

That software that mediates between all the hardware, all the networks, all the devices doesn't go away, but it gets better as standards evolve. So our vision is to be that software that mediates.

Welcome to The Space Capital Podcast. I'm your host, Chad Anderson, founder and managing partner at Space Capital, a seed stage venture capital firm investing in the space economy. We're actively investing out of our third fund with a hundred million under management. You can find us on social media @SpaceCapital. In this podcast, we explore what's happening at the cutting edge of the entrepreneurial space age, and speak to the founders and innovators at the forefront.

Chad Anderson:

This is The Space Capital Podcast. And today, we're speaking with Michael Small, co-founder and CEO of K4 Mobility, a digital technology and internet services provider for off-grid communications. We invested in K4 earlier this year, really, based on the quality and experience of the team. And we're incredibly excited about what they're building. Michael has built a career over 20 plus years in telecommunications, including nearly a decade as president and CEO of Gogo, the in-flight internet and wireless entertainment services company. So he is uniquely qualified to help us understand the opportunity that's emerging with the launch of new satellites and the deployment of 5G technology.

Chad Anderson:

Michael, it's great to have you on thanks for joining us.

Michael Small:

Thanks, Chad. Glad to be here.

Chad Anderson:

To kick things off, could you tell us a little bit more about yourself, your background, and how you came to found K4 Mobility?

Michael Small:

Sure. Well, I'm a lifelong telecommunications guy. I started in service operators, spent some time in telephony and in cable TV, but most of my career has been wireless communications. Was there from the very early days of the cell phone business when we had wild predictions that someday 1% of the population would use a cell phone. Since then, I've watched the industry grow. I've been in charge of staff functions, building the network, and marketing, and I've been a chief financial officer for a wireless company. And then I was a CEO of a wireless company. And then finally after doing that for so long, I decided to do something a little different, which is try to make the wireless networks reach airplanes. And that proved to be the biggest challenge of all for a lot of reasons. And that ultimately, the experience is at Gogo was what gave me and my partner on [inaudible 00:02:49] a cherry insight into how

we could make life better for people trying to do wireless connections in weird places.

Chad Anderson:

Reflecting back and seeing where people's heads were at with cell phones and massively underestimating the market demand for it, you've seen those... Well, you've seen pitfalls that have prevented growth within the wireless space as well. Can you tell us kind of where are we right now in terms of market development and are we vastly underestimating the market currently? Talk us through how you view these market dynamics.

Michael Small:

Yeah. That is the point fundamentally behind K4 Mobility, is we're still in the early days of wireless. And that seems hard for people to comprehend because it wasn't too long ago the cell phone didn't exist, and then we've magically got to a hundred percent penetration of cell phones. And it seemed like we were at the end of the road, and then the iPhone came along. And now all of a sudden it wasn't just making phone calls. It was the way you got on the internet was wirelessly. And so now once again, I think popular perception is we're kind of at the end of the road.

Michael Small:

But we, K4, believe that we're maybe at the halfway point, and the big next frontier is enterprises getting new visibility to the edge. And we know that happens with Apple and Google and their phones. And we kind of get our heads around that Tesla cars are connected, but our vision is virtually every enterprise wants to know what's happening at the edge with their products and services and their customers. And that's a long way to go. And one way to put dimensions around that, we often talk about the other 3 billion people that connect, but there's perhaps 30 billion devices that some enterprise would like connected, but remain unconnected. And there are a lot of reasons for that. And K4, we're going to knock down some of those reasons to bring on literally tens of billions of connected devices and a few more people. And some of the current people use cell phone in places where they didn't have connectivity before. We can help them get connectivity, not just some places, but every place.

Chad Anderson:

Ah, so interesting. You know? We recently published [The SatCom Playbook](#), an investment thesis for ubiquitous connectivity in a future where every person and every device and object on the planet is connected, similar to what you were just talking about. You know? One of the key conclusions of our research is that the next battleground for the race for satellite communications dominance will center around the user terminals and achieving interoperability to unlock some of these new customer and new use cases. So instead of one terminal that connects to a company's specific hardware, customers are now starting to demand that terminals can communicate with different satellites across bands, across orbits, and across even different companies and different hardware. Can you help us understand the pain

points in the market, what it's like to be a customer of services today, and how K4 is solving for some of those pain points?

