Satellite Executive BRIEFING

Vol. 8 No. 10 November 2015

SATELLITE Markets & Research

Industry Trends, News Analysis, Market Intelligence and Opportunities

Mobility Driving Satellite Ground Systems Market

by Dan Freyer

Mobility is hot, with satellite operators and service providers planning, launching and expanding maritime, land mobile, and new aeronautical broadband and in-flight services around the world via both conventional "bent pipe" capacity, and new Ka-Band, HTS (high throughput Satellite), and non-geostationary satellite systems. Satellite Executive Briefing talks this month with ground antenna and RF distribution technology suppliers about challenges and opportunities, with a focus on mobility and HTS.

Hot Market Segments

On-the-move (OTM) and mobility ground antennas and high capacity RF distribution systems are among the key enablers of growth in these applications and networks. Antenna and RF signal transport technology suppliers see HTS as a major driver of future demand and market dynamics.

Companies supplying critical antenna and RF systems enabling these new Ku-Band and HTS services to aircraft include a pack of current suppliers such as Cobham Aerospace Communications, Panasonic Avionics, ORBIT Communications, Astronic Corporation's AeroSat, and Honeywell, as well as flat-panel suppliers with deployed products, such as ThinKom Solutions, Inc., and firms such as Kymeta and Phasor Technologies, whose electronic beam forming antenna technologies are in various stages of commercial development.

With more than 1500 deployed terminals worldwide, ORBIT Communication Systems Ltd.'s VSAT solutions are being used by aircraft manufacturers, military users, and leading airborne integrators and communications service providers. According Stav Gizunterman, Director Product Marketing, "LEO HTS and MEO HTS will greatly extend the applications of satellite communication and will make it more available to end users. It will make satellite communication more 'popular,' reachable, and affordable. We already observe that the IFC (in flight communications) market is adopting the HTS – Inmarsat GX, ViaSat, EpicNG and other satellites that are going to be in service during the next 3 years."

Mobile applications for land, maritime, in-flight services are driving growth in the satellite ground segment market. (photo: ND SatCom)

Gizunterman believes that in the coming years we will see penetration of high throughput communication to completely new markets segments, including Defense markets. He points to a market research study by Northern Sky Research (NSR)

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From the Editor

4th Annual Vision Awards

Satellite Markets and Research in cooperation with Application Technology Strategy LLC headed by renowned industry consultant Bruce Elbert are proud to host the Fourth Annual Vision Awards at SATCON 2015 in New York City. A reception to honor outstanding achievements from companies, executives and products this year will be held from 5:30-7:00 pm on the first day of the show, November 11th.

Every year, the Vision Awards honors awardees in the following categories:

Visionary Executive of the Year- Awarded to an outstanding senior executive of a satellite company that demonstrated a keen sense of mission for his company and a forward-looking vision of where his company and the industry is heading.

Most Promising Company of the Year- Awarded to a company that has experienced growth in the markets they serve and demonstrated long-term viability of their enterprise.

Most Innovative Product or Service of the Year – Awarded to a product or service launched during the year that makes a substantial improvement to existing technology or performs a vital service.

Join us in honoring the winners at the reception at SATCON. To confirm your attendance just send me an e-mail at virgil@satellitemarkets.com or drop by our booth at SATCON (#438) to get an invitation. We look forward to seeing you there.

Virgil Labrador, **Editor-in-Chief**

Satellite Executive BRIEFING
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Satellite Executive Briefing
is published monthly by
Synthesis Publications LLC
and is available for free at
www.satellitemarkets.com

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Satellite Ground Systems Market...From page 1

which forecasts growth in supply of Gbps for systems such as WGS, AEHF, MUOS and European systems expanding from less than 30 Gbps in 2014 to 40 Gbps by the 2020 timeframe. "But most significant growth is expected for the aeronautical applications mainly IFC and ISR," he says.

HTS Market Opportunity

Market research and consulting firm Euroconsult forecasts growth in consumer broadband, commercial shipping, mobile 3G satellites, and business and commercial airline systems segments. One Euroconsult projects usage growth of HTS by commercial maritime ships will jump in number from 6 to 22,000 between 2014 and 2023. Meanwhile, mobile terrestrial carrier backhaul sites using HTS are projected to increase from 20 in 2014, to 5,900+ by 2023. During the same forecast period, the number of business jets using HTS jumps from 37 to 247, while commercial airline jets from 1,320 to 4,180.

Airborne applications include IFC (in flight communications), IFE (in flight entertainment), Business Jets, as well as Intelligence Surveillance and Recognizance (IRS) including UAVs and Mission Aircraft.

According to a separate study by NSR, "The aeronautical satcom market is on the cusp of a huge increase in demand and will experience significant changes with a proliferation of new solutions to enable better and more widespread in-flight entertainment and connectivity (IFEC)." The expected transition to high-throughput satellite (HTS) connectivity will mean that HTS revenues will see sizable growth from almost zero today, and bandwidth demand across Ku-band and HTS will grow significantly by the end of 2022 and reach $670 million in revenues for in flight services, the report says.

ThinKom's ThinSat 300 low profile antenna for mobile applications

In-flight Broadband Applications

Although there have been tremendous advances in technology, executives say, mobility systems remain quite expensive compared to fixed antennas, and this hinders the wider access of mobility services. Total cost of ownership reduction, and performance gains for antenna technology are major goals for mobility terminals. New commercial beam steering, beam forming, and other mobile antenna systems could have a huge impact in cost and performance, and enable lower price points for mobile Ku/Ka-Band satellite terminals, especially for aeronautical. Promising technologies in antenna design for mobility include new phased array antennas.

Aeronautical IFE service provider GoGo has differentiated itself from competitors in part by using ThinKom Solution, Inc.'s *2Ku* phased array antenna, which the company has said outperforms standard antennas in over 98% of flight minutes. GoGo enjoys a 50% operating cost advantage, fewer moving parts, compatibility with 180 satellites, and a lower, more aerodynamic profile, more gain efficient antenna, company presentations say. It already has installation commitments for over 500 aircraft, and estimates $0.5-1.8M in satellite bandwidth savings with the new technology, depending on the type of aircraft, according to company reports.

"The fastest growing markets for ThinKom are both the Aeronautical and Ground-Mobile markets, particularly at Ku-band, but moving quickly now to add Ka as well," says William Milroy, Chairman and CTO of ThinKom. These growth markets include the Commercial and the Government sectors, and both traditional "wide-beam", "bent pipe" satellite constellations, as well as Ku and Ka HTS systems.

Because its products offer advantages for HTS applications, ThinKom is closely following the industry-wide movement toward launching HTS geosynchronous (GSO) and non-geosynchronous ORBIT satellites (NGSO) in Ka- and Ku-band. "We see strong upside in this trend, as ThinKom's conformal antennas already support very wide (2-3 GHz) uplink and downlink bandwidths at both Ku and Ka bands. This means that we can support the wider channel bandwidths and broader range of operating bands that satellite constellations are evolving to. In addition, more satellites, higher E.I.R.Ps, higher MODCODs, and more frequency-reuse necessarily demands better Adjacent Satellite Interference (ASI) suppression and better linearity

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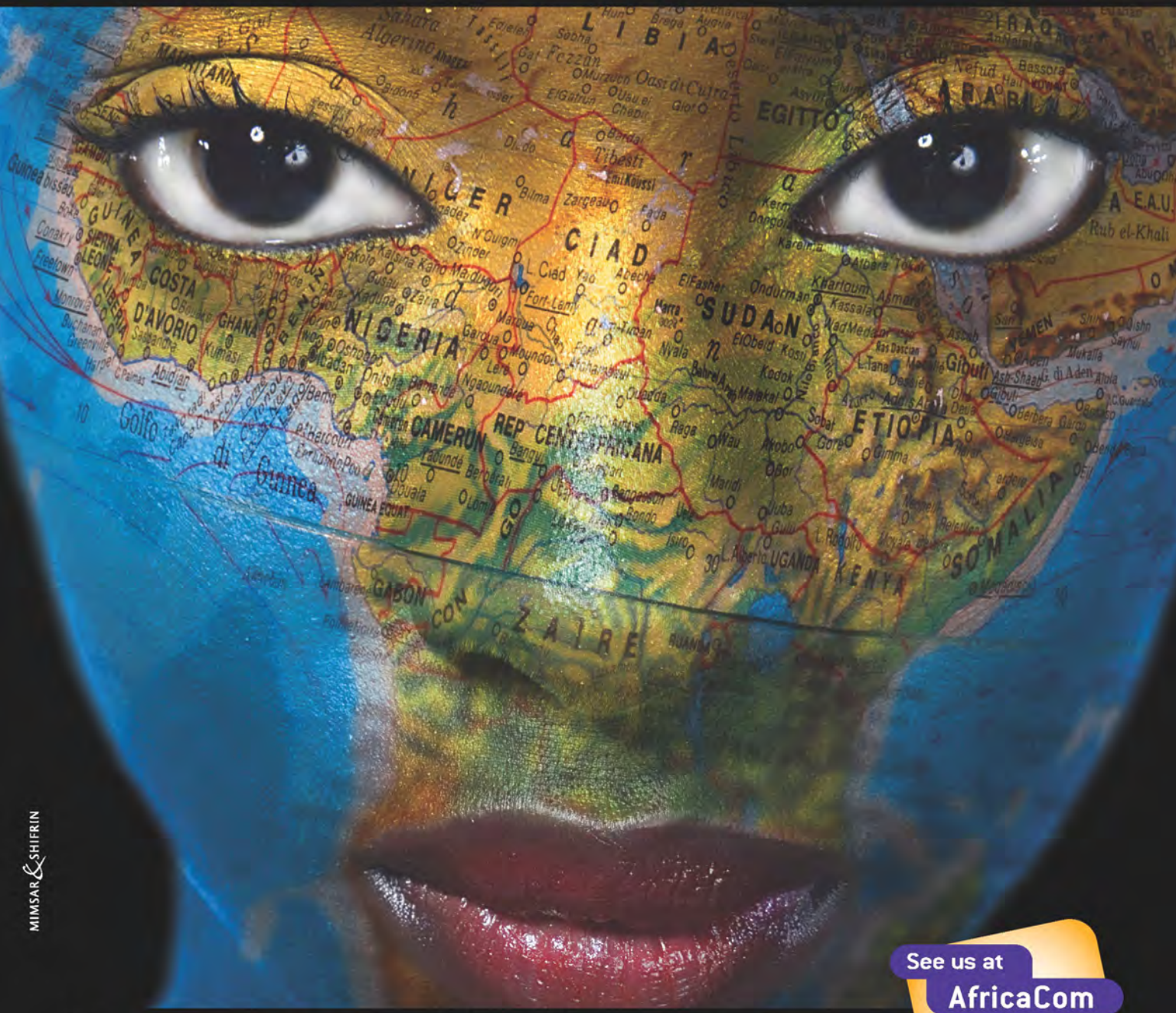

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for antennas, and that's something we already do quite well here at ThinKom."

ThinKom is a recent entrant to the aircraft antenna market. With its 2015 deal from GoGo in-flight, ThinKom joins incumbents such as Astronics Corporation's AeroSat, whose antenna product have been installed on commercial airline systems such as Jet Blue for several years using different technology.

AeroSat's patented Rexolite® Fresnel lens technology eliminates the need for typical feed horns mounted in front of a reflector antenna. Eliminating the feed horn improves antenna efficiency, and performance for the aircraft operator. The Rexolite® Fresnel lens technology acts as focusing optics, directing the satellite beam into the antenna waveguide, rather than a standard feed horn. Feed horns block incoming satellite beam energy resulting in reduced performance.

As ThinKom has challenged incumbents for a share of the aircraft fuselage antenna space, other players employing electronic antenna array technologies such as Phasor Inc. and Kymeta are "waiting in the wings" to join the fray.

Kymeta is developing technology to create ultra-thin Ku- and Ka-band antennas using a unique holographic approach to electronically acquire, steer, and lock a beam to any satellite, with no moving parts. The liquid crystal flat -panel design is lighter and will reduce weight and drag on the aircraft, in turn reducing fuel and maintenance costs for mobility applications according to the company.

Intelsat signed an exclusive agreement with Phasor Inc. to co-design and produce a low profile, active phased array Ku antenna that will be optimized for Intelsat's forthcoming Epic High Throughput Satellite (HTS) platform and sold to government and civil aviation customers. Phasor has created a breakthrough technology, phased-array electronically steerable antenna, designed for mobile broadband applications - thin, reliable, modular, and efficient, the company says.

AvL vehicle-mounted antenna

According to Dave Helfgott, CEO of Phasor, Inc, "The demand for broadband connectivity en route is expanding geometrically, due largely to the "Wi-Fi everywhere, connect anywhere, anytime" requirements of mobile device users, but also to the increase in IoT (Internet of Things)/ telematics communications. At the same time, satellite operators are beginning to provide a lot of capacity/supply focused on these growing mobility trends - new GEO, GEO HTS and broadband LEO constellations are in production and are beginning to come online, promising to bring Gigabits (GPS) of capacity.

Although its products are not yet commercially available, Phasor, Inc. aims to serve mobile broadband network service providers, across commercial aeronautical, maritime, land-mobile and defense coms-on-the-move (COTM) markets. There it aims "To quickly enable the coming wave of HTS, mobility-centric capacity," Helfgott says.

"Unfortunately, the existing access technology today is woefully inadequate to optimize mobile broadband services and has constrained these markets," argues Helfgott, "and that is where Phasor comes in. Our beam-forming technology is tailor-made for platforms moving from one-region to the next, switching from one beam to the next, whether that is an aircraft in-flight, ship at-sea, or a high-speed train en route. Electronically Steerable Antennas, like Phasor's, are the best way to optimize broadband HTS, spot-beam-based networks."

