Industry Trends, News Analysis, Market Intelligence and Opportunities

The Aeronautical Satcom Market

by Bernardo Schneiderman

nications industry and the growth both in ers. commercial and business aviation is unlimited.

SATALITA

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stalling satcom solutions in the next 10 years will be exponential. The report mentioned that the prospects for In-Flight Entertainment and Connectivity will reach 17,000 commercial aircraft by the year 2021 from 6,500 at the end of 2016.

Among the main players in the satcom aviation market we have satellite operators with multiple Global capacity in Ku/Kable during 2017 and 2018 (Image courtesy of ESA) providing the basic for

Connectivity). We have the following VSAT manuhe aeronautical Satcom market is one of the facturers competing in this market: Advantech, Gihottest new markets for the satellite commu- lat, Hughes, Idirect, Viasat and Newtec, among oth-

good performance in the links for the IFC (In-Flight

But the key element to provide the best satcom A recent study issued by Euroconsult estimates solution is the satellite antenna that is installed in the number of commercial aircraft that will be in- the aircraft that need to be with optimum perfor-



band and some of them In-Flight Entertainment and Connectivity will with LEO solution and reach 17.000 commercial aircraft by the year with HTS satellite availa- 2021 from 6,500 at the end of 2016.

the airlines companies introduce the satcom capaci- the range of 70 Mbps on wide beam capacity and ty for their fleet (Inmarsat, Intelsat, SES and Eutel- more than 100 Mbps on the spot beams of highsat are the key global satellite operators in this mar- throughput satellites. That modem goes to market).

Beyond the satellite capacity the other component is the VSAT (Very Small Aperture Terminal) aircraft online as of March 31, more than 4,300 modems. This is another key component to bring

ket during the second half of this year

Gogo reported nearly 3,000 commercial continued on page 4

mance with low impact in the airframe and good reliability to perform in a multiple satellite fleet anvwhere in the world. With 2Ku antennas from Thinkom. Gogo customers getting 98percent service availability, 98percent coverage of global flight hours, and at least 15 Mbps per passenger. A new modem for 2Ku is bringing speeds in



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What's Inside



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Spacecom's AMOS satellite constellation, consisting of AMOS-3 & AMOS-7 co-located at 4°W and AMOS-4 at 65°E, provides high-quality broadcast and communications services across Europe, Africa, Asia and the Middle East. With AMOS-17 planned for launch to-17°E in 2019, Spacecom will further expand its reach, reinforcing its position as a leading satellite operator.



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From the Editor

The Aeronautical Satcom Market



In this issue, we focus on the aeronautical satellite market. NSR's <u>Aeronautical Satcom Markets</u>, 5th <u>Edition</u> report found passenger behavior on the ground eventually drives installation of IFC onboard aircraft, and that connectivity will be on 2 out of every 3 commercial passenger aircraft by the end of 2026, generating over \$3 B by the end of 2026.

Combined aircraft deliveries by both Boeing and Airbus were 1,436 last year, and both upped their backlog and orders, as well as their aircraft demand forecasts (approximately 35,100 airframes in the next two decades). Concurrently, IFC take rates were up for ATG and FSS Ku-band, and deliveries as well as contracts of HTS service shot through the roof as free Wi-Fi was introduced on more planes, mainly in North America. Revenues for broadband satellite IFC last year inched up another \$150 million, close to 40% more than in 2015, which was just below expectations.

Not all is easy however and challenges remain. With 550 ATG units to be de-installed in the next few years according to NSR, American Airlines' set GoGo back to the tune of 23% of its revenues, which it will need to replace in the next few years. To offset this loss in the mature North American market, where insufficient bandwidth to planes is a showstopper for many airlines, higher bandwidth HTS service such as 2Ku, Exede-in-the-Air and Global Xpress will gradually take center stage as more customers jump to higher throughput satellite capacity.

Currently, the model seeming "best" to offset the current hesitancy of airlines to engage in offering fleet-wide IFC services is where "winning" an airline means service providers paying for all hardware/installation/ operations and utilizing a service revenue split. Free items for airlines typically include hardware, installation and network operations, while service revenues are split with the majority for the service provider and about 20%-25% going to the airline. The satellite industry stands to gain significantly from this model, but it will have to generate sizeable revenues in the face of fading capacity prices to recoup these large investments. Fortunately, opportunities abound moving forward., as the NSR report concludes.

Vingil Lah

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Aeronautical Satellite Market...From page 1

business aircraft using the company's terrestrial air-to-ground (ATG) network, and more than 1,600 aircraft contracted for 2Ku. As of April 30, more than 170 aircraft have 2Ku installed.

During a recent panel where a major system integrators were present the feedback we received is that Satcom Antenna for Aircraft still an open opportunity as is still the key main factor for the satcom solution in the aero global level with a high availability and low drag performance.

ers of aero satcom equipment to pro- tions. Cobham currently supvide insights on their products and their views on new developments and lows are their responses:

Cobham

Cobham radios and antennas have supported various Inmarsat L-band services in the past and will in future support the SwiftBroadband Safety service with technology and built- in C130. Biziet usage is limited to the Em- unreliable, antenna will cost a fortune procedures to ensure cyber security to braer Legacy 600/650. the latest industry requirements.

As a designer and manufacturer of L -band satcom systems that support cockpit connectivity, Cobham SATCOM will launch AVIATOR S with a HELGA antenna in 2018. This is an ARINC 781 compliant small satcom system with the most advanced security architecture and domain segregation measures available in a two LRU solution. The very compact Cobham SATCOM HELGA (combined HLD and Enhanced LGA) antenna incorporates the RF power amplifier and diplexer and the en-

hanced low-gain antenna into one single compact unit. In earlier generation systems, the amplifier had to be installed in the electronics bay because it market.

generated heat and required forced air enabled by AVIATOR 200S represents a

new solution is suitable for all including aircraft. smaller regionals and bizjets.

The enhanced connectivity offered can support a host of applications in the cockpit, from enabling on-line use of modern EFBs to accessing real -time weather reports, flight planning and chart information.

Cobham supplies both nas (ESAs) and Mechanically Steered Antennas (MSAs) in We invited the major manufactur- the L-band Inmarsat applica- antenna.

future prospects in the market. Fol- and Boeing airframes, including the further A320, A330, A350, A380, B737, B777, launching aero Ku/Ka antennas. B787 and B747. Cobham also supplies a smaller number of this antenna to various retrofit installers for older airframes of both these airframe manufacturers. The antenna is also deployed on a number of military aircraft like the A400m, A295, A225, C17, C17J and

> Cobham supplies non-ESA HGA antennas to the bizjet line fit and retrofit markets like Dassault, Embraer and Gulfstream and IGA and LGA antennas to a range of smaller bizjet manufacturers like Bombardier, Cessna, Embraer and Gulfstream.

