

## Viasat @ Bernstein's 36th Annual Strategic Decisions Conference (SDC) 2020

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– **INTERVIEWER** : Sanford Bernstein – Peter **SUPINO** – Senior Analyst – U.S. Telecom, Cable & Satellite

– **INTERVIEWEE** : Viasat – Mark **DANKBERG** – Chairman of the Board and Chief Executive Officer

### Opening Remarks

**SUPINO** Hi everybody, I'm Peter Supino—the telecom, cable and satellite analyst at Sanford Bernstein. Thank you for joining us at the Bernstein Strategic Decisions Conference, the 36th annual edition for this conversation with Mark Dankberg of Viasat. Before Mark and I start talking about his business, a few things relating to this year's format.

Our conference attendees can submit questions through the pigeonhole link available on the left side of your viewing screen. [...] So please go ahead and click on that link now to open it for yourself, because I'm certain you'll find our dialog exciting and want to ask questions, and I wouldn't want you to be held up by technology. [...] With all of that out of the way, we can get to the good stuff.

It's my pleasure to introduce Mark Dankberg, who is the CEO and Chairman of Viasat, and who founded the company in 1986. Mark is thought of as one of the leading minds in the satellite industry, and it's really exciting, Mark, to have you with us.

**DANKBERG** Thanks.

**SUPINO** I've planned some questions and we'll start with those, look for the audience's input, and hopefully we'll end up going in some surprising directions.

[02:11]

### Bernstein Questions

**SUPINO** So Mark, this audience—SBC—is a blend of portfolio managers with broad purviews and analysts who specialize in telecom. In that context and with a satellite bankruptcy in the headlines these days, let's begin by discussing how Viasat is unique in the satellite industry, especially in the context of your history as an equipment vendor.

**DANKBERG** OK, so I'll go into a little bit of background. We started the company as a technology company, so we sold equipment first to the Defense Department and then to the commercial satellite market.

And what we saw from, let's say, in the 1980s and 1990s, there was no such thing as broadband—like there were no cable modems. Even in the early 2000s, the whole notion of "would cable modems be successful?" was unknown, right? [We didn't know if] there was really a market for that.

So what we saw in the time that the company grew from '86 until the early 2000s—we started in my garage and we were up to several hundred million a year by the early 2000s—was that, yeah, broadband was going to be a big market. That giving people megabits (Mbps) at home instead of kilobits (kbps) was going to be transformative in business. And also that there is a need for that everywhere—in airlines and government—we could see all that.

What was really interesting about the satellite space is that satellite assets—everybody's satellite assets—were really geared around the broadcast market. [...] So if you think of broadcast—the difference between broadcast and unicast is—with broadcast I'm gonna send the same bits to everybody.

If I'm a broadcaster and I want low cost of transmission, basically the way I get low cost of transmission is I can make the number of people that get those bits really high. So think—the cost of the bits could be high, but if the number of people receiving it is *really* high, I don't need a lot of unique bits and I can have low transmission costs.

So that's how the space business evolved. What was interesting was, because the peak rates were in the megabits, people could use it for broadband. But when you used it for unicast—that is, send it to just one person—that put a spotlight on how expensive those bits were.

So the thing we could see happening in the late 90s and early 2000s was that if space were gonna be relevant in broadband, you needed new satellites. That all of the assets that were up in space were designed for broadcast.

And think, in the terrestrial business it would be like—hey, if I'm a broadcaster, I'm going to put an antenna on a mountain or on top of a tall building and use a *big* signal so that as many people as possible can get that broadcast.

But if I'm in the data business—and this really came home with the iPhone in 2007, right? When the iPhone came out—all of a sudden the cellular networks were jammed. And this was really the value proposition of Qualcomm (remember CDMA versus TDMA?) was—hey, this is way more capacity; I can have smaller cells; the cells don't interfere with each other.

So what we realized we had to do in space was to basically come up with *new* assets that were satellites that had—instead of having small numbers of big beams—had a large number of small beams. And everything about the technology of that was going to be

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different, just like everything about the technology between broadcast radio and cellular radio is different.

So what we did is, we went to the satellite operators and said, "look, hey, you need totally new satellites if you are going to go after this market." And they didn't want to do it.

So going back to your introduction about general U.S. and telecom, what we saw from a generic business strategy perspective was [that] this was, like, *classic* disruption. It was like, "hey there is a new dimension of value in space!"—which was broadband—which required totally different assets, which at first weren't going to be super efficient but that you could get on a learning curve, and that none of the incumbents wanted to do it.

