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SATELLITE Markets & Research

Industry Trends, News Analysis, Market Intelligence and Opportunities

Focus on Media Service Providers: What's New?

by Dan Freyer

As many in the satellite industry prepare to visit Las Vegas in April for the National Association of Broadcasters' NAB Show 2016, ***Satellite Executive Briefing*** spoke with some key media services providers to discuss the latest trends and issues affecting satellite-based services.

Global operators in this arena include Globecast, RR Media, Encompass Digital, Arqiva, and STN. Regional service providers include the likes of Media Broadcast, Germany, ABS-CBN International, PCCW, and Telstra in Asia and the Pacific, as well as Middle East players such as du Samacom and Jordan Media City, among others, most providing core teleport services as well as playout.

Globecast's teleport in Los Angeles, Calif.

Consolidation and Fragmentation

One dynamic that continues to affect the industry is consolidation and the quest for global media customers and scale. A recent case in the spotlight is RR Media (NASDAQ: RRM), Airport City, Israel, which purchased its local market rival Satlink in 2015. In February, RR Media, which boasts over 200 managed channels, agreed to merge with SES Platform Services of Munich, Germany, which serves over 300 channels with playout and broadcast services. The merged entity will become the number one media services company in the world, RR Media says. The merger is subject to regulatory approvals, due in the second half of 2016.

According to Elad Manishviz, Chief Marketing Officer of RR Media, "Our customers are finding it difficult to rely on multiple-point solutions for the supply of different services that are required to achieve their goals." RR Media can help them centralize all media operations and methods, and take full responsibility for the technical, operational, logistical and distributional needs, and deliver all the required services under one roof, he says.

Another dynamic that providers are seeing in the market is fragmentation. "As customers' demands grow, with so many ways in which to consume content, the challenges and complexities are only going to increase due to market fragmentation," Manishviz observes.

According to Francis Rolland, Director, Satellite & Networks and Strategy for Globecast, "Although

Continued on page 4

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From the Editor

The Changing Broadcast Market

As the industry makes its way to Las Vegas this month for the largest broadcast show in the world, the NAB, over 100,000 attendees from all over the world will be dazzled by gizmos showcasing the latest trends in the broadcast market. For our part, we attempt to help demystify the changes in the broadcast market as it applies to the satellite industry. Our cover story by Dan Freyer presents the changing requirements of broadcasters and how satellite service providers are adopting to meet those requirements. Elisabeth Tweedie in the feature article on page 16 presents the changes in the delivery and distribution of video content. We also feature the second part of our series on the impact satellite technology will be having in the forthcoming Summer Olympic Games in Rio de Janeiro, Brazil this summer on page 12.

We at Satellite Markets and Research are also making some innovative changes in the way we are delivering our content, specifically in how we prent the Marketcast video interviews with senior executives. We have partnered with the SPACECONNECTION and its Eventcast Live product which will feature live streaming of interviews with senior executives at the Satellite Markets booth # SU 10224 on Wednesday, April 20th from 1:00-5:00 pm. To view the videos live on any device go to: www.satellitemarkets.com/marketcast/nab2016 We have a stellar line-up of interviewees from the leading companies in the industry.

See you at the NAB.

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

Satellite Executive BRIEFING
Industry Trends, News Analysis, Market Intelligence and Opportunities

EDITORIAL

Virgil Labrador
Editor-in-Chief
virgil@satellitemarkets.com

Elisabeth Tweedie
Associate Editor
elisabeth@satellitemarkets.com

Contributing Editors:

North America: Robert Bell, Bruce Elbert, Dan Freyer, Lou Zacharilla

Latin America: B. H. Schneiderman

Europe: Martin Jarrold, *London*
Hub Urlings, *Amsterdam*
Roxana Dunnette, *Geneva*

Asia-Pacific: Peter Galace, *Manila*,
Naoakira Kamiya, *Tokyo*
Riaz Lamak, *India*

Editorial Assistant: Niko Rodriguez

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sales@satellitemarkets.com

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SYNTHESIS PUBLICATIONS LLC
1418 South Azusa Ave. # 4174
West Covina CA 91791 USA
Phone: +1-626-931-6395
Fax +1-425-969-2654
E-mail: info@satellitemarkets.com

Changes in the Satellite Industry...From page 1

linear remains the dominant format for content consumption, there's no doubt that audiences are becoming increasingly fragmented. As a result, we're seeing greater demand for OTT services and fiber/IP-based delivery. This is either a means to augment existing services and respond to consumer demand, or as a flexible alternative for a new channel launch or a foray into a new region."

"Media management and playout are growth areas for Globecast," says Rolland, "though we must add that both the contribution and distribution businesses remain very strong. Our media management services enable content providers to reach any audience, launching channels and delivering content anywhere in the world." Because Globecast has considerable experience launching channels and delivering content around the world, leveraging its Media Centers in Singapore, London and Los Angeles, "This experience enables us to do the same with new platforms and content consumption formats," says Rolland.

"...As customers' demands grow, with so many ways in which to consume content, the challenges and complexities are only going to increase due to market fragmentation..."

***-Elad Manishviz,* Chief Marketing Officer of RR Media**

RR Media playout center.

'IP-ization', Hybrid and Optimized Delivery

A regional provider in North America, ACTi runs over 100 GBit/s of capacity on INTELSAT, Anik, Eutelsat, SES, Level 3, Zayo and TW Telecom, and provides master control, satellite uplink, and web services from its Mesh TV facilities in Chandler, AZ, USA. Gary Hatch, Founder of ATCi, agrees that what he calls "IP-ization" of video is thoroughly changing the video landscape and creating new media ecosystems."

According to Hatch, "Over the Top (OTT) is the clear winner and a proven business model. User behavioral based algorithms for programmatic ad delivery, and new media monetization models are providing new revenue at Facebook, AMC, Google, and Twitter to name a select few. Moreover, providers are processing user analytics to best deliver video of what users want, when they want it and where they want it."

Another player in the North American scene, The SPACE CONNECTION has traditionally supplied transponder capacity for cable and broadcast customers, but is now positioning to address multi-screen apps. According to Jonathan Crawford, President and CEO of THE SPACECONNECTION, Inc., "The industry has seen a considerable amount of growth in mobility, Internet Protocol (IP) transmission, and Over-The-Top (OTT) based services over the past 12 months. The demand to expand the reach of a broadcast or the delivery of content to multiple platforms and screens has brought a surge in this area."

Bandwidth and Teleport Side

As technology continues to evolve, there has been a significant increase in throughput using satellites. "We have experienced throughput upwards of 140 Mbps using a 36MHz transponder. Increased throughput is beneficial for bandwidth intensive data and video applications," says SPACECONNECTION's Crawford. "Demand for maximizing channelization and reducing cost per bit, while maintaining overall transmission reliability are key drivers for our customers."

