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SATELLITE Markets & Research

Industry Trends, News Analysis, Market Intelligence and Opportunities

Japanese Satellite Market Update

by Naoakira Kamiya, Contributing Editor

One of the biggest stories for Japanese satellite service providers this year was an announcement made by Intelsat S.A. and OneWeb Ltd on February 28. They entered into a definitive combination agreement and SoftBank Group Corp. (SoftBank) would invest US$ 1.7 billion in newly combined company. Even though such transaction remains subject to regulatory approvals and completion of complicated debt exchanges, the story circulated very quickly in Japan. No doubt this was a potentially most influential trend in recent Japanese satellite market.

Japanese telecom and internet giant SoftBank's acquisition of Intelsat will profoundly change the satellite industry.

Masayoshi Son, Chairman of SoftBank, has been rather quiet for almost 20 years since he made a clever decision to merge his JSkyB into Perfect TV in 1998. After such transaction it seemed that his ambition in satellite broadcast and telecommunications disappeared. Now in 2017 Japanese satellite industry realized that things might change drastically with his ardent involvement in Intelsat and OneWeb merger. Industry specialists in Tokyo predict that SoftBank's ownership in the combined company might range from 35 to 40 percent.

As a matter of fact, SoftBank in Japan is currently involved in four satellite businesses.

First of all, they are one of the largest users of Thailand-based iPStar satellite in the territory of Japan. The main application is the backhaul of their 4G/LTE mobile networks extended all over Japan.

Second, they are also one of the users of JCSAT satellite operated by SKY Perfect JSAT. The main usages are mobile backhaul, IP content streaming, and emergency telecommunications in extremely rural areas and isolated islands, which are not covered by iPStar.

Third, they are listed as a sales agent of Thuraya Telecommunications Company from Dubai, UAE. SoftBank is aggressively promoting Thuraya's mobile satellite communication services competing against Inmarsat and Iridium in Japan. Their tools are innovative 501TH mobile terminals and dependable FDU-XT docking systems.

Last but not least, they established SoftBank Satellite Planning Company and are in full pursuit of

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What's Inside

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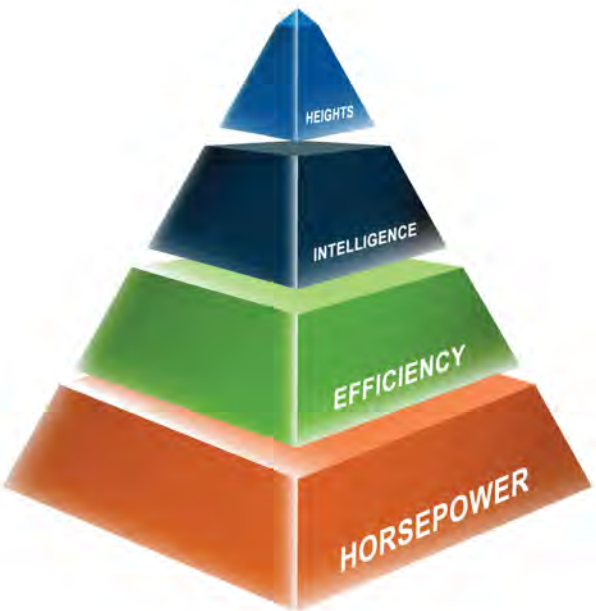

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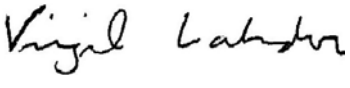
The Asia-Pacific Market

In this issue, we focus on the Asia-Pacific market. Our correspondent in Tokyo, Naoakira Kamiya, headlines this issue with an update on the Japanese satellite market. As he points out in his article, the big news from Japan has global implications for the industry—SoftBank's merger of OneWeb and Intelsat. As we go to press, we got wind of the news that the Japan-based satellite operator, JCSAT has entered into a partnership with OneWeb's competitor in the LEO field—Leosat. JCSAT, which is the fifth largest satellite operator in the world is taking on the other big four satellite operators led by Intelsat in the LEO market.

This is why the Asia-Pacific market is of crucial importance to the industry. Not only is the Asia-Pacific a good indicator of the overall health of the global industry, it has led the way in some key markets such as broadband and IP penetration in some key countries in the region. The Asia-Pacific is the second largest market for satellite capacity usage after North America.

This month, Satellite Markets and Research will be participating in two major conferences and one exhibition in Asia, namely, APSAT 2017 in Jakarta, Indonesia, and the CASBAA Satellite Industry Forum and CommunicAsia, both in Singapore. We expect that these events will shed more light in the opportunities and trends in the Asia-Pacific market and we'll be sure to report these back to you in our forthcoming issues and in our website www.satellitemarkets.com

If you are attending CommunicAsia in Singapore, visit us at out booth at Level 1 of the Marina Sand Expo booth # 1T6-03. See you there!



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Satellite Executive BRIEFING
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Japanese Satellite Market Update...From page 1

S-band satellite project to be realized in 2020. The key issue here is international frequency coordination with neighboring countries. SoftBank together with Japanese administration are eagerly coordinating with Chinese and Korean administrations.

In view of the above-mentioned status of SoftBank, a serious question from Japanese satellite industry is what kind of strategy Masayoshi Son has laid out in Space 2.0 environment. Accelerated achievement of Intelsat EPIC and OneWeb's ubiquitous broadband services must be in his vision. In addition a combined broadband network of satellite and next generation 5G may be in his mind. Such top-notch connectivity world seems to meet "the demand of people and devices everywhere" which Masayoshi Son has been advocating in recent years.

The second prominent trend in Japanese satellite market is the fact that SKY Perfect JSAT (JSAT) has ordered high throughput satellite, JCSAT-18, from Boeing Satellite Systems International on February 20. JCSAT-18 will be a Boeing HS-702 satellite and JSAT will share the satellite with Kacific-1 for Kacific Broadband Satellite in Singapore.

Besides JCSAT-18, JSAT has one more satellite, JCSAT-17, under construction. JCSAT-17 is S-band satellite to be made by Lockheed Martin based on A2100. This spacecraft will be launched in 2019. In addition DSN-1/Superbird-8 satellite is under repair work at Mitsubishi Electric Corp and will be launched in 2018.

Meanwhile JSAT has launched three SS/Loral-built satellites, JCSAT-14, JCSAT-15, and JCSAT-16 and strengthened its satellite networks not only in Japan but also in Asia.

JCSAT-14 (or JCSAT-2B) was launched aboard Falcon-9 rocket on May 6 2016. This spacecraft carries

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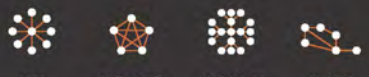


DVB S2

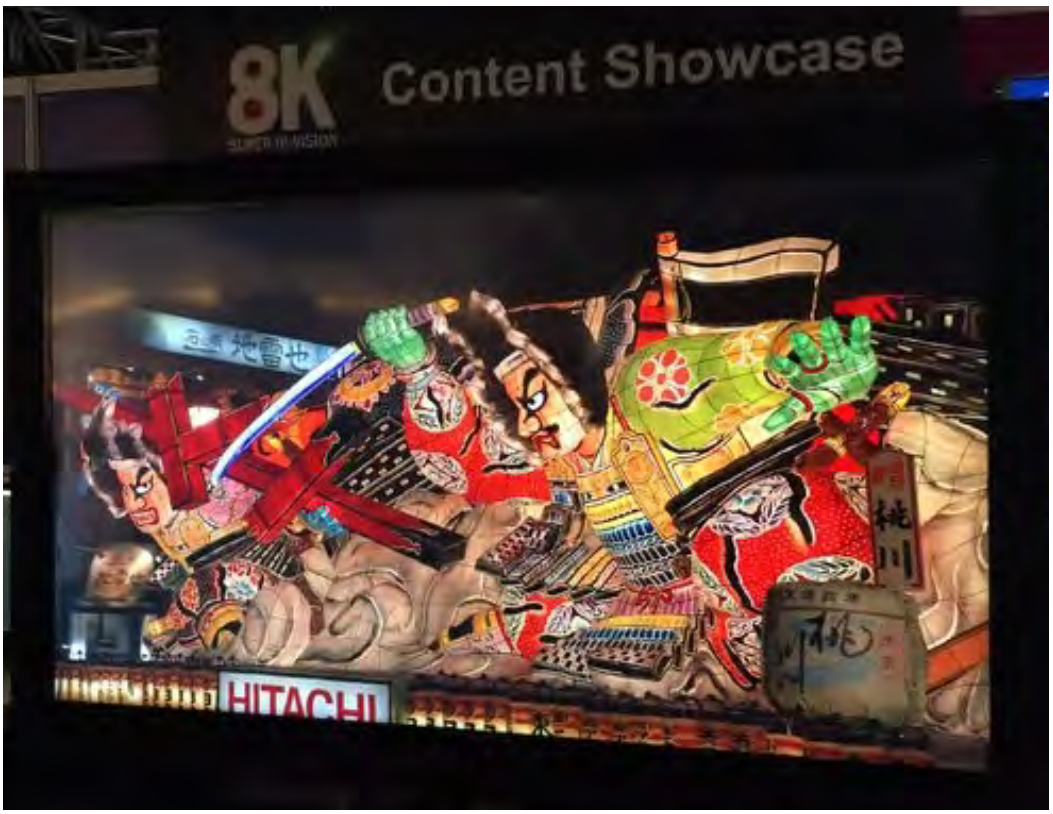
ND SATCOM

both C-band and Ku-band shaped beams, one of which is extended to Pacific Ocean Region.

JCSAT-15 (or N-SAT110A) was launched aboard Arine-5 on December 22 2016. Unique feature of this satellite is a Ku-band shaped beam focused on South Indian Ocean Region.