You know, we went to them and said, "look, here's how you build satellites, here's the design of the satellites." None of them wanted it. Because the upshot of it was to reduce the value of their broadcast assets in space. So nobody wanted to do it, we said, "wow, this is a huge opportunity for us." And so starting around 2008, we decided to enter the space.

And so one of the ways that you can just observe what's happened—and it's very timely—is Intelsat's declared bankruptcy. Intelsat has 50 satellites, about \$2B/year in revenue, so think of [each satellite as] \$40mm/year in revenue. The productivity of those assets isn't super high, right?

We have 4 satellites and about \$1B/year in revenue. So think of it as—the revenue per satellite is about 6x higher. The bandwidth that we have is multiples of all the bandwidth that Intelsat has.

And most of their revenue—almost all of their revenue, really, is in the broadcast space. We have no broadcast. So what we've done is, basically, we've created a space company that's totally broadband-oriented. We've built assets that are unique for that.

And if you look at the productivity of our assets—we just put another chart yesterday in a conference call—the productivity of those assets continues to grow. We're on a learning curve that we think is going to allow us to separate ourselves even further from all the other space companies.

Going back to this whole issue of consolidation and what are the assets of those? Intelsat—those ones in particular were leveraged up because people believed that the cash flow from those assets would go on indefinitely.

And what's happened is, as the broadcast market has shifted to more of an over-the-top market and contracted, that hasn't turned out to be true. The productivity has declined, demand for broadband is going up, and their assets aren't really super well...they're just not very good in the broadband space—our view. So what we think is, to some extent, the bankruptcies that you're seeing, the ones that are most stressed are either:

- companies that are broadcast-centric, that don't have good broadband assets because they were trying to defend the transponder pricing that they had

– or they were resellers, Speedcast being an example, and that they are basically all using these broadcast satellites. And again, their productivity can't be higher than the productivity of the assets that they're using.

And then you've got others that are also built around those assets that are now highly stressed—and that might be examples like Gogo or Global Eagle—and it's not totally clear that there really is a lot of value to us in our business—in those assets on a go forward basis.

[09:43]

**SUPINO** Citing that background—particularly your comments on broadcast-first unicast and the relevance of that transition to the provision of broadband services—links to something I've learned from you in our private conversations, which is: the importance of proprietary technology in the satellite business, and the distinction between the role that proprietary tech plays in satellite and the role that it might or might not play in mobile cellular communications.

So just to share with you a framework that you can pick apart, I think many of our clients look at satellites and think that the cost of buying a satellite is equal for anybody who wants to be in the business and the capacity that buys you as a commodity. And in the absence of any type of compelling on-the-ground distribution advantages, your returns just can't be good.

And you've explained to me that the satellite business does not rely on standards-based equipment, so there's a lot more room for proprietary technology to create different cost positions in the industry and that you seek to differentiate on cost. And so I just want to sort of offer you that on-ramp to share with the audience how different it is from the industry we've—many of us have spent more time thinking about, which is mobile.

**DANKBERG** Yeah, that's a really good analogy and the distinction is very important. So what's interesting if you look in the mobile business—think about the importance of the issue of data capacity. Remember, in the early 90s the cellular industry standardized on TDMA.

Qualcomm was this one voice saying, "well, CDMA's got a lot more capacity; capacity is going to be important," and they got a couple of operators to bite on that. And that was where you had, you know, Sprint, AirTouch, which became Verizon. And that's where you got the wars between CDMA and TDMA.

The thing that really cemented that capacity was important, again, was the iPhone. And really what unified the CDMA and TDMA was basically the 3rd generation—the 3G. Wideband CDMA was kind of the unification of that. And it was obvious that data capacity is the dominant issue, and that's really what 5G is about as well.

Well, in the satellite space, it turned out that all the incumbents were going, "I don't really like this broadband thing. It devalues my existing bandwidth. I'm not sure the

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market's really there for satellite broadband." And so there was never that convergence on standards.

The other thing that we observed as a technology provider was that the standardization was pretty good for the operators and really good for customers—but was *really* bad for the telecom technology providers. So if you look at other companies like Motorola, Ericsson, Nokia, Sa—who is it?—Siemens, and Alcatel Lucent. I mean, all of those companies have been *devastated* by standardization because it commoditized the technology.

So here we are sitting on this technology, we're going, "well, all the operators don't want it, the market is demanding it—we should use it and become a vertically integrated technology and operator company," and that's the best way to capitalize on the technology. So starting in 2008, that's what we did.