Phasor is not just looking at airborne markets. "Broadband mobility is a pervasive trend, but we see the most immediate opportunities in commercial and private aviation, commercial maritime - like cruise, private yacht, maritime energy - and in several defense coms-on-the-move (COTM) programs. Next year, Phasor will complete Beta testing in each of its use-cases—Sea, Air, and Land—and prepare for product launch.

Meeting Customer Challenges

According to ThinKom's Milroy "In terms of Mobility users, both on the Ground and in the Air, our biggest challenge is to enable for our customers (the service providers) a dependable and sustainable edge over their competitors in offering the most cost-effective service and at the highest QoS. ThinKom is meeting these needs today by providing affordable, proven, extremely low-profile phased array antenna solutions and products that (uniquely) enable 2x to 10x higher-efficiency as compared to existing antenna alternatives. With higher G/T and EIRP together with lower ASI (adjacent satellite interference), we

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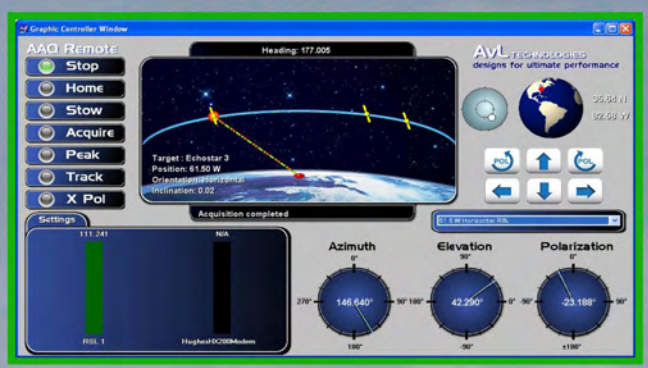

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achieve higher SNR's (signal to noise ratios), and that means that our antennas can operate at higher MODCOD's (modulation / coding) on both the forward and return links, thereby dramatically reducing, by 50%-90%, the amount of satellite bandwidth required to support a given QoS for a given user at a given location."

"From a technology perspective, our focus is to continue to develop and quickly field smaller, lighter, and antenna system products, that take maximum advantage of our unique and proprietary "CTS" and "VICTS" technologies as applied to current wide beam and upcoming HTS (and evolving NGSO) constellations and networks," he adds.

Entering On the Move

Other current players in the supply of land-mobile antenna systems for satcoms-on-the-move (SOTM) — transmission to moving vehicles — include General Dynamics Satcom Technologies, L-3, Rockwell Collins, Honeywell Aerospace, RaySat, Cobham, and KVH Industries, many of which have military product heritage.

But the field could get more crowded, as some transportable antenna suppliers are gearing up to join adjacent satellite-on-the-move (SOTM), and mobility market segments.

An example is C-COM Satellite Systems of Ottawa, Canada, which designs mobile one-button auto-deploying antennas for delivery of two-way broadband services into transportable stationary vehicles. C-COM plans its first foray into the SOTM field soon, and just released its first demonstrator units at the IBC 2015 show in September. C-COM's current products have found success in the hands of a variety of vertical market users, with over 7,000 of its iNetVu® antennas deployed globally. According to Drew Klein, Director – International Business Development for C-COM, "It is clear that the market is ready for a low cost, high performance, land-based Ka-band SOTM antenna." C-COM expects to showcase its iNetVu 1501 Driveaway with Dual 100W Redundant BUC's as well as our Ka-band Fly-75V Flyaway, which is approved for use on both the ViaSat Exede and Eutelsat KaSat services and its new COTM Ka-Band antenna in 2016. On top of being bullish on SOTM opportunities, Klein is seeing high demand from HTS-related applications. "Most customers need more bandwidth at a lower price. We expect the impact of HTS to be significant going forward," he says.

A similar view of HTS and SOTM demand is seen by AvL Technologies (www.avltech.com), based on Asheville, North Carolina, which manufactures a range of popular Ku- and K-band mobile antenna/positioner systems. According to Tony Wilkey, Sr. Vice President for AvL, "From a broader market perspective AvL is focused on the land transportable products, but we are hearing interest from some customers in HTS services for land mobile and other OTM applications." HTS is also having a significant, positive effect on AvL's customers and markets. Ka-Band HTS is the fastest growing market for AvL's products for industries such as remote broadcasting and energy exploration, while growth continues in international government and defense sectors, according to Wilkey. "Many of AvL's SNG customers have moved from traditional C-band or Ku-band service to HTS Ku- or Ka-band service, and are reaping significant benefits in terms of lower service costs, more bandwidth, and ease of use for the truck operator. Our oil and gas customers are also recognizing the ease of deployment and cost-savings with HTS services," he says. AvL is showcasing its products at CCW/SATCON in New York.

Sowing and Reaping Ka-band Rewards

An example of how HTS and Ka-band are driving new opportunities for mobility equipment suppliers that tailor systems to specific niches within mobility is the case of ORBIT Communications. The company divides is stabi-

Orbit's OceanTRx antenna

lized and antenna products into four segments by vertical customer needs: AirTRx for service airborne applications, OceanTRx suits maritime, RailTRx for train antenna systems in Ku and Ka bands, and TerraTRx meets requirements of LEO and MEO satellite communication. Due in no small part to its support for both Ka band O3b frequencies and commercial / Government with an interchangeable kit, "ORBIT's OceanTRx 7-500 maritime

2.2m stabilized antenna has generated high interest among HTS Ka-band users," according to Gizunterman. Other advantages include the system's small size and low shipping costs, and the fact that the OceanTRx 7-500's 2.2m dish and 2.7m Radome occupy 40% less deck space and weigh 30% less than comparable systems, according to the company.

Euroconsult's HTS market forecast infographic shows the number commercial maritime ships using HTS skyrocketing from 6 to 22,000 between 2014 and 2023. An example of how HTS and Ka-band are driving new opportunities for mobility equipment suppliers that tailor systems to specific niches within mobility is the case of ORBIT Communications. The company divides is stabilized and antenna products into four segments by vertical customer needs: AirTRx for service airborne applications, OceanTRx suits maritime, RailTRx for train antenna systems in Ku and Ka bands, and Ter-

raTRx meets requirements of LEO and MEO satellite communication. Due in no small part to its support for both Ka band O3b frequencies and commercial / Government with an interchangeable kit, "ORBIT's OceanTRx 7-500 maritime 2.2m stabilized antenna has generated high interest among HTS Ka-band users," according to Gizunterman. Other advantages include the system's small size and low shipping costs, and the fact that the OceanTRx 7-500's 2.2m dish and 2.7m Radome occupy 40% less deck space and weigh 30% less than comparable systems, according to the company.

RF Distribution and Switching: Bigger Loads, Wider Signals, Smaller Boxes

RF distribution and matrix switches and RF-over-Fiber systems manage and send signals to and from earth station antennas over the coaxial and fiber cable plant and network, and between and among antennas. According to suppliers of these technologies, growing demand for higher data rates and wider RF signals is pushing demand for their products. Another source of demand is increasing numbers of IPTV headends and new "convergence" RF/IP hybrid broadcast facilities requiring versatile and end-to-end RF solutions.

For example, the Quintech Electronics & Communications XTREME 256 port matrix switch has gained industry wide acceptance during its first year of production. According to Dan Prushnok, CEO of Quintech Electronics & Communications, Inc., "We have seen the rapid adoption of large asymmetrical configurations such as 48x208 and 160x96 all in a single chassis. These systems are shipping to commercial and government customers worldwide. The XTREME 256 configurations provide 'Expansion by Reduction,' due to the varied choices of asymmetric port configurations available in a single chassis that greatly diminish plant footprint by at least 75%, while providing power savings of up to 85%." Meanwhile, more suited towards the mobility/SOTM side of the market, Quintech's European Division, DEV Systemtechnik unveiled at the IBC 2015 show in September the company's new 8² L-Band Matrix Switch, a technology that packs stronger RF performance in the smallest form factor, which the company says sets the best value and price-to-performance ratio in its class.

Content acquisition and antenna site diversity are one of the major challenges of the satellite industry as customers are looking to receive more and more content for large DTH, cable, and IPTV headends, and HTS gateways, while mitigating the impacts of adverse weather conditions by installing distant and uplink and downlink diversity sites.

"To minimize service impact, automatic switching between primary and secondary sites becomes imperative for these applications," says Harjinder Sandhu, Product Manager, RF Products, for Evertz Technologies, a supplier of video infrastructure systems. "Large amounts of content ingest and dynamic work flows pose the next big challenge of large scale RF matrices to facilitate frequent switching between RF feeds and receivers." Evertz' offers advanced, flexible, high-density solutions designed to secure customer investment. The company's ACTI Simulsat multibeam antenna and long distance RF-over-Fiber CWDM/DWDM transport solutions facilitate large content acquisition and remote antenna site diversity, he says. This April, Evertz introduced its XPRF14 RF matrix, which allows configurations of up to 128x128 in a single chassis (2048x2048 with multiple chassis) to serve applications with a large number of Inputs and Outputs and require frequent switching.

Jörg Schmidt, Managing Director for DEV Systemtechnik, Quintech's European division, also expects Ka-Band site diversity systems to foster continued growth. "Especially with Ka-Band, there is a high sensitivity to heavy rain fall and other atmospheric influences, so conventional fade margin approaches are not optimal," says Schmidt. "DWDM (Dense Wavelength Division Multiplexing) transmission systems will increase significantly, and allows transmission of up to 40 RF signals, such as satellite feeds, including bidirectional, over a single fiber. These DWDM systems will need to be employed frequently due to the high sensitivity of Ka-Band transmission systems to rainfall, which requires a large geographic separation of Main and Diverse antenna sites." The company supplies an RF-over-fiber solution that lets Ka-band networks cost-efficiently employ antenna site diversity, and auto-switch between antenna sites in different rain cells, thereby avoiding outages and increasing network uptime. Customers have deployed the Quintech's DWDM RF-over-Fiber solutions, including optical amplifiers (EDFA), optical delay lines and built-in equipment redundancies.

Looking Ahead

As many industry participants head to Content & Communications World (CCW), Featuring SATCON, a major East Coast U.S. satellite conference and video industry trade exhibition in New York, November 11-12, the themes of mobility and HTS-related challenges are likely to be front and center among ground antenna and RF technology suppliers and users as they meet and do business.

Daniel Freyer is the Principal of AdWavez Marketing (www.ADWAVEZ.com), a marketing agency serving the satellite industry. Since 1990, he has worked with leading spacecraft and ground equipment manufacturers, satellite operators, services providers, broadcasters, associations and event producers to grow the businesses and brands. He can be reached at: **dan@adwavez.com**

Here Come the New LEO Constellations

by Elisabeth Tweedie, Associate Editor

At the time of writing among the multiple filings for Low Earth Orbit (LEO) communications constellations, three are being taken seriously: Leosat, OneWeb and an as yet unnamed system from SpaceX. All of these are talking about being in service by 2020 with demo systems in orbit before that. Is this reality or just pie in the sky?

In order for this to happen, numerous "boxes" have to be ticked. This article will attempt to look at some of those boxes and how the three systems are stacking up.

ITU Filing: OneWeb was the first to file with the ITU for a 2GHz Ku-band system and has been granted the old Skybridge frequencies. These have to be used, i.e. at least one satellite has to be in orbit by 2019.

According to Elon Musk, founder, CEO and CTO SpaceX, it has also filed in the Ku band and plans to launch two demo satellites next year.

Leosat has a filing with the ITU for a Ka-Band system.

The ITU gives priority to established systems, meaning that it is the responsibility of any non-geo system, using the same frequencies as a GEO satellite in orbit, to ensure that there is no interference. So these systems will have to deal with the issue of non-interference with the numerous GEO satellites also operating in Ku and Ka-Band. An issue that is causing considerable consternation among some of the operators of those satellites. It is generally agreed that interference becomes an issue in the area 2-3 degrees north and south of the equator only, although some people believe that a much wider area will be impacted. At World Satellite Business Week in Paris this September, Tom Choi, CEO of satellite operator ABS said that they had thoroughly examined all publicly available data about OneWeb and come to the conclusion that OneWeb's satellites would cross the path of a GEO 4,000 times a day, causing interference for two to three minutes each time. OneWeb seems confident that the design of its satellites incorporating "progressive pitch" takes this into consideration by tilting the satellites in such a way, as they approach the equator, so as to never cause interference when crossing the path of a GEO.

Landing Rights: All the systems will need landing rights for each country that they intend to come down in. Greg Wyler founder of OneWeb has said that the company has "operators in over 50 countries and territories." Presumably these operators will supply the landing rights.

Mark Rigolle CEO of Leosat has said that the company is putting together a team to work on landing rights. Coming from O3b, he is well aware of the magnitude of this task: "it took O3b four years, it's a big task, but it's doable."

SpaceX has been pretty quiet on this subject.

Finance: OneWeb is definitely the current leader here. According to Wyler the system – including launch – will cost around US$ 2 Billion. Over $500 million has been raised so far. Joining the founding investors of Qualcomm and Virgin are: Intelsat, Echostar (parent company of Hughes), Airbus, Bharti Enterprises, Coca Cola and Totalplay.

Some of these are naturally strategic investments. Airbus, as the manufacturer of the satellites is obvious. Intelsat, which invested $25 million is looking for interoperability between Epic (a High Throughput GEO system) and OneWeb, particularly with regard to the ground terminals. The interoperability will also enable OneWeb to transition its customers to Epic in the equatorial regions, so mitigating the effect of having to reduce power in these regions. Intelsat has given a service commitment to OneWeb in exchange for exclusive access to the aeronautical, maritime, connected car and rail sectors and for specified U.S. Government and oil and gas applications. Among other things this agreement enables Intelsat to extend its service to the polar regions. This may become an increasingly important region global warming aiding the opening up of three shipping routes in the region: the North West Passage, the Trans Polar Sea Route and the Northern Sea Route.

Hughes will be developing the ground system including gateways and terminals and will also use OneWeb to provide service to its global customers and distributors.

Qualcomm will provide the chips for the hubs and terminals.