JCSAT-16 was launched aboard Falcon-9 rocket on August 14 2016. This spacecraft was originally intended to backup several satellites located from 128 to 162 degrees east. Since DSN-1/ Superbird-8 satellite was damaged on the way to launch site, JCSAT-16 is tentatively operated at 162 degrees east.

"...the availability of more content is key to consumer adoption of 4K and 8K services..."



The third important trend in Japanese satellite broadcasting sector is the sudden increase in Ultra HD/4K/8K live transmission. To take up such new businesses, several OB Vans have been made recently. For example SKY Perfect JSAT and its subsidiary company SKY Perfect Broadcasting showcased 4K High Dynamic Range (HDR) OB Van on March 17 at their Tokyo Media Center. They said that such OB Van has been already used successfully at the time of Badminton S/J League Championship Game held on February 12. According to their announcement the OB Van accommodates eight Sony 4K cameras and three FOR-A 4K slow motion cameras.

Just before this event Totsu International, a well-known production company, unveiled its 4K HDR OB Van named R-1 at their Tokyo depot. They proudly said that they are fully booked during J-1 league professional soccer season.

In addition NHK is actively using 8K OB Van named SCH-1 and SCH-2. Recent deployments were made at the time of Sumo Tournament held from March 12 to 26, and High School Baseball Final Match on April 1.

There is no doubt that Ultra-HD/4K/8K live transmissions are the next big things in Japan.

The fourth and latest trend is that Association of Promotion for Advanced Broadcasting Services (A-PAB) started test broadcast of 4K content via N-SAT-110A located at 110 degrees east from April 1. The significance of such broadcast is an initiative to utilize left-hand polarized transponders carried by this satellite. As is known Broadcasting Satellite System (B-SAT) and JSAT have been authorized by Ministry of Internal Affairs and Communications (MIC) to use only right-hand polarized frequencies until recently and such frequencies are fully utilized by both companies. In view of such circumstances MIC decided to allocated three left-hand polarized transponders to B-SAT and five to JSAT. Therefore it is a next logical step for A-PAB as a promotional association, to try test broadcast on new frequencies. Regardless to say the availability of more content is key to consumer adoption of 4K and 8K services.

Naoakira Kamiya is Managing Director, **Satellite System Research Institute** and Director of the **Japan Satellite Business Association** based in Tokyo, Japan. He is a frequent contributor to various satellite and broadcasting trade publications. He can be reached at: ZUM05241@nifty.ne.jp

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Satellite Antenna Innovations

by Virgil Labrador, Editor-in-Chief and Peter Galace, Associate Editor

Largely brought about by the growing number of High-Throughput Satellites (HTS) and other new satellite technologies, manufacturers are designing a new generation of antennas that cater to increase in higher satellite data downlink capacity, increase in bandwidth, beam number, and throughput, as well as capability to reduce RF interference. The growing innovation is producing smaller, lighter, and reduced power needs of antennas and also resulting in faster and more reliable voice, data and video traffic.

Developing the next generation antennas is revolutionizing satellite communications for many industries including aviation and aerospace and defense. But most companies continue to focus on antenna technology that enable low cost, high-throughput satellite connectivity in hopes of retaining their hold on the lucrative mobility market.

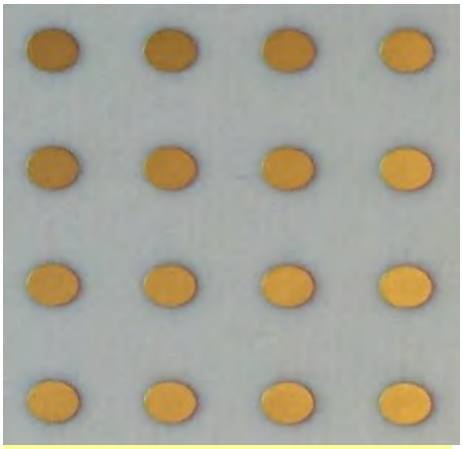
Today, many antennas are low cost and have no moving parts to adhere to the stability requirements of mobility, and many users now have a satellite terminal that would fit on smaller systems, such as in unmanned aerial vehicles. Some also have an all-digital payload that allows connectivity in any bandwidth increment from one beam to any beam, an upgrade on the high-performance technology first developed by Boeing Company for the WGS communications system.

Ka-band Phased Array Technology

Ottawa-based C-COM Satellite Systems Inc. said it has successfully tested its first Ka-band phased array modules based on the company's patent-pending phase shifter technology. C-Com said this makes it possible to deploy low cost, low weight, low profile Ku, Ka or hybrid Ku/Ka-band antenna system combinations for fixed and mobile satellite broadband communication applications.

With the antenna's expected modularity and ability to conform to curved surfaces, it will now be possible to deliver broadband high speed communications into vehicles, such as connected cars, boats, ships, trains, buses and aircraft, at reasonable prices and with reduced form factor. This new antenna system and its extension to higher millimeter-wave band will be deployed in telecommunications for the next generation 5G mobile cellular and millimeter-wave automotive radar.

This new phased array/phase shifting technology is expected to have a significant impact on the satellite antenna business. A working prototype of a 4×4 Ka-band intelligent antenna module, the size of a business card, employs a low-cost multi-layer planar circuit, based on an innovative architecture that is highly flexible, thin, modular, conforming and adaptive. The initial test results have shown that even with a few of the antenna elements turned-off, the module can still deliver an acceptable radiation pattern, without significant performance degradation. This is essential in situations when one or a few of the many elements of the active devices may have failed.



Prototype of C-COM's active 4×4 Antenna Module.

"This 'graceful degradation' is another unique advantage of the intelligent array systems, which have been implemented at the smallest module (building block) of this novel architecture," said Dr. Ali Safavi-Naeini of the University of Waterloo at its Centre for Intelligent Antenna and Radio Systems (CIARS), which helped develop the antenna.

"We are very excited about this new Ka-band antenna technology development and its potential application to expand the addressable markets for electronically steerable flat panel satellite antennas," said Bilal Awada, CTO of C-Com. "The 4×4 phased array modular approach provides the basic building blocks required to manufacture new Ka-band antenna designs of various shapes and sizes for fixed and mobile applications," continued Awada.

"These test results confirm that the technology can now be advanced to develop a high volume manufacturable product line of intelligent antenna systems in Ka and Ku-band frequencies and beyond," said Dr. Leslie Klein, CEO of C-Com. "It is a potential game changer for the mobile broadband satellite market—whether land-based, maritime or airborne—as well as for next generation 5G mobile cellular communications."

The phased array technology is not new and had been in the electronics world since early 20th century when it was demonstrated that an array of transmitting antennas can produce better signals. This technology has since im-

proved and a "phased" relationship among the antennas were further developed so that the physical antenna can be either stationary or fixed or may be electronically adjustable, as in beam steering antennas.

Gilat also has developed its own breakthrough technology for a fully electronically-steered array /phased-array antenna (ESA/PAA) using a "unit cell", composed of a custom designed MMIC (Monolith Microwave Integrated Circuit), which can be easily replicated to create arrays of different sizes. The system comprises of a dual aperture (transmit/receive) antenna architecture. The apertures may be different sizes, according to platform and service requirements. This makes the ESA/PAA antenna design highly scalable, with array dimensions that can be changed to optimally match specific gain requirements.

Gilat's technology is fully electronic with no moving mechanical parts. It is available in either Ku or Ka band, it is suitable for a large range of on-the-move platforms (arial, land, maritime), it meets varied satellite communication requirements or needs, and it can be designed for size and weights. It is also suitable for a large range of satellite communication on-the-move (SOTM) mobile platforms (aerial, land and maritime.)

Flat Panel Antennas

Kymeta's solution to deliver global, mobile connectivity and entertainment, while eliminating the need for bulky and unsightly dome antennas, hinges on its flat panel satellite antenna solutions. Kymeta says its metamaterial-based, lightweight, flat and thin antenna design will allow superyacht designers to embed the antenna into the superstructure of a vessel, allowing for beautiful, streamlined aesthetics like never before.

Kymeta and its partners, Panasonic, iDirect and e3 Systems, showcased its "no dome" yacht design during Superyacht Design Week in London in June this year. Trying to enlist the help of superyacht designers, the company held workshops, onsite 3-D demos, and showed prototypes of the new satellite antenna technology.

"Ultimately, superyacht designers and owners desire amazing designs, while at the same time having access to uninhibited global connectivity and entertainment," said Håkan Olsson, Vice President for Maritime of Kymeta. "Prototypes of Kymeta's flat panel antenna have already been successfully tested on yachts and in cars, and we are excited to expand our engagement with the superyacht industry for new builds and refits as we move towards commercial availability in 2017."

Kymeta said its new technology gives yacht owners scalable connection speeds with integrated, flat-panel antennas that can provide both internet and live TV capabilities. This cuts down on the need for multiple antennas, allowing for better design options and increased functionality. Kymeta

Kymeta Flat Panael Antenna

hopes to bring its first maritime product to market this year.

Kymeta is also working to deliver broadband internet access to cars using the same flat-panel antenna technology. The company said its revolutionary antenna can receive a reliable and secure data stream of up to 1TB/month. Its sleek and thin form factor is embedded in the top of the vehicle and it intelligently points at and tracks satellites—all with minimal power consumption; the ultra-secure connection reduces risk through authentication, system integrity, application integrity and attack surface reduction.

Another innovation, Kymeta's low-cost antenna, has no moving parts and provides a bidirectional communication network capable of supporting a global automotive deployment without traditional cellular constraints. The company said OEMs can leverage this connection for over-the-air vehicle updates, navigation routing with real time traffic, streaming media, finding points of interest, Wi-Fi hotspots and many other features.