And one of the first things that happened is, our satellite manufacturer, when we did ViaSat-1, copied our technology and sold it to one of our competitors. So we had—one of the good things was that tested the value of our technology in court. We went through a court case, we won a jury trial—several hundred million dollars—and so that validated that we really did have proprietary technology. And then what we did with the second generation and on is, we protected that technology *more* by getting into the payload business, which is really where the technology is.

And we've actually had, you know, one of the things that has suffered because there's not technology standardization—remember, the satellite manufacturers would only build what the operators wanted and the operators, the traditional operators, didn't want this broadband stuff—basically, we kind of have seen our technology business recede.

But our services business has grown tremendously. And we think that that's going to benefit in the future as the gap between our technology and the technology you can buy on the market—the stuff that's available to other operators—that the separation grows.

And so, you know, what we think that people should be really focused on—you can see this in other worlds as well—[...] there's a market value of the bandwidth that makes your company economically valuable. What is the market value for bandwidth? Then there's a cost to that bandwidth, which is the productivity of your assets.

And if we can basically get a big advantage in productivity, that's what creates economic value for our shareholders. And that's what we're doing.

[15:10]

**SUPINO** So that segueways almost implausibly nicely to what I was going to ask you next, which is—I wanted to ask you—what are the least well understood (or most misunderstood) aspects of Viasat today?

You talk a lot about the cost position of your company and your ability to provision bandwidth cheaper than your competitors, and importantly, your ability to share

some of that efficiency with customers to lock in your competitive position. So I don't know if that qualifies as one of the most misunderstood aspects of your company, but it certainly intrigues me, and is something that many investors might recognize incorrectly.

**DANKBERG** Yes. So the first thing is, I think we acknowledge that investors are looking for a good value proposition, and so to the extent that they don't understand it, it's probably mostly us not communicating it effectively enough. So we really appreciate the opportunity to do that.

But I think that the idea here is that if you look in the market, that we think these are validated in other telecom markets, like in the cable market, right? The thing that makes the cable companies such a good investment compared to the traditional telcos is that their bandwidth, their productivity—their assets have been much more productive.

They can deliver higher speeds than the traditional telcos can. Fiber has not been as cost effective—partly because the cable companies got a big lead and there are some game theory aspects of overbuilding. But the cable assets have been very productive, so what they do is they basically offer more value to their customers.

Cable RPU's are quite a bit higher than telco RPU's are, but the amount of bandwidth that the cable companies deliver to their customers is far higher than what you'd get with a DSL derivative. So you might see RPU's being 2 to one—I'm just picking an example—but the speed differential can be 5 or 10 or 20 to one, right?

So, we don't look at that as a weakness on the part of the cable companies. What's happened is they've created a value proposition that's really strong. And as they get productivity advantages, they give a lot of that to their customers, but their margins continue to improve.

And we think another really good example of that would be Intel during the Wintel days, when desktop computing or laptop computing dominated, as opposed to mobile computing. They've struggled in getting that same advantage in the mobile space but still have it in the desktop space.

And what happened is, as Moore's Law gave them productivity advantages, they would give some of those productivity gains to their customers to preempt competition. But their value continued to grow as they went down the Moore's Law learning curve.

So we think we can create the same thing where the market value of our bandwidth is driven by customers' next best alternatives. In some places, like the residential business, that's determined by terrestrial—it could be terrestrial, wireless or wired. But we tend to compete only in those markets that don't have really good fiber or really good cable. [...] There's 20 million+ households in the U.S. still on DSL—that's indicative of the market that we can attack.

But the most attractive markets for us are those where we're only competing with other satellite operators. And if our productivity continues to grow relative to them, we

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think that we can create a franchise that's very long lasting and very high margin.

And those markets are things like government markets where they can't rely on terrestrial, because most of the time they're operating in foreign countries so they can't rely on the terrestrial infrastructure there. They can't rely on the mobile infrastructure because that builds on the terrestrial infrastructure. Same thing for in-flight connectivity, for passenger ships, things like that.

There's many markets where the competition is going to be other satellite operators, and the dominant way that people measure value—the buyers measure by speed and bandwidth. And so those are the metrics where we look for productivity advantages.

[19:57]

**SUPINO** Keen on that subject of your key customer verticals, I want to ask you about your Satellite Services segment, which has 2 major components.

- One is that residential broadband business with which I think many people are familiar and which isn't growing, in what you've described as "not being highly, highly profitable."
- And then there's the In-Flight Communications segment, which is growing more quickly and has grown extraordinarily over the last several years.

Differentiate for us—what makes IFC the place where you are allocating your incremental bandwidth today rather than residential fixed?

**DANKBERG** So, one thing I want to talk about, just on the residential to start with, is this is an asset-intensive business—as all telecoms are. And so one of the things that you want to do is get the maximum return on those assets that you can.