All of these antennas will work with envisaged Inmarsat service expansions, so are to remain available for at least another 10 years. Cobham also recently introduced a very compact one LRU integrated satcom system for the UAV market, the AVIATOR UAV 200. In future, the company could consider communication requirement. launching variants of this with higher throughput for the lower end bizjet Gilat Satellite Networks

There is a growing adoption of Ku/ cooling. The space and weight savings Ka services for cabin connectivity and ogy provider for the commercial avia-Cobham has been monitoring this tion marketplace. In-Flight Communicastep change for the industry as this market evolution closely. Cobham has a tion (IFC) is a substantial growth area



market to become successfully at the Electronically Steered Anten- Cobham's SATCOM AVIATOR S with the ultra-compact Cobham SATCOM HELGA

> plies an HGA ESA, known as the HGA- number of developments to existing 7001, for line fit on a range of Airbus equipment in progress and will make announcements about

> > There are many antenna attributes other than the primary requirements of how much signal it can transmit (EIRP) and receive (G/T) and how immune it is to noise or interfering signals. One of these is the life expectancy or reliability of the product. A fantastic, but to keep serviceable and may cost the airline in opportunity, so a large premium is nowadays put on these softer attributes. Cobham designs its antennas for a mean time between failure of 100,000 flight hours, or about 25 flying years. The accumulated flying time of Cobham antennas on many aircraft are consistent with this objective.

> > Cobham constantly seeks to improve each antenna's efficiency in both receiving and transmitting signals to meet the minimal operating performance specifications, or MOPS, of each

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and a key strategic direction for Gilat, which is demonstrating significant progress and success.

Gilat is unique in providing a full portfolio of in-house cutting-edge aero terminal components including: antennas, transceivers, and modems. These innovative components comprise Gilat's aeronautical high capacity SAT-COM offering, with advanced network features that enable maximum perfor-

mance and efficiency for IFC service provid-Gilat ers. markets both the following leading individual components and a fullintegrated terminal.

na: Dualband Ku/Ka antenna

ty availability

standard IFC transceivers

- Modem manager (MODMAN): Ultra-high performance - 400Mbps

Gilat has brought to market a high performance IFC antenna, ER 6000-A, that can operate in either Ka or Ku. This dual-band antenna is unique in the industry as it is agnostic to the underlying VSAT/modem technology. A completely standardized system in an open architecture was built by Gilat to enable any service provider with any baseband to integrate and use the antenna. The antenna development was based on Gilat's long-standing expertise in mobile satellite antennas and Gilat's industry leading aero transceivers. The open platform approach enables the antenna to operate smoothly with any ly steers the transmission and recep-

by Hughes to operate with their VSAT equipment.

Gilat's single platform antenna benefits from advantageous weight and drag measures in comparison to the use of two separate antennas. The dual band capability enables continuous broadband connectivity for commercial

modem and as such has been chosen tion beams towards the satellite (versus traditional mechanical only antenna steering), which ensures high availability operations even at the equator (no key-hole effect). The highly scalable antenna features array dimensions that can be flexibly adjusted to optimally match specific gain requirements. Together with its low-profile aircraft traveling air routes that require form factor and versatility (Ku or Ka a combination of Ka and Ku coverage to band), the antenna is highly suitable for



a diverse range of mobile platforms and can address varied throughput performance needs.

Earlier this year, Gi-

lat was selected for a joint development project with Airbus for an ESA IFC antenna funded by Clean Sky Joint Undertaking, as part of the European Commission's Horizon 2020

maximizes service coverage and capaci- serve the full air route. Automatic program. This development is based on beam switching ensures uninterrupted - Transceiver: De-facto industry high quality service. The antenna further meets the volume requirements structure of the airframe without for radome line-fit installations on both Airbus and Boeing aircraft, while optimizing its aperture size under the available volume.

> Gilat is well underway in the development of the next generation electronically-steered array/ phased-array aviation.

> Gilat is also developing a breakthrough antenna ESA/PAA technology for satellite-on-the-move connectivity. The ultra slim antenna is ideal for platforms that are constrained by size and weight, such as airplanes, highspeed trains, land vehicles and yachts.

This advanced antenna electronical-

Gilat's PAA expertise. The antenna array will be embedded into the wing affecting aircraft performance and maneuverability by avoiding aerodynamic drag and reducing fuel consumption. The embedded antenna will contribute to the reduction of CO2 emissions thus supporting one of the key societal challenges, smart, green and integrated antenna (ESA/PAA) for commercial transport. Due to its fast electronically steerable beam capabilities, the solution is suitable for IFC utilizing GEO, MEO and future LEO satellite constellations.

> Gilat is the supplier of Gogo's next generation high performance 2Ku service, which was celebrated by Gogo in a live airborne media and investor event on May 9th. Unprecedented performance was demonstrated due to

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Industry Leading SATCOM GaN based SSPAs/BUCs Gilat's aero modem achieving on average 5x the industry speed.

The test flight not only confirmed its noteworthy throughput and user experience, but also successfully demonstrated interoperability capabilities of Gilat's aero modem with the aircraft's full In-Flight Entertainment and Communication (IFEC) avionic system. The new 2Ku service with Gilat's satellite modem will be installed in customers. over 1700 aircraft across more than 13 airlines.

Kymeta

Ku band flat panel antenna subsystem initial demand has been for Ku band module (ASM) called the mTenna^{u7}. solutions for both hardware and mTenna™ ASM has The been incorporated into the Kymeta Kyway™ terminal. The terminal is designed for operation in maritime and land mobile KALO global access services. Ka band formance to other solutions. applications. working with several partners to prototype stage and expected to need for lightweight, slim and efficient modify the mTenna ASM for use in launch commercially across the same aviation markets. Kymeta's low profile, broad market base as our Ku suite of lightweight, and low maintenance products. solutions are particularly attractive to aviation operations. Kymeta development efforts underway for to both commercial and business jet requirements



Kymeta Flat Panel Antenna

"...the satcom antenna that is installed in the aircraft need to be with optimum performance with low impact in the airframe and good reliability to perform in a multiple satellite fleet anywhere in the world..."

Potential include wide narrow and commercial fleets, business jets, UAVs, helicopters, and general aviation.

Kymeta's first product is a 70 CM across land, sea and air. The greatest ratus for steering. connectivity services. Kymeta is meeting those demands with the mTenna^{u7} ASM, KyWay terminal and Kymeta is currently solutions from Kymeta are in the

> As mentioned above, has products are currently being developed meet the of DO-160

> > FAA. The expected to available in the have a Kymeta solution available several for commercial airframes first, followed by certification for business aircraft. The timeline is gated regulatory and certification requirements.

> > The extraordinary amount of satellite spectrum has

aviation remained largely untapped because of applications for mTenna technology the industry's long-standing technical body challenges.

Traditional satellite dishes are heavy, large, consume a lot of power, Kymeta is listening to the market cost a lot and have mechanical appa-

> Phased array antennas are more expensive, require cooling, often cannot transmit and receive on a single aperture, and consume an extraordinary amount of power for parity per-

Kymeta was created to address the communication systems that do not require mechanical components to steer toward a satellite, and services these that are easy to buy and understand.

Kymeta technology is not a phased environmental array, but instead uses metamaterials and and glass-on-glass, thin-film-transistorregulatory standards of the based technology - the same technoloproducts are gy used on existing liquid-crystal disbecome play manufacturing lines. Metamaterisame als are created by arranging naturally sequence as our other occurring materials in a specific pattern market solutions, with Ku that produces an electromagnetic reband solutions launching sponse that is not found in nature. first followed by Ka band Through scientific experimentation and products. We expect to trial and error, it was discovered that the toolset could be utilized to form holographic beams that could link to satellites and perform while the antenna is in motion.

> Kymeta mTenna technology proby vides software-enabled, metamaterials -based, electronic, beamforming satellite solutions that are flat, lightweight, small, and use software to steer instead of mechanical components.