Electronically Steerable Antennas

Another breakthrough in the antenna technology is the Electronically Steerable Antennas (ESAs), which aims to transform the delivery of broadband connectivity to moving platforms. The antenna's small size and low profile facilitates easy integration onto vehicle structures.

Phasor, Inc. has made some headway on this technology that effectively eliminates the need for the traditional parabolic antenna while, at the same time, allowing the antenna to seamlessly and reliably steer beams to GEO and LEO communications satellites.

Phasor, a developer of high throughput, enterprise-grade, modular phased array antennas, is creating modular antennas that makes it highly scalable and allows service providers and vessel/fleet operators to create very high gain antenna arrays with superior RF performance. This results in

dramatically higher speed broadband connectivity, at a much lower installation and operating cost. Phasor antennas will initially be made available in Ku-band. However, Phasor promises to move into additional frequency bands such as Ka-band in the near future.

Last year, the SME Instrument of the European Commission recognized that Phasor was developing a unique, game-changing technology, and awarded the company a prestigious €2 million (US$2.2 million) grant through its Horizon 2020 program.

"…manufacturers are designing a new generation of antennas that cater to increase in higher satellite data downlink capacity, increase in bandwidth, beam number, and throughput, as well as capability to reduce RF interference…"

Intellian's 2.4m Product Line

Intellian, a supplier of maritime satellite communication antenna technology, has growing international reputation for bringing patented innovation to the VSAT and TVRO market.

Recently, it was selected to perform a triple installation for the next generation Petronas Floating Liquid Natural Gas (PFLNG) vessel, boosting demand for its 2.4m product line in the Offshore Energy and Enterprise market segments.

Two v240 C-band VSAT systems managed by a Dual VSAT Mediator will provide uninterrupted operation of enterprise data applications and crew welfare solutions. Live TV entertainment will also be available via a third 2.4m system providing simultaneous reception of C- and Ku-band anywhere in the world. The t240CK features Intellian's patented WorldView LNB and the company's proprietary Fiber Link optical IFL solution, which delivers near zero loss between above and below deck modules for cables up to 2 km in length.

Intellian is one of the leader in the GX maritime field, with over 4000 systems currently in service capable of converting to GX through a simple 10-minute process all executed through the access hatch in the base of the radome. Of the vessels who have adopted the new high speed service, Intellian claims 90% have chosen their product over the competition since it came online early this year.

Intellian's latest antennas are the critical link to Fleet Xpress, the revolutionary broadband satcoms service delivered through the Inmarsat GX satellite constellation, which brings commercial shipping and offshore subscribers high-speed data transfer between ship and shore. Fleet Xpress opens up unlimited possibilities for maritime applications, and the real-time monitoring and data analysis that will enable smarter and more efficient shipping.

Designed for optimized service quality over Fleet Xpress and available worldwide. Antennas come in specially pre-packed systems, delivered to the quay, which can be installed and online in just a few hours.

Intellian is also shaking up the satellite TV antenna through its i-Series antenna because of its unique combination of coverage and compactness. Its TVRO portfolio now includes the all-new i5 creates a fresh size category of marine satellite TV systems, and is a direct result of Intellian's user-focused product approach. The compact system offers cruisers the opportunity to experience coverage extending from US waters and throughout the Bahamas, Caribbean and Mexico, without compromising the aesthetic and physical requirements of their boat.

Intellian VP Global Marketing, Paul Comyns, says the i-Series antennas provide TV reception for boats as small as 20ft all the way up to the most luxurious yachts.

Block Up Converters

The ever increasing demand for higher data throughput on the uplink to satellites has triggered demand for antenna systems with higher power RF performance. Cobham Satcom, based in Copenhagen, caters to this need when it launched in July its new Ku-band antenna in the market, which has the potential for higher throughput uplinks even in tropical climates.

Cobham Satcom's new version of its Sailor 900 VSAT Ku-band antenna features a new Block Up Converter (BUC). The antenna makes it easier and less costly to ensure high availability of service as there is no need for additional hardware. It also delivers the potential for satcom service providers to deliver higher uplink bandwidths. The innovative 20W BUC in the its Sailor 900 VSAT High Power antenna also ensures reliable operation in warm, humid climates without the need for air conditioning systems in the antenna, despite the radiated power level increase from 8W to 20W.

Cobham said the new Sailor 900 meets the requirements of shipping companies for high Service Level Agreements (SLA), especially when a dual antenna configuration is required due to obstructions that cannot be overcome by setting up blocking zones.

The product has been tested to work on HTS services, including Intelsat's EpicNG. Sailor 900 is also prepared for conversion from Ku- to Ka-band operation on services like Inmarsat Fleet Xpress or Maritime Ka-Band on THOR 7 from Telenor Satellite, should the end-user request it. Its updated electronics, a precision reflector dish and radome tuned

for optimum performance on both Ku- and Ka-band frequencies ensure that SAILOR 900 VSAT High Power is an incredibly flexible solution.

Recently, Cobham Satcom's Aviator 300D system received a Civil Aviation Administration of China (CAAC) Validation of Supplemental Type Certificate (VSTC) for installation aboard the Airbus A320 series. It is the first time a SwiftBroadband ACARS (Aircraft Communication and Addressing Reporting System)-capable modem has received Chinese certification.

The significant Supplemental Type Certificate (STC) means that Chinese airlines and Chinese-registered aircraft can now order and install the Cobham solution on the Airbus aircraft A319, A320 and A321 to benefit from improved communications, connectivity, flight safety and operations on-board.

Airborne Stabilized VSAT Antennas

In March 2016, Orbit Communications Systems, Ltd, a provider of mission-critical communication solutions for land, sea, air and space applications, based in Israel, introduced an innovative airborne stabilized VSAT antenna system for various aircraft. This provides high throughput and quality broadband communication via satellite, the company has already received an order for several AIRTRx 60 systems from an Asian customer.

Designed to accommodate the regional and global coverage needs of the airborne communication market, the low-weight AirTRx 60 is built to empower critical applications. The antenna complies with the most stringent worldwide satcom regulations and certifications, including RTCA/DO-160G. Following the demand from the government and defense market, Orbit released its MPT 60 Airborne VSAT Antenna systems suitable for mission aircraft and UAVs.

AirTRx 60 and MPT 60 support Ku or Ka bands, featuring outstanding RF performance and dynamic response under virtually any operating environment. Switching between RF bands requires a simple replacement of the feed. Additional features include among the rest: multiband support, minimal swept volume, short lead time, INS and RF tracking.

Erez Shabirow, Orbit's CEO, said the company continues to make significant investments in R&D – reflecting customer demand for comprehensive, reliable, compact and continually more complex broadband infrastructure for audio, video, data and Internet.

In March 2016, Orbit showcased at HAI Heli Expo 2016 in Louisville, KY its new line of airborne audio communication solutions. The company's Orion brand is powered by a patented Dual IP Ring topology that offers 3D audio, noise reduction, system redundancy, incremental scalability and flexibility; all with reduced Swap-C. The Dual IP Ring eliminates the need for a central communication unit and thus reduces LRU count and system SWaP-C.

Dual IP Ring topology provides inherent redundancy and is ideal for 3D audio implementation. Orbit's 3D technology uses advanced binaural and psycho-acoustic principles, giving a unique and natural perception of sound as coming from a particular direction and providing pilots with a 360-degree clear audio experience that boosts their situational awareness.

Orbit has been developing and manufacturing airborne communication systems for more than 40 years with thousands of systems deployed and flying. Through these core business activities, the company has developed strong expertise in avionic communication management systems and airborne satellite communication systems.

AvL's Mobile Satellite Antennas

Also making lots of headways in antenna innovations is AvL Technologies, a privately held US company specializing in the design, development and production of mobile satellite antenna/positioner systems. AvL provides systems integrators with positioner and complete antenna system products, product development and services.

In 2013, O3b contracted AvL to design and produce a 1m class and 2m class transportable antenna that could support crises and contingencies around the world. The transportable O3b Ka-Band terminal will offer the power of O3b's high throughput, low latency connectivity in a compact and transportable design.

Today, O3b is working with AvL Technologies and the U.S. Marine Corps Tactical Systems Support Activity (USMC MCTSSA) to test and evaluate the new technology at Camp Pendleton, CA.

The new system will serve governments, first responders, and markets such as media. The antenna is designed to be a rapid-deploy, tactical terminal with a geared drive for continuous operations, and operates in tandem pairs with make-before-break communications. It can also operate as a single antenna, with a short break-before-make operation. To increase efficiency and flexibility, the system is designed to be transported in durable transit case that can be unpacked, set-up and on the air within 90 minutes.

During initial set-up and testing at Camp Pendleton, the team observed up to 455 Mbps downlink (from satellite to terminal) and 137Mbps uplink (from terminal to satellite) with round trip time latencies less than 150 msec over the 85cm system, using Speedtest. The high speeds and low latencies has so far impressed testing agents, and other gov-

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ernment agencies are already lining up to observe and experiment with the system at Camp Pendleton.

AvL provides solutions and support for satellite ground terminals for SNG, mobile broadband Internet access, Disaster Relief, Oil & Gas Data Backhaul, and Defense & Homeland Security customers throughout the world. AvL offers the world's largest range of satellite antennas for vehicle-mount and flyaway applications with sizes ranging from 60cm to 4.6M. Thanks to state-of-the-art manufacturing capabilities, cutting edge designs and development, AvL antennas are extraordinarily sturdy, efficient, and reliable. In addition, AvL is well known for providing adept customization to meet specific needs and requirements.