Virgin Galatic will be launching some of the satellites.

Bharti Airtel, which operates mobile networks in 20 countries will become a preferred distributor.

TotalPlay provides broadband and cable TV in Mexico – it's not clear what it will be getting in return for its investment.

As for Coca Cola: "This project is exciting because it combines commerce with purpose," said Bea Perez, chief sustainability officer of Coca-Cola. "We believe it will help spur local economic development where people are in the greatest need, while also helping our business by improving real-time access to some of the world's most remote areas where we are already active in helping provide opportunities for entrepreneurs."

In October it was announced that MDA will provide OneWeb with antennas for the satellite constellation and payload design and engineering services. Terms of the deal were not made public.

Earlier this year SpaceX received an investment of

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US$ 900 million from Google. At the time it was widely assumed that this investment was earmarked for the satellites. However this has since been categorically denied by Glynn Shotwell, President and COO of SpaceX. The total system is expected to cost US$ 10-15 Billion and the profits from the venture are earmarked to fund Musk's dream of a city on Mars. Musk has commented that since there will be no infrastructure on Mars, a similar satellite system could be developed to provide communications on the planet.

The current cost estimates for Leosat are US$ 2-3 Billion and one of Rigolle's primary tasks is to raise that money. Having succeeded in raising US$ 1.5 Billion for O3b, he is no stranger to the challenges involved here.

New LEO constellations featuring thousand of satellites are being planned by companies such as OneWeb which his backed by Qualcomm and The Virgin Group. (image: OneWeb)

Management: Leosat was founded by Cliff Anders and Phil Marlar, both former Schlumberger executives and therefore very familiar with one of Leosat's key target markets. Mark Rigolle, former CEO of O3b is now the CEO of Leosat, so he of all people is aware of the challenges of starting a global, telecommunications venture.

OneWeb was founded by Greg Wyler, founder of O3b, so he also is aware of the early challenges of this type of venture. Other former O3b executives include Dave Bettinger, Brian Holz and Bob Morris. Board members are Paul Jacobs, Executive Chairman, Qualcomm, Richard Branson, founder of the Virgin Group, Thomas Enders, CEO of Airbus and Sunil Bharti Mittal, founder and CEO of the Bharti Group. Matthew O'Connell, former CEO of GeoEye, has just been appointed CEO of OneWeb.

Elon Musk, founder, CEO and CTO of SpaceX and CEO of Tesla is of course leading the satellite venture, but as President and COO Glyn Shotwell is doubtless also actively involved. No one can dismiss Musk. He has no experience of manufacturing satellites, let alone 4,000 satellites and no experience building a global telecoms business; but he had no experience of building launchers or cars either, therefore he has to be taken seriously.

Target Market: OneWeb is primarily targeting the un or underserved and disaster situations, as well as business, military and commercial aviation. Terrestrial service will not be direct to user devices; antennas mounted on roof tops or emergency vehicles will create local hotspots for 3 and 4G cellular services. These days, there is a commercial reason for those underserved areas. Laudable though, the intent is, to provide service to everyone; in most cases, inhabitants of those areas don't have the disposable income, to generate sufficient revenue for a service provider.

O3b, started off with a similar intent, but quickly changed to include higher revenue commercial services. Aviation is already becoming a very competitive market, how much will be left by the time OneWeb comes into service? And will there be an antenna that can cope with the necessary handoffs to serve a fast flying plane from even faster moving satellites?

SpaceX is being relatively quiet about its ambitions, and after an initial announcement of the intent to build 4,000 satellites, recent announcements have been more subdued, with Shotwell, commenting at World Satellite Business Week, that: "we are looking at this." The initial announcement referred to serving the unserved and also made reference to taking 10% business and consumer Internet traffic and the majority of long distance Internet traffic. This may not be quite as crazy as it sounds, as all three LEO companies are claiming that their systems will be faster than fiber. Nevertheless over 50% of long distance traffic is an ambitious target.

In complete contrast, Leosat is firmly focused on a small number of high revenue generating clients. As mentioned earlier, the company was founded by two veterans from the oil and gas industry and has its sights firmly fixed on a small number of high revenue clients. Target sectors are: oil and gas, maritime, backhaul and enterprise data services. Data rates will start from a minimum of 50 Mbps and could go as high as 1.2 Gbps in both directions, for a single customer. In order to generate revenue from its first two satellites Leosat will be offering batch processing. From

those two satellites it will be able to batch process a day's worth of data, that is currently transported by helicopter, so offering the oil and gas industry a significantly improved service. Serving these high value customers, is by no means a slam-dunk, but it seems to be an easier market to address and generate significant revenue from, than the under-served mass markets.

Satellites: OneWeb has selected Airbus Space and Defense to build its satellites. These will weigh less than 330lbs and the first launches should start in 2018. According to OneWeb's website, the complete constellation is 648 satellites. According to the press release from Airbus, the contract is for more than 900 satellites. That would seem to be an awful lot of spares. Total capacity will be over 10Tbps.

SpaceX's 4,000 satellites will be built by the company itself at a new facility recently opened in Seattle. According to Musk, these will be "an order of magnitude more sophisticated than OneWeb's." The satellites are expected to weigh "several hundred kilograms" and to use Hall-effect ion electric thrusters which it will build itself.

Thales Alenia has completed a technical study for Leosat which according to Rigolle validates the required design which includes on-board processing and free-space optics for Inter-satellite links. Data can be transported from any point to any other point without any interim landings. The full constellation will be 80-120 satellites, each one of which will be able to transmit and receive 20Gbps.

Terminals: The cost and capability of the terminals will be an important success factor for all three ventures. Leosat is targeting high-end customers with high data rates. It presumably can therefore afford to use a very expensive terminal. The estimated price is US$50K for the high end falling to US$10K for lower speed terminals. According to Rigolle, the company is talking to both Phasor and Kymeta at present.

Hughes will be building the dual-purpose (Epic and OneWeb) terminals for OneWeb. A target price tag has not been announced.

SpaceX's terminals are intended to be priced between US$100-$300.

Launch: OneWeb has a contract with Arianespace for 21 launches on Soyuz. The first launch will carry ten satellites. The remaining launches will carry 32 satellites. There are also options for additional launches on Ariane-6. Unsurprisingly as it is an investor, there is also a contract with Virgin Galatic for 39 launches on LauncherOne (currently in development). These launches will carry one to three satellites.

SpaceX obviously intends to launch its own satellites.

Leosat has not announced a launch contract, but according to Vern Fothrington, Rigolles predecessor, it would most likely launch eight at a time on a medium class rocket "like Falcoln 9."

So, is it reality or pie in the sky?

These ventures face a lot of challenges, not least of which is the fact that no one has manufactured or launched sophisticated communications satellites in these volumes in the four to five year timescales, envisaged by these potential operators. Although an experienced satellite manufacturer (and owner of SSTL, manufacturer of small satellites) Airbus will have to build a production line in the US, to manufacture all but the first ten satellites. The antennas that the systems depend on are still in the development and testing phase, so more challenges there.

Even if this can be done – and that is a big "IF" can they get the distribution systems in place in time to generate a viable income stream? Of the three, Leosat has the least daunting task, as it is only targeting a few thousand customers. OneWeb is also ahead here, having struck some very strategic deals with Intelsat, Hughes and Bharti Enterprises.

As for financing, OneWeb is clearly the winner.

One thing, those of us that have been around the industry for a while, know for sure, is that almost without exception, any innovative product or service takes longer to come into commercial service than is originally envisaged, and costs far more than expected. There is no reason to think that any of these three ventures will change those paradigms.

The other question of course is: "Is there really room for three such innovative systems?" I very much doubt it. With its financing and strategic partners, OneWeb looks poised to move beyond the concept stage. Leosat is going after a very different market and if Rigolle continues his track record for raising finance, that venture also may move beyond the concept stage. SpaceX on the other hand seems to be seriously lagging at the moment. Since the primary motive for the SpaceX venture seems to be to fund Musk's vision of life on Mars, there is always the possibility that he will find an easier way of generating the money for that and this venture will fade away. A lot can happen in four years, watch this space!

Elisabeth Tweedie is the Associate Editor of the *Satellite Executive Briefing*. She has over 20 years experience at the cutting edge of new communication and entertainment technologies. She is the founder and President of Definitive Direction a consultancy that focuses on researching and evaluating the long term potential for new ventures, initiating their development and identifying and developing appropriate alliances. During her 10 years at Hughes Electronics she worked on every acquisition and new business that the company considered during her time there. She can be reached at: elisabeth@satellitemarkets.com

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Five Reasons Distribution May be the King of the HTS World

by Armand Musey

Satellite distributors (including resellers/systems integrators) have long been considered the black sheep of the satellite industry. Low margins, slow growth, low barriers to entry and dependence on large (Fixed Satellite Services) FSS operators have all kept returns down. But this may be changing.

High throughput satellites (HTS) are poised to increase satellite capacity roughly 250-500% over the next several years. Utilizing this capacity will require the FSS industry to expand beyond its traditional customer base to reach enterprises and consumers with whom it currently has no relationship. ViaSat's Excede and Hughes' Jupiter services are examples of how such new capacity can be sold. Each of those super high throughput satellites (over 100 gbps each), had capacity nearly equal to the total North American FSS capacity prior to their launches. ViaSat and Hughes filled these satellites by targeting new consumer markets at a fraction of traditional FSS pricing, and, more recently, new enterprise customers in the mobility sector.

How will this be replicated around the world? It's not clear that large untapped consumer broadband markets at $50/month+ exist in other parts of the world (although Facebook appears poised to try in Africa with its acquisition of Ka-band capacity on Spacecom's AMOS-6 satellite). Furthermore, historically, the satellite industry has been poor at developing new customer segments. It has left distribution in fragmented markets to resellers/systems integrators. Inmarsat has been an exception. Inmarsat acquired a significant portion of its distribution channel including Globe Wireless, Stratos and Ship Equip – although it sold its energy broadband business to RigNet. Another exception is the US government market. The relatively consolidated nature of the government market increasingly allows FSS operators to address it directly. These exceptions aside, as the FSS industry continues to increase capacity without a simultaneous distribution channel to sell the new capacity, it will become increasingly dependent on third party distributors with customer relationships.

The changing industry dynamics improves the outlook for satellite distribution channel participants for five main reasons:

1) Distribution Channel Consolidation Increases Purchasing Power

Distributors are further increasing their purchasing power leverage over FSS operators by consolidating. Notable examples include EMC/MTN, Panasonic/ICT and Rignet (NESSCO, Technor and Inmarsat's energy broadband business and others). Airbus has announced it intends to sell its SatCon division – most likely to another reseller. The reseller/systems integration consolidation creates obvious economies of scale in operations. But consolidation also enables them to obtain greater leverage negotiating large capacity agreements with FSS operators. Examples of such large capacity purchases include presales on Intelsat's upcoming Epic satellites totaling over $500 million from Harris CapRock, MTN (now EMC/MTN) and Panasonic aviation alone. As these distributors continue to consolidate, their purchasing power, and consequently their profit margins will likely increase further.

"...High throughput satellites (HTS) are poised to increase satellite capacity roughly 250-500% over the next several years. Utilizing this capacity will require the FSS industry to expand beyond its traditional customer base to reach enterprises and consumers with whom it currently has no relationship..."

2) Increase Bits per Hz Trends Help Resellers

Satellite operators typically sell capacity in MHz while resellers generally provide customers a certain amount of Mbps to meet the needs of their application. Historically, the ratio of bits per hz was relatively stable. But recent developments in antenna and compression technology enable resellers to meet customer needs with fewer MHz. Savvy resellers can design customer networks to increase the bits per hz ratio for customers. As a result, they can get more revenue from a given about of MHz they purchase in bulk from FSS operators. In other words, the distribution channel and end customer realize a disproportionate share of the benefit of improving bits per hz ratios.

3) The FSS industry is Becoming Increasingly Fragmented

While the satellite bandwidth distribution channel is consolidating, the FSS industry is fragmenting. New entrants, many quasi-state companies have emerged including new operators from Bolivia, Bulgaria, Turkmenistan to name a few. According to Euroconsult, nine new operators emerged from 2010-2014 and ten more are expected to launch their first satellite between 2015 and 2018. In the

past ten years, the market share of the five largest FSS operators has fallen from nearly 85% to approximately 70%, a trend that is likely to continue. Many of the new operators have non-commercial objectives, including national pride, which makes future consolidation difficult.

4) New Growth Markets for Distribution Emerging

The decline of the oil and gas markets is well known. But the energy market is cyclical and it is likely to return within a few years. More importantly, lower satellite capacity pricing is creating new mobility markets – aviation and maritime in particular. Airline announcements of agreements to provide new or improved passenger connectivity appear almost weekly. While public announcements with cruise lines are less frequent, the cruise lines are likewise aggressively ramping-up customer connectivity options. It's unclear if these new markets will grow large enough to support a reasonable return on the new HTS satellite capacity. But it is clear FSS operators will need to fight to get their share of these markets if they are to have a chance.

5) NGSO Entrants Will Only Exacerbate the Above Trends

To the extent planed LEO projects are built they will add even more industry capacity and further fragment the sources of satellite bandwidth. This will exacerbate the trends discussed above.

These industry dynamics have not gone unnoticed by private equity firms. We see little new investment by private equity in FSS operators and underperformance in FSS stock prices. But we are seeing a distinct increase in PE investment in resellers/systems integrators. Examples include Gilat (FIMI), Globecomm (Wasserstein), RigNet (KKR) and SpeedCast (TA Associates).