Phased Array Antenna Technology

Phased Arrays work by creating this pointing, or beam-steering, from an array of tiny fixed antennas. By electronically changing the relative phase for the signal that each element transmits, the (constructive & destructive) combination of all of these small signals creates a larger focused beam in a particular direction. Because this process is fully electronic, the resulting beam direction can be controlled and directed instantaneously in any direction. It can therefore track the movement of any satellite in the sky, no matter how or where you move, without the need for any mechanical moving parts. The principal



and application of Phased Arrays have been around for decades and is well understood. The challenge has been to miniaturize the technology and improve the performance while reducing the manufacturing cost to an economical price point. (Source: Phasor)

mTenna technology uses software to Thinkom electronically point and steer toward a satellite; this means the terminal will auto-commission and auto-provision, manufacturers both (Ku) and (Ka) band allowing for rapid setup and installation.

Phasor

high-performance ESA (electronically under contract for over 1600 systems. steered antenna) to the commercial mobile broadband market, (e.g. Aero - commercial and offers streaming movies while multibusiness aviation, Maritime - cruise, tasking on other network demanding yacht and energy, Land mobile - high connections. VOD (video on demand) speed rail, etc.). Phasor ESAs will be and streaming on Netflix, Amazon, superior in performance and in feature functionality compared anything available today. This technology will be able to work in both GEO (HTS) and LEO constellation architectures, interopera ble.

Phasor will commercial products in the Ku band the aero market.

ThinKom designs and antenna systems for the various commercial and military marketplace. In the Ku-band offering, we produce the antenna system for the large production with its ThinAir[®] GoGo '2Ku' antenna and service Phasor will provide a solid state, offering with currently (16) airlines

> Through GoGo, the '2KU' system YouTube, etc. as well as the many to social media data hungry applications in the market seem to be fueling the commercial interests, while others are looking to include remote viewing and monitoring in the cockpit and cabin, or pushing additional situational awareness launch streams to field operations.

ThinKom advances in antenna techfirst, followed by Ka band for the aero nology for GoGo's '2Ku' offering brings market or a Ku+Ka band product for 70Mbps to the plane today (100Mbps with HTS) and 2X to 4X this bandwidth in the near future. The key antenna same VICTS phased array technology in improvement ThinKom employs to (Ku or Ka) will be made available in a

support world-class broadband mobile throughput is having high efficiency (even in high skew, equatorial regions), broad tunable and instantaneous bandwidth, superior cross-pol (aero) discrimination and robust tracking.

> Although Thinkom is in full scale Falcon-Ku3030 system to meet GoGo's demands at Ku-Band, they are also delivering their (Ka-Band) ThinAir® Falcon-Ka2517 for a number of customers in the commercial and military markets.

> Emerging trends and customer demands in Phased Arrays are moving toward: (1) Wider channel bandwidths, a "must" for HTS; (2) Higher Area/Gain Efficiency; (3) Better Sidelobe Control for Interference Suppression; (4) Higher Scan Agility for LEO/ MEO capabilities; (5) Lower minimum Elevation scan capability; (6) More "Hybrid" approaches capable of working GEO, MEO, and LEO in the same antenna; and (7) higher operating frequencies (Ka-band, Q-band, V-band through E-band)

For Business Aviation markets, the

smaller fuselage mount form factor. This system will offer 3x to 5x better performance than 12" parabolic antennas that are constrained to larger biz jets that can accommodate a tail pod.

products ThinKom support Commercial and Military, Aero, SOTM, and Manportable applications.

The broad diversity of products requires ThinKom to span "high-end" military systems through commercial enterprise and on to extremely price sensitive consumer and automotive ThinKom's products are systems. uniquely bringing "extreme/best value" across the entire range. ThinKom uniquely provides High Data Throughput and High Spectral Efficiency in a very low-profile (Low-Drag) form fac- to the aero market as a complete solu- commercial and business aviation tor.

Viasat

number of aeronautical Ku-Band and entire satellite and ground infrastruc- ations and logistics of the aircraft the Ka-Band antennas suited for the appli- ture in mind, designing for high reliabil- capacity of bandwidth, modem percation. Antennas range from tail-mount ity, ease of installation and best perfor- formance and antenna reliability will antennas intended for business jets mance. With our integrated RF, our be the key factor in the Satcom and and small aircraft to fuselage-mount antennas have significantly lowered aviation industry. antennas intended for larger airframes the number of separate devices relike Boeing and Airbus airliners. We quired to be installed as compared to quality inflight connectivity (IFC) at the also produce the first dual-band Ku/Ka competitive products. fuselage-mount antenna that can switch between networks autono- Conclusion mously, always taking advantage of the best possible network.

a large number of Ku-Band antennas starting phase with potential of new that are currently flying, to serve the technologies to be implemented in customer with the highest capacity the next 3-5 years for new players possible in the future, Ka-Band anten- and existing players in the market NSR. nas will become our dominant antenna that are today providas we launch Tbps+ Ka-Band satellites ing solutions with parwith ViaSat-3, adding onto the ViaSat-1 abolic dish, Boxedand ViaSat-2 network systems.

Viasat's latest Generation 2 Ka- Horn Array and VICTS Band products are launching this year, Array and the newwhich will take advantage of the latest comers like Phasor satellite capacity improvements just and Kymeta with new launching with ViaSat-2 and future Vi- technologies in develaSat-3 satellites.



Thinkom's 2KU antenna

Viasat views bringing connectivity

In summary, the technology of While ViaSat continues to produce satcom antennas for aircrafts still in a

> Horn Array, Stacked opment phase.



Considering the overall market for tion, not just an antenna problem. To trends to implement satellite combring the most capacity at the best munications for IFC in this first phase economics, you need the best satel- of the program providing WIFI and lites. Our antennas are designed as a video for the passenger cabin and ViaSat produces and delivers a complete integrated solution with the follow up implementation with oper-

> High passenger expectations for right price are still front and center, and the road to success in providing it remains a long and winding path. Many positive signs point to more decisions from airlines to adopt better IFC solutions in this most visible satcom growth market; but it is still a difficult road to fulfill the promise it has held for many years now, according to a report by

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



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Interview with Arnold Kulbatzki CEO, bobbles

A promising new entertainment service is using satellite broadcasting and over-the-top TV (OTT) to bring a taste of home to expats living in Europe. We hear from Arnold C. Kulbatzki, CEO of bobbles, why satellite and OTT go hand in hand. Arnold C. Kulbatzki has over 20 years' professional experience as a manager in the media and telecommunications sector with a proven track record as entrepreneur and advisor. He also has experience as Member of Executive Boards and Boards of Directors at numerous companies in the media and retail services space. Prior to establishing bubbles media GmbH in January 2016, he was the CEO of a2b media (2004-2015) a management consulting firm with extensive expertise in customer experience management, digital transformation, paid content and Over-The-Top (OTT) audio-video services.

What is bobbles?

bobbles aims to make home feel a bit closer for expats. We deliver multiple packages of TV channels from around the globe, aiming to reach and entertain the 15 million people originating from Asia, Latin America and Africa but currently living and working in Europe. bobbles can be received throughout Europe via satellite and online. We went live in August 2016 initially with programming offers for Chinese and Indonesian communities. Our most recent launch was our new package of India's best and most popular TV channels. Our services are avaialble via ASTRA satellite at 19.2 degrees East for pan-European viewing.