Among its most innovative products are military antennas which provide applications from vehicle mounted to flyaway applications. While the vast majority of military applications to date have relied on commercial satellite interoperability, especially at Ku -band, AvL is now leading the industry in the delivery of systems that will operate over the next generation of military satellites, including Xtar (X-band) and the new US Army Wideband Global Satellite (WGS) constellation (X- and Ka-band). Most of our military antennas can be offered with upgradability to X- and Ka -bands of operation.

Conclusion

The innovative products that the satellite antenna market is bringing in the industry is a good portend of things to come for the overall satellite industry. Watch this space for further developments.

Virgil Labrador is the Editor-in-Chief of ***Satellite Market and Research*** based in Los Angeles, California. He is the author of two books on the satellite industry and has been covering the industry for various publications since 1998. Before that he worked in various capacities in the industry, including a stint as marketing director for the Asia Broadcast Center, a full-service teleport based in Singapore. He can be reached at: *virgil@satellitemarkets.com*

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Teleport Operators Like What They See in the Sky

by Robert Bell

Every year for the past seven, the World Teleport Association has surveyed teleport operators to learn their view of the commercial and operational practices of the satellite operators they do business with. The project got its start out of serious concerns among teleport operators about competition from their satellite vendors for managed services business. Given the control that satellite operators have over this pricy part of the connection, teleport operators saw themselves at a competitive disadvantage. They turned to their trade association for help.

Our solution was simple. Instead of having worried conversations in meeting rooms, it was time to have a conversation out loud, and to let the teleport sector to express its concerns with one clear voice. Seven years on, that single voice has produced results.

Getting Better All the Time

In the most recent *Satellite Operator Benchmarks* report, published in March 2017, teleport operators rated the commercial performance of satellite operators 9% better than the previous year. They rated the operational performance 11% better than in the previous year. Most important, these improvements were not one-offs but part of multi-year trends to which we believe this series of reports has contributed.

In 2014, only 25% of teleport operators gave high marks (a "strong" rating) for commercial performance to the satellite operators covered that year. By 2017, 64% rated their satellite operator's commercial performance as strong. Ratings covered the quality of personnel and commercial procedures, transparency and fairness in pricing policy, flexibility of commercial terms, and the amount and fairness of direct competition for managed services business.

Regarding operational performance, respondents to the 2014 survey rated 50% of their satellite operators as strong performers. By 2017, that percentage had leaped to 85% even as the number of satellite operators covered by the survey expanded. Operational ratings covered availability and the handling of RF interference, outages and frequency grooming.

Competitive Pressures

These trends are encouraging, but commercial tensions persist around the original issue of competition between customer and vendor. Such competition takes place in every business. The questions asked by the Benchmarks studies is how frequent that competition is and – much more importantly – how much of a competitive threat it poses in the eyes of teleport operators.

Competition there certainly is. Intelsat, SES and AsiaSat were cited as direct competitors for similar managed service business by 50% or more of respondents, and Eutelsat by 48% of respondents. Telesat, Arabsat and Gazprom were cited by fewer than one-third of respondents as direct competitors.

The more pressing question is how much that competition represents a significant competitive threat. The structure of the market gives satellite operators the ability to discount teleport services as part of a combined teleport-and-satellite deal to reach a price that no teleport operator can match while staying in business. It is behavior with a short-term benefit to the satellite operator. But taken to extremes, it will damage the industry's ability to serve customers everywhere and to provide an innovative range of services.

Of the seven operators covered in 2017, two were seen as offering little competitive threat. Another four were cited as high-threat by one-third of respondents. Only one operator was cited as a major threat to their managed service business by nearly half of respondents. Yet even this operator was seen as less threatening in 2017 than it had been in 2016. Overall, perceptions of threat declined for all but one satellite operator over the past three years.

For satellite operators, teleports are not just another customer. They are a partner crucial to the success of the business. Through the Benchmarks studies, WTA seeks to objectively track, rate and compare the commercial and operational performance of satellite operators, as experienced by their teleport customers. There are good commercial reasons for doing so, but the real aim is to strength the industry by driving self-improvement across all companies.

If the 2017 results are any indication, I think we're getting there.

Robert Bell is Executive Director of the World Teleport Association, which represents the world's most innovative teleport operators, carriers and technology providers in 46 nations. He can be reached at: rbell@worldteleport.org *Satellite Operator Benchmarks* is available free to members and for sale to non-members.

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Products and Services MarketPlace

A guide to key products and services to be showcased at CommunicAsia 2017 in Singapore from May 23-25, 2017.

ABS
booth # 1R3-01
www.absatellite.com

ABS operates a global fleet of satellites including ABS-2A at 75 °East the latest addition to the satellite fleet. ABS provides capacity to support video and television distribution, cellular backhaul, broadband trunking and maritime connectivity. Its extensive teleport network provides comprehensive coverage to 93% of the world's population including Africa, Middle East, Asia Pacific, Russia/CIS and the Americas. ABS has strategic alliances and partnerships with state-of-the-art communication hubs to deliver the best possible satellite solutions.

Advantech Wireless
booth # 1H2-01
www.advantechwireless.com

Advantech Wireless supports the critical need for High Throughput Satellite communications in a rapidly expanding digital environment. Our proven low-cost and highly reliable system solutions are meeting the ever-increasing need for high-bandwidth communications essential to broadcasters. We integrate award-winning research and development engineering into our designs. The result: custom solutions with lowest overall capital and operating costs, together with an unparalleled commitment to lead the industry in materials, design and reliability.

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AQYR
booth # 1Q2-11
www.aqyrtech.com

AQYR is a land terminal provider of Tactical SATCOM Solutions, used by Military & Defense, Public Sector, Foreign Governments, Commercial & Enterprise markets. AQYR designs and manufactures highly portable GBS and 2-way Ku/Ka-band full auto-acquisition, single case portable ground terminals. These intuitive, patented, auto-acquire terminals are developed from our 14 years' experience as the Tactical SATCOM Systems Provider.

AvL Technologies
booth # 1N1-01
www.avltech.com

At CommunicAsia 2017, **AvL Technologies** will showcase The Family of Integrated Terminals (FIT), AvL's newest line-up of flyaway antenna systems. These antennas are designed to accommodate current and future modem, RF and satellite frequency options. On display in our booth will be two aperture sizes – a 1.35m and a 0.98m. This new line of user-configurable, IATA checkable and carry-on satellite terminals are ultra-compact, ultra-lightweight, ultra-high performance fully integrated systems, upgradeable from the baseline manual-point configuration to a motorized, auto-acquisition platform.

Featured in our booth will be a 1.2m O3b MEO tracking Ka-Band antenna. The antenna offers the power of O3b's high throughput, low latency connectivity in a compact, easily transportable and rapidly deployable design. The antennas operate in tandem pairs (same size) with make-before-break communications.


AvL 1.35M Fully Integrated Terminal (FIT)

We also will have our 85cm auto-deploy flyaway fully-integrated solution that packs into two airline checkable rugged cases, loaded with features including multiple modem choices, and mission-configurable weatherproof electronics enclosure with the latest power efficiency technology. Additionally we will have a 1.2m SNG motorized vehicle-mount Ka-Band antenna with a swappable Ku-Band feed displayed in our booth.

C-COM Satellite Systems Inc.
booth # 1Q4-14, BG2-07
www.c-comsat.com

Be sure to stop by **C-COM's** booth at CommunicAsia Singapore to see the new iNetVu Ku-band Manpack system. This 80cm or 1M backpack portable antenna can be set-up in less than 10 minutes and is available either as an auto-deploy or manual point solution. C-COM

will also display our Next Generation 98cm Driveaway and Flyaway Ku-band antennas, both of which are field upgradeable to Ka-band.

The iNetVu® 981 Drive-Away Antenna is a 98 cm Ku-band/X-band auto-acquire satellite antenna system which can be mounted on the roof of a vehicle for Broadband Internet Access over any configured satellite. The system works seamlessly with the iNetVu® 7024C Controller providing fast satellite acquisition within minutes, anytime anywhere. Field upgradable to Ka-band.

Visit the booth to view demos of our growing product line and learn more about C-COM's progress in the design and development of a new generation Ka-band and Ku-Band COTM (Comm-on-the-Move) antenna, which will deliver satellite broadband solutions into vehicles while in motion.

COMTECH EF Data
booth # 1T2-07
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).

Stop by the Comtech booth #1T2-07 and ask us about Heights Dynamic Network Access (H-DNA). H-DNA is an evolution in satellite access technologies. We welcome the chance to share how this new technology:

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COMTECH Xicom Technology
booth # 1T2-07
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.

Comtech Xicom Technology will be showcasing its SuperCoolTM family of amplifiers which has many practical advantages over traditional air-cooled amplifiers including: ambient noise reduction, ease of service and maintenance, higher reliability, reduced heat load in hubs, flexible and compact installation and gain stability over ambient temperature. The Comtech Xicom design incorporates integrated cooling channels in the amplifier baseplate, external to the high voltage and RF circuitry and drip-free connections. Liquid cooling is available across the high-power end of the product-line, including: the new SuperPower 2000W, and 1500W products; the 1250W, 750W, 500Ka and 250Ka family of amplifiers.

Gazprom Space Systems
booth # 1U2-01
www.gazprom-spacesystems.ru

Gazprom Space Systems (GSS) – one of two Russian national satellite operators which holds 30% of the satellite capacity market in Russia. At IBC2016 GSS presents new opportunities of its space telecommunications system based on four satellites: Yamal-202 (49E), Yamal-402 (55E), Yamal-401 (90E), and Yamal-300K (183E). Total Yamal satellite constellation capacity amounts to 248 equivalent transponders of 36MHz and about a third of it is concentrated in beams pointed over territories outside Russia.