Broadly speaking, the FSS industry is left with two choices 1) allow their distribution channel to keep an increasing share of the value of their HTS investments; or 2) buy their distribution channels, likely at a large premium. Either way, the PE firms are likely

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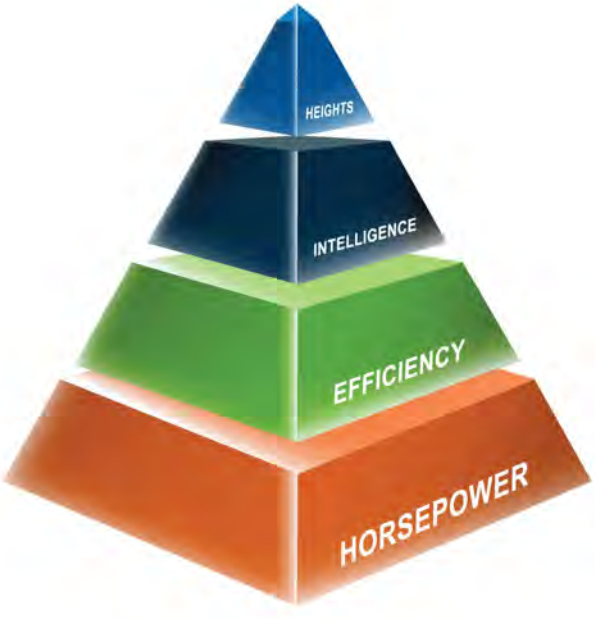

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The Maritime Satellite Antenna Market

by Bernardo Schneiderman

According to Euroconsult's newly published report, Maritime Telecom Solutions by Satellite, Global Market Analysis & Forecasts, the value of the global maritime Satellite communications market will double over the next decade, with a CAGR of 6% in terminals and 8% in revenue over the 10-year period. Ever-increasing data communications needs and the massive launch of new generation High Throughput Satellite (HTS)Systems are expected to drive both the growth in the market and consolidation in the value chain.

To shed light on the prospects and opportunities in this growing market, we invited key executives of companies providing martime satelltie antennas to participate in an executive roundatable discussion. Participating in the roundatable are Jan Kragh Michelsen, VP-Maritime Business Unit, Cobham SATCOM; Carl Novello, General Manager, Intellian Americas; Håkan Olsson, VP-Maritime, Kymeta and Stav Gizunterman, Director of Product Marketing, Mobile Satcom, Orbit Communications System.

Excerpts of the roundtable discussion follows:

Satellite Markets (SM):*What trends do you see in the next five years for the Maritime Satellite Antenna Markt considering the following market segments: Cruise, Transportation, Oil & Gas, Leisure, Fishing, & Defense?*

Jan Kragh Michelsen, Cobham SATCOM: The various maritime verticals have different requirements but one thing across the board is a growing demand for data. All maritime businesses are becoming more reliant on data communication and Machine-to-Machine (M2M) data, which can help to reduce the cost of operating by providing the means to i.e. reduce fuel consumption, improve maintenance and servicing, or provide better weather routing. This means that clever operators will be requesting antennas that can be relied upon to provide a link even in the harshest conditions at sea.

For trends in antennas specifically, we will of course see a growth in demand for Ka-band antennas as Inmarsat Global Xpress becomes established alongside other High Throughput Satellite services such as Telenor's THOR 7. Our Ku-band antennas that can be easily field converted to Ka-band are proving popular as shipping companies consider the possibility to switch to HTS in the future. In Leisure and Fishing, the spot beam architecture of HTS is also opening the door to VSAT for smaller vessels. We now have 60 cm antennas for GX and THOR 7, which are superlight and compact, making them much more suitable for yachts and trawlers. As for the large, multi-user, complex networks in the cruise and transportation markets, the requirement continues to be high-end, high-tech antennas in both C-Band and Ku-band. We think Ka-band will be adopted in these markets but the complex nature of cruise ship and offshore vessel communication networks makes the core requirement antennas that can be integrated with the customized, multi-carrier hybrid networks that are needed to service hundreds of concurrent users.

Carl Novello, Intellian: Starting with the overall maritime market, we see that the industry is actually being outpaced by not only the rate of change in the broader telecommunications and technology industry, but more importantly, that the user expectation has dramatically changed. Now, users experience ubiquitous broadband connectivity in the palm of their hands, and this becomes an expectation at sea, not just a nice-to-have. This trend will continue and do so dramatically over the next five years. While we are connecting people onboard, we will also see an overall explosion of connected devices at sea. As we see onshore, the Internet of Things will soon become the Internet of Everything, and Everywhere. This pressure, in turn, causes the ship owner challenges. The ship owner wants a connected vessel, and he wants this implemented quickly, easily, and at a cost where he sees value. Imagine the disparity, a ship at sea is a multi-million-dollar enterprise, and their average connection to the outside world is LESS capable than the smartphone in your pocket. This dynamic is driving us to build products that continue to solve our customer's and end-users problems, large or small.

Håkan Olsson, Kymeta: There are three trends we can expect to see over the next five years. The need and desire for higher bandwidth in order to support both operations and crew welfare across all markets. The requirements for this increased bandwidth varies by segment—Oil & Gas tends to require higher transmit bandwidth, while Cruise/Transportation/Leisure is more demanding on the receive bandwidth.

The need for a new breed of 'smart'

equipment that can be hand-carried onboard, eliminating the use of cranes and/or professional IT crews and automatically acquire connection with satellite and provisions itself on the network.

The market's response to high usage costs associated with today's usage of L-band satellites: The launches of HTS, MEO and LEO satellites over the next few years are expected to significantly decrease the cost of bandwidth usage.

"...We see that the industry is actually being outpaced by not only the rate of change in the broader telecommunications and technology industry, but more importantly, that the user expectation has dramatically changed..."

-Carl Novello,
General Manager, Intellian Americas

Stav Gizunterman, Orbit: Orbit believes that VSAT penetration will continue with great emphasis for the HTS based solutions mainly for the Leisure, O&G and Defense. The transportation probably will continue with Global coverage conservative networks but we might start seeing GX based solutions as well.

SM: ***What specific regions do you see a potential growth in any specific market segment or the overall segment?***

Cobham SATCOM: The shipping and offshore development in the BRIC regions that seemed to be on an upward growth curve has slowed down, whilst we are all well aware of the smaller order book for new offshore vessels across the board. Some of this will be countered by growth in demand for new Wind Farm Support Vessels but it will be a good few years before we see the same levels of new vessel orders for traditional offshore hotspots like the North Sea or Gulf of Mexico.

This of course could affect the satellite antennas sector but there are changes across the professional maritime industry that are placing satcom as even more important, especially during challenging commercial climates. We see that the idea of 'Smart Shipping' is becoming more accepted. Shipping companies are becoming more data-centric. They want to operate smarter with smarter ships – which means an always on, reliable high-speed broadband connection is needed, wherever they are sailing. They can harness the power of communication to save money, so rather than trying to cut communication costs during tougher times, forward thinking shipping companies are investing to make more use of data and communication to operate more efficiently. This is not a regional thing, but it's certainly a driver for growth in the satcom services and satcom antenna market.

Having just attended the Danish Maritime Forum in October with 200 other key maritime executive and ministers, I see a growing interest in connectivity and the benefit a company like Cobham SATCOM can bring to the global shipping industry to assist in reducing the underlying cost base. Cobham SATCOM has for the last 80 years been instrumental in shaping industries through utilization of the advances in sophisticated technology. Hence it is no surprise that leading shipping companies consult Cobham SATCOM when in need of SATCOM solution. Our word is our bond and the element of trust is a centerpiece in everything we do and resonated very well with the cyber security agenda that is becoming more and more present in the industry right now. Nobody understands the security aspects better that Cobham as we have been engaged in the security and defence industry for more than 80 years.

Intellian: We see huge growth potential in the overall maritime market. In a near term perspective, we will see downswings in a market segment, for example, as we've seen in the Oil and Gas in recent years, but we will see a marked increase in other segments, as we have benefited from over the last few years in the Commercial Shipping and Transport segments. While we are strongly committed to the growth of the overall maritime market, Commercial Shipping, Leisure and Fishing are the Blue Ocean markets, representing the largest un-tapped potential in terms of market adoption of VSAT. When we look at our growth potential from a geographic perspective, all three of Intellian's geo-regional entities expect very similar year over year growth. From a total Obtainable Market perspective, EMEA will continue to lead the way, with the Americas and Asia following closely. When we look at total Addressable Market, then, Asia holds the greatest potential for growth and we expect that the adoption rate will continue to grow exponentially. Further into the future, Asia will represent the largest total number of maritime VSAT users, but exactly when this will happen is subject to debate.

Kymeta: Kymeta will not be targeting its solutions by region. Instead, it will work with global partners, such as, Intelsat and Intellian to target the global commercial maritime market as a whole. Although initially, we expect to see the most growth in the Mediterranean/Caribbean regions where the yachting industry is centralized. The biggest market growth will likely come from terminals that are easier to install and less expensive compared to today's solutions. The ability to hand-

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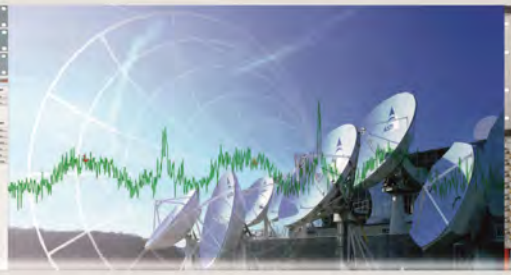

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carry solutions onboard and have a working internet connection within minutes will significantly increase the addressable markets across all segments, including satellite solutions for smaller leisure vessels that haven't used satellite solutions to date.

Orbit: ORBIT believes that APAC and LATAM will be the most growing markets for O&G and Leisure. EMEA and North America for the Defense.

SM:Do you have a specific set of antennas solutions that address the requirements of a specific Market segment (ie. Oil& Gas, Defense, Transportation, etc.)

Cobham SATCOM: Yes, i.e., our Sea Tel VSAT antennas are aimed mostly at the cruise and offshore markets, providing high-end functionality such as automatic switching between Ku- and C-band in a matter of seconds. For shipping, SAILOR VSAT antennas act almost as COTS solutions. Since the dawn of maritime VSAT, procurement and installation has always been time consuming and expensive. SAILOR VSAT approaches things differently. We deliver a complete solution from the factory as a single supplier. Once on board, installation is easy – there's just a single cable between antenna and the below deck equipment, and connecting to the network is a simple, one-touch process. There's no need to call the network operations centre. It really does save time and money, making it much easier to install VSAT on larger fleets. Also as mentioned, our 60 cm SAILOR GX and Ka antennas are designed for use on smaller vessels, giving them a much easier path into fast maritime broadband than was available before. Then there is SAILOR FleetBroadband – the Inmarsat FleetBroadband market leader by far – it's perfectly suited for ships with low data requirements or the hundreds of thousands of yachts and motorboats that expect to be able to stay in in touch with land when they are cruising.

Rendering of Kymeta antenna deployed on a vessel.

Intellian: Intellian builds maritime antenna systems with the user in mind. Often, though, in the development process, we find that features that solve pertinent problems in one key segment are actually pervasive in others. When we look at tailored solutions, we have systems that are most appropriate specific market segments. A very clear example of this is our Defense product line. These are distinguished by meeting and exceeding the MIL-SPEC standards, and available in specific configurations suited to the military user, whether it be frequency band (X-band, Mil Ka-band), interface, software, or even color.

Likewise, in the commercial market, some of our products are tailored to the unique requirements of the particular market, as our v240M (Auto-switching multiband antenna system) is ideally suited to the Oil and Offshore market as well as the Cruise and Ferry market. The v240M's "killer app" is the Multi-band capability. Both the End User and the Service Provider need a future-proof solution that allows them to forget all about the constraints and focuses on delivering high throughput and highly reliable service. Moving towards the broader Commercial Shipping market, our products incorporate an ease of use that is unparalleled, for both the end user, and the satellite service provider.

Kymeta: Kymeta mTenna powered solutions will address the need for cost-efficient and easy-to-install/operate terminal solutions. Terminal integrators who partner with Kymeta are creating maritime-proofed solutions, specifically curated for each of the maritime market segments.

Orbit: ORBIT OceanTRx family including OceantTRx4 (1.15m) and OceanTRx7 (2.2m) solutions are well prepared for current era. This product line has a multi-band support starting C -band (for OceanTRx7) and up to Ka-band. It supports large quantity of BUC configurations to comply with wide EIRP demands. ORBIT solutions are very simple for installation and maintenance and known for high reliability required these days.

SM: What impact would the developments of new High Throughput Satel-

Continued on page 29

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ABS-3A at 3°W entered full service on 31st Aug 2015. ABS-3A features 48 C and Ku-band active transponders (96 x 36 MHz equivalent) and is equipped with high performance beams to support the rapidly growing markets in the Americas and Africa as well as the European and Middle East regions. ABS-3A provides expansion capacity to reach markets servicing high-growth data, video, mobility and government applications.

ABS-2A, the second of the pair of 702SP satellites procured from Boeing, is planned to launch in early 2016. ABS plans to add more satellites over the next 2-3 years to its growing fleet.

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Spacecom's AMOS-4 satellite provides a full range of services to Southeast Asia, Russia and China. AMOS-6, planned for launch in 2016, will provide steerable Ku-band across Europe and the ME and high-throughput Ka-band coverage in Africa and Europe. Ku-band and Ka-band on AMOS-4 is now available.

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Operating a growing fleet of owned satellites at the 20° E, 26° E, 30.5° E and 34.5° E, ARABSAT is the only satellite operator in the MENA region offering the full spectrum of Broadcast, Telecommunications and Broadband services,

making Arabsat satellites' fleet the youngest in the region.

ATCi
SATCON booth # 803
www.atci.com

ATCi is a custom communications solutions provider specializing in commercial satellite communications systems and services including: the Simulsat multibeam, parabolic antennas, complete uplink systems/services, teleports, cable television headend and plant components, test equipment and input matrix switches, as well as fiber optics components for corporate, broadcast, cable television, government and education.