Michael Small:

Absolutely, Chad. And step back a little bit on the issue you described is everybody recognizes that you can't get the wireless connections where you want them all the time. And we see all these new satellite constellations going up. And we actually see huge investment in 5G and terrestrial. So the world understands the problem, but we think where K4 takes it to the next level of challenge is yes, you need the infrastructure out there, but what you describe the interoperability across different networks is very important. That's one dimension of the challenge. So getting infrastructure out there, wireless satellite, or terrestrial, and then being able to use the best available network. So that's one big piece of the challenge.

Michael Small:

The other piece of the challenge is managing all those things that are connected to the network. Some of it is simple internal policy. What do you want to use bandwidth for where? But there's a cybersecurity challenge. You really need to know what's on your network and be able to manage it. And it's one thing to do it in the headquarters or in the data center, but it's another thing to do it when you have thousands or millions of distributed devices all over the globe. And so, we think there's two challenges; it's a multi-network and its ability to manage a myriad of users and devices on the network.

Chad Anderson:

Got it. So, can you tell us a little bit about your product, K4 Hydra? In conversations that we've had and something that really stuck with me since, I think, our first conversation is that you use words like intelligent orchestration and seamless operability to describe what you do. So you talk to us a little bit about that?

Michael Small:

Yeah. So our software... And we are fundamentally a software company, and we built some hardware so we have something to run our software on since most of the hardware out there is very proprietary and one network or one industry vertical driven, we want to generalize it. But the software uses algorithms, intelligent algorithms, to choose the best network against multiple parameters. It's not just necessarily the existence of a signal, but how well that network's performing. Is it at capacity or not? So we have, we think, world leading capabilities to make dynamic intelligent network selection. We also can bond together various networks. And so to get a fatter pipe, two different satellites, two different terrestrial networks or more, or a combination of satellite and terrestrial networks. So that's one side of our software.

Michael Small:

The other side of the software is enterprise service management. And so it's almost like a network operating center, but it's on a smartphone. It's in your pocket. You

know? From anywhere in the world, you can see exactly what's going on your network and you can set policy and control how that's used, who's allowed to use the bandwidth, which applications or devices get a certain amount of bandwidth. So it's a two-sided software managing the local area network and managing the wide area network.

Michael Small:

We started... Our rich first use case to really get down to where the business is today was superyachts. It's a sizable market; there may be 10,000 of them in the world over 80 feet. But it was a reasonably complex use case, a fair number of users and a lot of devices on a superyacht. And it allowed us to build our software and get the end-to-end solution. And it was a very short sales cycle. You could walk the dock. There was no corporate purchasing organization to work through.

Michael Small:

We are now expanding into commercial shipping. But we think what makes us unique is the software that we use on every piece of our hardware or in every industry vertical is exactly the same. We're trying to generalize it so we can actually have a scale solution in the long run. So we'll move to ground transportation, to emergency services, to agriculture and numerous verticals. And ultimately, the objective is to democratize the ability to manage a far-flung wireless network. So it becomes accessible to any industry, not just the ones that are super high value and are prepared to go through a lot of effort to connect to the edge.

Chad Anderson:

How interesting. And so you are essentially offering the ability to connect to whatever service, terrestrial, space-based, what have you, optimize for connectivity, bandwidth, price, and do all of this mostly seamlessly through a software solution with a little bit of hardware added in. So from our perspective the going after maritime makes the most sense. Right? Because the boat, when it's docked, it's connected to terrestrial cell and Wi-Fi, but when it starts to go offshore, then it immediately starts to need a more dynamic solution. From conversations with you, that's a pretty big lift in terms of knowing what to do, but also managing it, and then making sure that you're getting the best product for the best price.

Chad Anderson:

So it's really interesting to me because that is a very clear first use case. Your website really talks a lot about superyachts and maritime. It's interesting to hear about the other markets that you're going into because it's also, kind of going back to the beginning of the conversation, you've got IoT devices, some of this is in remote operations; heavy industry, very valuable infrastructure that's online and needs to stay online. And you're essentially offering the ability for them to connect to whatever network that they have now, but also to provide them some redundancy as well in case that there's an outage or anything else. Right?

Michael Small:

Yep. That describes it well. Some ways we describe it as many, to many, to many. Many networks connecting to many, what we call, smart nodes; so this would be the antenna radio server that might be on a boater playing, and then the third many is all the devices and users behind that. So if you're on a commercial shipping vessel, container ship, you certainly want to have the ability for the crew to report back to corporate, to their reporting, but you might also want to let the crew, when they're downtime, view the video. You know? Netflix or YouTube. But you might want to have parameters around that on how much bandwidth can be consumed that way. And then you want to keep track of all the containers on the ship so shippers know where they are at any point in time.