U.S. Electrodynamics, Inc. (USEI) supplies teleport and transmission services for broadcasters via its fiber-ringed Brewster, WA and Vernon Valley, NJ teleports, which serve the Western Hemisphere, Atlantic and Pacific

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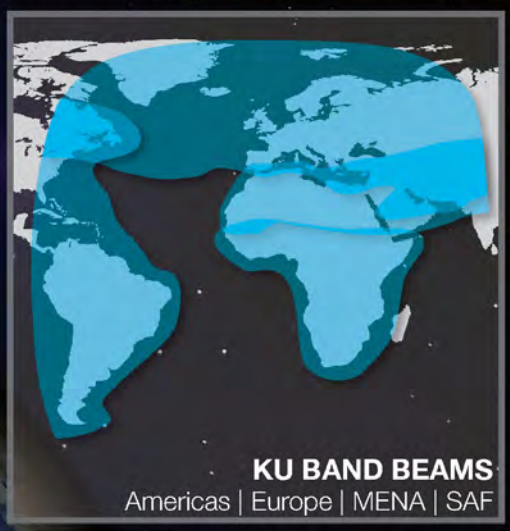

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Satellite rendition courtesy of the Boeing Company

regions. USEI migrated its video transmission method from "ASI over SONET/SDH" to "H.264 over IP" for point-to-point contribution circuits in 2009. "Our video customers are mainly overseas broadcasters. They usually want point-to-point, high quality HD video," explains Satoshi Ono, USEI's executive for global development and video. "The video source is usually on a satellite, so we downlink, for example, NBC Sunday Night football feed which is a back-haul feed. Then we encode with H.264, encapsulate it, and transmit over secure private IP network protected by MPLS technology."

Despite the hype, plenty of video traffic is sent today over non-IP infrastructure. Even today, however, some customers are still wary of video over IP, says Ono. "After 5 full years of successful services including the Super Bowl live, the World Series, the NBA Finals, and hundreds of flawless live feeds, I can say with full confidence that our video-over-IP really works." Nevertheless, some customers shy away from video-over-IP because of prejudices or old-school mindset, he says. However, as a new generation of decision-makers advances their careers within customer ranks, Ono predicts that IP-based video circuits will become more popular.

Role of Satellite

Given the technology changes and OTT, will satellite retain its importance for media distribution in the future? Services providers believe it will continue to play a vital role, within the media delivery ecosphere.

"While satellite is still the most efficient method for delivering live broadcast over wide coverage areas to massive amounts of concurrent viewers in high quality, most broadcasters and TV channels are also delivering by other means, including via fiber and IP," RR Media's Manishviz argues. "The way viewers consume content today means that they will use some form of video streaming, whether this is to enable VOD or online viewing. Optimizing content delivery can address the problem of "second screens," or losing viewers' attention to other devices."

"...Customers are seeing the benefits of the new technologies and ultimately it means using less space segment–or increasing the number of bits per Hertz and therefore the same number of channels in a smaller bandwidth..."

***-Anver Anderson,* General Manager, STN**

According to Globecast's Francis Rolland, "We live in fractured contribution and delivery world and central to our role is the ability to work with customers to create bespoke (custom) solutions. Satellite remains the most viable solution in many customer cases and still enriches the portfolio of the network solutions provider: major sporting events are a key case in point on the contribution side," he adds.

A Picture of Evolving Compression: SD, HD, UHD

For Globecast, which provides services globally including extensive services in Europe, "The main change in the current period of time is the migration SD to HD," according to Rolland. "Although of course HD has been available for many years, a majority of channels remain SD only. It's only recently that the big migration SD to HD of channels has started," he says. "As a service provider, we have to work closely with satellite operators to adapt the available satellite capacity. Today, the demand is mostly on DVB-S2/MPEG -4, but we know already that the technology will migrate soon to UHD and HEVC."

Another European operator facing similar market challenges is fast-growing STN PLC (www.stn.eu). STN transmits over 600 TV channels, delivering global service via satellite and fiber from its teleport and media center in Dob, Slovenia, and won the "WTA Teleport Operator of the Year" award for 2016. In December 2015, the company announced IPO plans, and in January of this year it appointed a new General Manager Anver Anderson as part of its initiatives. Anderson's view of market trends echoes that of fellow European industry executives.

"From STN's perspective, we are seeing a high rate of transfer from DVBS to DVBS2, MPEG2 to MPEG4 and of course to UHDTV and HEVC. The transition is always traumatic because the networks have to ensure the set top box community is fully upgraded – and that takes time and money. Customers are seeing the benefits of the new technologies and ultimately it means using less space segment – or increasing the number of bits per Hertz and therefore the same number of channels in a smaller bandwidth." The savings can be significant enough to upgrade the networks in the near-term, Anderson says. "At the end of the day, the industry is driven by advertising and subscriptions and so as a teleport we need to be technically prepared to offer quality yet cost effective solutions to our customer, so that they can reach theirs."

Clients usually require prime satellites positions with a premium channel neighbourhood but it boils down to budgets, according to Anderson. "We have been looking at the MPEG4 HD solutions using HEVC and we've had great quality results down to only 4Mbit/s channels. This really gives our customers some opportunities to more fully populate their transponders with a greater number of channels. We always

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USEI Teleport in Brewster, Washington State, USA.

collaborate fully with our customers and often bring them new ideas about distribution methods and technology fit. It's a partnership approach and one of the reasons we've grown so quickly to handling over 600 channels globally," Anderson says.

Transponder deals vary by market and coverage. For example, "In an unstable economic climate, especially in places like Russia, the Middle East and emerging markets, customers are looking for flexibility with shorter-term contracts and more back-to-back terms," according to RR Media's Manishviz.

For its part, SPACECONNECTION, with the company's extensive North American transponder inventory, capacity usage has actually increased in the past year. According to Crawford, "Many of our customers continue to recognize the importance of reliability because they have placed significant value on their business and transmission requirements. "In some cases, customers had selected alternative methods such as fiber or IP to deliver their content but after experiencing outages, determined that satellite was the better solution based on customer requirements and captive audiences. The combination of hybrid transmission technologies that use satellite and IP is an emerging growth area for the SPACECONNECTION."

Ultra High Definition (UHD), aka 4K TV technology development is impacting capacity demand on the contribution side today as well. For example, USEI's Satoshi Ono is seeing that some new applications such as 4K require satellite solutions, even for point-to-point links in the near term, due to lack of fiber last-mile infrastructure.

"We are getting occasionally 4K turn-around requests. There aren't many terrestrial video circuits that support 4K video, even at a compressed level. The easiest method is ASI turnaround via satellite. For us it's high bandwidth ASI turnaround service even if the contents are in 4K video. This is something new, and we expect to see more of those requirements." "In the last five years we made adjustments to meet higher modulation, higher bit rate/symbol rate, 4:2:0 to 4:2:2, Mpeg2 to Mpeg4/H.264. Soon we should have a 4K capable IRD or two, if the market expands well," adds USEI's Ono.

"4K ("Ultra High Definition video) requires, at a minimum, four times the bandwidth of 2K (1080i HD video) for satellite transmission. "But once HEVC or H.265 encoding become more affordable and available, 18 Mhz of satellite bandwidth should be good enough for 4K transport," he says.