AvL Technologies
SATCON Booth # 427
www.avltech.com

AvL Technologies' booth at SATCON will showcase one of our newest antennas, the 1.0m Eutelsat KA-SAT type-approved Mobile VSAT with a cowling. The 1.0m antenna easily fits onto the roof of a small vehicle, such as an SUV, and operates in Ku- or Ka-band. The antenna features our proprietary zero-backlash AvL Cable Drive, stows to 13.5", and is operated with AvL's new AAQ controller.

Also on display will be our lightweight, compact and robust Manual FlyAway antennas - 60cm and our new 70cm axi-symmetrical ultra-compact, eight-segment carbon fiber reflector which assembles in five minutes, packable in an airline carry-on IATA-compliant single case. This antenna operates in Ku-, Ka- or X-band.

AvL antennas are the industry benchmark of excellence for SNG, mobile broadband Internet access, Disaster Relief, Oil & Gas Data Backhaul, and Defense & Homeland Security solutions.

C-COM Satellite Systems Inc.
SATCON booth # 711, Africacom booth # E8
www.c-comsat.com

C-COM Satellite Systems Inc. is a world leader in the development and manufacture of commercial grade, mobile, auto-acquire antenna systems (iNetVu®) for the delivery of broadband Internet, VoIP and Video services, via Satellite, to any location, no matter how remote. The iNetVu® Comm-on-the-Pause (COTP) antennas can be mounted on a vehicle (Driveaway), deployed on the ground from easily transportable cases (Flyaway) or as fixed motorized systems (FMA). C-COM is a pioneer in the land-mobile Ka-band COTP revolution currently underway, and is also involved in the design and development of a new generation of Comm-on-the-Move antenna, which will deliver satellite broadband solutions into vehicles while in motion.

More than 7000 C-COM antennas have been deployed in 103 countries around the world in vertical markets such as Oil & Gas Exploration, Military Communications, Disaster Management, SNG, Emergency Communications, Cellular Backhaul, Telemedicine, Mobile Banking, and others. The Company's satellite-based products are known worldwide for their high quality, reliability and cost-effectiveness.

COMTECH EF Data
Africacom booth # P77
www.comtechefdata.com

Comtech EF Data Corp. is the global leader in satellite bandwidth efficiency and link optimization. Our integrated SatCom infrastructure solutions encompass Advanced VSAT Solutions, Satellite Modems, RAN & WAN Optimization, Network & Bandwidth Management and RF Products. The offerings feature groundbreaking efficiency (industry-leading coding, modulation, compression and physical layer operation), robust intelligence (traffic shaping, dynamic bandwidth allocation and integrated network management) and unparalleled horsepower (processing power for your pps and Mbps transmission requirements). Commercial and government users utilize our solution suite to reduce OPEX/CAPEX and to increase throughout for the most demanding fixed and mobile networks.

COMTECH Xicom Technology
SATCON Meeting Room # 2D10
www.xicomtech.com

Comtech Xicom Technology provides a broad product line of KPAs, TWTAs, SSPAs and BUCs for worldwide satellite uplink covering C-, X-, Ku-, DBS-, Ka-, Q-band, Tri- and Multi-band with power levels from 8 to 3,550 watts and available in rack-mount and antenna-mount ODU packages.

At SATCON, Comtech Xicom Technology representatives will be there for SATCOM uplink providers and developers to discuss and obtain technical information on the latest in high-power amplifier designs including the Award-Winning line of rugged antenna-mount and rack-mount SuperPower™ TWTAs that take established millimeter wave designs and scales them for use at Ku-band (http://xicomtech.com/index-superpower-twtas.aspx).

Comtech Xicom will also be hosting a one-day technology showcase seminar on November 11 at SATCON at Meeting Room 2D10.

Crystal
SATCON booth # 421
www.crystalcc.com

Founded in 1986, **Crystal** designs and delivers network monitoring and management solutions that improve operational efficiency, analyze errors, and enhance system resiliency, particularly for businesses that deal with complex and dispersed distribution pathways. Every day, program and advertising content worth billions of dollars flows through equipment managed by Crystal for leading media, enterprise, and satellite customers -- including Fox, CNN, Disney, and Intelsat. Crystal, a privately held company, is headquartered in Greater Atlanta, GA.

Gazprom Space Systems
Africacom booth # MR8
www.gazprom-spacesystems.ru

Gazprom Space Systems (formerly Gascom) is a private commercial, non-governmental satellite operator based in Russia. The main shareholder is Gazprom, one of the largest energy companies in the world. Gazprom Space Systems' orbital fleet consists of four satellites under the Yamal brand. Gazprom Space Systems' ground infrastructure consists of four teleports in the city of Moscow and in the surrounding Moscow region, which are connected to the main telecom backbones by means of fiber-optic lines. The company also has a wide network of earth stations across Russia.

In Russia Gazprom Space Systems is not only a satellite operator but also a service provider and system integrator. Within Russia, along with satellite capacity, it provides satellite services including satellite links, video distribution, Internet access and network development and management.

Globecast
SATCON booth # 439, Africacom booth # P97
www.globecast.com

Globecast is a leading-edge content contribution, media management and distribution company. It brings together bespoke management and monetisation solutions and the most extensive connectivity mix, ensuring that broadcasters and media companies can maximise the value of their content.

Globecast provides a seamless global service with expertise and operational facilities on the ground in London, Paris, Singapore, Los Angeles, Rome, and Johannesburg, with Media Centers – featuring full media management and playout services - in London, Singapore and Los Angeles. Our global approach allows customers to contract once for a turnkey end to end global solution tailored to support their business objectives.

Hunter Communications
SATCON booth # 638
www.huntercomm.net

Hunter Communications was founded in 2002 as a satellite bandwidth and teleport provider. We work as an independent agent, working with satellite network service providers, US Government contractors and teleports worldwide, to support them with bandwidth procurement, analysis, and teleport facilities.

Hunter Communications entered the Canadian market in mid-2013 when it repositioned the Satmex 5 satellite in order to serve Canada, where Ku Band capacity has been both scarce and expensive. In October of 2015, a follow-on satellite was placed into service with Hunter's new hosted Ku-beam – this beam provides for excellent coverage with primary focus over all of the Canadian landmass and surrounding waters, including northern Canada and its Arctic waters. Hunter Communications, formed in 2001, has been providing global satellite solutions for a wide variety of clients, including the US and foreign governments, energy industry, maritime and aeronautical sectors. The company focuses on bringing together satellite capacity from various space segment providers and the latest ground segment technology to provide innovative satellite communications solutions around the world.

Newtec
SATCON booth # 506, Africacom booth # B5
www.newtec.eu

Founded in 1985, **Newtec** is celebrating 30 years of connecting people this year. The global leader in satellite communications equipment and technologies is marking this milestone with 20% growth and new market expansion, including cellular backhaul,

multiservice and High Throughput Satellites (HTS).

Solutions for these, including the Newtec Dialog® multiservice platform, with new patented technology Mx-DMA™ which combines SCPC and MF-TDMA qualities, will be demonstrated at the IBC 2015. Technology for established markets, like broadcast and VSAT, including the new DVB-S2X transmission standard as software-upgrade available will also be showcased.

The Newtec Dialog® platform consists of hub(s) and terminals. The Newtec Dialog Hubs are modular and scalable and can be configured in different sizes to fit the needs of customers. This picture shows the HUB6501 1IF and the HUB6504 4IF Hub Modules.

Onlime Business Communications
Africacom booth # B10a
www.onlime.com

Onlime is leading the way in providing high quality, secure and reliable business communications to customers across the globe. Onlime provides premium quality VoIP, Internet and data connectivity over VSAT or fibre to enterprise, government, military, oil & gas, mining, banking, NGO and many other customer groups.

With its extensive satellite coverage, across Europe, Africa, the Middle East, Central Asia through the Caribbean and South America, as well as dedicated access to a growing network of fibre links and with a range of the latest technology platforms, wherever an organisation is in the world, Onlime is there to provide an unrivalled communications environment for business.

RSCC
Africacom booth # A1
www.rscc.ru

The Russian Satellite Communication Company (RSCC) is the national state satellite operator whose spacecraft provide a global coverage. RSCC belongs to the ten largest world satellite operators and owns five teleports and its own optical fiber infrastructure.

The company possesses the largest satellite constellation in Russia located in the geostationary orbital arc from 14 West to 140 East and cover the whole territory of Russia, the CIS, Europe, the Middle East, Africa, the Asia Pacific region, North and South America, and Australia. RSCC offers a full range of telecommunications services such as TV and radio broadcasting, data transmission, telephony, multimedia and others using its own terrestrial engineering facilities and satellite constellation.

ScheduALL
SATCON booth # 621
www.scheduall.com

ScheduALL, the leading global provider of Enterprise Resource Management (ERM) solutions for media, broadcast and transmission businesses since 1989, will showcase their award-winning self-provisioning scheduling solution, ScheduALL Portal™ at IBC. ScheduALL will also feature their revolutionary end-to-end provisioning solution, ScheduALL Connector™ during the show.

Portal recently won the TV Technology's Best of Show award during NAB 2015. This unique product simplifies making complex bookings of Occasional Use transmission feeds in real-time, directly into a transmission provider's system. Utilizing a browser-based, user-friendly wizard for selling transmission feeds, Portal allows users to quickly make transmission bookings without requiring in-depth network expertise. Meanwhile, behind the scenes, Portal leverages all of the unrivalled power and complexity of ScheduALL's transmission scheduling and conflict resolution.

Walton De-Ice
SATCON booth # 619
www.de-ice.com

Walton De-Ice, the world's leading designer and manufacturer of satellite earth station antenna (ESA) weather protection solutions, Walton will showcase its latest Ka-Band satellite ESA weather protection solutions, **Ice Quake, Rain Quake**, and **Snow Shield** at SATCON.

"New Ka-Band satellite networks in Europe and elsewhere offer huge capacity for 4K and future media services, but the potential signal degradation due to rain, snow, and ice pose new challenges at Ka-Band," says Walton De-Ice's David Walton. "Antenna de-icing and weather protection systems from Walton De-Ice can reduce signal loss through Ka-Band dishes, and improve the reliability and quality of content delivery services."

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Snow Shield

WALTON DE-ICE

IceQuake

What Customers Are Saying

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Maritime Antenna Market...From page 22

lites in Ku-Band and the next generation of Ka-band on your product portfolio?

Cobham SATCOM: HTS is already changing the requirements from maritime satcom service providers and the end-user. The impact of this to our product portfolio is described in the previous topic. We have embraced HTS with a new line of antennas for Inmarsat and other Ka-band services. In fact, Cobham SATCOM through Sea Tel was the first maritime Global Xpress partner, so we've been developing antennas for Ka-band HTS for five years already and it's exciting to see this work come to fruition towards the end of 2015 and into 2016. We are more than ready to help the market adopt HTS with very easy to install, highly reliable and best performing ka-band antennas. We also very early on ensured that our Ku-band antennas can be easily migrated to Ka-band in-situ, giving SPs and end-users the flexibility to change services in the future without replacing the antenna – which can be a logistical nightmare in addition to being costly. Ku/Ka-band flexibility was a key requirement from satcom service providers who over the past 18 months have needed to continue providing new VSAT service for customers, whilst keeping one eye on how things will be changing because of HTS in the next five years. Ku-band VSAT will still have a very prominent position in the market though, and we will continue to develop antennas for it alongside our systems for Ka-band HTS services.

Intellian: We are very excited about the latest developments from the satellite side of things. Both HTS and the host of "New Space" constellations seek to solve the biggest monetizeable need of the user; ubiquitous broadband connectivity. This will lead to even greater market penetration, and that's what will fuel our growth as an industry. In then becomes incumbent on Intellian to continue innovating to maintain our leadership position in the market.

"...Orbit believes that VSAT penetration will continue with great emphasis for the HTS based solutions mainly for the Leisure, Oil & Gas and Defense..."

-Stav Gizunterman
Director of Product Marketing,
Orbit Communications Systems

Already today, our portfolio contains products built to leverage the HTS constellations of today and tomorrow. We currently have products supporting Inmarsat's GX Ka-band HTS network, Intelsat's EPIC, Telenor's Ka-band THOR 7, and others deployed in the market now. In the future, Intellian's product portfolio will expand as the options in the market increase to bring a greater level of connectivity to the mobile user.

Kymeta: Kymeta mTenna powered solutions are optimized for new HTS satellites in both Ku-Band and Ka-Band, while also enabling solutions with MEO and LEO satellites. The antennas electronically steer beams to the satellite without any moving parts, allowing a switch to any satellite in view within milliseconds.

Orbit: ORBIT is well prepared for HTS new generations of satellites having it OceanTRx family operating in all available HTS band and working with Multiple Satellite operators as O3b, Inmarsat and others.

SM:Do you have any new solution that you launched the last 12 months or you are planning to launch during the next 12 months focusing on the maritime market?

Cobham SATCOM: SAILOR 60 GX and SAILOR 600 VSAT Ka were launched in September this year. They are based on a unique super-light, high performance Ka-band VSAT platform designed to deliver best in class performance on Inmarsat GX and Telenor THOR 7 HTS services. They share the same advanced design and lightweight carbon fibre composites/aluminium construction and at 37kg are some of the lightest antennas in the 60cm VSAT class. However, both retain the performance and reliability of larger SAILOR VSAT and GX antennas. They are designed primarily for yachts, fishing vessels, short sea shipping and ships with space restrictions, and are easily lifted or carried on board and installed without taking-up too much precious space. This can reduce installation costs significantly, which combined with being (relatively) compact, will lower the threshold for installing VSAT on smaller vessel, in turn, opening the market up considerably.

We also have a Type Approved SAILOR 100 GX terminal (100 cm class terminal for GX). It is designed to the same quality and reliability ethos that resulted in over 45,000 SAILOR FleetBroadband terminals and thousands of SAILOR and Sea Tel VSAT antennas being sold in the maritime sector. We have become the defacto standard for Inmarsat and we intend to keep it that way. Additionally, it features unique technology for satellite acquisition not available in competing GX terminals.