And so as an example, you know, one of the ones you look at in the telecom space is the mobile business. They have a finite amount of bandwidth, which is really driven by the amount of spectrum they have and then the densification. And so if you look at the mobile space, the yield that they get...

Let's say I've got a customer that's going to pay me \$60/month in the mobile space—I might have to deliver 15 or 20 GB of bandwidth to that customer. Whereas in the fixed residential space, a customer for \$60/month might expect 100 or 200 GB. So the mobile companies have prioritized mobile business over fixed.

So what we're doing in the satellite space is we're prioritizing those markets that give us the best returns. And that's basically Government and In-Flight, as we've described before, and that's because they get packaged with other services in order to make it viable—so that's not just a pipe. We do a lot of other services for those as well, which overall improve the margins.

The residential space [...] hasn't grown in subscribers very much, but it's grown in revenue and margins substantially. And that's because—this is the simple

analogy that we use—it's way better for us to have one residential customer at \$100/month than to have two at \$50/month. That's because we'd only have one set of acquisition costs, we'd only have one amortization period,, and we tend to have lower churn because those customers are getting more.

So over the last 2 years, I think that our residential business has grown by 25 or 30 percent in revenue—even though subscribers have been relatively flat—because we've migrated our base more upstream. Because we have a finite amount of bandwidth, we've targeted higher end customers.

Now on the other side, you know, the In-Flight and the Government businesses are growing fast. We've gone from—if you were to go back just to [...] the satellite services segment—which is about \$800mm for last year, a little over \$800mm—about 25% of that came from non-residential. About 5 years ago, over more like 95 percent of our business was residential. So we've been growing our portfolio.

That's mostly been In-Flight Connectivity, and we've been very successful there because our value proposition is so high, because we do 2 things. One is just that the cost of our bandwidth is lower so people get more bandwidth per dollar.

And if you fly on our airplanes and compare that to, say, Gogo or Global Eagle, you can just experience that because video streaming works better, the cost of a session in the airline is less expensive. Then the other thing that we do really well—is we have the geographic distribution of our bandwidth is way more favorable. So we can deliver a lot more bandwidth to hub airports—like Dallas, Chicago, New York, Los Angeles, San Francisco—for our major airline customers. So that makes our service a lot more attractive, and that's grown. We've grown market share in those.

What's interesting to think about from a go-to-market perspective—and by the way, our Government market has grown from 10s of millions to a couple hundred million annually. And that's recorded in our Government segment.

So the issue is on the enterprise or Government side—you go through some form of acquisition where you go through an acquisition authority, you have to convince that one. Once you do that, then you, you get your business in lumps as you win] airline or you win an organization.

On the consumer side, we can target that—just basically by the amount of money we spend on marketing, by the discounting that we use for particular promotions.

And so we have the ability to move bandwidth back and forth between them. And actually, the fact that there is churn on the residential side is—on the one hand, it's bad because, in some sense we have acquisition costs that are wasted when a customer goes away. On the other hand, it's good because we can then repurpose that bandwidth for these higher value markets as we penetrate those markets higher, right.

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So that allows us to increase the yield on our satellites over time, even when we don't increase the bandwidth.

[25:46]

## Audience Participation

**SUPINO** And speaking of moving capacity around dynamically—one of your priority markets, IFC, has recently faced a huge blow from Covid. And so we seem like we'll have excess plane capacity for quarters, if not years, and I wonder how that is affecting your business.

And then more importantly, if you could just share a multi-year outlook for whether you can use this period of dislocation to actually accelerate your market share gains. And by the way—I should say, just to keep people focused on it—that's a question from the audience.

**DANKBERG** OK, good, yeah. So one thing, right now I think one of the best companies in the world that's really suffering is Disney. And that's because they have these theme parks that allow them to leverage the value of their other media and entertainment assets. Right now, those theme parks are a huge drag because they can't—you know, people can't go to them.

But I don't think there's another media company in the world that wouldn't instantly take over all those theme parks if they could, right? If Disney said, "we don't want these anymore," I think that there's huge demand for them. And that's how we look at our airline business. Right now the airline business is very stressed and we have a bunch of our business tied up in that. But we think that business is coming back and we wouldn't trade it for other businesses with others.

So that is impacting our business in the short-term. Remember, telecom is a high fixed cost / low variable cost business—so, you know, a little bit under 10% hit to revenue is much more than that from a margins perspective. So we're dealing with that. We've had to make some cost cuts in order to be able to preserve our cash flow, and that cash flow is funding our new assets.

