



## Episode 61 – The Emerging Ground-Segment-as-a-Service, New Business Models and the Importance of the Southern Hemisphere

Guest: Mark Thompson, CEO and Chief Engineer, Capricorn Space– 18 minutes

John Gilroy: Welcome to Constellations, the podcast from Kratos. My name is John Gilroy and I'll be your moderator. Our guest today is Mark Thompson, CEO of Capricorn Space. He's also the chief engineer that organization.

And in today's podcast we're going to talk about ground segment as a service and how it is impacting the satellite industry, in particular, the new space environment. We will also discuss how ground segment as a service empowers organizations to access their satellite data with greater speed and efficiency. Plus, we'll also learn why Australia of all places is uniquely positioned to address the burgeoning small sat industry.

Our guest today, Mark Thompson, as I mentioned earlier, he is the CEO and Chief Engineer of Capricorn Space. Mark has worked in the satellite industry for several decades, starting with Australia's National Satellite System and organizations like Inmarsat, Intelsat, Australia's National Broadband Network, and the Australian Department of Defense.

Well Mark, we're going to jump right in, but before we jump in, Capricorn. You got a shirt that says Capricorn on it. Why that name?

Mark Thompson: Thanks John. A pleasure to be here and it's great to be back at my third satellite conference here in Utah. The name Capricorn Space comes from the fact we wanted to highlight our presence on the world being in the Southern hemisphere. So the obvious connection was the Tropic of Capricorn going across the breadth of Australia. We're going to go for that as a name in our company. And you can see that also in our logo.

John Gilroy: It just hit me like a ton of bricks. It's like the most obvious thing in the world. Like it's hot outside and it's sunny. It's like Capricorn goes right through there. It's just so obvious. So tell us briefly, what does Capricorn Space really do?

Mark Thompson: Well, we're providing ground segment as a service. So in brief, if your satellite flies over our ground station, we will offer that service of downloading, exchanging data with your service. So we're providing a service with your satellite passing over our ground station. We will use our infrastructure to support that transmission and exchange of data and then ship that information to you. So it saves you from investing in real estate and infrastructure around the world in order to get the coverage that you need.

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John Gilroy: Well I think everyone who's been alive for the last 10, 15 years has heard of the concept of software as a service, SaaS, SAS. So we all know about software. In fact, salesforce.com has done that. A lot of organizations are doing this as a service. And I guess that's what you're moving a trend ... You're making a transition here to ground segment as a service. So how does it compare with the traditional old foggy standby ground service?

Mark Thompson: Very good point. Well in respect to the space industry, we saw a need when I was here in the 2017 Small Sat Conference, in effect, that a lot of industry is shifting away from the Geo orbiting services to the LEOs and the MEOs. And with that you need increased coverage. So an obvious factor from that is to provide ground segment of multiple locations around the world. And we saw that need in Australia in particular. We took advantage of the fact that Australia is a very expansive country. We've got a very wide longitudinal span, 35 degrees, and we can position ground stations on the west of the country and the east of the country and have a very extensive reach.

John Gilroy: In fact, I spoke with Vint Cerf just two weeks ago and he was talking about the importance of Australia when they're initially putting to the internet and initially tracking some of the Apollo missions. It was very, very important, even 40, 50, 60 years ago.

Mark Thompson: Indeed, if I can just digress there slightly. It was the 50th anniversary, of course, last month. So I actually went to the Honeysuckle Creek tracking station, which was the station that received one small step for man.

John Gilroy: No one realizes that.

Mark Thompson: And it was extremely poignant because there were about 30 of us there in this no longer used facility. We could still see the concrete base area, etc. And all of a sudden at 12:56 local time in Australia, everyone just started applauding. It was lovely.

John Gilroy: Yeah, I mean you were there and I don't think Americans realize how integral it was. I mean it was like ground zero for communications from Apollo.

Mark Thompson: It was significant indeed.

John Gilroy: So let's say we walk into a local Starbucks and you have to describe ground segment as a service to just the uninitiated layperson. How would you describe it?

Mark Thompson: I would describe it as: Allow us to look after your ground segment capability. You've invested into a space solution, a space capability, and that's been your

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primary driver in your business model. But let us look after your ground segment interconnection.

And to facilitate that, we provide two main types of service, a retail service where we provide air time on our infrastructure or we sell spare infrastructure as it were at our ground station site. So that you could bring in your equipment, John, from over here in the US, put it in Australia, and have in effect your own Australian ground station. And you'd have that within a very short period of time.

John Gilroy: You know, Mark, there's advantages and disadvantages to everything. I have a friend who took a van, went up to Boston with a bunch of boys for it was like a hockey tournament. And the bad news is that he's got bad gas mileage, but could fit a lot of people in there. So there are advantages and disadvantages to the ground segment as a service, as well. And give us both. Give us the dirty laundry; tell us about the good and the bad.

Mark Thompson: Well the advantage is rapid access to a teleport capability and infrastructure. We fundamentally see ourselves as an infrastructure provider, of course, so we can use that infrastructure to support our own equipment or third party equipment. The other factor of ground segment as a service is it improves the latency issue with respect to data. So it increases its value.