INTEGRASYS
booth # 1U2-10
www.integrasys-space.com

INTEGRASYS is the satellite carrier monitoring technology leader for telecommunication and broadband Markets. INTEGRASYS is highly specialized on Carrier Signal Monitoring, Interference Detection and VSAT autocommissioning systems and SNGs. Our software products are the state-of-the-art in Control Systems in terms of speed, flexibility, efficiency and scalability and introduces a new concept in signal monitoring communications.

ND Satcom
booth # 1V1-01
www.ndsatcom.com

At CommunicAsia, **ND Satcom** will be showcasing its SKYWAN modem family— a reliable, flexible and versatile satellite communication platform for customer centric networks. It is a bi-directional MF-TDMA plus DVB system that supports voice, video and data applications in the most bandwidth efficient manner.

The new SKYWAN **5G** unlocks new business opportunities for service providers. Total cost of ownership is significantly reduced thanks to the fact that only one type of device is needed for all roles in the network.

Newtec
booth # 1P2-01
www.newtec.eu

Newtec, a specialist in designing, developing and manufacturing equipment and technologies for satellite communications, will be showcasing at the NAB its most advanced VSAT modem to date – the first on the market to support wideband DVB-S2X , the Newtec MDM5000 Satellite Modem. The MDM5000 is capable of receiving forward carriers of up to 140 MHz, and processing over 200 Mbps of throughput. On the return channel, it supports SCPC, TDMA and Newtec's unique Mx-DMA™, up to 75 Mbps.

RF-Design
booth # 1L2-10 (German Pavillion)
www.rf-design-online.de

RF-Design specializes in developing, manufacturing and marketing high quality RF distribution solutions for the international satellite, broadcast and broadband communications market. Our product range includes a wide range of **Switch Matrix systems, RF-over-Fiber solutions, Splitters Combiners, Switches/Redundancy Switches, Line Amplifiers, RF/DVB Signal Quality Analyzers** and **LNB-supply control systems**...perfectly suited for applications in teleports, satellite earth-stations as well as broadcast and broadband RF distribution infrastructures.

We also have strong capabilities to design and to manufacture custom-made RF distribution solutions for your individual needs. All our products are developed, manufactured, tested and approved in our own facilities in Lorsch/Germany and characterized by high quality, reliability and superior RF performance.

At CommunicAsia 2017 we will demonstrate our unique, innovative and clever Switch Matrix systems **"FlexLink-K7-Pro"**, our RF-over-Fiber system **"RedLink+ FLCRplus"** allowing N+1 and N+2 redundant optical transmission as well as our new **"LSEL/LCEL EcoLine low-cost type Splitters/Combiners"**. Join us at our booth and we look forward to welcoming you and to talking about your individual RF equipment requirements.

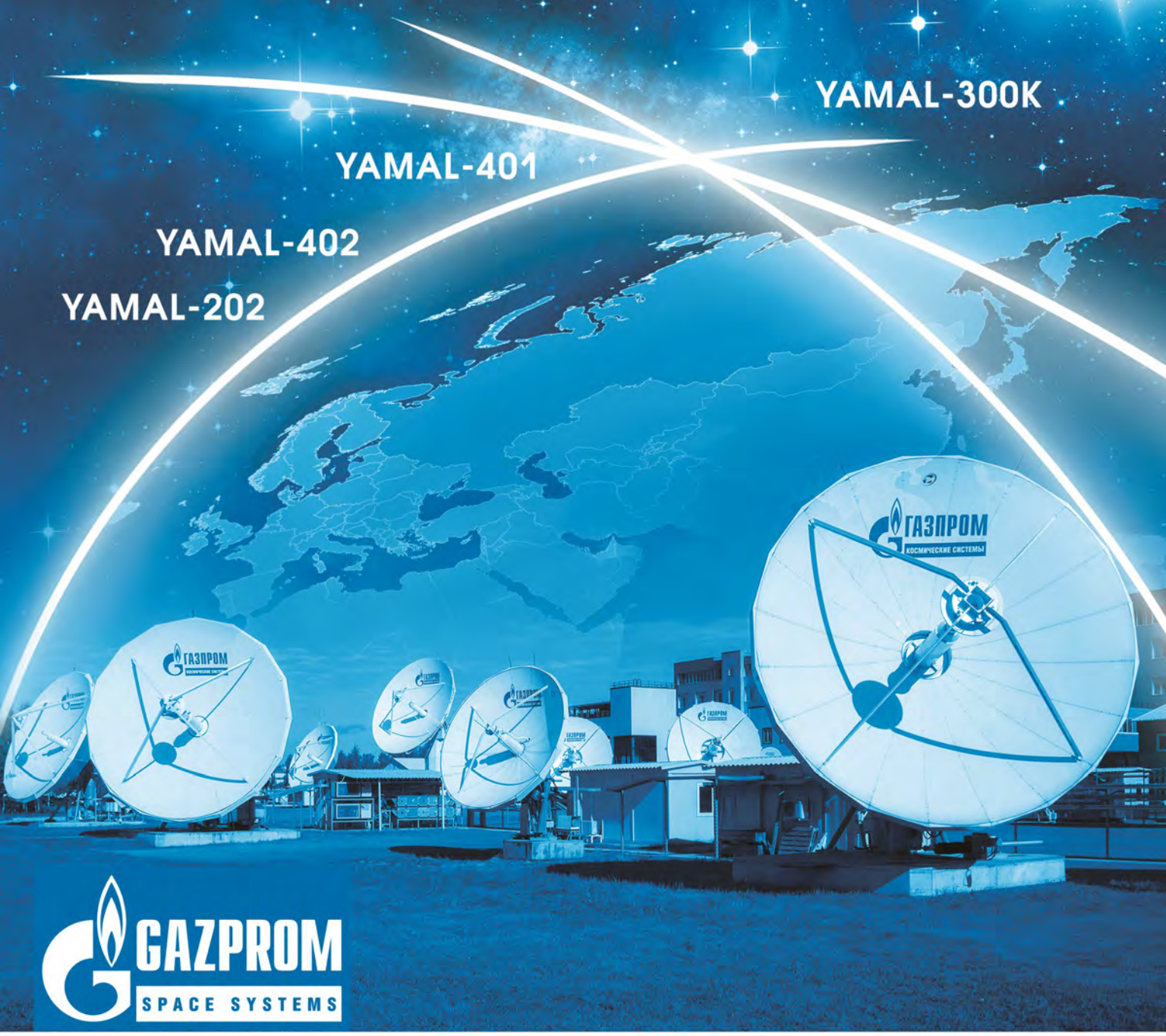
Terrasat Communications, Inc.
booth # 1Q2-12
www.terrasatinc.com

Terrasat began in October, 1994, specializing in engineering design and manufacturing of advanced radiofrequency products for satellite and terrestrial microwave communications systems. Today, the company is focused on innovative RF solutions for satellite communications. The ground-breaking IBUC – Intelligent Block Up converter – brings full-featured, carrier-grade performance to commercial and military satellite communications terminals.

Work Microwave
booth # 1V2-07
www.work-microwave.com

At CommunicAsia 2017, WORK Microwave will demonstrate how satellite operators in the Asia-Pacific region can dramatically increase flexibility, bandwidth, and margins while reducing their operational costs by using its portfolio of analog and digital satcom solutions. The latest innovations on display include one of the world's first end-to-end solutions for DVB-S2X wideband transmission and reception.

WORK Microwave devices are deployed by operators worldwide to support a range of applications within the satellite broadcast and satellite communications markets, including SNG/contribution, direct-to-home, IP networking, teleport management, governmental, and more.



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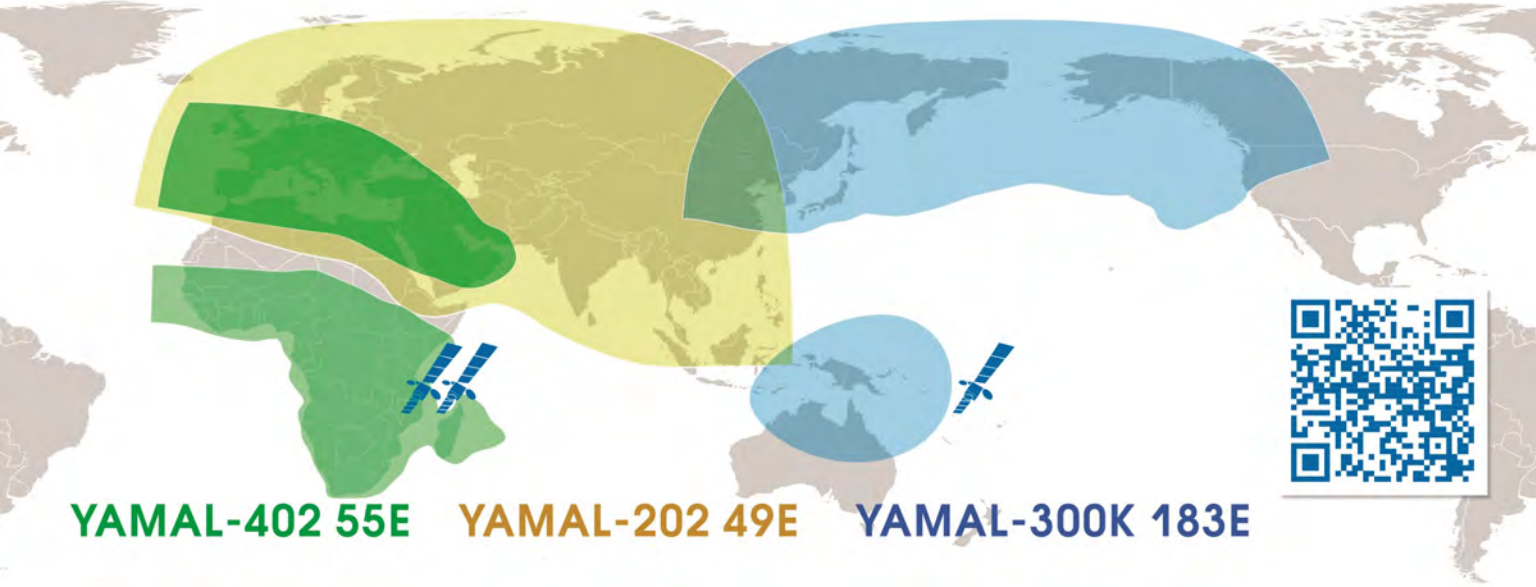