But on the other hand [...] the point that we're making is that we can repurpose that bandwidth. And so we are seeing increased demand on the residential side—as are pretty much all terrestrial telecom providers because of work at home, school from home—and so we can repurpose some of that bandwidth.

We're very careful not to repurpose it in a way that's going to inhibit our ability to service our airline customers as that comes back. So we're going to be—I would say we're going to be conservative on how we're going to repurpose the bandwidth. [...]

And one of the things that I think you're saying—I think I mentioned this before—is whereas there's conflict in the supply chains of others where the distribution is tiered between the value added suppliers and the route satellite operators, for us—we don't have those constraints. We can move our bandwidth around as most effective, and that's helping us. We are getting good growth in

residential, and we think we're going to see good growth in the government as well, in the near-term.

[28:56]

**SUPINO** Several of our guests have asked about your reception outside the United States—particularly in light of the pandemic—whether that's impacting demand, and what your emphasis and strategy will be outside the United States in the next year or two?

**DANKBERG** So outside of the U.S., our residential business is smaller. We have been growing; it is growing. We've been doing what we call shared services. So shared services—for instance, shared Wi-Fi, where we're going to rural towns in Mexico and Brazil and we offer people connectivity via Wi-Fi. Basically people will pay cash for that or they can pay digitally for time. And those are nascent businesses for us.

Right now, I would say, right now growth is a little constrained because we haven't really built up the distribution as much as we have in the U.S. and so it's a little bit harder to do in the current environment. Brazil is very affected—that's one of our main markets—and Mexico is also pretty affected.

So we will be entering other markets. They won't show up as much in our aggregate results, but those markets will be growing. We're still working in Europe where there also is increased demand but we don't necessarily have distribution yet to capitalize on it the way we can in the U.S.

Internationally, we are growing In-flight Connectivity and—even although we've got orders, the airlines don't yet want to announce them. So we—they haven't wanted to make announcements yet. And we are getting—almost all of our government growth is international as well. That answer your question there?

[30:56]

**SUPINO** No, it does, thanks. It seems like generally, bandwidth demand is accelerating faster than the 5-year planning cycles that I associate with satellite launches. And I think your ViaSat-3 project looks extremely capacious—absolutely and relative to anything you've done in the past. And yet the planning for that began years ago.

And so I wonder—how do you plan a business, and how do you have an expected return on capital, when the number of customers you can serve—and ultimately the economic demand of theirs that you can serve—continues to exceed prior expectations? I think that happened in your residential broadband business years ago.

**DANKBERG** Okay, no—I wouldn't put it that way, but the basic point that you're getting at, I would say, is a foundational pillar of all information technology. If you look at, say, 3 pillars of information technology: compute power, storage, and transmission, right? And so storage

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and compute power are basically direct Moore's Law businesses.

What's happened is, over time you can look at the trends of productivity improvements for memory, disk drive, solid-state disk drives, compute power, and you can sort of project into the future. And then you can also project the demand. Now the things that drive supply and demand are different, right?

The things that drive demand on the compute side *and* on the storage side—and actually on the transmission side too—are all video related. It's video processing on the compute side—so higher resolution, more compression. On the storage side it's video files. On the transmission side it's live or over-the-top video.

So basically, you can deduce trends. And kind of the long-term trends have been in the 20 to 30 percent annual growth in per capita bandwidth consumption from a transmission perspective, right? And that's been offset a little bit by RPU growth.

If you look on the cable side, you've had RPU growth by probably 6 to 7 percent over the last several years, and that's projected out pretty well. And if you look at rural cable providers like Cable One, their RPU growth has been in excess of what it's been for Comcast and Charter, right? So think of that RPU growth as offsetting, to some extent, the deflation in the bandwidth.

So what we do is we say, "well look, we've got the same effects and we got in there for the same reasons"—primarily video growth. And what's happened with us is we've gotten RPU growth that's higher—because we're in markets that are higher demand, and we're catering to the higher ability to pay segments of those. And that's true all the way across our portfolios. So actually, even though you could look at per capita bandwidth growth, that's been offset by RPU growth for us to a greater extent.

So what we've projected over the life of our satellites—which drives return on capital—is bandwidth deflation in the 10-ish percent range. And we're actually running a little better than that. Now, you can't really tell until you're done, but we have older satellites—like our 15 year old, next one is 13 years old, the first one we built, our ViaSat-1, is coming up on 9 years from launch. And our empirical history has been pretty good. It's been consistent with that, kind of, 10-year deescalation, which is consistent with 20%-ish return on capital over the life of the assets.