Many missions are earth observation. They need to get that data to the end client as quickly as they can to have the most impact. And increasing the opportunity to download that data through service providers like Capricorn Space enhances that data value.

It also allows the satellite operator to concentrate on their core business. They want to provide a mission which is a space-based platform to achieve some particular mission objective. Downloading the data is often considered secondary in their planning. And we are willing to fill that gap so that they can close the vital link and take the data off the platform and make it into something useful on ground.

John Gilroy: I once read the history of the founding of Australia. And I'll tell you, that's the movie for you. I mean that's the movie that would really have a lot of people not believing how crazy and wild it was down there. So there must be a distinct advantage to be located in Australia with the satellite business, is that right?

Mark Thompson: We feel so. I suppose the first point to make is don't forget the landmass. The landmass is huge. But in the southern hemisphere we have just half the landmass of the northern hemisphere. So opportunity to put ground stations in the southern hemisphere is inherently limited, therefore. And you've got

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Australia with New Zealand very close by, but you've got a lot of Indian Ocean before you get to South Africa.

John Gilroy: Most of the smallest part of South America, too.

Mark Thompson: And then you get to the Pacific Ocean over to South America. So opportunities in between are extremely limited. And you combine that with the fact that the satellite spends 50% of its orbit going over to the southern hemisphere. You want to take advantage of that time that, that opportunity, that window to transfer that data.

John Gilroy: So what is a business model for someone walking around this conference here, or in Chicago and New York. So what are the business models that are available for companies who want to take advantage of this concept of ground segment as a service?

Mark Thompson: Okay. Our business model really comes back to the basic issue of number of passes versus priority. How many passes do you want and what priority of service do you need? And with that we can provide a level of prioritization so that we can service your satellite on every orbit, or once a day, once a week for example. So that's the discussion we're having with a lot of clients at this stage is to the utilization of the service.

And I mentioned earlier about our retail model where we'll sell either airtime on our service or if the client gets to a need where they have a significant volume of data that they'd more likely look at the landlord solution.

John Gilroy: Thousands of people from all over the world, including Australia, are listening to this podcast. If you are listening and would like to get email alerts when new episodes are available, go to Google, type in Constellations Podcast. You wind up at the Kratos site. Give us your email and we'll send you out the next time we get another gentleman from Australia on and talk about the fascinating topic of ground segment as a service.

So if a satellite operator who's walking around the four here walks up to you and says, "Well, how can you help me establish some kind of a capability in Australia?" What's the first step?

Mark Thompson: We'll talk to them, first of all, to understand what they need is. Because we have a variety of market categories that we believe we're well placed to serve. And we've got three main categories that we look at. As I mentioned, the retail user who wants to use the service without having to put any infrastructure of their own.

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We've also got the mission operations people. I've been surprised this year the number of companies offering mission as a service. So that could be a podcast next year.

John Gilroy: Oh, another as a service.

Mark Thompson: And they do cradle to grave support. So they'll go to the particular clients and design the capability, test it, launch it, operate it, right through to the end of the mission. And the other category that we're aiming and we believed that they'd fall into, are the wholesalers and resellers.

So we have potentially spare capacity, we hope not much. And we'll be able to put that over, to transfer that over to the wholesale operators who could then in turn provide that to, a good example would be the universities. Who typically don't want a great deal of access to the ground segment, but they do need stations around the world.

John Gilroy: I was doing research for this interview. I went to YouTube and I saw an interview on ABC, the Australian Broadcasting Company. I think Americans sometimes get too self-absorbed that they're the center of the world. And you also have the Australian Space Agency as well recently formed. So how does that help you improve? How has it changed the game for companies like Capricorn?

Mark Thompson: I was delighted to be at the IAC in Adelaide in 2017 where the Australian Space Agency was announced. So that was a real boost. And to hear the applause in the room was fantastic. Indeed you go to conferences such as the Small Sat Conference here in Utah and others around the world and the number of times people reference the Australian Space Agency, and reference it in a very positive way, is fantastic to see. There's no doubt it's increased the level of profile of space activities in Australia and we see their job as facilitating activities within Australia. They're not like a NASA that has big budgets that can fund a significant projects, but maybe we'll get there. But at the moment they're doing a great job of elevating the profile of Australia both within the country and overseas.

John Gilroy: We kind of touched on this earlier. I want to come back to this idea of how is Capricorn Space addressing the growth in the market of LEO and MEO satellites? We talked about it earlier, but you're uniquely positioned to help, aren't you?

Mark Thompson: Indeed, John. As mentioned earlier about being a low earth orbit and medium earth orbit, you're inherently closer to the Earth, of course, than geostationary orbit satellites. So you have the opportunity of downloading data at a far reduced scale. So that necessitates multiple stations around the world. So

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increasing the coverage, and particularly in the southern hemisphere, we think is going to be of great importance in the years to come. And I mentioned the fact that the orbits of course spend 50% of their time down under. So let's support that.