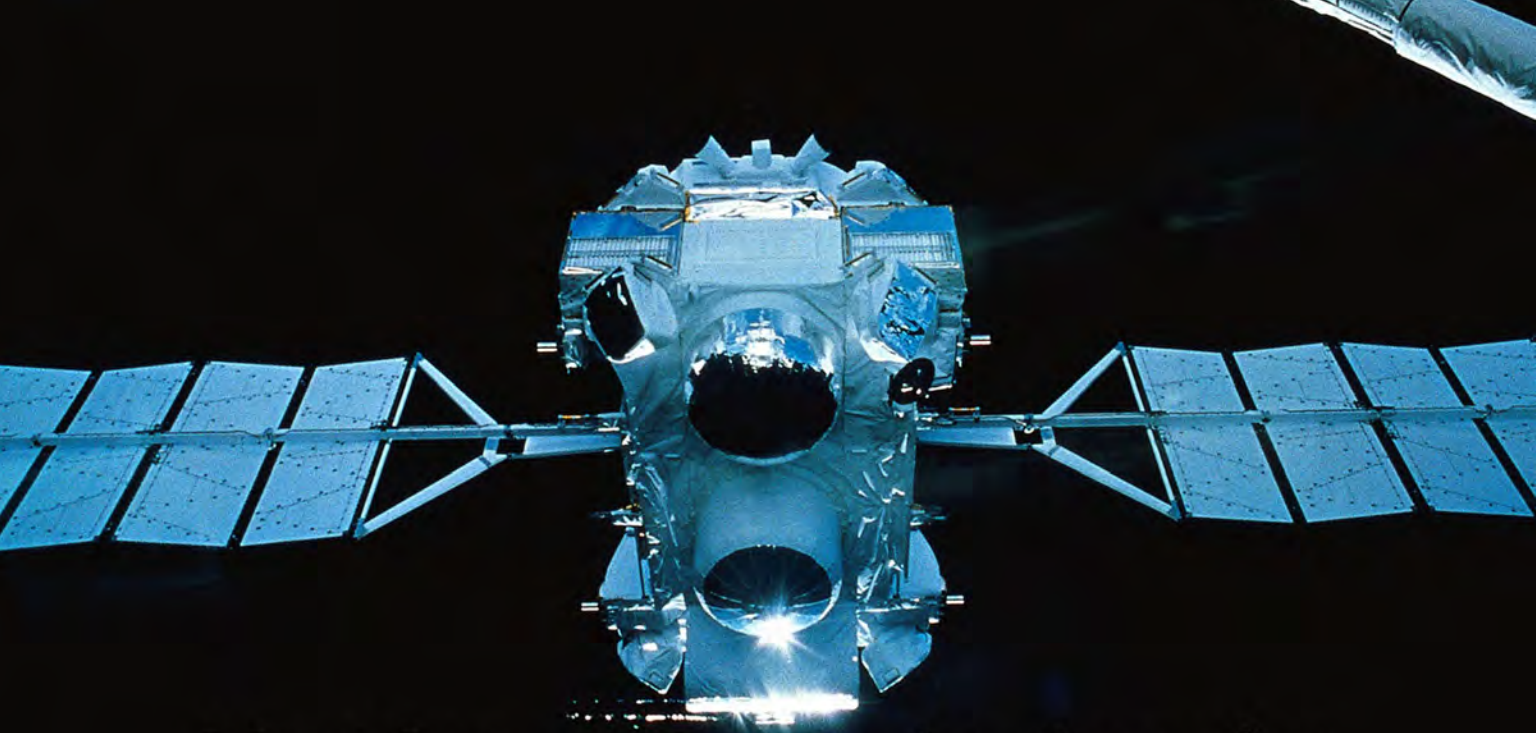

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Crystal Acquires Video Design Software, Inc.

Duluth, Georgia, April 18, 2017– Crystal, a provider of advanced software control systems, has completed the acquisition of Video Design Software, Inc. (VDS) a New York-based broadcast control and graphic data insertion software company.

Crystal will integrate the acquired VDS technology into its monitoring, control and metadata management solutions for video distribution over satellite, cable and internet. The incorporation of VDS technology into Crystal's expanding OTT/Streaming product line will offer Crystal's customers the ability to enhance reach, engagement and monetization of their high-value content. VDS has transitioned all operations to Crystal, including sales, marketing, management and support of all its products.

"The VDS Streamliner software is a natural complement to Crystal's Insight suite of products," said Roger Franklin, CEO of Crystal. "We will use the company's graphics and digital asset management control systems to selectively extend our product line. We have been discussing the prospect of a business relationship with VDS for several years, and 2016 was the right time for both parties. We have some exciting things planned for the community both of us serve"

A key part of the transaction will be the addition of VDS founder and CEO, Larry Mincer to the Crystal team as Senior Sales Consultant. Larry brings with him 40 years of industry experience, particularly in automation system integration for frame accurate metadata and graphic insertion. During the first half of 2017, Larry will ensure the smooth integration of VDS products into Crystal's offerings, and transition of operations to Crystal. "Larry brings relationships gained over decades in the industry that will be important to our growing customer base," Roger added. "We are both passionate about making the OTT streaming evolution possible for our customers and have a common vision based on the vital importance of metadata for the future of video."

"I'm looking forward to joining Crystal," said Larry Mincer. "Collaboration on product development offers customers an inclusive approach to automation for content distribution. VDS's advanced metadata toolset will allow Crystal's customers to boost audience engagement for both linear and OTT content."

The terms of the transaction were not disclosed.

Hytera Enters Definitive Agreement to Acquire Norsat

VancouverBritish Columbia, Canada, March 27, 2017– Norsat International Inc. (TSX: NII and NYSE MKT: NSAT), a provider of unique and customized communication solutions for remote and challenging applications, announced that it has entered into an arrangement agreement (the "Arrangement Agreement") with Hytera Project Corp. a subsidiary of Hytera Communications Co., Ltd. pursuant to which Hytera will acquire all the issued and outstanding shares of Norsat for $10.25 in United States dollars ("USD") in cash per share, pursuant to a court-approved plan of arrangement (the "Arrangement"). All unexercised options and restricted share units will also be acquired under the Arrangement. The proposed transaction values Norsat at an equity value of approximately $62 million USD.

As previously disclosed by Norsat on March 17, 2017, Privet Fund Management LLP ("Privet") submitted a non-binding letter of interest to acquire the Company for cash consideration of $10.25 USD per share subject to due diligence, financing, the completion of a definitive agreement and other conditions.

At that time, Norsat and Hytera were in exclusivity with respect to a possible transaction. Based on Hytera's offer of the same cash consideration as indicated in Privet's non-binding letter of interest, with no further due diligence, no financing conditions and the synergies between Norsat and Hytera including but not limited to a greater global sales presence, access to additional markets and research and development collaboration, the Independent Directors of Norsat's Board of Directors decided to proceed with the Arrangement Agreement.

Oilfield Connectivity, HTS and Mobile Backhaul

by Martin Jarrold

GVF is somewhere "on the road", representing the interests of the satellite industry in a conference, seminar, workshop, or symposium, at least every alternate week of the year. Many of these events are partnerships with the major commercial event organizers, who collaborate with GVF to secure innovative content for their programs. Other events are those held by international organizations such as the ITU. Others are organized by the major research and consulting organizations, and also by our sister associations. Still others comprise the portfolio of the GVF-EMP Conference Partnership, for which May and June are two very busy months, featuring: [1] ***Oilfield Connectivity 2017*** *- The Next Generation Digital Oilfield: New Revenue Streams from M2M & IoT to Applications in the Cloud*; [2] ***High Throughput Satellites - The DC Roundtable:*** *Show Me the Margin, and the Spectrum, and the Value Chain, and the Hardware, and the Investors, and…?* [3] ***Cellular Backhaul 2017:*** *Smartphones & Tablets to the Satellite Network... and the World*.

For ***Oilfield Connectivity 2017*** GVF is Aberdeen-bound. This conference, on 10th May, will be the GVF-EMP Partnership's 10th anniversary event to focus on the communications networking imperatives of the global digital 'oil & gas patch', and for the first time the conference – which is sponsored by Hughes, Inmarsat, SES, Advantech Wireless, and iseaglobal – will feature speakers from (in alphabetical order) CETel GmbH, Clyde Space, Europasat, E-WAN Networks, iseaglobal, Kratos Networks, LeoSat, Phasor Inc., and the Scottish Centre of Excellence in Satellite Applications (SoXSA). As announced in a recent GVF press release, the event will for the first time engage in discussion covering LEO constellations and nanosatellites in the oil & gas user vertical.

In *Session 1: Communications Technology Solutions & Building the Digital Oilfield* the conference will cover themes including 'Satellite for Oil & Gas: Market Perspectives & Technology Roadmap', 'Satcom Technology to Optimize Oil & Gas Operation', and 'Solutions for a New Age in Space: The Role of the Nanosatellite in the IoT/M2M Revolution', and will hear from HispaSat; Comtech EF Data; PHASOR Inc; Advantech Wireless; Gilat Satellite Networks; and, Clyde Space.