Intellian: We have been quite busy over the last 12 months and this pace will not lessen in the coming year. We have launched our Ka-band systems, in various form factors, two X-band products, a new Ku-band system. A very exciting future product on the horizon is our integrated maritime terminal which utilizes the Kymeta technology. Looking forward, expect more products that will build on the Multi-band theme, helping our customers and the market become more frequency agnostic.

Inmarsat and Intellian have announced a significant deal with EUKOR Car Carriers. The deal will enable EUKOR, one of the world's largest shipping companies specializing in the transportation of cars and other rolling cargo, to take advantage of the latest technology offered by Intellian and Inmarsat's new high-speed broadband Global Xpress (GX) network. EUKOR has selected Intellian's latest GX100 terminals to equip its 27 vessels with regional connectivity powered by GX in the Indian Ocean Region. Once all three GX satellites are live and operational EUKOR will be able to harness the Fleet Xpress service on a global basis

Kymeta: Kymeta will deliver its Kymeta mTenna solutions for maritime to terminal integrators in late 2016, and expect these solutions to be available in mid-2017 across commercial shipping, energy and leisure markets.

Kymeta drastically reduces the total cost of ownership by use of flat panel antenna solutions that feature no mechanical parts—therefore significantly cutting down cost for maintenance. Reliability is expected to be higher for the same reason, as failure of mechanical parts on traditional antennas typically leads to a usage outage until repaired.

Orbit: ORBIT is working with Inmarsat GX Government and expected to be type approved during next few month for leased services. In addition we are working on other solutions for different market segments that we cannot yet reveal.

B. H. Schneiderman is the Principal of Telematics Business Consultants. He can be reached at : info@tbc-telematics.com

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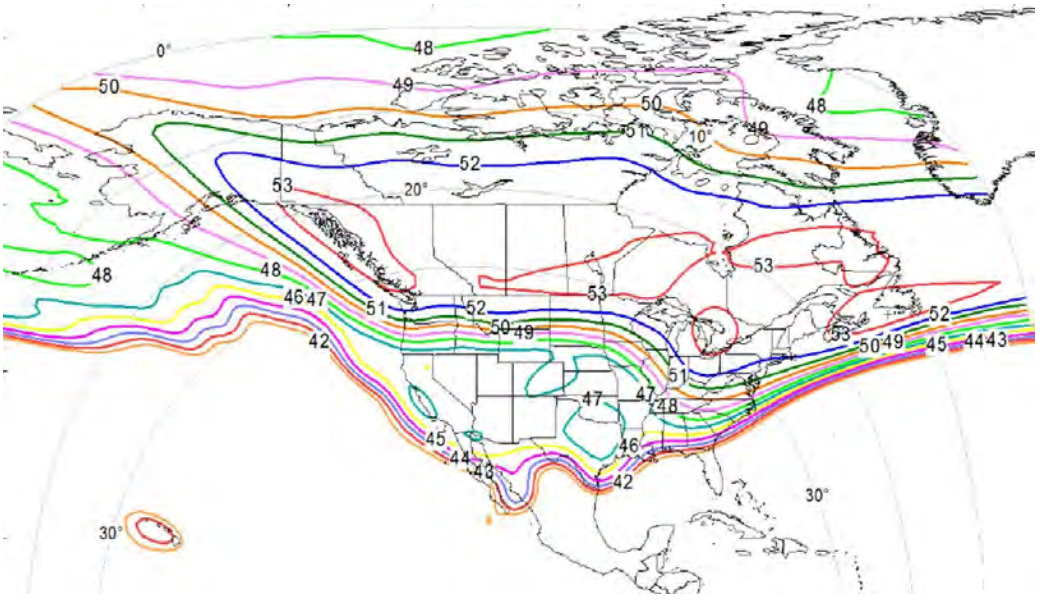
Hunter Canada/US Ku-beam

Hunter Communications announced that the Hunter Ku-beam over Canada/US has officially entered into service as of October 15th. This marks the end of the initial three-year design/build/launch phase, and the beginning of the 15 year operational life of the satellite. With the satellite's IOT (in orbit testing) now complete, the satellite is in perfect health and are already in process to activate services, including a test network for prospective clients.

To meet with Hunter , they will be exhibiting or attending the following conferences: Oilcomm Houston - Nov 4-5; Satcon New York - Nov 11-12 and SecureTech Ottawa - Nov 25-26.



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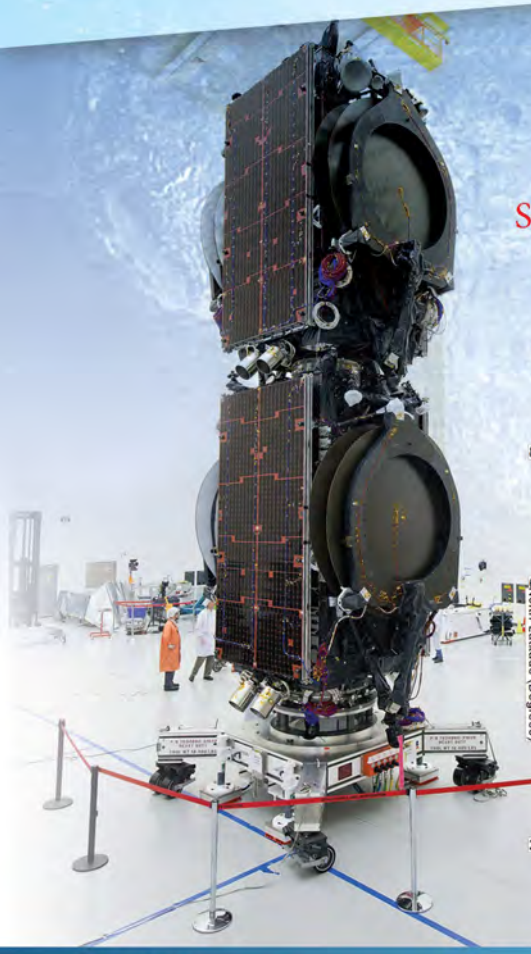

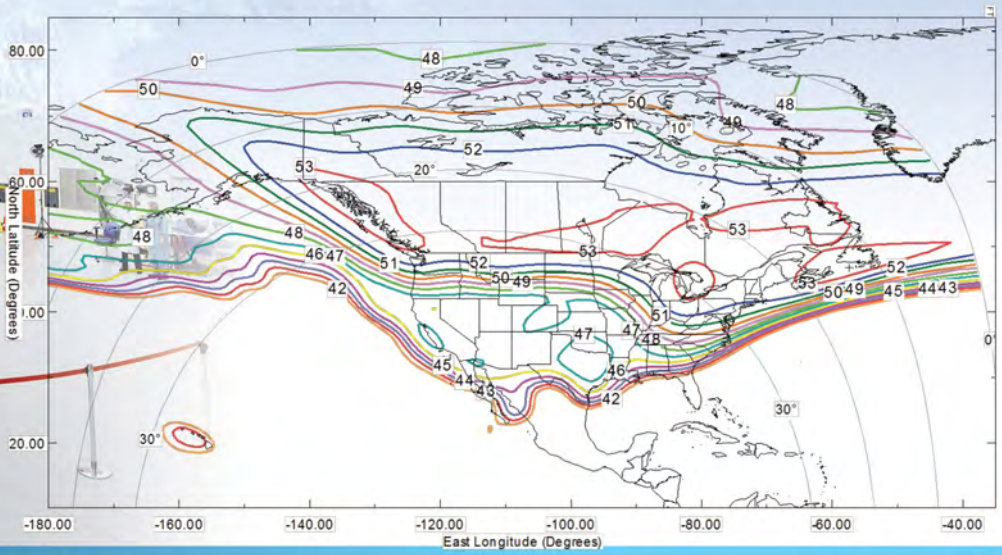

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Oil and Gas Cyber Security: Satellite...Big Data, the Cloud and IoT

by Martin Jarrold

In the modern digitally interconnected world no part of industry, commerce, government, civil society, or, less directly, the individual Internet user as a customer of online services, is exempt from the constant threat and frequent actuality of cyber-attacks. Targets include: banks and financial institutions; healthcare facilities; utilities and other critical infrastructure; oil, gas and petrochemical upstream and downstream facilities; retail and consumer databases; vehicle and other mobile asset-tracking systems; telecommunications service providers; and, the satellite industry.

All of these sectors of economy and society, and others, face this constant and growing menace, orchestrated by a wide variety of differently motivated perpetrators, scaling from purely mischievous and socially maladjusted IT geeks, through to nation-state government agencies (police, military, security and intelligence), via neighborhood thugs, cyber-warriors, industrial spies, traditional trans-national criminal organizations, organized cyber-crime groups, hacktivists, state-sponsored proxy fighters, and terrorists.

It is impossible to defend against the variety and sophistication of cyber-risks emanating from all these forces. Additionally, volume, as well as variety and sophistication, makes it difficult to achieve 100% prevention. However, mission-critical communication networks must be made resilient enough to bounce back from an attack instantly, and efforts to build this resilience means that, collectively, the 'actors' in the cyber-crime space are forcing massive expansion in the cyber-security industry. Currently the global market is estimated at US$80billion, and forecast to increase to over US$140billion by 2019.

The oil and gas sector – critically and increasingly dependent on an ever-more complex ICT infrastructure – has been the target of well-known cyber-attacks. The commercial broadband satellite industry – a key networking communications solution provider to the oil and gas industry across its upstream, midstream, and downstream segments – is currently subject to a greater degree of networking security-related scrutiny than ever before. These two industries have a clear customer and provider common interest in working to ensure that cyber-security prevails.

This common interest will be explored during the dialog at the 25th event in the GVF's global Oil & Gas Connectivity Series. To be held in the InterContinental Hotel in Kuala Lumpur, 12-13 November 2015, **GVF Oil & Gas Connectivity – The Kuala Lumpur Meeting 2015: Evolving the Big Data Digital Oilfield** (www.uk-emp.co.uk/current-events/o-g-comms-kl-2015/) will bring the Series to the eighth annual event to address the connectivity and communications networking imperatives of the South East Asian region of the global oil and gas patch. The event in 2015 is once again supported by the **Asia Pacific Satellite Communications Council (APSCC)**, and is sponsored by **Maju Nusa**, **SpeedCast**, **Gilat**, and **Hughes**.

The oil and gas industry's constant preparation for, and need for vigilance against, the threat of cyber-attack must not be compromised by any infrastructure and systems security investment budget caps that may follow from the ongoing price per barrel oil market slump. The most famous cyber-attack on the oil and gas industry happened in 2012 – when the price of a barrel of oil was circa US$85 – when 30,000 computers in Saudi Aramco's network were crippled by an attack by the terrorist group Cutting Sword of Justice. The operations of the largest oil producer in the world were disrupted for months, but, although the terrorists actually failed to stop oil and gas production, the attack was one of the most destructive cyber-security strikes against a single business. During the current, or any other, downturn, it is critical that oil and gas companies maintain capital investment in respect of managing cyber-security risk exposure. It is reliable, and secure, data which enables oil and gas companies to make key decisions. Now, more than ever, that data needs to be protected.

"...The new cyber-landscape threatens the critical information infrastructures on which the oil and gas industry, upstream to downstream, is wholly dependent. ..."

The new cyber-landscape threatens the critical information infrastructures on which the oil and gas industry, upstream to downstream, is wholly dependent. Thanks to accelerating advances in ICT, the oil and gas industry has been able to automate many of its processes to ensure a safer and more cost-effective approach to exploring for, producing, and distributing energy resources. Companies have been able to significantly reduce costs through replacement of many inefficient manual processes, but with automated equipment being controlled by IT through the Internet, there needs to be a greater focus on security of networks. The evolution of cyber-threats and the exploitation of data vulnerability is escalating, and the proliferation of sophisticated efforts by malicious state, terrorist, and economic actors to steal and monetize corporate data or leverage it to assert power, track trends/behavior, etc., or cause physical disruption in operations, is a growing concern in the energy industry, in which critical infrastructures and processes are managed remotely from central control centers.

One such consideration is protection against Direct Denial of Service (DDoS) attacks, which pose a serious risk to the oil and gas industry. For example, DDoS attacks can be used to disrupt the hazard management systems at production and storage facilities. This can have potentially catastrophic consequences, or at very least cause significant downtime, leading to damage to commercial reputation and an advantage for commercial competitors, both domestic and overseas.

Another consideration is the connectivity of field equipment. From mobile devices used by workers, to remotely-accessed pumps, sensors, and valves, all are now connected to networks over IP, and lack of focus on securing these connections has left them vulnerable to attack. For example, many such connections may be secured by the original password they were supplied or installed with, and a password which has never been changed is simple for cyber-attacker to exploit.

Centralized process and systems control in the oil and gas sector is strategically dependent on global satellite communications, an industry that – as noted above – shares in the fight to preserve cyber-security. In 2014, the GVF, the satellite industry's only global representative body, established its Cyber Security Task Force (CSTF) as a coordination center for satellite security knowledge. Following a not insignificant volume of print and online media reports about satellite networks security, beginning around mid-2013, a GVF February 2014 press release noted that the satellite industry required a *"... global initiative to address escalating cyber-security threats with the establishment of a task force that will identify best practice and provide guidance on how users and industry can optimize the application of VSATs to reinforce network integrity."* Essentially, the CSTF is encouraging equipment vendors and network operators to implement robust protection measures, abandoning widely discredited practices where they still exist.

The GVF CSTF – which includes members representing earth station/terminal equipment manufacturers and vendors, network operators, and end-users of VSAT systems – has produced the **GVF Product Security Baseline (PSB)**, a voluntary specification detailing requirements and recommendations for all VSAT hardware and software that supports or transmits on an IPv4 or IPv6 network. The Task Force has now also prepared the **Satellite Service Provider Security Document (SSPSec)**. Further details of these documents are available to members of GVF by contacting the Task Force chairman, and in the first instance by contacting me at martin.jarrold@gvf.org.