Launched in August 2016, <u>bobbles.tv</u> breaks new ground in viewer choice and service usability. <u>bobbles.tv</u> is available in Europe via ASTRA satellite at 19.2 degrees East. Supported by MX1 bobbles can also be enjoyed via OTT for online viewing, via connected TV, PC or mobile devices. <u>bobbles.tv</u> is a product of Hamburg-based privately held bubbles media GmbH, a new pay TV provider specializing in TV offerings for international target groups. bobbles' 15-strong team includes highly experienced broadcasting industry professionals and native speakers from various international communities overseeing licensing, marketing and sales

Why did you launch a service for expats in Europe?

I've travelled a lot during my career and I'm familiar with the feeling of being abroad, but wanting to know what's going on at home. Moreover, my personal cir-



Arnold C. Kulbatzki

cle of friends includes many expats who've chosen to relocate to Europe. They've come from India, Korea, China and elsewhere. One thing they have in common is their desire to retain links with home, even to watch their favorite TV channels from their native country. For decades diaspora populations in Europe have been able to access programming from their native coun-

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ATLANTA GA | ABERDEEN MD | WASHINGTON DC | DUBAI | NEW DELHI | SINGAPORE | STOCKHOLM 866.855.3800 | datapath.com tries in numerous ways. But these language-based million ex channel bouquet services usually were not professionally managed or attractively packaged. Also they were frequently associated with piracy. My partners and I imagined there must be a way to create a business built around delivering multiple packages of high quality programming to the many people from all around

million expats living in mainland Europe, we are excited to deliver this innovative, attractive low-priced new service to communities.

Why did you decide to use satellite as well as OTT for bobbles?

the world who have chosen to call Europe home. When our research revealed there are over 15 million people originally from Asia, Latin America and Africa but living in Europe, we knew that these volumes meant such a service would truly delight a huge number of people. We also knew we had a great business opportunity.

Can you please tell us about your new Indian package?



For us it was important to pair the bobbles.tv **OTT** streaming service with the reach of direct-to -home (DTH) satellite broadcasting. Certainly in Europe, if you want to truly engage with people located right across the region, pan-European satellite is really the only way to go. We realised that combining OTT with DTH

We launched our bobbles.tv India package in early 2017 with 15 channels of entertainment in Hindi and English including Bollywood blockbuster-packed movie channels, India's most popular news services, general entertainment, comedy, drama, lifestyle, reality TV and made-for-TV movies. With 13 channels, bobbles is Europe's largest and lowest-priced Indian satellite TV package. Additionally, 14 popular channels in Hindi and English can be received via OTT, available live and via 7-day catch-up with more channels on the way.

What's the pricing, subsciption model for bobbles packages?

Subscribing is easy and affordable - this was always critical for us and really sets us apart from competitors. Depending on the chosen package, bobbles.tv monthly prices start from just €6.95 online and €14.95 on satellite. What's more, our viewers don't need a contract. With a potential audience of around 15

would yield the best of both worlds and enable us to build our business based on universal Europe-wide reach, including areas where there is no or limited broadband. We knew that for the widest possible satellite reach, choosing SES was a no-brainer as global leader in beaming top TV programming straight to the living rooms of millions. No other provider anywhere offers DTH and OTT in this way. Also, for many of our broadcaster partners, this is their first foray in Europe, so we know we are offering something truly unique to viewers.

What's next on the horizon?

Soon we will launch our new HUMAX HEVC set-top box for satellite reception and our new HUMAX OTT box for streaming on the TV set. We are keeping a close eye on the smart-TV market but usage doesn't look that promising so far. In this niche market we will wait and see. We're rolling out more language packages as well.

Satellites and the Ethics of Finding Aliens

by Lou Zacharilla

"People ask me, 'Do you believe in life on other planets?' And I say. 'That's exactly the right way to ask it. "Do I believe? I have no data. But I will not have data unless I look. And I won't look unless I believe that before having the data that the data could be there, and that it is (therefore) worth looking for it."

ow that's a scientist and a phisoul

And he is. Literally. Those are the words of Brother Guy Consolmagno, a Jesuit priest and an astronomer who directs the Vatican Observatory. Brother Guy gave the keynote and joined a increasingly what we seem to cherish panel of scientists at a seminary in the New York area last month where he and others probed the boundaries and role of science and ethics. His discussion provoked for me thoughts that we in the satellite industry will need to wrestle with at greater depths, both scientifically and ethically, as our industry continues to become precisely what SSPI's "Better Satellite World" cam- Emirates will rely on satellites and IT/ www.bettersatelliteworld.com paign has claimed for it since its big bang at Satellite 2016. Satellite is the world's indispensable technology. What this means is that it functions at every level of human life and, by default, in the world of ethics and moral choice because it is underpinning what occurs in the living rooms in which we sit and live, the food we eat, the jobs we per- Center for Space Entrepreneurship to form and the world to come. Amen.

It has done this for many years, of course. And will do more in areas such as the economy, national defense and the search for origins and weirdlooking neighbors light years away. As a technology that guides weapons, monitors the climate and ensures compliance with treaties signed by nations connecting the dots." Whether those often at odds or in confrontation with dots are to maximize throughput, a

"...It is time for us to have a discussion about science, satellites and ethics as we continue to launch further into space ... "

one another, satellites carry weight.

was to maintain that there has to be a means of regulating not only spectrum, but human choice.

"Just because something is possilosopher. A Guy after my own ble, does not mean necessarily that it is good," said Brother Guy. He echoes a famous phrase from Gandhi, who said simply that "the purpose of life is not Korea here. to increase its velocity."

> and worship. "Better, faster, cheaper" is a mantra not unlike a prayer. It has cut across every organization, public or private. Yet creativity, once thought to be a gift from the "gods," requires a decidedly non-linear direction to be taken, and often reflection, time and moral input.

> space tech to reduce its reliance on petrodollars and to diversify its economy. This will make it a mandate, says UAE Space Agency head, Khalifa Al Romaithi to both engage with the international community and cater to smaller businesses. Less reliance on fossil fuels has other benefits, of course.

> engage with SSPI and others to help it link the state's robust universities to its anemic Upstate communities and their economies. But this choice to go forward will lead, it is hoped, to a new ecosystem in the once-mighty Empire State.

"Creativity," said Steve Jobs, "is

benign act which has a range of bene-One conclusion drawn at the event fits, to deciding to use a satellite to identify a slave trade on the high seas, an act which was driven by the Associated Press and its mission to serve the facts for the public interest, connecting dots and data can lead us toward obiectives and ends which can be both glorious and demonic. Think North

They can lead us, but they cannot Yet velocity is what we have, and force us to decide whether or not to act in the interest of humanity. "That is an ethical choice. And science cannot help you there," said the man who was reveling over the discovery of the exoplanet planet TRAPPIST-1 around a dwarf star. He didn't think there was life there. ("The star is really quite unstable.")

The event concluded with a memo-It is creative that the United Arab rable remark by a chemistry professor from Bryn Mawr college, who said elegantly, "Science is just another door into the sacred....but they are not the same." So it is that satellite, which has been opening doors of all kinds for generations, seems to be moving toward opening yet another. The Big One. It is time for us to have a discussion about science, satellites and ethics as we con-It is also creative for the New York tinue to launch further into space. 🌌



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

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Change and Media, Entertainment and **Technology Convergence at the NAB 2017**

by Elisabeth Tweedie, Associate Editor

over 100,000 visitors and 1,700 exhibitors. The halls were buzzing with talk of all the change impacting the industry. The theme of the show was the "M.E.T. Effect." Technology are converging.