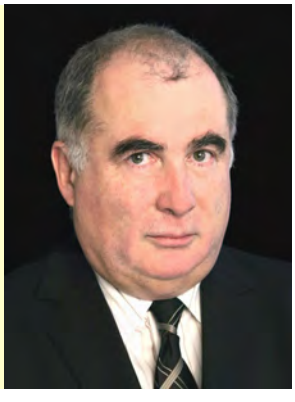
HTS Capacity

Another issue with transponder capacity is, the new HTS capacity lighting up the skies around the world. "There are also some major changes happening in space," says STN's Anderson. "C-band and Ku-band are used for the most part for TV broadcasting, but we are now starting to see Ka-band being used for small, more specific markets. The High Throughput Satellites HTS will allow for a great deal of data-passing capacity due to the frequency re-use (not that all HTS satellites are at Ka-band of course – other systems use the same techniques in both C and Ku-bands)," he says. " We're also seeing an influx of 'single-satellite' operators that tend to offer very competitive rates for space segment. This has to be balanced with the coverage, subscribership, and in-orbit back-up systems in place by the more traditional satellite operators. Despite the regular misreporting of the death of satellite, I'm glad to say that STN is busier than ever."

In STN's view, "There is increasing demand for OTT services and after running some tests here recently, we're looking forward to serving this burgeoning market segment. STN is now offering OTT services as an add-on for our existing and new customers, with development towards HTS-related opportunities for new services, such as

"...Our customers now need to continue to deliver content via their traditional linear offering - where satellite plays a crucial role both in backhaul and DTH delivery - as well providing access to content via OTT and VoD services. .."

***-Francis Rolland,* Director, Satellite & Networks and Strategy,Globecast**



data for consumer broadband markets," and enterprise.

STN's Anderson says, "The coming year for STN will see a real consolidation and growth of our traditional services with the uptake of the OTT services likely to provide connectivity with the on-line generation/s to come."

Optimizing Hybrid Networks: Satellite, fiber, Cloud

How do you meet customer requirements in this environment? "By using the very best fiber and satcom IP delivery, and above all, by effective planning in concert with an eye for scalable NFV (network function virtualization) and SDN (software defined networks)," according to ACTi's Gary Hatch. "Our next generation teleport has been nominated by the WTA as a leader for OTT delivery, programmatic ad delivery, ingest, playout, storage, SatCom and DR services." The SDN / NFV are back office hardware and software for media cloud delivery, such as the type ACTi is employing.

In addition to these network design issues, integration with customers' workflow is a key success factor, especially for non-linear video, executives say. For customers, delivering content to more places on more devices, using a converged, single media workflow reduces the distribution costs," argues RR Media's Manishviz. "Hybrid solutions for satellite, fiber and online video distribution also help to reduce content operation and delivery costs."

Looking Ahead

No doubt, satellites will play a significant part in the media services game, but their role in the solution will take new forms and models in addition to pure provision of capacity.

Globecast's Francis Rolland sums up well the challenge for many end-to-end players in the media space: "Our customers now need to continue to deliver content via their traditional linear offering - where satellite plays a crucial role both in backhaul and DTH delivery - as well providing access to content via OTT and VoD services. The challenge here is that content needs to be packaged in different ways for different delivery mechanisms."

However, in addition to being able to delivery content using hybrid and optimized satellite-terrestrial delivery mechanisms, leading providers will need to go a step further, adds RR Media's Elad Manishviz. Providers will need to show customers new and inventive ways to monetize their content assets, and extend their reach into new markets around the world. Clearly, satellite technology will continue to play a part in support of these aims.

Helping Customers Monetize Content Production: Media Providers at NAB 2016

An example of how this media convergence is pushing providers to expand their solutions is the new service SPACECONNECTION has launched. The company will feature its streaming service at the NAB Show 2016, delivering live interviews to smart phones, tablets, and the web. The service allows organizations to deliver important meetings, conferences, events, news feeds and content to the Web, smart phones, iOS/Android based tablets, set-top boxes, and Internet connected TVs.

According to SPACECONNECTION's President & CEO, Jonathan Crawford, "The service goes beyond a High Definition live broadcast. The company's new service facilitates monetization of events through eCommerce registration, creates social media interaction through effective and viral posts, enables live streaming and sharing multimedia via advanced mobile applications, and allows on-site participants to share photos and videos in real-time. Real-time analytics allow users to make informed decisions to suit the needs of the target population." SPACECONNECTION is partnering with Satellite Markets and Research and will be demonstrating its Eventcast Live product which will feature live streaming of interviews with senior executives at the Satellite Markets booth # SU 10224. To view the videos on any device go to: www.satellitemarkets.com/marketcast/nab2016

Also at NAB 2016, **GlobeCast** will highlight its playout and media management services, including VoD logistics and its US distribution services.

Meanwhile, **RR Media** will emphasize its "optimized content delivery over satellite, fiber and the Internet," and showcase its cloud-based global media platform, solaRR, which lets broadcasters, content to launch and monetize scalable, multi-screen services anywhere in the world. Among the features being touted are greater visibility for customers into their content, easy online tracking and management assets through the single unified platform, viewer engagement and monetization capabilities, social media connectivity, and value-added localization services, such as automated clipping, and dubbing.

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

Satellite Services to Play a Key Role in the 2016 Rio Olympics, Part 2

by Bernardo Schneiderman

Teleport and facilities for broadcasters and content delivery organizations during the 2016 Olympics Games in Rio de Janeiro, Brazil this summer is the main focus of the second part of our article originally published in the March edition.

With the goal to support more than 206 countries with broadcasters that are planning to cover the Rio de Janeiro Summer Olympics during the venue we have this complementary article with information of key companies based in Rio de Janeiro and other parts of Brazil that will have facilities and operations available during the period of the Olympics summer games in Rio de Janeiro.

In Brazil to operate any satellite services the operator need to have a license from the local regulator Anatel (the equivalent of the FCC in the USA) and have all the equipment certified by Anatel agency. This is the main reason the International broadcasters during the Olympic games should find a local operator or need to get a temporary license from Anatel to uplink any video services from Brazil to prevent the potential penalities involved in operating without a license in Brazil. In case the broadcaster needs local temporary license in Brazil, Telematics Business Consultants has a team of Brazilian consultants specialized to support this requirement. (See TBC's e-mail contact details at the end of this article).

We have in Rio de Janeiro beside the satellite operators' local subsidiaries including Eutelsat, Hispamar, Intelsat, SES, StarOne and Telesat, which we covered in the article that appeared in the March edition. We are complementing that article with companies that support broadcasters with Satellite News Gathering (SNG), Mobile uplinks, studios and Teleport related facilities.

To better illustrate the overall logistic the Olympic Games will be held in four location of sports events in various parts of Rio de Janeiro, including the following:

- **Barra da Tijuca area:** Main Facilities, Barra Olympic Park
- **Deodoro area–** Equestrian Center & other evnets
- **Maracana area–** Soccer & Volleyball
- **Copacabana Beach-** Beach Volleyball

The companies we are covering in this article have licenses to operate in Brazil and provide any uplink services approved by Anatel include the following: Telespazio do Brasil, STI elecom, Prime Telecom and F&F Work .

Telespazio do Brasil

Telespazio do Brasil (www.telespazio.com) is a satellite service provider operating in Brazil since 1997 with NOC and Data Center located in Rio de Janeiro's downtown area with national coverage and newly opened studio for recording and live transmission and a full equipped Teleport.

Telespazio has 2 teleports in Rio de Janeiro located in downtown Rio and one located in the South of Brazil in the city of Porto Alegre, State of Rio Grande do Sul.

The new studio located in downtown Rio is equipped with Cameras, Tricaster, smartboard, TV monitors, sound, lighting system, monitoring computer.