The year 2014 also saw the creation of the Oil and Natural Gas Information Sharing and Analysis Center (ONG-ISAC). This entity is in the process of becoming operational to advance cross-company collaboration sharing of cyber-security threat intelligence, including specific oil and gas industry threats. The security of oil and gas critical infrastructure ICTs is highly complex and brings together three facets of the modern digitized world:

Big Data – The continuous churn of enormous amounts of information being gathered and sifted for specific purposes.

Cloud Computing – The online storage and repository of this data using massive networks of computing resources, with less information stored on local hard drives and more data aggregated together and hosted on servers somewhere on the planet.

Internet of Things (IoT) – The all-things-connected phenomenon – forecast to encompass nearly 50 billion connected devices by 2020, with an average of more than six connected devices per person – gathering this data.

Readers can find out more about the other themes and topics to be discussed by consulting **The Kuala Lumpur Meeting** webpage at **www.uk-emp.co.uk/current-events/o-g-comms-kl-2015/**, or by contacting **Martin Jarrold** at **martin.jarrold@gvf.org**, or **Paul Stahl** at **paul.stahl@uk-emp.co.uk**. Registration information may be obtained by contacting **Paul Stahl**.

Martin Jarrold is Director of International Programs of the GVF. He can be reached at matin.jarrold@gvf.org

Sintec Media Acquires Broadway Systems

New York, NY, October 21, 2015--SintecMedia announced that it has acquired Broadway Systems, a provider of broadcast management solutions. Broadway Systems manages several billion dollars in advertising revenues across news, sports, music, and entertainment networks for leading customers in the media industry, including three of the Top 15 rated cable television networks in the US.

"We are excited about the addition of Broadway Systems to the SintecMedia family and look forward to bringing our two companies together. With its technology leadership and extensive industry experience, Broadway fits seamlessly into the SintecMedia portfolio," said Amotz Yarden, SintecMedia CEO. "The media industry is changing and it requires an experienced partner and strong technology to navigate the complexity of new channels, new advertising methods and new business models. Our strategy is to use the best people and systems to deliver that to the market."

"We recently launched OnBoard, a TV sell side platform (SSP) that gives networks the tools they need to control their Linear and Digital advertising inventory. Integrating OnBoard with Broadway Systems' innovative solutions will provide Broadway customers a path to enhance their business, particularly in the growing category of digital, programmatic solutions."

"The acquisition of Broadway Systems will contribute to the further expansion of SintecMedia in the US," said Amir Lavi, President of SintecMedia Americas. "We will continue to invest in and support the Broadway Systems products, as well as leverage our expanded portfolio to offer Broadway's customers exciting new solutions. We will integrate Broadway into the wider SintecMedia product suite, providing all our customers with enhanced technology offerings and superior customer service. We are looking forward to having Broadway join the SintecMedia team."

Ericsson Completes Acquisition of Envivio

Stockholm, Sweden, October 28, 2015—Ericsson (NASDAQ: ERIC) completion of the acquisition of Envivio, Inc. (NASDAQ: ENVI). The transaction was completed through a merger of its indirect wholly-owned subsidiary, Cindy Acquisition Corporation, with and into Envivio, Inc. (NASDAQ: ENVI). Envivio, Inc. survives the merger as a wholly-owned subsidiary of Ericsson.

The merger follows the successful completion of the tender offer by Ericsson for all shares in Envivio for the price of USD 4.10 per share. As of expiration of the tender offer, 26,385,322 shares (including 58,467 shares pursuant to guaranteed delivery procedures) were validly tendered and not withdrawn in the tender offer, representing in excess of 93 percent of Envivio's issued and outstanding shares. All validly tendered shares have been accepted for payment in accordance with the terms of the tender offer.

As a result of the merger, any Envivio shares not tendered in the tender offer have been converted into the right to receive USD 4.10 per share. In addition, options to purchase Envivio shares have been converted into the right to receive a cash payment equal to their net exercise value, based on the USD 4.10 per share merger consideration.

Notwithstanding the completion of the merger, Ericsson will pay for shares tendered via guaranteed delivery procedures promptly after delivery of those shares.

As a result of the merger, Envivio shares will be delisted from the NASDAQ Global Select Market.

Envivio is a global leader in software-based video encoding with an installed base of over 400 TV service providers and content-owner customers in all markets globally. The deal will strengthen Ericsson's position as a leader and global innovator in TV and media. It will enable Ericsson's customers to deploy new technologies and agile video processing, and to develop innovative new services that engage TV consumers every day.

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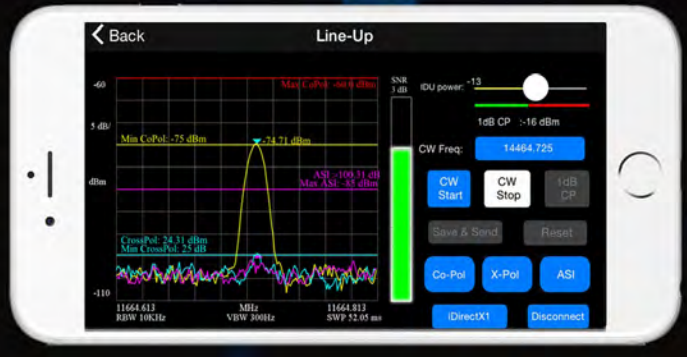

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Signalhorn Names New President and CEO

Backnang, Germany, October 1, 2015 – Signalhorn announced the appointment of **Alexander Mueller-Gastell** as Signalhorn's President and Chief Operating Officer. Mueller-Gastell will be reporting to Robert Kubbernus, who will continue to fill the role of CEO and Chairman of Signalhorn.

Alexander Mueller-Gastell joined Signalhorn in May 2013 as Chief Financial Officer. This progression to President and Chief Operating Officer is on account of his quick understanding of the company and his passion for excellence within the organization, dedication to growth and his customer-first approach.

Mueller-Gastell

In his new role, Alexander Mueller-Gastell will direct and control Signalhorn's daily operational business and give strategic guidance and direction to ensure that the company achieves its objectives and goals.

MEASAT Appoints Desai as Sales Director-Africa

Kuala Lumpur, Malaysia, September 28, 2015 – MEASAT Satellite Systems Sdn. Bhd. announced the appointment of **Santosh Desai** as Sales Director – Africa. In his role, Desai will be responsible for opening new markets in Africa, developing sales channels, and managing customer accounts.

Prior to joining MEASAT, Desai was Head of Products for satellite communications, media & managed services for a global telecommunications company based in India.

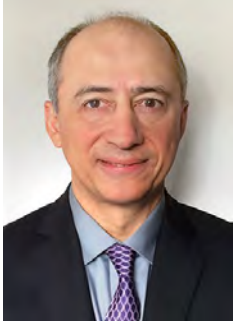
Desai holds a Bachelor Degree in Electronics & Telecommunications Engineering from Pune University, India and also completed an Executive Program in International Business Management from Indian Institute of Management, India. Santosh has more than 14 years' experience covering international projects, network operations, products, and sales in satellite and media.

Santosh Desai

Inmarsat Names Sam Matar as Director-Airline Market

London, UK, September 24, 2015-- Inmarsat has announced the appointment of Sam Matar as Director of Airline Market Development, with responsibility for expanding the company's airline customer base and revenues in the North America market

Matar has 20 years of business development experience in the global aviation industry.



Sam Matar

He most recently served at leading avionics and aerospace product companies B/E Aerospace-LIS (formerly EMTEQ Wisconsin) and ECS (now Carlisle Interconnect Technologies), working with airlines, system integrators and OEMs on the key areas of satellite communications, inflight entertainment, connectivity and the passenger interiors cabin experience. Extremely valuable

Matar, who is fluent in English and French, holds a BBA degree from American University of Beirut and a MBA in Finance from the University of Wisconsin. He will be based in Chicago and report to Neal Meehan, Inmarsat Aviation's VP Business Development – Americas.

Melquist Joins Sage Communications

McLean, VA, September 22, 2015-- Catherine Melquist, a marketing executive with more than 20 years of experience in the satellite industry, has joined Sage Communications as senior vice president of its Satellite division.

In her new role, Melquist will replace Penelope Longbottom as head of the Longbottom Communications division that Sage acquired two years ago.

Catherine Mequist

Ms. Longbottom founded her eponymous company in 2000 and built it into the premier public relations and marketing agency serving the global satellite industry. She will be retiring effective October 31.

The Satellite division of Sage works with a number of leading clients in the satellite industry, including Intelsat, Intelsat General, Hughes, XTAR, ITC Global, OmniEarth, CMMB Vision, LeoSat and Space Partnership International.

"This is an exciting time in the satellite community and a tremendous opportunity to lead Sage's Satellite Division," said Melquist. "Penelope Longbottom has built a truly remarkable practice and team and I look forward to continuing the unequalled service and reputation she helped establish in the industry."

Melquist began her industry career at Comsat in 1994. Over the next two decades she held a number of increasingly senior positions in marketing and product management at Lockheed Martin Global Communications, Telenor Satellite Services, Vizada, Airbus, and MTN Government. She holds a bachelor's degree from the University of California at Santa Barbara and a master's in business administration from American University.

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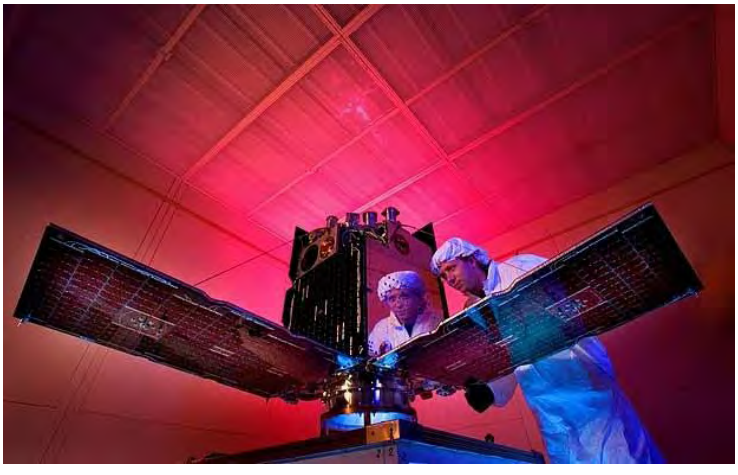
Government Space Programs to Grow

"...Despite budget cuts, governments should maintain high launch rates over the next decade: 856 government satellites are planned for launch between 2015 and 2024, a 32% increase from the last decade, driven by civil Earth observation, communications and satellite navigation missions ..."

Paris, October 28, 2015 - According to Euroconsult's newly released report, Government Space Programs: Strategic Outlook, Benchmarks & Forecasts, a new growth cycle in government space spending is expected to start and average 2.1% over the next ten years worldwide, reaching $81.4 billion by 2024.

"Despite budget cuts, governments should maintain high launch rates over the next decade: 856 government satellites are planned for launch between 2015 and 2024, a 32% increase from the last decade, driven by civil Earth observation, communications and satellite navigation missions," said Steve Bochinger, COO at Euroconsult and editor of the report. "242 defense satellites are expected to be launched over the next 10 years, an 11% increase compared to the past of which 40% will be launched for the U.S. government."



The report assesses key economic and program trends for each major space application, which include:

- Earth observation programs received $10.9 billion in 2014, becoming the first application area after eight years of continuous growth driven by the combined investments of 52 countries.
- Manned spaceflight comes second with $10.8 billion in 2014, invested by only seven countries plus the European Space Agency. Budgets stabilized over recent years as the ISS program transitioned from development to exploitation phase.
- The development of launch vehicles has received $7.4 billion, growing at an average of 9% over the past ten years driven by investments required for next-generation launchers. Due to the high and long-term development costs, launchers can represent between 15% to 50% of an agency's budget.
- Satellite communications programs totaled $5.9 billion in 2014, decreasing by 37% compared to 2010 essentially due to the cyclicality of the U.S. DoD's procurement. Civil programs are currently driving expenditures, with 51 countries investing in satcom programs and 62 expected by 2024.
- Space science and exploration is estimated at $5.9 billion and is expected to reach $8.6 billion in 2024, i.e. a 3.4% CAGR driven by ambitious plans in Russia and Asia and a sustained high level of investment in the U.S.
- Satellite navigation reached $4.5 billion with only five countries, plus the European Union, investing in the development of costly systems. Funding is expected to remain at the current high levels until 2024 to support systems' deployment, with 124 spacecraft to be launched over the next ten years.

Space security programs received $2 billion in 2014, with the U.S. accounting for two thirds of the expenditure. Security remains under the remit of the top 10 leading space nations, a situation which is not expected to change in the future.

"The international landscape is experiencing profound mutations with a diversification of countries investing in space; the number of countries investing over $10 million in space activities has grown from 38 in 2005 to 58 in 2014," continued Bochinger. "International suppliers are competing fiercely for these business opportunities, with China currently accounting for 28% of communications satellites ordered by emerging programs, and Europe for 54% of Earth observation satellites."

Government Space Programs: Strategic Outlook, Benchmarks & Forecasts assesses from an economic perspective space programs undertaken by civil and defense government organizations worldwide. Key metrics such as public investment (funding) in space and government satellites to be launched are analyzed from different angles to provide a 360-degree view of government space programs.