Change was also the theme of the opening keynote, by Gordon Smith, President and CEO of NAB. Change in the way consumers access content, and change in the way

s usual, the National Association of Broadcasters greater, up to a minute in some cases. This can be a prob-(NAB) Convention was held in Las Vegas, attracting lem for the broadcasters, particularly for sporting events. As guoted by Ajit Pai, the new Chairman of the FCC, Ooyala's recent State of the Industry Forecast, found that "original, local and live, are the three types of OTT content This was a reference to the way Media, Entertainment and that will set services apart in a standing-room only video marketplace." At NAB, Harmonic was showcasing its realtime, low-latency streaming workflow, that mimics the latency of broadcast.

Change was also in the air at SES, with the announce-

broadcasters deliver it. Smith, had a very positive take on this convergence: "We need to believe in the virtuous cycle - the idea that adopting new distribution platforms, serves to build our overall audience and engagement with discussed in previous articles,



At the NAB 2017, SES, Newtec and the Fraunhofer Heinrich Hertz Institute demonstrated an immersive Virtual Reality experience with a live 360them." As degree Ultra HD VR satellite broadcast at the SES booth. In picture from left, Thomas Van den Driessche, CEO, Newtec and Thomas Wrede, VP, **Reception Systems, SES.**

ment of a reorganization. The company has created two new divisions: Networks, led by Steve Collar, former head of O3b, and Video led by Ferdinand previously Kayser, COO of SES.

Change was also announced at Eutelsat, with the appointment of Mike Antonovich as CEO of the Americas. Most of will remember Mike from his PanAmSat and Intelsat days. Since then he has held a variety of positions in ancillary satellite companies, so it is good to see him back in the mainstream again. Ajit Pai, the new Chairman of the FCC, is also promis-

search from Leichtman Research Group, in the USA, there reviewing over one thousand pages of FCC regulations, inare now more connected TV devices than there are pay-tv cluding those pertaining to direct broadcast by satellite and set-top boxes. OTT comes in two main variants. On de- cable. "I'll work aggressively to modernize the FCC's rules, mand streaming of content, and live streaming - primarily cut out unnecessary red-tape and give broadcasters the news, sports and special events. When a live event is flexibility to serve their audiences." He also pledged to shown on linear TV, the broadcasters work with a delay of make ATSC 3.0 or Next Gen TV a priority. Next Gen TV, up to seven seconds. With OTT, the delay can be much offers the convergence of Over-the-Air and OTT.

Over-the-top (OTT) is now mainstream. According to re- ing change. During his speech at NAB, he committed to

Among all the sessions and what felt like miles of exhibits, three events stand out. The first was the first ever, live 4K next stream from space, courtesy of AWS Elemental and The U.S. S2X modulator and demodulator (the MCX7000 Multi-National Aeronautics and Space Administration (NASA) dur- Carrier Satellite Gateways), designed to drive better banding the Super Session "Reaching for the Stars: Connecting to the Future with NASA and Hollywood." NASA astronaut and International Space Station (ISS) commander Dr. Peggy

The transmission itself was optimized using Newtec's generation DVB width efficiency and higher performance throughout the broadcast.

The other very notable event, particularly for this maga-

Whitson NASA and astronaut Jack Fischer conversed with Amazon Web Services Elemental CEO and Cofounder Sam Blackman live from the ISS and in 4K Folvideo. lowing а conversation about the essential role video plays faciliin the tating missions of NASA, the astronauts demonstrat-



Satellite Markets and Research celebrated its 10th anniversary at the Wynn Hotel during the NAB 2017. It also held concurrently the 5th annual Vision Awards. Here presenting the award for Most Promising Company of the Year to The SpaceConnection, from left, Bruce Elbert, President, Application Technology Strategy, Virgil Labrador, Editor-in-Chief, Satellite Markets and Research, Jonathan Crawford, CEO, The Spaceconnection and Roger Franklin, CEO, Crystal.

zine, was the party to celebrate the ten-year anniversary of Satellite Executive Briefing. Virgil Labrador founded the magazine ten years ago and it has gone from strength to strength ever since. As well as the magazine, Satellite Executive Briefing, is also the responsible for the creation of The Vision Awards. These are awarded annually to innovative companies, products and key executives in our industry. The party held at the Wynn, was to

ed experiments made possible in a zero-gravity environ- acknowledge all the sponsors, advertisers, writers, and prement.

During the course of the conversation, the astronauts demonstrated the fun elements of being in space: playing ping pong with drops of water and effortlessly twirling the microphone as they spoke. The live stream lasted about 15 minutes. At the beginning the astronauts were above Baja California, and by the end they were over Africa.

SES together with Fraunhofer Heinrich Hertz Institute HHI and Newtec, demonstrated at the NAB an immersive Virtual Reality (VR) experience with a live 360-degree Ultra HD VR satellite broadcast. The live VR broadcast originated from Fraunhofer HHI's OmniCam-360 camera, which captured the sights and sounds of the SES event booth at NAB. The 10K x 2K panoramic broadcast signal was transmitted over an SES satellite to multiple Ultra HD TV screens and VR goggles at the SES booth and other locations throughout the Las Vegas Convention Center.

vious award winners who have contributed to the magazine's success.



Elisabeth Tweedie 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. www.definitivedirection.com She can be reached at: etweedie@definitivedirection.com

ENENSYS Completes Acquisition of TeamCast

of video delivery infrastructure, announced that the acquisi- nies, and as such our teams have a lot in common." The tion of TeamCast, a modulation technology provider for geographical proximity has facilitated the acquisition as terrestrial, satellite and wireless markets, has been com- both companies are based in Rennes, France, the European

Cesson-Sevigne, France, June 6, 2017--ENENSYS, a provider were very positive. We are two innovation driven compa-

center of excellence for Digital Video Networks companies.

ENENSYS Technologies To maintain customer focus, ENENSYS confirmed that TeamCast will continue to operate as a standalone company. "TeamCast has many prestigious customers and partners. Some of them were a bit concerned by the changes that

pleted. The combined group will provide an extensive product and software range across Video Delivery Infrastructure, especially in ATSC3.0, DVB-T2 and DVB-S2/S2X.

"The announcement of the acquisition was perceived very positively by the market", said Regis LE ROUX, President and CEO of ENENSYS. "The fact

that there is essentially no overlap in the product range this acquisition may bring, but once they've understood our tablished presence in the USA market," he added.

2nd guarter of 2017, but proceeded faster than expected. keep strategic management positions within TeamCast. Jean-Luc PAVY, co-founder of TeamCast said "All discussions Terms of the deal will not be disclosed.



makes it straightforward for our respective customers. And willingness to ensure continuity and to leverage on Teambusinesswise we already see traction from TeamCast's es- Cast strength, they were all very positive", adds Regis LE ROUX.

The acquisition was expected to close before the end of the TeamCast co-founders Jean-Luc PAVY and Gérard FARIA will

Intelsat Terminates Merger with OneWeb and Share Purchase Agreement with SoftBank

McLean, Virginia, June 1, 2017- Notes tendered for exchange will be temporaneous with the closing under Intelsat S.A. announced that the previously announced offer or offers to exchange certain of the respective outstanding senior unsecured notes issued ed. by its indirect wholly-owned subsidiaries, Intelsat Jackson Holdings S.A., Intelsat Connect Finance S.A., and Intelsat S.A. and solicitation or solicitations of consents to amend the indentures governing the Existing Notes expired pursuant to their terms at 12:00 midnight, New York City time, on May 31, 2017. As of the expiration date, the minimum tender conditions for the Exchange Offers and Consent Solicitations had not been satisfied. The Issuers have not accepted any of the Existing Notes for exchange, any Existing

as of February 28, 2017 between Intelsat and WorldVu Satellites Limited pursuant to which Intelsat and OneWeb would combine through a merger, and Exchange Offers, Intelsat currently exthe related Share Purchase Agreement, dated as of February 28, 2017 among Intelsat, SoftBank Group Corp. and OneWeb, pursuant to which SoftBank would make a cash investment in exchange for common and preferred shares of the combined company con-

promptly returned to holders, and the the Combination Agreement. The suc-Exchange Offers and Consent Solicita- cessful completion of the Exchange tions have accordingly been terminat- Offers would have satisfied a condition to completion of the transactions un-The Exchange Offers and Consent der the Combination Agreement and Solicitations were conducted pursuant the Share Purchase Agreement. Intelto the Combination Agreement, dated sat has notified OneWeb and SoftBank of the failure to consummate the Exchange Offers.