[34:47]

**SUPINO** Speaking of return on capital, I want to make sure that I ask you about contribution margins, profitability and returns on your 1st and 2nd generation satellites, and if you'd venture a guess about ViaSat-3?

Said differently—what are the EBITDA margins of those [satellites] if they were evaluated as a standalone business before allocation of corporate? What is the contribution margin of those legacy satellites and what might "Three" be?

**DANKBERG** Okay, so you've touched on a couple of really important points. Number one is when we look at return on capital, what we really want to do is look at the return on capital of the assets that are *in use* and subtract out—don't count—the assets that are under construction—that are not deployed, okay.

Then the other thing that you really have to understand there is that the new assets that we're bringing to market are *growth* assets, they're not purely maintenance assets. And that's because, you know, we have this relatively predictable rate of depreciation of those assets—from a value of the bandwidth perspective. [...]

Now then, the next step to answering your question is to realize that this is a high fixed cost / low variable cost business. So what you've seen with our assets—basically, we're overlaying. First we have a return curve for ViaSat-1, then we overlay ViaSat-2 on top of that.

With ViaSat-1 before we did ViaSat-2, what you saw was that the contribution margin—that is the...think of it as  $\Delta$  EBITDA /  $\Delta$  Revenue, so what was the contribution margin of individual revenue—that increased over time as the satellite became more and more full. [That's] because our fixed costs didn't change and our variable costs were far lower than the incremental revenue that we got.

So by the time we were in, like, the fourth-ish year of ViaSat-1—fourth and fifth years of ViaSat-1—we were seeing  $\Delta$  EBITDA of like 70% for  $\Delta$  Revenue, okay. When we started it was in the 25% [range], went to 30, 35, and kept growing.

With ViaSat-2—and you noticed this in our results, like, in the first year of service—our EBITDA margins were in the 30s range, then they went up to, like, the 50s range. And they would be even higher, except that we're investing right now in some of these new distribution channels. Especially international. Okay.

**SUPINO** And you're talking about your consolidated or segment level [...] margins?

**DANKBERG** Yeah, segment level... segment level margins. And so there's no reason to think that the  $\Delta$  Revenue—the  $\Delta$  EBITDA or  $\Delta$  Revenue—for a given business like residential isn't up in those 70% ranges as we've filled up ViaSat-2 as well.

[37:58]

**SUPINO** Wow, that's an exciting prospect.

One topic which we'll both be in trouble if we don't touch upon is lower Earth orbit satellites. There's a big "hype versus reality" angle to pursue. You're also focused on LEO as a business for yourself.

**DANKBERG** Yeah.

**SUPINO** The way I would like to frame the question—actually the way the audience framed the

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question is, do they create new markets or do they take share of existing markets? And [I'm] curious which direction you would take that question.

**DANKBERG** Okay, so absent subsidies [...] basically the reason...the big thing that we did yesterday is we said, "hey, we're going to build LEO"—which I think surprised a lot of people. And one of the questions is, is that because we think there's something better on the [...] supply side than there used to be—that is that LEOs are better than we thought they were—or was there something on the demand side? Basically it was the demand side that we're after. And the only thing that's really changed on the demand side are government subsidies.

So that is—the FCC has, through the auction rules have said, "We're going to subsidize low latency through this RDOF subsidy. We want people to build low latency transmission systems." And that could—it is not a given that a LEO is low latency within their definition. But it certainly could be whereas a GEO on its own can't be. So that's what we're addressing. [...]

We don't think that the LEOs expand the market very much, okay. And I think that the—you know, the—one of the good analogies, again, in the telecom world is if you look at 5G what People are saying that mobile 5G is going to do is, hey, we've got more bandwidth, we're going to offer higher speeds, and were going to have lower latency.

What I think is you're not going to see is people say, "look, we've kept this data and bandwidth capacity the same, but we've reduced latencies, so pay us \$20/month more. I don't think you're going to see that. I don't think that the latency itself is going to expand the market. I think what's going to really expand the market, if it does, it's going to be the speed and the volume.

So that's what we think are the dominant determinants of the broadband space market. We think that offering higher speeds—for instance with ViaSat-2, we're the only ones that offer 100 Mbps and even 50 Mbps residential service. With ViaSat-3, we'll be able to offer that everywhere in the U.S., and in other markets as well, and we might decide to offer even higher speeds. We will offer more bandwidth, better value—according to the types of growth escalate learning curves that we've described before.