Session 2 will explore *Communications Service Solutions & Building the Digital Oilfield* and panelists will represent iseaglobal, LeoSat, SpeedCast, CETel, and GVF to discuss such themes as 'Exploration & Production Satcom Business Models: Getting More, Paying Less', 'A Unique Low Earth Orbit Data Network Solution for Smarter Oilfields', 'Hybrid Networks for Oilfield E&P: Matching the Needs with the Right Solution' and 'The GVF Cyber Security Task Force (CSTF) in Oil & Gas'.

Digital Oilfield Applications: Development & Roll-Out is the subject of Session 3 and will be addressed by SpeedCast, E-WAN Networks, Access Partnership, and an independent Connectivity Expert investigating such themes as 'High Demand Communications for Crew Welfare, Crew Safety, and Crew Training Applications', 'Unified Communications Infrastructures: Case Studies', 'M2M Regulatory Challenges', and 'Satellite: IoT & M2M – Why They Are Different, Customer Perspectives'.

The final section of the program, Session 4, is entitled *The Greater Connectivity Ecosystem in the Oil & Gas Environment* and will feature discussion around the themes 'IP-SEC VPN & CIR for Voice over Satellite', 'Operational Innovation in the Satcoms Toolbox: Mitigating Signal Interference & Degradation', 'Satellite Data: Connectivity Challenges & Innovation' and, 'Satellite Interference: Prevention Strategies' amongst speakers from EuropaSat, Kratos Networks, the Scottish Centre of Excellence in Satellite Applications (SoXSA), and GVF.

Just one week after the Aberdeen program, on 16th May, we return to the dialog on HTS in Washington DC with ***High Throughput Satellites - The DC Roundtable***.

The Roundtable – held in coordination with other top industry associations, including: the Mobile Satellite Users Association (MSUA), the Satellite Industry Association (SIA), the Society of Satellite Professionals International (SSPI), and the Washington Space Business Roundtable (WSBR), sponsored by Hughes, Inmarsat, SES, and Advantech

Wireless, and with NSR as Content Partner – will address the fundamental question "Is there enough investment, technology, regulation & customers to support thousands of satellites?" This, and other, questions such as:

How will the integration of GEOs, MEOs & LEOs impact HTS satellite industry portfolios… and will that integration become a competitive necessity? and,

What does the new value chain look like? And how will companies who have been fixtures in the traditional business survive… and thrive?

Have been prompted by the plans of the communications and earth observation industries to launch more than 5,000 satellites in the near-term, and with additional questions tabled, such as: Will growth be dominated by mobility, the Internet of Things, Smart Cities, Connected Cars, and wireless backhaul, with a huge addressable consumer broadband market?

Reflecting not only the extent to which the HTS dialog has expanded way beyond original discussion around spot-beams and frequency re-use technology, but also reflecting the breadth of the interests attending the event, from flat-panel antenna manufacturers to operators of small-satellite constellations, and specialists in mobility and 5G backhaul to the Internet of Things.

Cellular Backhaul 2017 follows next on 22nd June, in London, to explore the current interaction between the satellite and wireless industries, the current and future growth of data traffic from mobile devices, and how that will impact both cellular and satellite networks. Featured themes for the program include:

Network Stretch & Technology Challenges: The satellite industry is at a crucial stage of evolution, with more data coverage "in build", and due to be launched, than on all the satellite communication payloads ever launched combined. The wireless industry is seeing data usage by business and consumers doubling regularly, posing network stretch and technology challenges across the spectrum. With the growth of M2M, the exponential expansion in the internet-of-things, and 5G in coming years, these challenges may make 4G LTE seem like a simple dial up deployment of the past.

1000 Times More Data Traffic by 2020: One of the most significant challenges in the mobile services market is achieving scalable, flexible backhaul, particularly as markets move to 4G/LTE networks which are forecast to need to support 1,000 times more data traffic by 2020. The backhaul optimization technologies used to reduce bandwidth which have been introduced cannot solve all backhaul challenges, especially as the roll-out of LTE continues. As a result there is a need for cost-effective mobile backhaul over satellite for global 3G/4G expansion to relieve congestion.

Reducing Cost: Mobile operators must deliver their services at the lowest possible total cost of ownership. The cost of backhaul is one of the most important factors. Traditionally, satellite backhaul was an expensive option, but with HTS this is no longer the case – even in areas supported by terrestrial access. Within the next few years, it is predicted that the cost of Mbps over satellite will drop by a factor of six.

Mitigating Latency: Latency is challenging for mobile operators. With a GEO satellite link latency potentially resulting in a round-trip delay of 500 to 600 milliseconds. This affects the response time of 3G/4G/LTE data applications when sent over satellite, resulting in wasted satellite capacity, link under-utilization and poor performance. Latency is a matter of physical law, but the application side can help mitigate the effects of latency. Caching also helps as a way of reducing latency, as does TCP acceleration/ backhaul optimization, reducing satellite bandwidth needs, enhancing mobile users' experience and network performance, increasing network throughput and improving network response times and reliability.

Link Availability: Some HTS systems are susceptible to rain attenuation/ fade during bad weather conditions, resulting in service disruption. The solution is a secondary communication path added at base stations so that voice and signaling can be routed over high availability terrestrial or C-/Ku-band routes, while the packet service runs over HTS, maintaining the use of the existing infrastructure and ensuring voice and signaling stays on low latency and highly available communication paths but provides an alternative backhaul approach for service providers, therefore, eliminating the need to upgrade expensive terrestrial communication paths.

Emerging LTE & Small Cell Deployments: Mobile network operators (MNOs) want innovative backhaul architectures that are robust and flexible to accommodate shifting traffic loads on mobile network sites without massive bandwidth over-provisioning. Importantly, MNOs are looking at the segmenting of macro-cells into smaller (femto-, pico-) cells, a trend presenting new challenges for the satellite backhaul vendor.

The Evolution of Communications using Smart Mobile Devices: Additionally, the conference will explore how the two industries may better mutually benefit from collaboration and cooperation, both today and in the future, Whilst there is no one fixed technological winner known, or expected, in the years ahead, invited panelists, moderators and attendees will have the opportunity provided by this event to share in current leading thoughts, plans and technology developments for a world that will shape, and be shaped by, the evolution of communications using smart mobile devices.

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

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Antonovich Appointed CEO Of Eutelsat Americas

Paris, 26 April 2017 – Eutelsat Communications (NYSE Euronext Paris: ETL) announced that **Mike Antonovich** is joining **Eutelsat Americas** as Chief Executive Officer.

Antonovich, a longtime satellite and telecommunications industry executive, began his career at ESPN as a broadcast engineer. He held a number of sales and marketing functions during a lengthy career at PanAmSat, including

Mike Antonovich

leading PanAmSat's global sales team. He has more recently been CEO of Genesis Networks, Senior Vice President for the Americas for ATEME and Senior Vice President Global Sales for Global Media Links in Japan. He will leverage his broad experience across media, broadcast and telecoms markets to steer Eutelsat Americas' activities within the Americas and serve Americas-based clients using Eutelsat's global satellite fleet.

"With Eutelsat's expanded satellite capability coming online across the Americas, this is a great time to welcome Mike Antonovich to the Eutelsat team," said Rodolphe Belmer, CEO of Eutelsat. "Well regarded for driving many media and broadcast service initiatives, Mike also brings a wealth of experience in video encoding and video transport solutions through fibre that will benefit our service offer. His proven leadership and entrepreneurial skills will help drive the growth of Eutelsat Americas across all markets."

Patricio Northland, previously CEO of Eutelsat Americas, is leaving the Group to pursue other interests.

SSL Builds Executive Team for Government Systems

Palo Alto, Calif.,April 12, 2017— Satellite manufacturer **Space Systems Loral (SSL)** announced that it is increasing its commitment to support U.S. Government missions with key executives that bring a depth of experience to the company. Under the direction of **Richard White** who was promoted to President of SSL Government Systems, **Robert Zitz** has joined the company as Senior Vice President and Chief Strategy Officer for SSL Government Systems. He is joined by Tim Gillespie, who takes on the role of Vice President of Business Development, National Programs for SSL Government Systems.

Richard White, President of SSL Government Systems. White, who joined SSL in October 2016 as the Senior Vice President of Government Systems at SSL, will continue to focus on growth in the U.S. government business as well as developing robust solutions across all U.S. government agencies and departments, and will work closely with operations across the company. Mr. White was previously Chief Executive Officer at Capstone Corporation, a privately held services provider to the U.S. Government. Before that he served in senior management roles at Harris Corporation from 1982 to 2013, and has been working with the U.S. Government for over 30 years to provide advanced mission critical solutions. Mr. White is a graduate of the University of Toledo with a bachelor's degree in mechanical engineering. He earned a master's degree in mechanical engineering from Purdue University and an MBA from the Florida Institute of Technology.

Robert Zitz, Senior Vice President and Chief Strategy Officer, SSL Government Systems. Zitz served the U.S. government for more than 30 years where he made key contributions to improve the processes and outcomes for national security and intelligence missions. He started his career as a U.S. Army civilian intelligence officer supporting counter-terrorism operations. He went on to hold a number of senior executive leadership positions with the Army, the Central Intelligence Agency (CIA), the National Geospatial-Intelligence Agency (NGA), the National Security Agency (NSA), the U.S. Department of Homeland Security (DHS), the U.S. Secret Service (USSS) and the National Reconnaissance Office (NRO). He demonstrated expertise and leadership in intelligence analysis, modeling and simulations, architecture analysis, strategy, budget, research & development, cyber -security and infrastructure protection. Upon retiring from government service in 2011, Rob joined the executive ranks of SAIC (later Leidos) where he served as Chief Systems Architect and corporate Strategic Account Executive, focused on growing the company's Intelligence Community market. Mr. Zitz holds a bachelor's degree in political science from George Mason University .