> As a result of the termination of the pects that OneWeb and SoftBank will exercise their respective termination rights under the Combination Agreement and related Share Purchase Agreement on June 2.

Cellular Backhaul and the Satellite Convergence Synergy with 5G

by Martin Jarrold

EMP conference in London. Cellular signaling which inhibits the adoption of Emergency Notifications). Backhaul 2017, which will take place on new service types. Additionally, 5G will 22nd June, is entitled 'Smartphones & trend towards 'Information Centric to 5G networking is further reinforced Tablets to the Satellite Network... and Networks' that are designed with the in the perspectives of the Satellite the World' and will explore the current user in mind, facilitating efficient acinteraction between the satellite and cess to information with a good quality nology Platform for communications wireless industries, the current and of experience, and this will tie-in with networks and services, '2020 Netfuture growth of data traffic from mo- the cloud approach to service delivery World'. Its vision of satellite's role is

n my previous column here, I pro- network redesign. Today's networks agement, Reliable Communications); vided brief details of the themes to feature a design legacy based upon 3G, Vehicular Communication (Traffic Upbe featured during the next GVF- resulting in excessive and inefficient dates & Software Upgrades, eCalls & bile devices, and how that will impact and network architecture - i.e., the summarized in the following state-

The position of satellite as integral Working Group of the European Tech-

both cellular and satellite networks. In this column I outline the event program, but first I intend to explore certain of the themes 1 included in а recent presentation - entitled 'The Satellite Convergence with Synergy 5G' - which I delivered recently at the



SCWS World conference, themes close- 'software defined network approach'. ly related to the Cellular Backhaul 2017 program.

certain of its characteristics are already clearly anticipated. It is predicted that by the year 2020 data requirements will be around 1000 times greater than today, with two-thirds of that data traffic being embedded video. 5G will feature denser networks with spectral mote Area Services, Backhaul Connecefficiency increases by orders of magni- tivity, Broadband to Moving Platforms tude and smaller cells which will not be - Drones, Aircraft, Ships); Machine solely homogeneous but flexible and Type Communication (Fleet Tracking, heterogeneous with capacity resources Asset Management, Wide Area Sensor This will require a fundamental cellular (Disaster Management, Air Traffic Man-

Defined already by the 3rd Generation Partnership Project, or 3GPP, is a 5G is still in its definition phase, but range of 5G "Use Cases" based on satellite that span: Multimedia Delivery . (Mobile Broadcast, Content Caching, Broadcast to Home); Broadband (Mobile Broadband to Users & Vehicles, Fixed Broadband to Homes & Enterprises, Ubiquitous Coverage - Readapting dynamically (on demand). Management), Critical Communication •

ments:

"Satellites • will integrate with other networks rather than be а standalone network to provide 5G and it is this integration that forms the core of the vision."

"Satellite systems are fundamental components to deliver reliable

5G services not only across the whole of Europe but also in all regions of the world, all the time and at an affordable cost."

- "Thanks to their inherent characteristics, the satellite component will contribute to augment the 5G service capability and address some of the major challenges in relation to the support of multimedia traffic growth, ubiquitous coverage, machine to machine communications and critical telecom missions whilst optimizing the value for money to the end-users."
- "Satellites can proficiently be part of a hybrid network configuration,

infrastructures and to all end-users ... "

and satellite networks has also been urged by the European Commission (EC). "We have encouraged the [communications] communities to jointly develop standards so that new high-throughput [satellite] is developed Backhaul 2017: 'Smartphones & Tablets with the same 5G standards in mind as the terrestrial systems, and this has also been supported by the European Space Agency, which has had a role in the activities of the 5G-PPP, managed by the EC for the public part, and the 5G Association for the private part. HTS should be an integrated part of the 5G architecture and final system, and com- ule can be viewed at www.ukplement the terrestrial technologies..."

Working together with standards bodies, the satellite and wireless industries can create truly integrated networks that complement one another. Information sharing is crucial and the Satellite and Wireless Industries Stand satellite and terrestrial industries must work more closely together and build trust. Satellite is, of course, active in such 5G fora as the European Union's Horizon 2020, the European Telecommunications Standards Institute, European Space Agency, the European Conference of Postal and Telecommunications Administrations, the 3GPP and the 5G-PPP.

The 5G Public-Private Partnership (www.5G-PPP.eu) is a major 5G research program, a joint initiative between the European Commission and lite - What is the state of play today? Europe's ICT industry which aims to deliver 5G solutions, architectures, technologies and standards. The Partnership has said the following about HTS etc). Is there a "right architecture" the wireless-satellite future:

geneous set of integrated air interfac- for? es: from evolutions of current access schemes to brand new technologies. are rapidly reducing satellite latency to 5G networks will encompass cellular bring services closer in performance to and satellite solutions. Seamless hand- terrestrial services. Legacy platforms over between heterogeneous wireless are enjoying the fruits of acceleration

infrastructures managed in such a neous radio access technologies to inway that it brings, seamlessly and crease reliability and availability. To immediately, converged services achieve the expected capacity, cover- platforms expected to be delivered age, reliability, latency and improve-Enhanced convergence of cellular ments in energy consumption, the 5G architecture is expected to run over a converged optical-wireless-satellite infrastructure for network access, backhauling and front-hauling..."

> This is the background to Cellular future? to the Satellite Network... and the World'. The conference will be chaired by David Howgill, President of Huckworthy, and co-moderated by Richard Swardh, Senior Vice President, Mobile Networks Operators with Comtech EF Data, and me on behalf of GVF.

emp.co.uk/current-events/cellularbackhaul/programme/, but at time of writing will comprise the following panel themes:

The State of Play: Where do the Today? Tales of Bandwidth, Latency, Spectrum and the Future. Discussion points here amongst the panelists -Richard Swardh, SVP Mobile Networks Operators, Comtech EF Data; Kieran Arnold, Head of Networks & Systems, Satellite Applications Catapult; Simon Gatty Saunt, VP Sales Europe & CIS, SES; Mark Lambert, VP Sales & Mar- • keting, Advantech Wireless; and, Dario Mulassano, Business Development Director, Hughes – will encompass:

LTE, 3G and 2G networks over satel-

Satellite services operate across multiple HTS and traditional architec- • tures (FSS, MSS, GEO-HTS, non-GEOfor 4G LTE and 5G in the future? What • "5G wireless will support a hetero- are the key network elements to look

The latency debate: New platforms

consisting in a mix of broadcast access technologies will be a native and improved network tools to allow broadband feature of 5G, as well as use of simulta- LTE and other traffic to operate over almost any satellite network.

