Antennas and Terminals: What's Up?

by Lou Zacharilla

The launch of ViaSat-1 in October 2011 continues to have impact throughout the industry. It triggered a wave of innovation of products and business models throughout the chain of the satellite business. It is no coincidence that when Mark Dankberg was planning the satellite's launch, he frequently referred to Clayton Christensen's best-seller, The Innovator's Dilemma. Christensen (like Dankberg) accepted the premise that good companies could do everything "right," but still lose and have their lunch eaten before Noon. The book launched the concept of "disruptive innovation" which, like ViaSat-1, has become an accepted standard.

By February 2012, 24 satellites with some type of Ka-band payload had been launched, while Inmarsat, Hughes and Avanti soon after joined "The Space Race for Human Progress." This has coincided with a rise in VSAT sales and applications, an uptick in demand for data services within verticals such as the maritime sector, along with new applications and network extensions for media, enterprise and government. There is now a simple acknowledgement that high-throughput satellites are the game-changer that Dankberg and others (including SSPI) believed they would be. As a result of the business out there, there is a new mandate for innovation and service.

I thought it was time to poke around to get a snapshot view of how HTS and other developments over the past three years have changed a key sector of the satellite industry, antennas. So I invited Tony Wilkey, Vice President, AvL Technologies; Keith Buckley, CEO of ASC Signal (formerly Andrew Corporation) and Paul Scardino, Vice President, Globecomm, to talk about what they see today, nearly three years after ViaSat-1.

***Lou Anthony Zacharilla (LAZ)** : There's been a lot going on since that ViaSat-1 launch. What are the big trends that you see in the area of antennas and transportable technology today?*

Keith Buckley: If you look at it from a macro market level, what I find is that the market is looking for products with the capability to meet more than one mission and to do it without adding complexity. So for us, the trend prompted an engineering adjustment which led to us designing multi-band and dual-band systems within a single aperture size. We now have a 4.9 meter dish, for example, which does UHF through Ka-band.

Paul Scardino: Certainly the multi-band provisioning is a trend that was stimulated by the ViaSat-1 reality. Another area that resonates for us is SWaP. It is interrelated to multi-band, when you think about it. Customers, particularly in the government space, want small, lightweight systems with reduced power consumption. The auto acquire functionality is being replaced with manual point systems with simple acquisition applications on smart phones. Customers are willing to forego this feature to improve SWaP. Transportable multi-band systems are also available. As both Keith and Tony know well, leveraging a single antenna mount and reflector to satisfy multiple frequency bands reduces overall CAPEX and enables flexibility with space segment and geographic deployments.

LAZ: You are all going in that direction. Tony, your boss, Jim Oliver, founded TWO antenna companies. He said back in 2012 that the introduction of Ka-band to commercial users reminded him of the introduction of Ku-band to C-band users. You have both said that the "ultimate antenna" would operate in all frequencies and work in any network with the elements being agnostic.

Tony Wilkey: I believe Jim said that two years ago. Yes. That's what everyone really wants. The rapid advancement of high-throughput Ka-technology and the demand for highly integrated functionality between the antenna and the NOC is where we see the train heading. At AvL we've been investing in both antenna and controller technology that support both of these trends.

***LAZ:** Like ASC I believe you manufacture in-house and are always pushing the envelope.*

Wilkey: Our reflectors are manufactured in-house using carbon-fiber materials and techniques. We recently introduced an AAQ auto-acquisition controller, which we believe is the most advanced and flexible embedded controller in the industry. This is important because another trend we see is the demand for incredibly fast and reliable acquisition over satellite networks to incorporate those advanced modems and stringent NOC management requirements for maximum throughput.

LAZ: *It sounds like you all agree that we are still in a new phase where disintermediation can occur quickly. Is the controller a big part of the innovation in the antenna sector?*

Buckley: Yes. To Tony's point, we also have a next generation controller on the market which you will be hearing more about shortly. If I can add one other thing, there is a trend that I would define as "fragmentation."

LAZ: *Market fragmentation?*

Buckley: Not precisely. But more of a technological fragmentation in terms of the degree of customization being asked for by the market. There isn't much that comes across our desk that doesn't have something unique, new, or atypical to it. We see more customization than ever before, as well as more demand (and competition) from quarters and organizations previously not seen in the market.

LAZ: *Does that mean there is more business out there? ASC has been on a roll lately.*

Buckley: Well, we are getting more business. If the numbers we look at are right, there sure isn't less out there. My point is that a growing diversity of needs will require all of us to continue to innovate, despite a fixed-cost structure for a lot of our production. Having said that, we are also getting bigger orders in "traditional" deals as well from all around the world.