But the other issue that we think we're well placed to support is the movement higher in frequency band and also right up to laser communications. Because outside in Western Australia, it has one of the clearest skies that you could ever see. You need your sunglasses wherever you go outside. I can tell you most days of the year it's very rare to have an overcast day or a wet day. And it's ideal therefore to very high frequencies as we get past sort of the S- and X-band services. And ultimately up to optical laser coms.

John Gilroy: When we started the show, I kind of read all your background, which is an incredible amount of background and many different organizations, high level responsibilities. But as far as this company goes, it's relatively a new kid on the street, aren't they? You're like the new kid that just moved in down the street, aren't you?

Mark Thompson: We'll accept that. And we're pleased with that. We've got a great team, though, and we've got a significant number of years of experience under our belt. I think we can leave it at that, John.

John Gilroy: So are there any major issues you've encountered because you're such a new company?

Mark Thompson: Well, I think the reality is, if it's lessons learned from what we've done in the past 18 months, I think there's some obvious lessons there, to be honest. It costs more. It costs more than you'd expect. We've budgeted a certain amount, a certain expenditure profile. And needless to say, we're on the upper side of that profile. It always takes longer to implement a capability. And it's always the small things that get you.

For example, if I may, we had two terminals; S, X-band terminals being shipped over from the UK to install, great performing terminals, and unfortunately they got held up at the UK border force in some random inspection for almost three weeks. It's like, did they realize we're trying to follow a commercial schedule here? It's issues like that you cannot plan for that you have to deal with. So we've moved on from there, but they're the little unexpected items that really catch you out.

And I suppose the other really significant lesson that we've learned, which is not totally unexpected, is that customers really won't commit until they see an advanced state of implementation. And it's really therefore a case of build it and

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they will come. So you've got to have this faith, this belief that you're doing the right thing. And I'm grateful to our investor for backing us right throughout this period. But as you get closer to an operational capability, and we'll be there at the end of this month, given the UK border force delay, that we're seeing a lot more interest and genuine conversations about utilizing our service from day one.

**John Gilroy:** Now I'm in the classroom a lot, and I have a whiteboard and a marker and I put a box here and a circle and a box here and voila. Website, 32 blogs, and it's secure, and it's great and it looks so easy. But really going from concept to capability is very, very hard. You've done it what, a year and a half? I mean that, I mean you got away from the whiteboard pretty fast and really got in the streets.

**Mark Thompson:** Indeed. And thanks for pointing that out because it really has been a Herculean effort at times. And look, I say there's probably three items that have motivated us in that area. One is the funding. We're privately funded by a company, a person, who's not experienced in the tech sector but has an in-depth knowledge of infrastructure development. And that's been a real bonus to us because in effect we are building infrastructure. And we sell that infrastructure to ourselves; we sell it to third parties. So that's been a huge hurdle to overcome and we're extremely grateful for that.

We've got a truly expert team of people. And we cover a range of fields. Having had the benefit of working in the space industry for well over three decades, I've got to cross paths with some very capable people. So we've got some expert consultants in the fields of business development, regulatory, let's not forget regulatory, and licensing, site development, site operations, planning and engineering activities. And then ultimately, in line with our directive from our investor, we've got the Nike approach. Just do it.

**John Gilroy:** Well you've got decades of experience, you've seen all kinds of different government perspective, commercial, startup perspective, frustration, people getting stuck in import and export stuff. If you could change any of that, just one aspect of the business, what would it be?

**Mark Thompson:** Rather than having a better crystal ball to gaze into, I'd probably say a simpler and less costly regulatory framework. We see it as being a necessity. It's important. I hop off the plane from Australia and I want my phone to work. I don't want to get it jammed because it's not using the right frequencies, etc. But it'd be good to see the regulatory process focus more on growth and innovation rather than the ongoing enforcement of legacy-based constraints.

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John Gilroy: That makes sense to me. Well there's Australian football, and I don't know if they have a two minute drill in Austrian football, but in American football we sure do. I'm going to put you on the two minute drill here. We're going to ask you to look into the future and just tell us what is the outlook for the ground segment as a service in the next four or five years.

Mark Thompson: Well actually it's a good question because I can base that on my last three years at the Small Sat Conference. And I've been impressed with, A, the attendance, but also you can spot the shifting change in the market. And what we experienced last year, even just 12 months ago, has changed to 2019. So obviously the outlook, the growth of the market is extremely positive. However we feel it needs to be tampered with the lack of focus that many operators put on ground segment. And the lack of funding that some operators therefore have in their business models.

So maybe increasing the awareness of the ground segment, such as this podcast and further discussions we're having here at the conference, we think will be a good thing. So many years ago when I started in the industry, no one thought about regulatory. No one, we didn't have a licensing guy. If you did, he was a part-time licensing guy. Now it's one of the first issues you think of when you develop a space project. What are we going to do about licenses? Have we allocated enough money to get the outcome that we need? I think ground segment will elevate in status because of similar sort of understanding and maturation.

John Gilroy: Well, unfortunately, Mark, we're running out of time here. I'd like to thank our guest, Mark Thompson, CEO of Capricorn Space.

Mark Thompson: Thank you, John. Thanks, indeed.