For more information on Telespazio contact:
Paulo Bigal - Sales & Mkt Director email:
Paulo.Bigal@telespazio.net.br

Telespazio Brazil's teleport in Rio de Janeiro overlooking Guanabara Bay.

STI Telecom

STI Telecom (**www.stitelecom.com.br**) is company specialized on satellite, wideband systems integration, and in development of custom turn-key solutions for audio, video and data transmission. The main focus is in International and Domestic Broadcasters. Uniquely positioned downtown Rio de Janeiro (Near the museum of tomorrow) with good look angles to major satellites, and terrestrial fiber backhaul, with teleport able to cater to the most demanding requirements of international customer. STI is part of WTA (World Teleport Association), STI's teleport is registered on EBU (European Broadcast Union) with strategic relationships with leading satellite operators.

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Prime Telecom

Prime Telecom (**www.primetelecom.com.br**) is a Satellite service provider company with a fleet of SNG, Teleport and Virtual Studio for the Olympics Games. With a wide expertise in satellite communications and have worked in the

broadcast market in Brazil since 2001.

SNG Prime Telecom SNG is equipped with a fleet of 8 Vans in C-Band and Ku-Band. They are totally redundant 1+1. The modulation capacity goes to 32 APSK with 5% of the ROF. The video engine is H.264 HD/SD.

Prime has bases in six states in Brazil: Rio de Janeiro, Sao Paulo, Pernambuco, Ceara, Sao Luis and Para. Prime provide facilities for World Cup 2014, Confederation Cup 2013, Formula One, Brazilian Soccer Championship, Beach Soccer Games and many others.

In Rio Prime have a Teleport Facility to support the SNG fleet and provider for full or partial time uplink services since there are 10 antennas from 2,4 m to 4,5 m in C-Band and Ku-Band available in Barra da Tijuca.

For the Rio 2016 Prime will have a Glass Studio with the Olympic Complex in Barra da Tijuca in the background. In this facility there are 4 HD cameras, switcher, IFB, lights and uplink to Europe, North America, South America, Africa and Australia. The technical team is fluent in English and Spanish.

Contact Person: Andre Balthazar, Director
email: balthazar@primetelecom.com.br

F&F Work's DSNG truck.

F&F Work

F&F Work (**www.ffwork.com.br**)is a video and audio production services company leader in video and audio transmission by satellite in Brazil. Doing business since 1990, F&F Work offers high quality equipment and expert professionals for the transmission of live events and the playout of journalistic material for information agencies, using both mobile (DSNG's) and fixed transmission units.

F&F Work has 10 DSNG´s (C-band) equipped for SDTV and HDTV Flyways (C and Ku band).

F&F Work's teleport with antennas for several satellites, with resources and facilities for turnarounds, uplinks, playouts, downlinks, recording and editing.

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Contact: Mr. Francisco Cavalcanti –Director email: ffwork@ffwork.com

If you need any further assistance or advice on how to make the most of the local facilities available during the Rio Olympic Games, contact info@tbc-telematics.com

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

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Don't Write Off Linear TV...Yet

by Elisabeth Tweedie

To borrow from Mark Twain: "the reports of my death have been greatly exaggerated." One could say the same about Linear TV and Standard Definition (SD). Looking at Linear TV first. To hear many people talk, there is no hope for it, video will be viewed, on-demand, on mobile screens. And, indeed, some will, but the majority of viewing time will still be spent watching linear TV. Given that video is still the mainstay of satellite operators' revenue, (it represented 63% of Eutelsat's revenue and 67% of SES' last year) this is a good thing for the industry. Statistics abound, but they all show that watching linear TV is still the main method for viewing content. According to Nielsen, 26% of global consumers pay an online service provider, for programming content whereas 72% pay to watch via a traditional TV provider (Cable, satellite or Over-the-Air). In North America, 22% of respondents claimed that they were planning to "cut the cord", which would be worrying, except that evidence has shown that only a very small percentage of those who indicate they will do so, actually do. Even in the US, where online consumption is the highest, average viewing of linear TV was four and a quarter hours per day in 2015, compared to one and a quarter hours of online viewing. OTT appears to be developing as a complement to traditional TV, not as a replacement for it. In the US, 78% of OTT users are also traditional multichannel subscribers. Jacob Keret, SVP Sales, at Amos Spacecom, echoed this saying: "Amos Spacecom does not see OTT services impacting our business at all. We mainly conceive OTT as a complementing service to existing pay TV services, with additional material."

HD

HD has been around for many years now, and it is easy for those of us located in Western Europe or the US to assume that it is now "the norm," soon to be replaced by Ultra High Definition (UHD). Not so at all, in the rest of the world. Approximately 30% of the 7,268 channels carried on SES are HD channels. However HD is growing in popularity, and 45% of the 380 new channels added in in the emerging markets in 2015 were HD channels. Eutelsat carries 600 HD channels. According to Euroconsult, 2017 will be the tipping point, when the total number of SD channels will start to decrease, but it will be in the second half of the 2020s before HD and UHD will account for over 50% of video channels. Jacob commented that for Amos (which provides service over Central Europe, the Middle East, Africa and Nepal), the majority of channels are SD only, and the transition to HD is taking place slowly, albeit steadily.

With UHD, or 4K, as it's also known, once again the perception belies the reality. It has been talked about for several years now, and compared to its predecessor, HD, has made relatively rapid progress. Or has it? Walk into any electronics store in the United States and the majority of television sets will be UHD. Interestingly these have reached price parity with 1080p HD sets very quickly, so reinforcing consumer perception that UHD is here, and stimulating demand for the sets. For example in the US, a LG 60" 1080p LCD TV retails for $849 and a 55" UHD LCD TV from the same manufacturer retails at $899. If only UHD was as simple as buying a new TV!

UHD is a work-in-progress. Standards are still evolving. Initially the focus was on more pixels; 4K is defined as 3840x2160 pixels, compared to HD's 1920x1080. That was Phase One. We're now entering Phase Two, which is likely to include "better pixels." A better pixel, is one that has a wider color gamut, greater brightness, higher frame rate (HFR) and higher dynamic range (HDR) as well as better audio. One concern expressed by the industry was that in order to appreciate UHD in its first incarnation, a viewer had to be seated at the optimum distance from the screen, which is 1.5 times the screen height, otherwise the difference between HD and UHD is barely noticeable to the average viewer. Given that most people don't sit that close to the screen, this is potentially a stumbling block to adoption. Enter "better pix-