LAZ: *Growth and fragmentation tells me that the "innovators' dilemma" continues.*

Scardino: As an engineer I think that is right and it does require some serious problem-solving capacity at a strategic level, Lou. To add to what has been said, you can see how this creates a challenge to forecasting. According to Compass and others who watch it, the VSAT market reported year-over-year growth. But it's hard to say if it will continue to grow at the pace it has. It stands to reason that as remote locations continue to choose VSAT technology for connectivity needs, the bandwidth consumption will continue to grow. What makes it a challenge is that what is sold as a suitable amount of bandwidth on the first day gets bogged down quickly after 90 days go by! This is because usage tendencies change. So you have a couple different scenarios; either it is the dedicated network case where in a reasonably short period of time everyone sharing the bandwidth in a private network needs more, or you have the shared network scenario where traffic is bursty, and the issues are compounded due to the fact that you have multiple networks competing for the same bandwidth.

LAZ: *So how do you attack that? You have just described an unyielding market trend driven by what I call the "Broadband Economy." Consumption rates will rise as we become more indebted to living our lives and running our economies and governments online and on small screens.*

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Scardino: Globecomm has stood by the policy of not over-selling bandwidth on shared carriers, and continuing to provision new links as sites enter networks and bandwidth becomes saturated.

"...The market is looking for products with the capability to meet more than one mission and to do it without adding complexity..."
—Keith Buckley, President, ASC Signal

LAZ: *This requires a great deal of flexibility.*

Scardino: Yes. And discipline. Tony's remarks about being agnostic are right on. A technology agnostic approach has served us well and allowed us to be more nimble. We can get wherever someone needs to be – because we have thought through this issue and made network choices on a global basis - without frequency being a hold-up.

Wilkey: On the VSAT issue, we're seeing the most significant growth in mobile VSAT applications, especially in the oil and gas sector. These folks are racing to tap into the growth in their industry that's been sparked by heavy demand and advancements in exploration and extraction techniques. These techniques require extremely expensive equipment and extensive bandwidth. AvL is working with several significant customers to develop extremely robust, auto-acquisition VSAT terminals that operate in the most remote, rugged and difficult environments. We like that business.

LAZ: *I want to go back to a theme that Paul's remarks triggered. The touted "Internet of Things" is a trendy phrase but also, apparently, a reality. Does the Internet of Things impact your thinking?*

Buckley: It does. We keep a keen eye on ensuring our products provide useful data without needless complexity and overload. For example, the NGC Controller I mentioned was designed along the lines of this ubiquitous and seamless consumption of data. It not only controls the antenna positioning but it also ties the whole "Antenna Control" concept together in a comprehensive way. It mimes the comprehensive nature of the Internet. It offers at-a-glance plots and trend data that was previously only available after intensive logging, analysis, and graphing. We offer this data real-time so users can see the impact of tuning configurations. People do not want to wait for information, especially when they practically have it built into them!

LAZ: *Is it a double-edged sword as well?*

Scardino: It is an exciting area and of course like everything it is a double-edge sword to civil society. "Security" is no longer just encryption for military applications. Like the Internet, it touches everything, from commercial and personal privacy, law enforcement and the regulation of civic life. In fact, misuse of the Internet of Things poses the largest security threat to advanced nations today. Our new cyber security brand, Cytelics, is addressing the security issues that wireless networks need to consider for example.

LAZ: *Certainly the military gets this. The United States military has a think tank, called the Maneuver Center for Excellence, which is doing some advanced thinking about the nature of warfare going forward.*

Buckley: Antenna technologies will change precisely because of this. While traditional military spending may be shrinking, non-traditional areas of intelligence gathering are growing. We get worldwide requests for radio direction-finding antennas and are doing a deal now for aircraft-mounted military antennas.

LAZ: *And not all military budgets are shrinking.*

Buckley: Correct. We did a deal in Asia with one of Asia's leading providers of HF radio systems for a major HF antenna infrastructure project for coastal communications systems used by the government of China.

Scardino: Yes. Non-traditional deals will continue and drive more innovation. You already see antennas designed in the shape of the tail of drones for military applications.

LAZ: *It seems like there is an endless source of opportunities for our industry.*

Wilkey: There is for us. Our latest antenna controller technology is IP-based, so if a customer in Asia needs us to help him update software, share logged data or diagnose a problem all we need is his controller IP address and an Ethernet connection to assist from our headquarters in Asheville, North Carolina. Like Globecomm and ASC, we can extend our antenna business anywhere now.

LAZ: *We wish you all success and good luck solving the "innovator's dilemma."*

Lou Zacharilla is the Director of Development of the Society of Satellite Professionals International (SSPI). He can be reached at: LZacharilla@sspi.org