to say it, but it's like agile software development. You can toss out that phrase, but being agile not that easy.
Brad Grady:	Yeah, no. I think there's lots of challenges to be had. The next 12, 18 months are really going to be key in deciding whether or not a lot of these reforms are just the typical Washington dog and pony show or if there's something really behind there. From where we sit, we found in our report there's a lot of positive aspects to believe the story this time, and not even just from the U.S. We're here in D.C., so we focus a lot on the U.S. government for a good reason. They're a significant purchaser of satellite capacity and services, maybe one of the largest in the world across commercial and government, but we do see a lot of interest outside the U.S. in terms of people investing in technology and capabilities and other kinds of services that are still pushing the market forward.
John Gilroy:	Software defined network is a term that was popular five or six years ago. It's gaining more steam now, seems to rise and fall. Now people are looking at systems and hybrid cloud, interoperability, software defined networks again. We're talking about networks of networks. Is that just a phrase to confuse people, or where does that fit in within this discussion?
Brad Grady:	Yeah. I think that gets back to that war fighter scenario. You're sitting somewhere and you're looking and going, "Uh oh, how do I talk from Network 1 to Network 2?" and that's what we're talking about hybrid networks, and networks of networks and systems of systems, and creating that flexible ground infrastructure to not really care what the transport path is, of, maybe I need to have some security around my ISR information and that needs to go over a proprietary network. But if they're playing Xbox or they're playing some video game, that can go over a public network, that could go over a commercially sourced.
Brad Grady:	That's what we're talking about when we talk about networks of networks, is best routing, least cost routing, those technical capabilities of matching the requirement of the application to the dynamics of the network. We already see that in the commercial world. If you go onto an oil rig, for example, or a cruise ship, they already partition up their network from the stuff that goes to the bridge to the stuff that goes to the crew to the stuff that connects the sensor and downhole in an oil rig. Those are all very different network configurations with different security requirements that are getting routed all over the place.
John Gilroy:	I was talking to some Amazon people, and their catchphrase was dynamically allotted, and why buy a hard drive when you can dynamically get a hard drive?

I'm thinking, "This could almost be like dynamically allocated ground services. There's a checklist. You went up to Level B, up to Level C." It's there and it's not a matter of a terminal or hardware. It's software defined service that can dial in the appropriate amount for watching a television show versus the military requirements.

Brad Grady: Yeah. No, absolutely. The question we really have to ask ourselves these days is, "Okay, great. You're bringing communications, but as a commercial provider is there an opportunity for something else?" So if you're bringing an MWR, a morale welfare network, is there some other service that you should be bringing, some other capability that you're going to introduce to the table? That's where we see a lot of the interest and the investment. Yeah, sure, okay. I'm going to make sure your bits get from Point A to Point B and maybe there's some security or quality assurance around that, but is there something else that I can help you with?

John Gilroy: Yeah, you may not want to pay for redundancy for an entertainment network, but this resilience redundancy is mandatory for the military.

Brad Grady: Yeah, absolutely. Then, even just having the capabilities of routing that traffic between the two means maybe it's not an ideal case, but if your military network does go down you can still reroute the traffic maybe using protected tactical waveform and other encryption technologies to use the commercial systems as well.

John Gilroy: Well, unfortunately, we are running out of time here. I'd like to thank our guest, Brad Grady, senior analyst Northern Sky Research.