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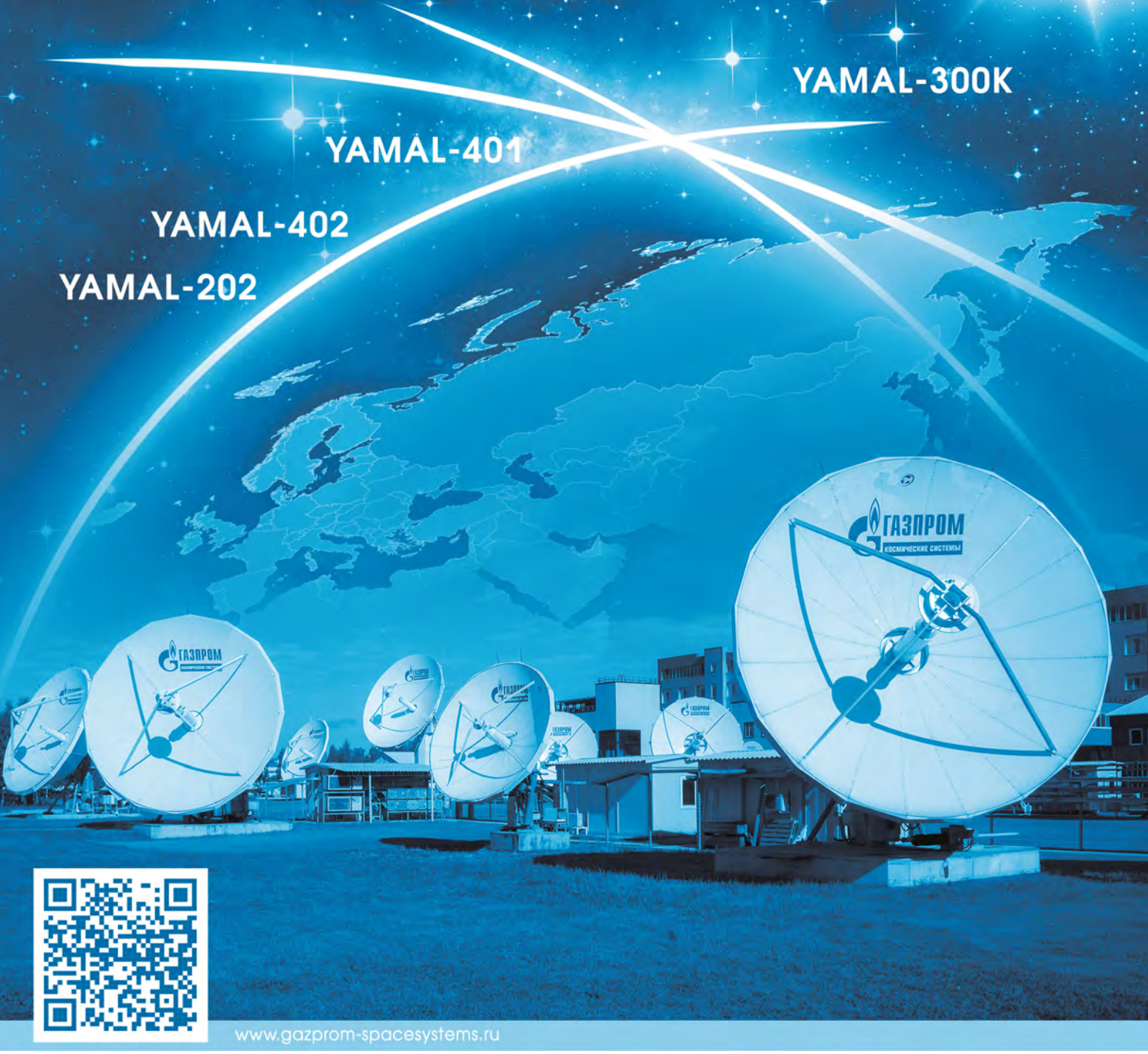

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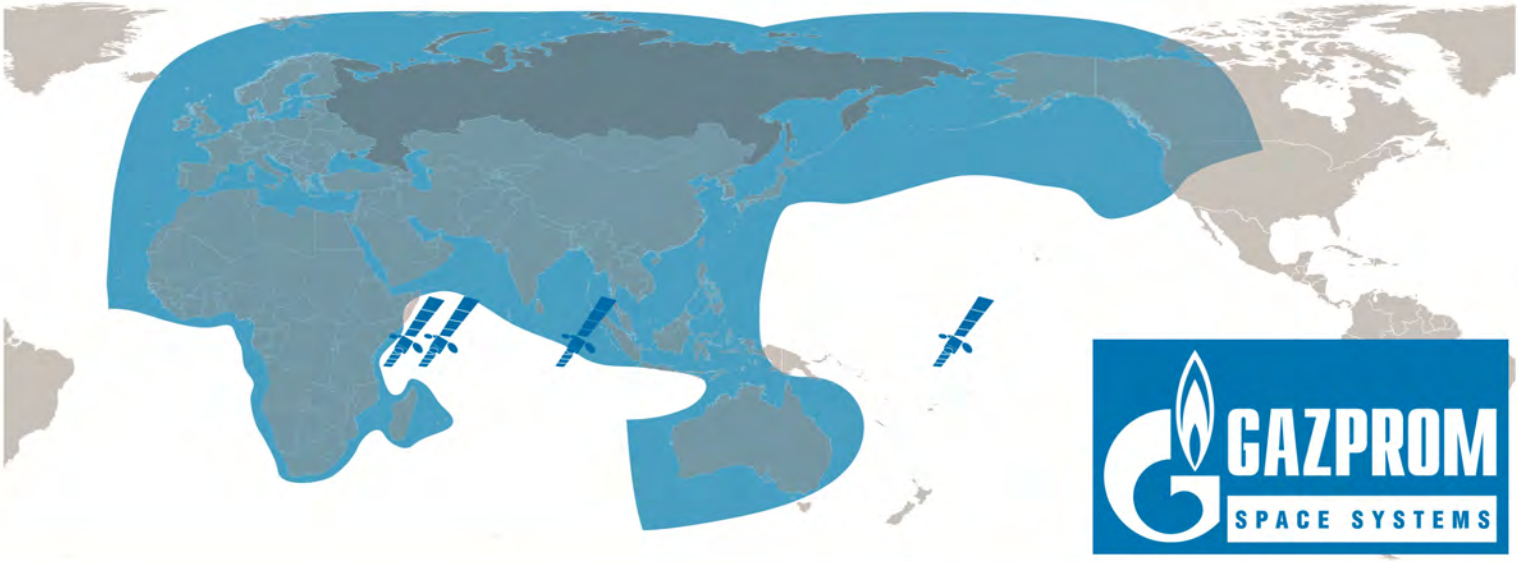

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els." With these the difference in quality is noticeable at a far greater variety of viewing distances. Herein lies the first problem: most UHD TV sets sold to date, don't support high dynamic range. Are early adopters going to be upset when they realize that they aren't getting the full benefit of the new technology? Or, as Peter Siebert, Executive Director of the DVB project put it during a panel at Satellite 2016: "there's no Wow factor for the early adopters!"

Standards

As always, with a new technology, there is no shortage of industry alliances and standards bodies working to develop standards. There are currently at least 12 different industry bodies, working on various aspects of these. The standards are often confusing, but nonetheless important, as they help de-risk new products for the manufacturers, and in some cases help demystify things for consumers. The UHD Alliance, for example has now developed a logo to identify devices, content and services capable of delivering a "premium UHD experience." Among other things, HDR is part of the premium experience. Most who have seen it, agree that HDR, particularly when combined with Wide Color Gamut (WCG) and 10-bit sample depth, is the "Wow factor" that will win consumers over. Some have even likened its impact to the change from black and white to color.

Meanwhile the DVB Project has issued draft commercial requirements for UHD-1 Phase 2. This is designed to let DVB members start offering HDR from 2017 and HDR combined with HFR from 2019. It is also possible that one of the commercial requirements will be to allow for HDR to be combined with 1080p (i.e. HD) images as an interim step. It is likely to take at least until the end of this year before the standards will be finalized.