But, [...] this issue, what we think is that the success or failure of the LEO market's really going to be driven by their bandwidth productivity. We think that part of the reason that OneWeb is in bankruptcy now is—if you look at it—they've spent \$2.5 to \$3B, they needed another \$2.5B. And at the end, they were going to have 1Tbps of sellable capacity, which was going to be distributed all around the world. You know for ViaSat-3, we'll get 1 Tbps for \$6 or \$7 hundred-ish million in the best markets. So that basically is an indication of the productivity gap.

And what's interesting is—you know, they talk about latency, they talk about how inexpensive their satellites are—that's what most LEO operators talk about. They don't talk about bandwidth productivity. And that's the

thing that we think is really going to set—it's going to be hard to have pricing power if you don't have strong productivity.

Our distribution is—we're vertically integrated, people are not going to have a lower distribution cost than us.

And then the other really big thing about lower Earth orbit satellites is that the life of those assets is short. So one of the problems, you know, is that, OK, you might be able to know, for instance, you might drive down market price because of oversupply, but if that only happens for two or 3 years because the lifetime of the assets is short, I think we can deal with that, right. That doesn't make for an enduring value proposition.

[42:42]

**SUPINO** So—ground network technology—our audience would like to know more about your assets in ground network technology, and your opportunity to compete in ground network technology as a service, as a third party provider.

**DANKBERG** Okay, so two—a couple things here. One is [that] one of the potential problems with vertically integrated companies is that their vertical integration becomes noncompetitive, right, that they've got this internal customer, and they don't really compete well in the open market.

And one of the things I'd like to point out is, in the LEO market, we've competed successfully—providing payload technology on Iridium. We didn't disclose it before, but now that they're bankrupt—you know, they owe us a little bit of money, because we were one of the main ground technology providers for OneWeb and their LEO system. We've also been a ground technology provider for MEOs as well, in both user terminals and gateways. So we think we're very competitive, we think we have more staying power than the other ones., so just in competing in technology, I think we do well

For ground as a service—there's not a big market *there*—but there *is* in communication. But there *is* a potential market in Earth observation, so that's another potential market that we're entering. That's kind of a small market for us—but growing. [...] I'm not quite sure if that's what you're getting at with "ground as a service."

The other thing I would say—in order to make LEOs or MEOs competitive, ground technology is *really* important. That is phased array antennas for the user side, and also effective gateway antennas, which also have to be full of motion antennas—or phased array antennas.

And the other thing is a lot of these NGSO systems end up doing, I'd say, extraordinary things in space in order to minimize their ground cost. But because we—basically —no satellite can have higher throughput than the fiber network that feeds it right. You can't have a terabit per second (Tbps) satellite unless you've got a Tbps ground network to heat it. So, not only do we have the largest space networks, but we have the largest ground networks. And it's very extensive in terms of geographic

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location. We can leverage that when we go after non-as well.

So we think that—one of the points we made in our filing is that, because we have a very extensive ground network, we can put more of our LEO capacity on a more pervasive ground network. Which has a longer life, can be modernized more quickly, and we think that's going to make us very competitive in the non-GEO space.

But right now, we think that the LEO demand is really mostly subsidies—that's the dominant thing. And if the subsidies go away or aren't there, it's more questionable how valuable that is.

That's the purpose of subsidies, right? To make things that otherwise are not economical, economical because the government thinks they are important.

The point is, you know, we're trying to completely comply with the purpose of the subsidies. But we just are pointing out that the subsidies are sort of fundamental to making the thing economically viable

[46:17]

**SUPINO** So—Ka- and Ku-band capacity—the question is, over 5 or 10 years, could you imagine either or both of those bands becoming capacity *constrained*? Do you think connectivity customers might make long-term decisions with that in mind if so?

**DANKBERG** Okay [...] there've been long debates between Ka and Ku, I think it's being decided. People are realizing that Ka is the winner, and the reason is because there is more spectrum at Ka than there is at Ku. The propagation characteristics of the two are very similar, but there's more spectrum at Ka than Ku. So that's what makes Ka more valuable as a spectrum, and so we focused on that. Also there was more available at the time that we did it.

But the other big thing is, just like in the terrestrial space, once you have a finite amount of spectrum, the way you get more capacity is through densification—that is, more cells per geographic area will deliver more capacity. So the way you do that in space is either more orbital slots or more capacity *per* orbital slot. So that's how you can grow capacity.

But more orbital slots doesn't increase productivity—right? Because your *productivity* doesn't change just because you have more slots—your *capacity* does. But more productivity per satellite increases both capacity *and* productivity, and the way you get that is more beams per satellite.

And you can't get—it's very difficult to get more bandwidth per beam because there are regulatory limits on the amount of power you can use per unit area on the ground. So what you need is more beams, and that's the beam-forming stuff that we focused on. I think that we're by far in the lead in that dimension of competition. Does that answer your question there?