> There are over 1000 new satellite around the world over the coming years, some in constellations of hundreds and some individual platforms with the bandwidth of hundreds of older craft - how will this affect and effect the telecom landscape of the

> The satellite and wireless industries continue to battle over spectrum ownership, use and even potential sharing. Does this ongoing battle effect the existing and future opportunities between the two industries or is it the proof of why they are symbiotic?

In discussing Optimizing Satellite The very latest full program sched- Services into the Mobile Ecosystem today, and for a 5G future: "Traditional" Telecom (Voice, Video, Data), Streaming, Social Media, CDNs & the IoT, the panel members - Mark Briggs, VP, SiR-RAN Communications; Ben Ash, Account Manager, IP Access; Amir Yabo, Product Line Manager VSAT Business Unit, Advantech Wireless; Kumar Singarajah, Director Regulatory Affairs & Business Development, Avanti Communications; Gerry Collins, Business Development, iDirect; and, Toni Lee Rudnicki, CMO, Agilis - will cover such key questions as:

- From a services aspect, is satellite a niche adjunct to the wireless market of the future, or an embedded core component of a wider network? Are we transport only, or value add?
- How can the satellite industry expand the addressable backhaul market?
- What are wireless carriers looking for from the satellite industry?
- With mobile network operators (MNOs) looking increasingly at the segmenting of macro-cells into even smaller (femto-, pico-) cells, what challenges/opportunities does this trend for the satellite

backhaul vendor?

- What are the various challenges in

 facilitating 3G/4G/LTE services
 outside ground network foot prints?
- Are there differences to be

 adapted between the main service types and bandwidth drivers?
- Is the satellite industry ready to accommodate the next generation of wireless? What should carriers look for in a satellite services part ner?
- Is there a future where satellite can become a larger part of the carrier network, or will terrestrial always be first choice, and satellite be for redundancy and hard to
 reach locales?

The third panel session of the day comprising Richard Swardh, SVP Mobile Networks Operators, Comtech EF Data; Alvaro Sanchez, Director Sales & Marketing, Integrasys; Yair Maor, Senior Director, Sales - Europe, Gilat Satellite Networks; John Finney, Founder, Isotropic Systems Ltd; and, Maria Kalama, Lead, Satellite Communications, Innovate UK - will focus on the Evolution of Ground Equipment, Infrastructure & Systems: How Satellite Equipment and Infrastructure have Evolved to Support Accelerated 3G and 4G LTE Mobile Network Rollouts, Optimize Bandwidth and Traffic, and Enable a Scalable Global 5G Future.

Key discussion points will be:

Like the wireless industry, the satellite industry is operated from a mixture of standards based and carrier specific solutions. Is proprietary satellite hardware, infrastructure and ground technology fully compatible with carrier infrastructure or is it a custom integra-

tion every time?

- How has satellite infrastructure D and hardware evolved to facilitate a 3G and 4G networks, and how does this ready us for 5G and IOT?
- How can and will the respective cyber security imperatives, platforms, and strategies of satellite and mobile wireless technologies be integrated to function on a pan-networking level?
- Can, does or will cellular network encryption effect satellite industry capability to pass and optimize networks? How do the industries cope with increased client based security layers in the future?
- Optimizing solutions for media content - traffic acceleration, cache of popular content, prioritization; how do we go about it? What can satcom learn from terrestrial backhaul, and vice-versa?
- With a wealth of new satellite platforms coming, what should carriers look for in ground infrastructure and satellite hardware partners? How has the satellite industry adapted to accommodate cellular?
- IoT and 5G will be delivered to places where satellite has always ruled, such as remote areas, and to places where satellite is making inroads now such as maritime/ aviation transport networks; how can or will it adapt hardware to reach new markets – such as vehicular networks, man-portable solutions etc.?

To close the day panel session 4 will adopt a regional focus, looking at *Latin America, Sub-Saharan Africa, Asia* ... *How to Profit from Satellite in the Hottest Markets.*

The dialog amongst the panelists – Krasmira Bozhinkova, VP, Data Portfolio Management, SES; Kannan Soupra-

manien, Regional Sales Director, Eutelsat; and, Jack Beuchler, VP Business Development, Talia – will focus around:

- High pricing and limited bandwidth historically made satellites unappealing to wireless carriers, in all but the most challenging of geographic areas. Has that changed? How?
- Where is the growth that the cellular industry finds hardest/most costly to rollout? Does it match the satellite industry's bandwidth availability?
- How do both industries address the contrasts of the markets: some countries deploying 4G LTE while others are still deploying 2G?

Registered to attend the conference as of 26th May are: AB5 Consulting; Agilis; Airbus; Anver Ltd; Argiva; Avanti Communications; British Telecom; Comtech EF Data; EuropaSat; Eutelsat; General Dynamics; Global Eagle Entertainment; Huckworthy; iDirect; Integrasys; Intelsat; IoT Insights; iSat; Isotropic Systems Ltd; Konnect Africa Eutelsat; Loreto Capital; M&J Communications; Media Broadcast Satellite GmbH; Onlime; RDP Media; Satellite Applications Catapult; Sematron; SES; Smith Engineering; Soracom; Spacecom; SpeedCast; Telesat; Terrasat; UR Group; ViaSat; and, XipLink. Delegate registration, which is free-of-charge, remains open. Please contact me (martin.jarrold@gvf.org) or alternatively, Paul Stahl at EMP ~ (paul.stahl@uk-emp.co.uk).



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RigNet Appoints Sullivan as CTO/CIO

Inc. announced that Brendon Sullivan will join its executive management team as Chief Technology/Information Officer (CTO/CIO). Sullivan will support RigNet's strategic initiatives, aligning the company's product architecture with business priorities, and will work to streamline business processes.

He brings over 20 years of technolo-



Brendon Sullivan

gy

leadership, driving transformational business process change and developing network services solutions. Sullivan's teams have been awarded multiple honors such as the Frost & Sullivan Innovation in Industry, Forbes Magazine Best of the Web, and a Technical Emmy. His broad industry experience spans the media, telecom, entertainment and emerging technology industries. Mr. Sullivan previously held top technology positions at Vubiquity and DG Fastchannel, two leaders in global media distribution, and prior to that, management positions at Level 3 Communications and Accenture. He company, Varian Associates, Inc., in received his Bachelor of Arts with Honors from Brown University.

"Brendan's leadership will clearly strengthen RigNet's capabilities, by driving and shaping technology solutions, to help our clients address their enterprise business needs," said Steven Pickett, RigNet's CEO & President.

CPI Appoints Ficket CEO

Palo Alto, Calif. May 1, 2017--Houston, Tex., June 1, 2017 -- RigNet, Effective May 1, 2017, Bob Fickett will assume the role of chief executive officer of CPI International, Inc., which is the parent company of Communications & Power Industries LLC (CPI) and Communications & Power Industries Canada Inc. (CPI Canada). Fickett has served as president and chief operating officer of CPI International since March 2002. He will retain his current roles at CPI, where he has served as president since March 2002 and as chairman of the board of managers since December 2015.

Fickett replaces Joe Caldarelli in the TION, chief executive officer role at CPI International. Mr. Caldarelli will transition to a new role as vice chairman of CPI International, and will continue to serve in his current roles as a member of the board of managers of CPI and as president of CPI Canada.



Bob Fickett

Fickett joined CPI's predecessor 1982. He holds a B.S. in mechanical engineering from the University of California, Berkeley.