Even with all the enhanced features incorporated, new TV sets alone are not sufficient to drive viewers to 4K. We need content. Something to watch to take advantage of all the new features! To date most 4K has come from the Over the Top (OTT) services, Netflix and Amazon in particular. Netflix and Amazon both started streaming 4K content in 2014. Now, with the exception of children's programming, all Netflix original content is produced in 4K. At the end of 2015, it claimed over 300 hours of UHD content. This year, Netflix intends to roll out some titles in HDR, starting with "Marco Polo." Amazon Prime already has the full season of "Mozart in the Jungle" available in HDR.

"...With one-to-many transmission, satellite is the ideal delivery mechanism for UHD. And it is coming, but relatively slowly. NSR is predicting that there will be over 1,000 UHD channels by 2025..."

A 20-25Mbps connection speed is needed to view streamed 4K content. This is attainable for most of the US and Western Europe. In the rest of the world the situation is very different. In South Africa for example, only one household in ten, has the required bandwidth to receive a Netflix stream in Standard Definition (SD) never mind HD or 4K.

With one-to-many transmission, satellite is the ideal delivery mechanism for UHD. And it is coming, but relatively slowly. NSR is predicting that there will be over 1,000 UHD channels by 2025. Looking at the major satellite operators, SES, the leader in 4K satellite channels, is currently broadcasting eight UHD channels worldwide; four of which are in North America, where it has created an "UHD Neighborhood" on SES-1, SES-3 and AMC-18. Eutelsat, currently has two demonstration UHD channels featuring co-productions by Eutelsat and content providers. Hotbird 4K1 can be seen by consumers in Europe, the Middle East and North Africa; and Fransat UHD, broadcasting from Eutelsat 5 West A, can be seen in France. Intelsat also has a demo channel on Galaxy 13. Asiasat is broadcasting two free-to-air (FTA) UHD channels and has also established a UHD research laboratory to evaluate all the different potential components of the 4K ecosystem. In the US, Directv launched a dedicated UHD satellite at the end of last year, and now has a dedicated UHD channel and also a selection of shows and movies available on demand. It is also planning the first live broadcast in UHD. On April 7th viewers – with a suitable TV set will be able to see the Golf Masters tournament live in 4K. Apparently this may allow viewers to "actually see the ball spin and to pick out individual divots in the turf." Spinning balls and small holes in the ground – one has to wonder, will this be enough to entice viewers in sufficient numbers to recoup the not insubstantial investment that Directv has made in this technology?

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

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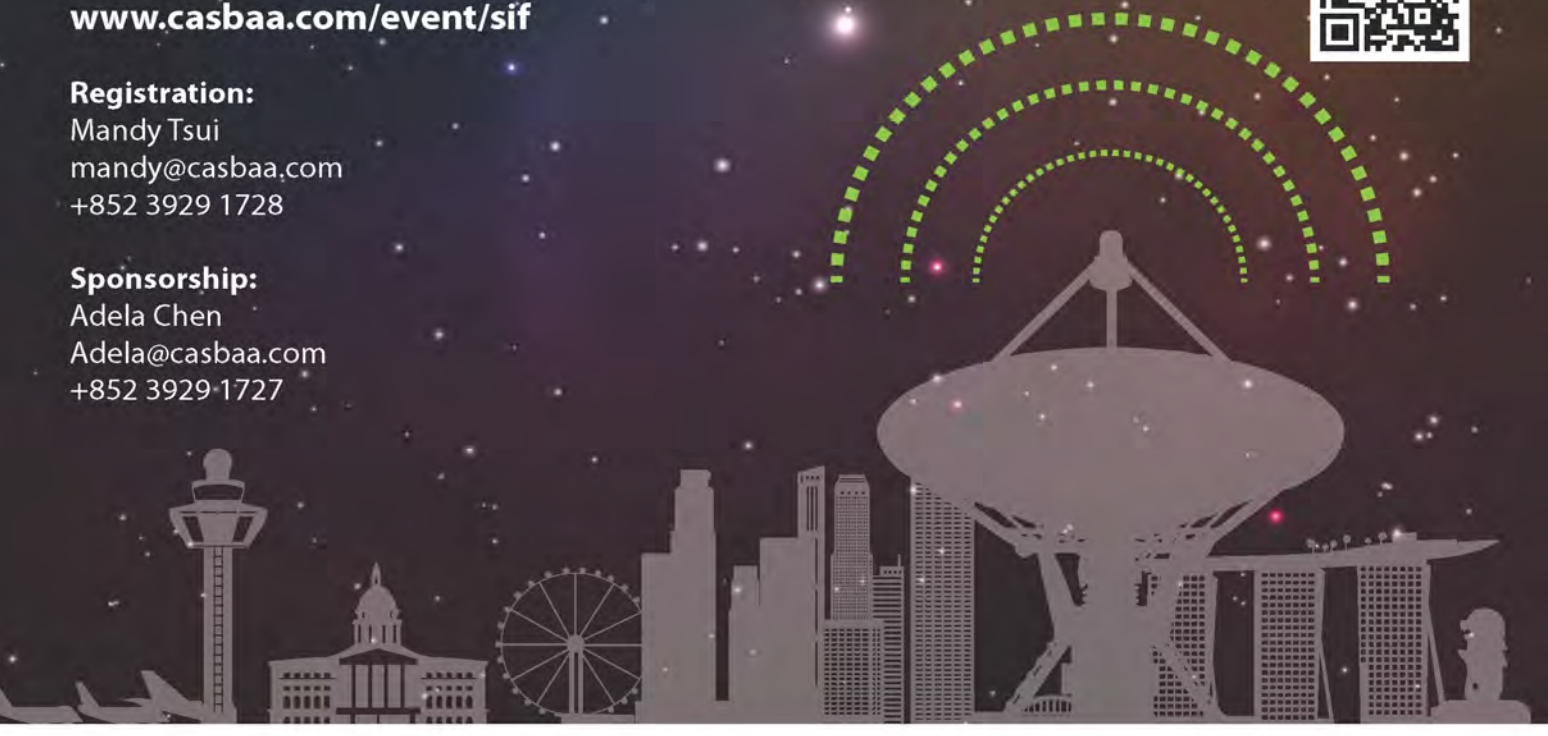

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Letting the Chips Fall Taiwan Style

by Lou Zacharilla

I will never forget the banner that greeted kids upon their entry into Zhungping Elementary school in Taoyuan City, Taiwan. It read:

"Drop Everything and READ!"

To me it spoke volumes about the reason why some cultures succeed as others fail; and why those who do not assume a pre-ordained "exceptionalism" often change the world.

I spend a lot of time in Taiwan. I agree with author Thomas Friedman, that it is my second favorite country after the USA. Taiwan has learned well a few simple things about itself. The first lesson it did not need an advanced degree to grasp: it is an island with few natural resources. Its "raw materials" include a cohesive culture, an obsession with educational capacity and the collective will of 23 million citizens to become better and better using technology. Educators in Taoyuan receive intensive training in the use of ICT to improve education, while the school system is constantly updating its curriculum to take advantage of the latest digital tools, including the use of satellites. Digital Opportunity Centers in remote areas provide thousands of residents with access to technology and skills training.