[48:23]

**SUPINO** It does, yes. One last question on ViaSat-3— it's obviously so important to your results in the next few years. How do you think about what type of returns that investment ought to yield for the company? Should the contribution margins be any better or worse than the ones you described on ViaSat-1 and -2 as they matured?

**DANKBERG** Well, I would say—there's potential for them to be better. We don't expect them to be worse, and there's good potential they'll be better.

And part of the reason, [...] the single largest market that we're in right now is the residential market in the U.S. And there we have a competitor which has technology that's very similar to ours.

Matter of fact, the satellite manufacturer that they buy from basically used our technology. That's what that trial was about. So as we get more separation with them, we think we have an opportunity to expand our margins in the U.S. That is, we can keep more of the productivity gains for ourselves.

And certainly on a *global* basis there's nobody that we can see building technology with the productivity we have. So certainly we think there's opportunities for margin expansion there. And we don't see any reason that the margins wouldn't be at least as good.

I think that the, you know, I think the most fundamental issue is return on capital, which gets played out over a long period of time. For ViaSat-1, we're 8 years into a 17-year life and it's on the trajectory that we would like to think—for the older satellites that are 15 years old—those have been on that trajectory.

So I think we have good reason to project that we'll get good return on capital over the life of these assets, and that they can be better in the ViaSat-3 era.

[50:17]

**SUPINO** That's exciting. One last question—anything about Amazon, people want to know about it. Do you have any comment on Kuiper? And if their opportunity is real, why wouldn't they just try to buy your consumer business?

**DANKBERG** So I'll tell you, that's a *really* good question. Number one is that I think the Kuiper system is actually probably the best of all the filings that are out there in terms of productivity, But we don't think it's as good as what we can do with GEO.

I can tell you one thing that Amazon says publicly—and so do others that are in their position—their dominant business is basically becoming cloud services. Whether it's retail services for their own or for others', or music, or media, or gaming, or search—those are all really cloud services. And one of the things that cloud operators will tell you is *they* don't like latency. That latency, even latency that is *imperceptible*, has a *measurable* decrease on customer engagement.

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So I mean, we heard this from Google and we'll hear it from every service provider—from a service provider perspective, people that use high latency channels will do fewer searches and they'll watch less videos than somebody on a low latency channel. Even though end customers can't perceive the difference. And you can perceive the difference in a set of GEO versus LEO, but they're talking about 20 millisecond differences in latency, which are imperceptible.

So from their perspective, they want to promote low latency, and that's a good reason for them. The issue is the buyer values bandwidth more than the guy that's paying for it—right? So I think that's kind of a paradox in the cloud services base.

You know, what I would say is—as an example, you know, we've worked with Facebook and Apple and they've gone, "hey, if people can have a better experience through your service on, say, an airplane than they could otherwise, hey that's a great opportunity for us—in-flight or a remote area."

So I think that what you'll see—the cloud providers will embrace satellite. And that if the bandwidth side is the customer-facing value, the guy buying the bandwidth is going to value speed and bandwidth more than latency. I think that's what's going to make them more successful.

But yeah, we spend a lot of time looking at new entrants. I think, clearly Amazon can fund whatever they want in this, no question about that. They do look for long-term returns, on the other hand. They also tend to be pretty rational. They don't waste capital so I don't think they will underprice bandwidth that they bring to market.

On the other hand, they can capture value through cloud services. And that's a big part of what we're trying to do, is to capture more of the value of our services than the transmission ones. So I think that one will be an interesting one.

But from the Amazon perspective, they're going to—the space safety thing is still a constraint on the whole notion of LEOs and productivity. Right now, the way that LEO operators are trying to drive down productivity is through proliferating satellites. Even at the cost of lower reliability, for example, to make the satellites low cost.

And from a regulatory perspective, it's not clear that's a viable solution. That's one of the things we'd like to address [...] I would encourage people to look at that and ask us questions about it. It's a complex business.

[54:28]

## Closing Remarks

**SUPINO** Mark, thank you so much. This has been fun. It would be easy for me to keep going for another half an hour—our guests have to hustle to the next meeting room. So thank you so much.

For those on the webcast, please remember to complete the procensus poll as we wrap up, which will be on the lower left hand side of your screen.

Again, Mark Dankberg, thank you so much for your contribution to our event. Best of luck and we'll look forward to the next conversation.

**DANKBERG** Thanks very much for having us. Really enjoyed it as well.

**SUPINO** Bye bye.

[55:01]

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