Boeing's Dawn Harms and DataPath's David Myers Named Chairperson and President of SSPI

New York City, May 18, 2017--- The

Society of Satellite Professionals International (SSPI) today announced the appointment of Dawn Harms, Vice President of Business Development, Boeing Satellite Systems International, as its new Chairperson, and David Myers, President & CEO, DataPath, as President of its Board of Directors through March 2018.

SSPI also announced the election by its worldwide membership of seven new directors. Stuart Baillie, Vice President, Distribution Technology & Affiliate Services, Viacom, Ariane Cornell, Business Development & Strategy, Blue Origin, Jonathan Crawford, President & The SPACECONNEC-CEO. Jonathan Hofeller. Vice-President of Commercial Sales, SpaceX, Jason Juranek, CEO and CFO, Globecomm, Nathan Kundtz, Chief Executive Officer and President, Kymeta Corporation, and Richard Leshner, Ph.D., Vice President, Government Affairs, Planet, were elected to serve three-year terms beginning March 9. Ed Giovannini, Vice President, Media Sales, Ericsson, was elected to serve a second term as Treasurer.

"I am pleased to welcome the new SSPI board members who represent a diverse and impressive cross section of leaders operating during this dynamic and exciting time in the satellite industry," said Dawn Harms, vice president of global sales and marketing, Boeing Satellite Systems International. "Working with the board members, SSPI looks to advance its important missions including future leader development and to promote the contribution of satellites to commerce, STEM education, communication and human welfare."

"The SSPI Board will be focusing much of the next year on a strategic initiative to become more inclusive of the emerging 'New Space' sector of the industry," said David Myers, President of the Board. "We will soon be announcing plans for enhancing the association's membership, events and brand to benefit both new space and satellite professionals."



Pay-TV Innovation Forum Reveals the 2017 Challenges and Growth Strategies of North American Pay-TV Service Providers

Cheseaux, Switzerland – June 7, 2017 – NAGRA, a Kudelski costs. As a result they can deliver value through highly-Group (SIX:KUD.S) company and the world's leading inde- relevant, personalised content and user interfaces, targeted pendent provider of content protection and multiscreen advertising and improvements to sales and marketing opertelevision solutions, in partnership with MTM, a leading international research and strategy consultancy, today revealed the first wave of findings from the Pay-TV Innovation growing in the North American pay-TV market. Key chal-Forum 2017, which looks first at the state of the North American market. The global research program examines the state of pay-TV innovations and strategies that will drive the next phase of growth for the industry.

viders polled in April 2017, evolving consumer expectations and habits, along with a significant increase in on-demand content consumption, pricing pressures driven by new OTT offerings and simplified access to pirated streaming services, are driving a major transformation in the North American pay-TV industry. Some experts talk of a possible risk of significant revenue loss if the status quo were to be maintained.

To address these challenges, service providers are leveraging OTT, streaming and cloud technologies as well as advanced data analytics and anti-piracy measures to stay way," said Jon Watts, Managing Partner, MTM. "There are ahead of the game. In parallel, they are considering reviewing their pricing and packaging models and services to better respond to a more segmented market place.

will help to drive growth and ensure the North American pay-TV industry retains and strengthens its position as the most innovative and diversified in the world:

younger audiences, pay-TV operators are focusing efforts Trudelle, Senior Director, Product Marketing, NAGRA. on significantly strengthening OTT and multiscreen propositions. According to industry executives, there are strong generational differences in terms of perceived value of pay-TV services. Younger audiences expect to consume ondemand content on mobile screens versus the traditional linear TV environment and bundles preferred by older generations. As a result, operators are rethinking their pricing driven partnerships with content owners as well as technoland business model approaches to better address all demographics and market segments. Cloud-based technolo- The Pay-TV Innovation Forum explores the next generation gies can also help service providers compete more effective- business and technology developments of pay-TV operators ly with internet-based rivals.

executives polled cited advanced data and analytics as an visuals and statistics on the North American research can be area that will have a significant impact on the North Ameri- found in NAGRA's "Pay TV Innovation Forum 2017 Key can pay-TV industry over the next five years. Developments <u>Trends and Developments in North America</u>" presentain advanced data and analytics will help pay-TV operators tion. For more information please visit https:// gain more flexibility and insight while reducing operating dtv.nagra.com/paytvif.

ations.

Anti-Piracy Measures: The threat of content piracy is lenges include the emergence of illegal retail IPTV set-top boxes and apps, the growing costs of pay-TV subscriptions and the increased sophistication of pirates. However, new more holistic anti-piracy solutions and increased industry According to a panel of North American pay-TV service pro- awareness, along with smarter legitimate on-demand TV services are expected to reduce the impact of piracy in the long term.

"North American executives clearly recognise that the industry is experiencing a period of change and disruption – and are making the investments required to remain competitive in a challenging market. This year's research programme shows that the North American industry is moving forward, developing and extending product and service portfolios and addressing new opportunities. In areas like OTT, data and analytics and IoT, the region is leading the clearly significant challenges ahead, as competition grows but the pay-TV industry is on track to deliver improved value propositions to consumers. This is an industry in transi-Industry executives highlight three key priorities that tion and it's exciting to see the progress that is being made."

"North American pay-TV operators have started to deliver improved value propositions to consumers that address OTT, Streaming and Cloud technologies: To attract the disruptive actions of the digital giants", said Simon "Service providers who are planning to develop and deliver better user experiences, new OTT services, leverage cloud and data analytics, while contributing to curbing the impact of piracy on the ecosystem will be able to maintain a leadership position with solid margins. Yet the intensity and pace of change in the industry calls for a new era of innovationogy vendors."

around the world to uncover and understand what will Advanced Data and Analytics: More than half of industry drive the next phase of growth in the industry. Additional

Company Name	Symbol	Price (Jun 05)	% Change from (May 05)	52-wk
Satellite Operators				
Asia Satellite Telecommunications Holdings Limited Eutelsat Communications S.A. APT Satellite Holdings Limited Inmarsat Pic SES S.A.	1135.HK ETLPA 1045.HK ISATL SES.F	9.00 24.11 4.19 843.50 23.06	-0.05 0.09 0.02 0.11 0.09	8.80 15.19 3.64 594.50 17.90
Satellite Manufacturers				
The Boeing Company MacDonald, Dettwiler and Associates Ltd. Lockheed Martin Corporation Orbital ATK, Inc. Honeywell International Inc.	BA MDA.TO LMT OA HON	188.95 63.83 280.13 101.28 133.49	0.02 - <mark>0.03</mark> 0.03 0.03 0.02	122.35 61.80 228.50 67.04 105.25
Equipment Manufacturers				
C-Com Satellite Systems Inc. Comtech Telecommunications Corp. Harris Corporation ViaSat Inc. Gilat Satellite Networks Ltd.	CMI.V CMTL HRS VSAT GILT	0.99 15.40 112.74 71.44 4.69	-0.02 0.08 0.02 0.09 -0.06	0.92 9.52 78.42 61.85 4.05
Service Providers				
DISH Network Corporation Globalstar Inc. Orbcomm Inc. Sirius XM Holdings Inc. Sky plc S&P 500	DISH GSAT ORBC SIRI SKY.L ^GSPC	66.19 2.04 10.42 5.38 980.00 2436.10	0.07 0.15 0.09 0.10 -0.01 0.02	48.51 0.73 7.15 3.74 560.00 1991.68

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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 (Jun 05)	% Change from (May 05)
Satellite Markets 20 Index [™]	2,940.83	3.61%
S & P 500	2,436.10	1.53%

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