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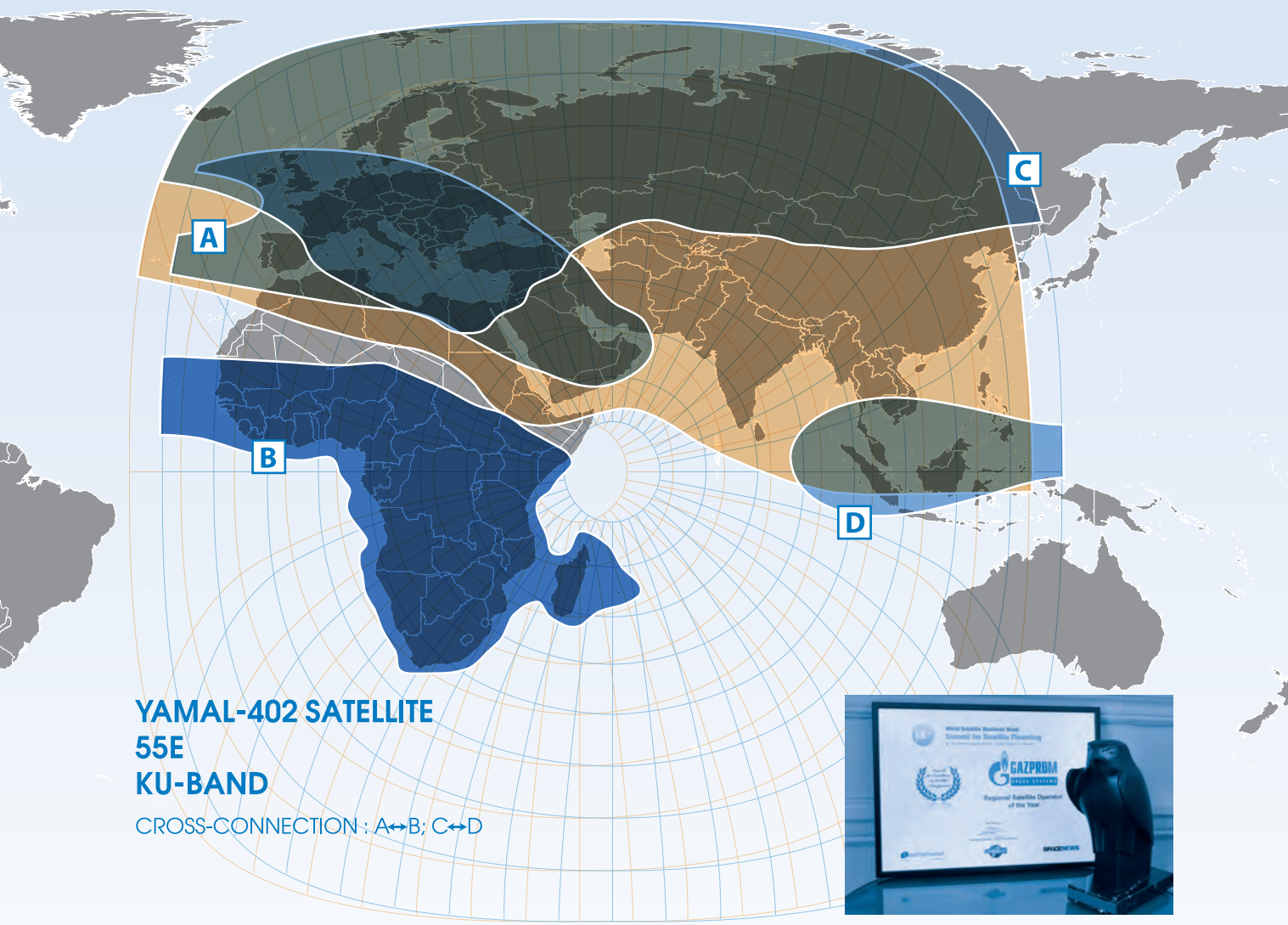

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Africacom 2015 to Highlight Opportunities in the Growing African Telecom/Satellite Market

CTICC, Cape Town, South Africa, November 17-19, 2015

Taking place at the Cape Town International Convention Centre (CTICC) from 17 - 19 November 2015, AfricaCom is now in its 18th year. AfricaCom is Africa's largest communications conference & exhibition attracting 10 000 delegates. The conference programme covers the most strategic issues affecting companies in Africa's digital market - services, efficiency, profitability, customer experience, partnerships, policy and more – and features several co-located events: VSAT Africa, TV Connect Africa, LTE Africa and Apps World Africa.

AfricaCom's innovative Ericsson AHUB is the premium space for investors to meaningfully connect with the wealth of entrepreneurial excellence in Africa's innovative technology sector.

The Ericsson AHUB at AfricaCom, taking place from 17-19 November at the CTICC, will bring together Africa's leading entrepreneurs, tech start-ups and venture capital/angel investor communities. The aim is to encourage investment and showcase talent in a sector that has an abundance of ICT tech skills, but needs more funding and guidance from industry experts.

The Ericsson AHUB is structured around a three-day conference programme packed with insightful discussion, debate and presentations by some of Africa's most innovative and exciting tech focused entrepreneurs and start-ups. Investors will be able to identify ideal companies they wish to check out, by using a pre-event networking tool and then take advantage of the speed networking sessions on offer at the show.

There are many opportunities for investors to interact with and identify the potential 'next big thing', but none better than AfricaCom's AHUB that has pre-identified and qualified participants. Rey-Gore confirmed: "The Ericsson AHUB welcomes all investors, incubators and funders who want to play in the tech space and help these vital communities to grow and evolve. If your organisation recognises the importance of grassroots ICT in Africa then the Ericsson AHUB is the place to be."

Ericsson AHUB sessions will be offered free of charge to start-ups and small businesses operating in the sector, making this the ideal place for any company to position its innovative offering. "Another aim of the Ericsson AHUB is to foster new relationships between various incubator hubs allowing the sharing of best practice, membership recruitment and funding models," she said.

This brand-new community-driven event at AfricaCom 2015 is proudly developed by Informa, working in partnership with mlab, Disrupt Africa, Silicon Cape and a host of other like-minded partners.

This pioneering space is geared towards enabling entrepreneurs to share ideas, collaborate and connect with the most active and sophisticated venture capitalists and angel investors. The Ericsson AHUB is the essential destination for anyone interested in investment, media exposure, customers or mentoring. It is the perfect platform for investors to stake their claim in Africa's future technological advancement.

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SSPI To Honor Future Leaders in 10th Annual Dinner in New York

November 11, 2015, Penn Club, New York

Awards to Ethan Lucarelli of Wiley Rein LLP, Jennifer Salmon of Space Systems Loral and Sarah Thomas of The Boeing Company. The Promise Awards honor three satellite executives age 35 and under for outstanding achievement in the early stages of their career. The three recipients will be honored on November 10 in New York City at SSPI's 10th Annual Future Leaders Dinner. On that night, SSPI will also honor its 2015 Mentor of the Year, Chris Stott of ManSat, for the encouragement, support, and inspiration he has provided to students and young professionals throughout his career.

"We have the privilege once again of identifying and honoring three stellar young professionals who are exceeding expectations and delivering extraordinary value to customers and clients," said executive director Robert Bell. "The quality of leadership in our industry is of primary importance, and the Promise Awards give SSPI a chance to hold up these young leaders as examples, while honoring a mentor who is bringing more young talent into the business."

The 2015 Future Leaders Dinner (www.satfuture.com) takes place at The Penn Club in Manhattan on Tuesday, November 10, on the evening before the opening of NAB CCW featuring SATCON. The proceeds of the dinner go to fund SSPI's educational, professional development and industry growth initiatives.

During SATCON, the three Promise Award winners will join top executives of the satellite industry for a November 11 keynote panel, featuring Space Systems Loral President John Celli and Intelsat General President Kay Sears, which will explore the most profound trends shaping technology, markets and business models in the next few years.

The SSPI Promise Winners:

Jennifer Salmon, *Payload Manager, Space Systems Loral* (*SSL*)

Jennifer Salmon joined SSL as a Test Verification Payload Engineer in 2006, just after graduating from California Polytechnic State University, San Luis Obispo. She demonstrated her talent as a leader in planning and coordinating investigative passive intermodulation testing of a very complicated antenna configuration that pushed the power limits of SSL's test range. In this role, Jennifer helped multiple internal SSL organizations, including systems engineering, thermal engineering, and the test range team, work together to develop procedures that protected both personnel and equipment while performing a complex test never before attempted at spacecraft level.

Sarah Thomas, *Field Marketing Lead, Global Sales & Marketing, The Boeing Company*

Sarah Thomas serves as Boeing's military liaison for the Department of Defense space and ground systems in Colorado. She is responsible for ensuring that changing mission needs are understood and communicated to the Boeing business units that serve them. This work brings her into contact with senior military officers as well as senior executives of her own company. She is the youngest employee and first female employee to serve the company in that job.

Ethan Lucarelli, *Associate, Wiley Rein LLP*

Working in Wiley Rein's Telecom, Media and Technology practice group, Ethan Lucarelli has become a specialist in regulatory, policy, privacy, security and transactional matters related to satellites, broadband, and both international and domestic information and communications technology (ICT). His work has included advocating for satellite service providers before the FCC on various matters of spectrum policy and emergency communications; analyzing satellite industry developments for investment firms targeting the MSS/ATC sector and hybrid satellite-terrestrial businesses; and advising on day-to-day licensing and regulatory matters for diverse satellite industry clients in the MSS, FSS, DBS, and SDARS sectors.

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The Satellite Markets 25 Index™

Company Name	Symbol	Price (Nov 04)	% Change from Last Month	52-wk Range		% Change from Jan. 02, 2015
Satellite Operators						
Asia Satellite Telecommunications Holdings Limited	1135.HK	11.40	2.52%	10.50	33.50	-57.62%
Eutelsat Communications S.A.	ETL.PA	30.34	0.80%	24.94	32.71	13.21%
APT Satellite Holdings Ltd.	1045.HK	7.98	15.82%	5.03	9.83	-27.19%
Inmarsat Plc	ISAT.L	980.50	4.59%	672.50	1056.00	24.11%
SES GLOBAL FDR	SES.F	27.00	-6.09%	25.277	34.90	-8.78%
Satellite and Component Manufacturers						
The Boeing Company	BA	148.19	6.08%	115.14	158.83	13.97%
COM DEV International Ltd.	CDV.TO	5.41	1.69%	3.67	6.22	34.24%
Macdonald Dettwiler & Associates Ltd.	MDA.TO	80.77	9.36%	70.55	101.42	-14.76%
Lockheed Martin Corporation	LMT	218.83	2.61%	181.91	225.15	12.95%
Orbital ATK, Inc.	OA	85.79	8.90%	56.06	140.61	223.43%
Ground Equipment Manufacturers						
C-Com Satellite Systems Inc.	CMLV	1.05	-5.41%	0.92	1.50	-23.91%
Comtech Telecommunications Corp.	CMTL	25.25	8.18%	20.30	40.69	-20.12%
Harris Corporation	HRS	79.81	5.39%	66.15	84.78	11.37%
Honeywell International Inc.	HON	103.37	2.18%	87.00	107.41	2.96%
ViaSat Inc.	VSAT	65.33	-6.87%	55.11	71.41	4.98%
Satellite Service Providers						
Gilat Satellite Networks Ltd.	GILT	3.57	-1.92%	3.36	7.07	-25.31%
Iridium Communications Inc.	IRDM	8.31	21.67%	5.85	11.36	-14.15%
ORBCOMM, Inc.	ORBC	6.08	-7.18%	5.27	7.62	-7.18%
TeleCommunication Systems Inc.	TSYS	4.46	22.19%	2.75	4.55	42.95%
RRSat Global Communications Network Ltd	RRST	7.23	0.00%	-	-	0.00%
Consumer Satellite Services						
DIRECTV	DTV	93.55	0.00%	-	-	7.91%
DISH Network Corp.	DISH	63.54	1.57%	54.62	80.75	-12.18%
Globalstar Inc.	GSAT	1.99	4.74%	1.45	3.58	-25.75%
Sirius XM Holdings Inc.	SIRI	4.1550	7.92%	3.27	4.18	19.23%
SKY DEUTSCHLAND	SKYD.MU	6.7660	0.00%	5.96	6.93	0.53%

INDEX	Index Value (Nov 04)	% Change from Last Month	% Change from Jan. 02, 2015
Satellite Markets 25 Index™	2,070.67	3.88%	12.87%
S & P 500	2,102.31	4.34%	2.04%

The Satellite Markets 25 Index™ is a composite of 25 publicly-traded satellite companies worldwide with five companies representing each major market segment of the industry: satellite operators; satellite and component manufacturers; ground equipment manufacturers; satellite service providers and consumer satellite services. The base data for the Satellite Markets Index™ is January 2, 2008--the first day of operation for Satellite Market and Research. The Index equals 1,000. The Satellite Markets Index™ provides a benchmark to gauge the overall health of the satellite industry.

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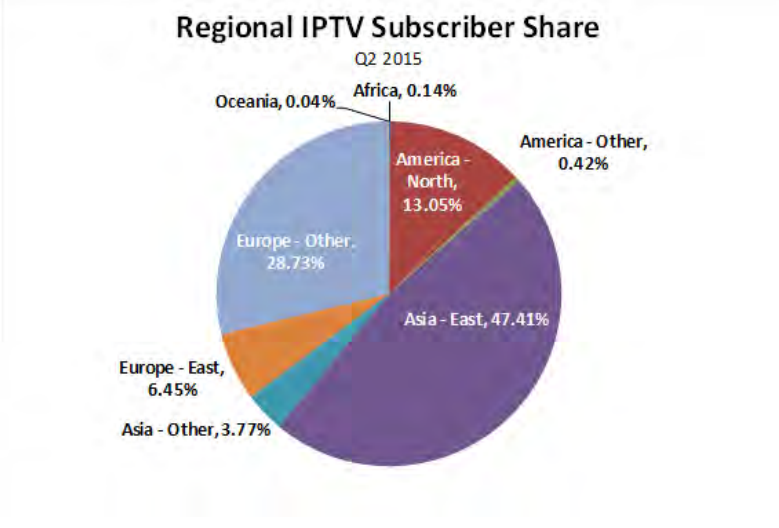
Global IPTV Subs Reach 123 million

Global IPTV subscriptions reach 123 million according to recent research by Point Topic. while their growth slows down slightly. East Asia continues to dominate in terms of quarterly IPTV net additions. A number of developing markets see their IPTV subscriptions reach almost 50% of total fixed broadband subscriptions.



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