Second, Taiwan has a remarkable propensity to apply technology in order to add value to its economy. This is vital to the production of silicon chips, tablets and smart devices, where it outperforms everyone, including China. It has used a strategic overlay of IT, mobile broadband and logistics to become the third largest exporter of high-tech, precision machinery in the industrialized world. This ability to apply tech is linked to its educational system because the people of Taiwan work under former president Ma's "Intelligent Island" concept. The concept implies that, irrespective of the remoteness of many of its villages, and the political threat of a big neighbor, it is going to remain a "learning community," and let the chips fall (and the silicon wafers to be improved) as they may. I like the spunk.

What is instructive to the satellite industry is that this small country does not wait for innovations to come from customers before they take the order. In the area of precision machinery, they innovate continuously and new markets are continuously sought. They adhere to Clayton Christensen's observation about innovators, which is that when commercializing disruptive technologies, innovators find or develop new markets that value the attributes of the disruptive products, rather than search for a technological breakthrough in order for the disruptive product to merely compete in established, mainstream markets.

"...What is instructive to the satellite industry is that this small country does not wait for innovations to come from customers before they take the order. In the area of precision machinery, they innovate continuously and new markets are continuously sought..."

I do not see this type of thinking in every corner of our industry, despite many feints and much reference to innovation. Mark Dankberg often

quoted Christensen during the run-up to the successful launch of the ViaSat-1 satellite and effectively ushered in the HTS Era.

Despite this, you had to look hard to find this kind of thinking at this year's Satellite conference. I attended one of the best panels most people probably never saw where the subject came up. It was unfortunately a thinly-attended panel and part of the show's Broadcast Forum titled "Occasional-Use in a Fully Networked World."

With able moderation from Brett Belinsky of Deluxe Entertainment, it morphed into a discussion about innovation and got interesting.

Encompass Digital's Chris Myers spoke about a "total reinvention of business," which he believes is required for the satellite services industry to survive.

"I believe our new customers are looking for us to bridge the Internet with satellite," he said. This led to a discussion about whether teleports, tech providers and satellite operators should initiate innovations on behalf of broadcast customers, or whether they

should become as technically proficient as they can, and then wait for customers to come to them for a solution.

It was surprising to hear anyone express the view that we should wait. But some did. People said that it was not our job to bring new ideas to customers or even to seek new industries. The legacy of caution that often curses the satellite community was occasionally on display.

My view is biased: we should become the Taiwan of the communications industry, and invent new applications for new verticals and existing customers, especially broadcasters. We have done it before. We never a thought that satellites would help educate people in remote villages, deliver operas to regional movie theatres or bring Howard Stern (USA radio personality) into automobiles along with Frank Sinatra, Miles Davis and music from Senegal. But it happened because someone fit two previously unlinked pieces together. Perhaps every company in our industry needs a Chief Innovation Officer.

Heading toward NAB, I would suggest a banner to be hung at the entranceway to the show floor in Las Vegas, targeted at satellite industry professionals:

"Drop everything and innovate!"

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

The Satellite Story Today: Not A Replay of Fiber 2000-It's Worse!

by Armand Musey

Initially, the parallels between the fiber buildout around the turn of the twenty-first century and the satellite industry today are compelling.

In the late 1990s, the telecom industry increasingly poured billions of dollars into fiber. As these investments peaked, new technologies emerged to increase fiber optic capacity, including wavelength division multiplexing. This resulted in such a massive increase in efficiency that much of the fiber laid nearly twenty years ago is now dark. Rates plummeted and companies that were heavily invested in fiber were forced to restructure. Even today, fiber backbone providers' competitiveness often relies on price paid for the network in restructuring rather than its initial cost and capacity.

Historically, satellites typically had 1-3 Gbps of throughput, although Hughes and WildBlue had launched satellites in the mid 2000s with roughly 10 Gbps throughput. In 2011, ViaSat launched ViaSat I with approximately 130 Gbps of throughput, followed by Hughes Network Services' Jupiter I with similar capacity. Each of these new satellites individually has approximately as much capacity as previously existed over North America. In early 2017, ViaSat expects to launch ViaSat II with approximately 270 Gbps of capacity over North America and has announced plans to launch three satellites with 1 terabit of throughput each! These new 1 terabit satellites will each have approximately as much capacity as the entire satellite industry today. Meanwhile, several other high throughput satellites ("HTS") are being launched by Eutelsat, Hughes Network Systems, Inmarsat, Intelsat, O3B and others. While other don't have the capacity of ViaSat's planned satellite, the cumulative impact of the new satellites guarantees a several-fold increase in global satellite capacity.

The parallels with fiber end there. Relative to fiber, the satellite story is worse for incumbents, and better for new entrants. Existing fiber network deployments can often be easily upgraded to benefit from new technology to increase capacity. Such is not the case with satellites; compression and antenna technology can often incrementally increase the capacity of an existing satellite, yet throughput cannot increase anywhere near the order of magnitude of improvement in throughput featured on new satellites. Simply put, for most internet-based and network applications, new HTS satellites beat old traditional satellites. The also create excess capacity on legacy satellite and, to an extent, depresses pricing for broadcasting applications.

The mismatch between new and legacy technology can put incumbents at a disadvantage and encourages increased investment even when there is overcapacity. Excess capacity is creating price pressure, so existing operators tend to view adding new HTS capacity and thus lowering their unit cost as the only way to compete. The fallacy is that the industry as a whole is responding to overcapacity by adding more capacity! Individual rationality is leading to collective irrationality. As a result, this cycle is on track to repeat itself with every new generation of HTS technology. It's not clear how this will end as the dramatic increase in satellite throughput over the past ten years makes it seem unlikely that satellite technology improvements will stabilize with the introduction of one terabit satellites. To date, incumbent satellite operators have been partially buffered from the impact of this new capacity — much of it has gone into new consumer offerings that fill a gap in rural and semi-rural areas where many telcos are disinvesting in DSL. However, the ~$50/month consumer satellite broadband market is limited, especially outside of North America and Europe. As a result, the weight of this new capacity is likely to drive-down satellite capacity pricing at an increasing rate over the next several years.

"...Relative to fiber, the satellite story is worse for incumbents, and better for new entrants. Existing fiber network deployments can often be easily upgraded to benefit from new technology to increase capacity. Such is not the case with satellites; compression and antenna technology can often incrementally increase the capacity of an existing satellite, yet throughput cannot increase anywhere near the order of magnitude of improvement in throughput featured on new satellites..."

J. Armand Musey is the president and founder of Summit Ridge Group LLC (www.summitridgegroup.com). Armand specializes in the satellite, media and telecommunications industries. He has a unique blend of 16 years of equity research, investment banking and consulting experience. He can be reached at: amusey@summitridgegroup.com

Products and Services Market*Place*

A guide to key products and services to be showcased at the NAB 2016 in Las Vegas, Nevada, USA from April 18-21, 2016.

Advantech Wireless
booth # SU 2802 and Outdoor Exhibits OE 907
www.advantechwireless.com

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AvL Technologies
booth # C 7248 and Outdoor Exhibits OE 904
www.avltech.com

AvL TECHNOLOGIES

AvL Technologies' booths at NAB 2016 will showcase a number of new and cutting-edge antennas. In our Central Hall booth, C7248, we will have two O3b MEO tracking Ka-Band antennas - 85cm & 2.4m. These antennas offer the power of O3b's high throughput, low latency connectivity in compact and easily transportable designs. These rapidly deployable, tactical terminals operate in tandem pairs (same size) with make-before-break communications and can be set-up and on-the-air within two hours.