Michael Small:

For example, you have all the systems on the ships can be reporting. And not only finding the right network, but deciding what's the highest value use of the available bandwidth, and what's inherently a highly dynamic wireless environment. So one point you may have more bandwidth than the next point. And so you need to make real time decisions. So one half the software is figuring out where the best available bandwidth is across multiple networks. The other half of the software is figuring out how to allocate that bandwidth to the highest value uses consistent with the corporation or enterprises policies and just good common sense by the artificial intelligence.

Chad Anderson:

And this is really resonating. I mean, customers love your products and service. As part of our diligence process, we spoke to several of them, and they're not only exceedingly happy with what you're providing, but they're also helping to sell it. They're referring it to their friends and things. And it sounds like word-of-mouth is a really great marketing avenue for you just based on the quality of service. Can you tell us a little bit about your traction, your progress that you've had with customers today?

Michael Small:

Sure can. We're at about a hundred boats right now, predominantly superyachts and a few commercial ships. That's after being in business a little over two years. On most of those boats, we have our own hardware, which we have four different versions of, but all of them run the same software. The reason customers like us, and we took these customers from a competitor, every one of them, they all had some solution before us, and haven't lost any for competitive reasons. Sometimes a boat goes into shipyard or sold or for those reasons, but not for competitive reasons. And there's the quality of the bandwidth is better in general because we use multiple networks and have the intelligence and the visibility to the bandwidth quality and know what the problems are if there are problems. That is key. There's the user interface where they get to control who gets what bandwidth. If the owner's on the boat, they allocate more there than if it's not and so on.

Michael Small:

But I think at the end of the day, why we keep customers is the ability for us to see what's going on that boat anywhere in the world and offer support at sea. So if there's a problem, the captain, the ship doesn't have to start pulling out operating manuals and trying to troubleshoot himself. You know? We can be there and can see everything. And why that's valuable to a captain, that ability from anywhere in the world to see the edge and manage what's going on the edge, in this case the edge is the ship, that's what's going to be hugely game changing to enterprises. You know? They don't have to train everybody on every truck or plane or boat or oil well how to do this stuff. It can be managed centrally. And I think that's the magic that keeps our customers with us, is we can support them wherever they may be in the world.

Chad Anderson:

Makes sense to me. How do you price this? How do you make money? Is it a subscription service?

Michael Small:

Yeah. There's two ways we make money. Today, the predominant source of revenue is bandwidth resale. So we have contracts with various cellular operators, virtually all of them around the world, and multiple satellite providers. And we buy the bandwidth from them and resell it still at competitive prices, often lower than competition. And that's one source of revenue. The other source is what we call K4 as a service or KaaS where we license our hardware and our software to the user. So they'll buy a server with some radios, either terrestrial or satellite radios incorporated and perhaps an antenna incorporated, and we'll charge them for the equipment and license fee for the software.

Michael Small:

In the long run, we will become increasingly software licensing. Because we are in the enterprise space, these smart nodes, what a smart node looks like on a plane versus a boat is going to be dramatically different; or a truck. So you will have... And again, a smart node is the server of the radio, the antenna power supply that is shared across everybody on that boat or plane or truck, and all the various devices. So those are going to need to be looked differently based on industry verticals. So our vision is it'll be our software running on someone else's smart node in the long run. It doesn't mean we totally get out of hardware, but our focus and our vision is to be a software driven company.

Chad Anderson:

Got it. So during a panel at the SATELLITE 2022 conference in Washington recently, executives there predicted that 5G based networks that combined satellite and terrestrial infrastructure would be available in 5 to 10 years, and that the satellite mobility providers expected to offer customers seamless transitions between terrestrial and satellite networks within the decade. And I'm curious what you think of that. And is this, in terms of the long term future of K4, based on that, is it a gap filler that the industry is going through a transition right now, and you are helping to ease the transition or is there staying power here?

Michael Small:

I believe there's staying power. So everybody is trying to solve the same problem we're solving, which is better wireless internet access from anywhere. Everybody that we've seen is doing it on a proprietary basis to some degree. We actually really hope a lot of the technical challenges or the lack of standards, the lack of interoperability gets knocked down over time because right now we have to do a lot of work to make the technical differences between one satellite network and a terrestrial network become invisible to the customer. If standard setting improves, it gets easier and better.