Richard White

Tim Gillespie, Vice President, Business Development for National Programs, SSL Government Systems Mr. Gillespie is a seasoned industry professional who will be responsible for growing business across the Defense and Intelligence agencies and departments of the U.S. Government.

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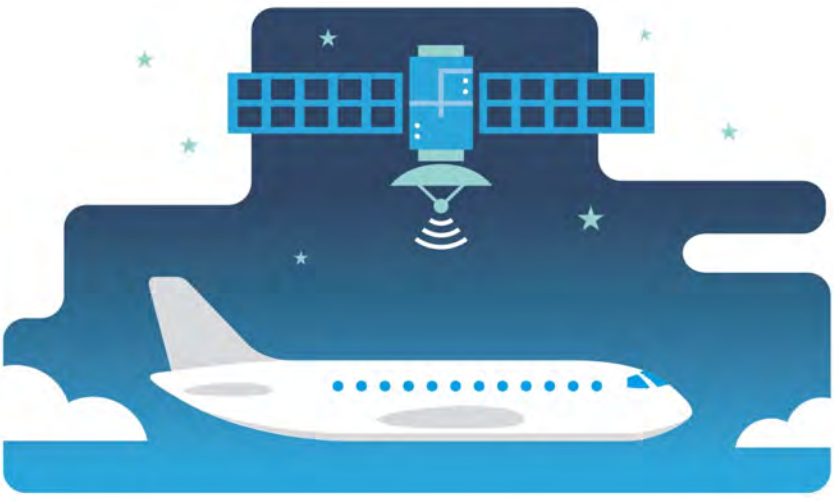
Nearly 50% of Commercial Aircraft to be Connected by 2021

Paris, France, May 4, 2017-According to Euroconsult's newly released report, Prospects for In-Flight Entertainment and Connectivity, over 17,000 commercial aircraft will offer connectivity to their passengers by 2021, up from 6,500 aircraft in 2016.

"In January 2017, over 80 airlines had either installed or committed to install in-flight connectivity (IFC) solutions," said Pacôme Revillon, CEO of Euroconsult. "This is a dozen more than last year. And while the recent U.S. and U.K. bans of personal electronic devices on certain flights might impact IFEC dynamics if extended, we believe that aero connectivity is poised for structural growth."



Our research confirms that installations will accelerate, and innovation largely improve the in-flight experience. New generation satellite systems (globally) and air-to-ground networks (in the U.S. and Europe) will dramatically increase available bandwidth. Industry leaders such as Inmarsat, Gogo, Intelsat, SES, ViaSat and new entrants such as SmartSky Networks invest in or have started to deploy networks offering up to hundreds of Gbps. IFC hardware, from receiving antennas to modems and in-cabin solutions, is also evolving rapidly. Honeywell, ThinKom, Gilat and Zodiac Data Systems for example introduced new antenna solutions in recent months.

"In the current take-up phase, we observe a diversity in pricing models applied by airlines to passengers, from free access to a premium applied by the hour, by flight or on a monthly basis," added Mr. Revillon. "For airline connectivity suppliers, we estimate that revenues from IFC topped $1 billion in 2016 and should reach $6.5 billion by 2026."

The increase in connected aircraft and in bandwidth consumption per passenger will support growth. To that respect, the ability to support video streaming on a large scale shall be a game changer. The revenue per aircraft per year shall double in the next five years to nearly $300,000 for connectivity suppliers. Still, the need to improve profit margins, and to benefit from economies of scale, shall favor vertical integration and consolidation in the IFC value chain. Competition will be strong between leading suppliers and new entrants, with our research benchmarking the positioning of main market players including Panasonic Avionics, Gogo, Thales InFlyt, Global Eagle, Inmarsat and ViaSat.

Beyond cabin connectivity, the next ten years will see the full emergence of the smartplane concept. The future connected aircraft shall support big data strategies through multiple networks. Beyond passenger services, this will open new opportunities to optimize flight operations, aviation safety and contribute to the design of future aircraft. Our research assesses the first signs and initiatives preparing for this major transformation in the aero sector.

Prospects for In-Flight Entertainment and Connectivity includes sector dynamics, analysis and forecasts addressing the IFEC market for commercial airlines and business aviation. Interviews have been conducted with stakeholders from around the globe and across the full value chain, including satellite operators, service providers, antenna/modem manufacturers and airlines. An analysis of the various stakeholders of the ecosystem is presented as well as Euroconsult's 10-year forecast for cabin connectivity. The report assesses trends for both content and equipment provision; market forecasts for revenue, installation, and bandwidth by region, by segment and by network technology are provided.

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MarketBriefs

Key industry trends and opportunities

Satellite Manufacturing and Launch Market to Generate US$ 258 Bil. In the Next Decade

Cambridge, Mass., May 5, 2017 -- NSR's *Satellite Manufacturing and Launch Services, 7th Edition* (SMLS7) report, forecasts 2,356 satellites are expected to launch during the coming decade, with both GEO and non-GEO satellite operators turning to diverse solutions to remain competitive with space-based and terrestrial players. NSR identified a growing focus on leveraging advanced technologies and new practices in optimizing satellite business cases across all satellite applications.

"New platforms, flexible and more capable payloads, mass production, satellite servicing, reusable launch - myriad options are now available to operators in their toolbox as they diversify their solutions to respond to an evolving market," stated Carolyn Belle, NSR Senior Analyst and report author. "Non-GEO constellation projects, capacity and data pricing declines, and evolving end-user demand are creating a new market environment. The near-term result was a low 2016 commercial GEO order rate expected to continue into 2017, but long-term, NSR expects a rebalancing of the market to involve unique architectures in GEO, and non-GEO, and a combination of the two."

NSR's SMLS7 study also found that government & military satellite markets demonstrate equally robust activity. "The value of space for economic development and national security continues to drive interest in launching space-based platforms, leading to a 10% increase in average launch rates in the coming decade," continued Belle. From science to Earth Observation to situational awareness, the pursuit of space projects by experienced and developing space-faring nations will generate an average $17.5B in revenues annually.

As space utilization increases and emerging constellations are deployed, preservation of the space environment will become more important than ever. Efforts to manage not only spectral interference between satellites but orbital traffic and debris are attracting more attention, with both commercial and government players needing to actively seek sustainable solutions that enable ongoing health of the industry at large.

The Satellite Markets 20 Index™

Company Name	Symbol	Price (May 05)	% Change from (Apr 07)	52-wk Range	
Satellite Operators					
Asia Satellite Telecommunications Holdings Limited	1135.HK	9.44	-0.01	9.30	11.20
Eutelsat Communications S.A.	ETL.PA	22.04	0.03	15.19	27.58
APT Satellite Holdings Limited	1045.HK	4.10	0.00	3.64	6.48
Inmarsat Plc	ISAT.L	761.00	-0.09	594.50	889.00
SES S.A.	SES.F	21.25	-0.02	17.90	24.44
Satellite Manufacturers					
The Boeing Company	BA	185.01	0.03	122.35	185.71
MacDonald, Dettwiler and Associates Ltd.	MDA.TO	65.63	-0.05	63.52	92.92
Lockheed Martin Corporation	LMT	273.03	0.01	228.5	276.64
Orbital ATK, Inc.	OA	98.63	0.00	67.04	102.72
Honeywell International Inc.	HON	131.41	0.06	105.25	135
Equipment Manufacturers					
C-Com Satellite Systems Inc.	CMI.V	1.01	-0.02	0.92	1.29
Comtech Telecommunications Corp.	CMTL	14.27	0.07	9.52	23.97
Harris Corporation	HRS	110.72	0.00	73.72	113.58
ViaSat Inc.	VSAT	65.49	0.03	61.85	82.19
Gilat Satellite Networks Ltd.	GILT	4.97	-0.09	4.05	6.19
Service Providers					
DISH Network Corporation	DISH	61.60	-0.02	44.35	65.61
Globalstar Inc.	GSAT	1.78	0.10	0.63	3.00
Orbcomm Inc.	ORBC	9.60	0.02	7.15	10.98
Sirius XM Holdings Inc.	SIRI	4.89	-0.05	3.74	5.53
Sky plc	SKY.L	992.50	0.02	560.00	1050.00

The Satellite Markets 20 Index™ is a composite of 20 publicly-traded satellite companies worldwide with five companies representing each major market segment of the industry: satellite operators; satellite manufacturers; equipment manufacturers; and service providers. The base data for the Satellite Markets Index is January 2, 2008 - the first day of operation for Satellite Markets and Research. The Index equals 1,000. The Satellite Markets Index™ provides an investment benchmark to gauge the overall health of the satellite industry.

INDEX	Index Value (May 05)	% Change from (Apr 07)
Satellite Markets 20 Index™	2,838.37	-1.32%
S & P 500	2,399.29	1.86%

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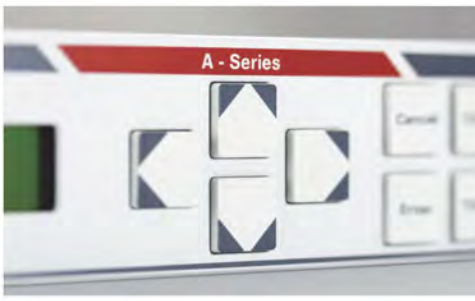

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