Michael Small:

We often do the analogy to the prior stages of the internet, and there's always an operating system that makes the difference. In the first stage of the internet, the fixed-line internet, where the personal computer was the iconic device, it was Windows that ultimately made it easier. And initially, when you install a new hard drive, or a new processor, or a new screen, or a new headphone or something, Windows kind of mediated it all, but there was still a loading. You know? You had to do some software, it was a little bit of a pain. You know?

Michael Small:

Today, this new headphone I'm using to talk to you, I just plugged in. There wasn't a thing to do. I was worried there might be, but there was not a thing to do. That software that mediates between all the hardware, all the networks, all the devices doesn't go away, but it gets better as standards evolve. Our vision is to be that software that mediates. And so originally, it was Windows. I stopped before I got to the cell phone when it was iOS and Android. And we want Hydra to be that for enterprise wireless. That's the vision. And nothing lasts forever, but we think it's decades, many decades if we obtain our vision.

Chad Anderson:

I appreciate that answer. I mean, as investors in this space economy, this is a new and rapidly growing category. But for us, I mean, so much of what we see is new. So much is blue ocean. You know? New capabilities, new markets, and limited competition. There's a lot of first movers. Here, what you're doing in satcom and in telecom more generally, this is an established and hyper competitive market. So I really appreciate the take on the company and the product and your differentiators there. Your team is also a key competitive advantage for you. So we talked a little bit about you, but what about the rest of your team? You all bring significant experience to the table.

Michael Small:

Yeah, that is true. And Anand Chari, president, and he was the chief technology officer at Gogo, but he is for being so versed in telecom technologies, extraordinary businessman too. He was employee number one on the commercial aviation side of Gogo. And he and I and others grew that from nothing to an \$800 million revenue

business by the time we left. So we've seen not only technology, but the ability to scale an organization.

Michael Small:

Our chief financial officer, Rishi Potdar, has worked in aviation and consulting and financial restructuring of Sears prior to joining us. He also briefly worked at Gogo. My chief technology officer at K4 was one of the key technologists at Gogo also. And our ops guy is Mark Malosh; also spent some time at Gogo and he's worked in telecom operations his whole life. So I think we have a team that understands the problem and a team that knows how to scale a company and run a larger company. So it's all feeling pretty good and largely has gone to plan. Even COVID. Perhaps the biggest challenge of COVID was the part shortage, which caused a lot of rapid redesign of some of our hardware, but the team's been really good at setting a plan and executing against it.

Chad Anderson:

That's great. And so what's next for K4?

Michael Small:

What's next for K4? Well, we have a hundred nodes right now, smart nodes, which is largely our hardware running our software. In some cases, off-the-shelf computer running our software on various boats. You know? We got to get from a hundred to a thousand to ten thousand to a hundred thousand to a million. It's finding ways to scale rapidly. That's what wins in today's world. And in a lot of ways, that's letting go of what you're just doing to get to the next more scalable solutions. So what we're working on today is setting up a dealer network in yachting and commercial shipping. So it's not our direct sales force selling anymore. That'll lead to the next level of scalability. We're also shrinking the size of some of our equipment so it fits on more vessels and hits lower price points. That'll lead to the next level of scalability.

Michael Small:

But by way of analogy, Gogo was the world's leader in in-flight connectivity. And we had 8,000 planes. We had four sets of software; the old and the new software in both business and commercial aviation. So that 8,000 divided by four, that was 2,000 units running on each set of software on average. And literally getting to thousands of versions of Hydra running will give us world leading scale for complex enterprise grade software. Some of the backyard dish solutions that do one thing for one house, it's measured in hundreds of thousands there, but for anything for enterprise, it's measured in the thousands. So we want to get to world leading scale running Hydra, our software, as fast as possible. And we think that's attainable in the next couple of years.

Chad Anderson:

Great. So how can listeners learn more about K4?

Michael Small:

Well, we have our website. That's k4mobility.com. Can also find through LinkedIn or other social media. You'll see some of the articles about us. We just did a webinar that describes our hardware products. I didn't really get into those here because kind of hard to do verbally and quickly, but can see those. So I'd say those are the best two places to go.

Chad Anderson:

Okay. Great. Anything else you want to cover?

Michael Small:

No. We're thrilled to have Space Capital as a partner. Your study of the space industry and the satellites being launched we think is right on. So I would also recommend that as, I don't know if that's how available that it is, but your site is highly helpful for understanding the issues we're trying to take on.

Chad Anderson:

Well, thank you. Michael, it's been great to have you. Thanks for coming on the show.

Michael Small:

Chad, appreciate it. Thank you.

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