Also in our Central Hall booth will be a new 85cm auto-deploy flyaway fully-integrated solution that packs into two airline checkable bags. This unit is loaded with features including multiple modem choices and offers options such as on-board WiFi, fiber connectivity and AC/DC prime power.

On display in our outdoor booth, OE904, will be our newest 2.5m three-piece segmented vehicle-mount antenna for military and SNG applications. This robust quad-band antenna features a lightweight, new design AvL carbon fiber reflector with notched corners enabling it to be transported by helicopter. Also in our outdoor booth we will have a new 1.2m SNG vehicle-mount antenna with a motorized selectable dual-feed system.

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

C-COM Satellite Systems Inc.
booth # SU 9824
www.c-comsat.com

C-COM

C-COM Satellite Systems Inc. is a leader in the design, development and manufacture of commercial grade mobile SOTP antennas. iNetVu® systems are available in Vehicle Mount, Flyaway, Airline Checkable and Fixed Motorized platforms. More than 7000 C-COM antennas have been deployed in 103 countries around the world in a variety of vertical markets including SNG/Broadcasting.

Under development now, is a new generation of Ka and Ku-band SOTM (Satcom-On-The-Move) antennas. Be sure to stop by C-COM's booth at NAB and catch a glimpse of the NEW Ka-band inMotion terminal.

Also on display will be the Fly-75V which is approved by Eutelsat on their KA-SAT High Throughput Satellite using their new-generation NewsSpotter service. This 75cm antenna was among the first and Flyaway's to receive such type approval. Easily assembled in 10 minutes by one person without any tools, it fits in 2 compact transportable cases and auto-acquires satellite within two minutes using the iNetVu® 7710 controller.

The iNetVu® 1202 Drive-Away antenna system is a sleek, simple to operate auto-deploy VSAT terminal using a long focal length for excellent cross-pol performance. All three motorized axes have very low backlash and work together

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COMTECH EF Data
booth # SU 3407
www.comtechefdata.com

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

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

At the NAB, Comtech Xicom Technology will be showcasing its SuperCool™ 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. Comtech Xicom engineers are available to help customers understand and specify liquid cooling systems that are right for them.

Globecast
booth # SU 10706 (Connected Media Area)
www.globecast.com

Globecast is exhibiting in the Connected Media arena at NAB 2016 and will be highlighting its market-leading playout and media management services. Globecast opened its new Media Center in LA in 2015 offering fully managed playout services as well as media preparation and VOD logistics service. It also provides a point of presence for the company's global coverage.

Media Factory: a global solution

Globecast's Media Factory leverages the company's proven expertise in handling both linear and on-demand services through playout and over-the-top solutions. It delivers on the promise to take content from anywhere in the world, process it in any way required, and then deliver it anywhere to any device.

Localization and monetization of content

In competitive media landscape, Globecast understands the business imperatives and the complexity of efficient content monetization on every screen. The company has multiple solutions to help broadcasters achieve this objective: from handling local channel branding through advertising management, compliance work, rights management services, to advanced content selling tools and analytics for all online video services.

Distribution

Late last year Globecast launched a new platform on the AMC-11 satellite. As a result, prospective and current clients can benefit from the most powerful orbital position in the Americas for distribution to cable headends. This is evidenced by the fact that the satellite already hosts over 70 major Tier-1 American channels. Sports channel Gol TV, a 24/7 network dedicated to soccer and an existing customer, is the first to have taken the opportunity to transition their HD feed onto Globecast's new platform. As well as Gol TV, Globecast has signed additional contracts with companies including Revenue Frontier.

VOD logistics

Globecast makes creating and delivering VOD packages simple, handling the considerable complexities of supplying

content that satisfies the complex requirements of each platform. The company assembles VOD content packages with all the relevant metadata, languages, graphics, subtitles and promos in the technical formats demanded by VOD platforms globally. Globecast manages an extensive network of VOD platform affiliates to help its clients distribute VOD content easily.

Hispasat/Hispamar
booth # SU 11613
www.hispasat.com

The **HISPASAT Group** is composed of companies with a foothold in Spain as well as in Latin America, where its Brazilian affiliate HISPAMAR, sells its services.

The Group is a leading Spanish- and Portuguese-language content broadcaster and distributor, including over important direct-to-home television (DTH) and high-definition television (HDTV) digital platforms. HISPASAT is one of the world's largest satellite companies in terms of revenue in its sector, and the main communications bridge between Europe and the Americas.

Newtec
booth # SU 2324
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.

With forward symbol rates from 1 to 133 Mbaud and coding up to 256APSK, the MDM5000 will boost efficiency and performance on legacy satellites while fully unleashing the potential of next-generation High Throughput Satellites (HTS). As the latest addition to the Newtec Dialog® multiservice platform, the MDM5000 is designed to handle a wide range of IP services, including: Internet and Intranet access, Voice over IP (VoIP), mobile backhauling and trunking, along with video contribution and multicasting.

RSCC
booth # SU 12710
www.rscc.ru

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

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

Walton De-Ice
booth Outdoor Exhibits # OE 504
www.de-ice.com

Walton De-Ice, the world's leading designer and manufacturer of satellite earth station antenna (ESA) weather protection solutions, Walton will showcase its latest Ka-Band satellite ESA weather protection solutions, **Ice Quake, Rain Quake**, and **Snow Shield** at NAB 2016.

Antenna de-icing and weather protection systems from Walton De-Ice can reduce signal loss through Ka-Band dishes, and improve the reliability and quality of content delivery services.

The Ice Quake system (U.S. patent) enhances the reliability of the Snow Shield systems by a factor of 185 percent.

The Ice Quake System also acts as a Rain Shield to prevent water from sheeting on the antenna reflective surface causing rain fade on a Ku or Ka band antenna.

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www.stn.eu

INDEPENDENT TELEPORT OPERATOR OF THE YEAR 2016

Bruce Elbert, Application Technology Strategy

At the Satellite 2016 conference in Washington, D.C. last month, Bruce Elbert, President of consulting firm Application Technology Strategy LLC, spoke at a panel on "Can Satellite Services Prosper in Interactive Media and Over-the-Top Video?" There were many important insights during the panel discussion and we at Satellite Executive Briefing thought that it would be useful to share some the views presented to our readers. Follows are amplified responses from Bruce Elbert to questions raised at the panel discussion:

How do you see the move from the simplex broadcast model to a duplex, interactive model for user access?

Bruce Elbert

Traditional TV and other media markets have been addressed using three models: contribution, distribution, and Direct-to-Home (DTH). The DTH model has provided much value in the mass market of home TV reception. In terms of satellite communications, the move to interactivity is not particularly complicated. Consumers of broadband simply need a dish of about the same size as used for DTH video that is equipped with a transmit capability. This is precisely how VSATs (a 30 year old technology) employ satellites in geostationary (GEO) satellites. There is a marginal increase in dish hardware cost to add the block upconverter (BUC) and perhaps a second cable if the existing one is inadequate. The major shift is on the satellite itself, which goes from being a classical area coverage design (DIRECTV, Galaxy, Astra, etc.) to the high through-put satellite (HTS) design (ViaSat Exede, Intelsat Epic, Eutelsat KA-SAT, etc.). Using multiple spot beams, the satellite facilitates direct-to-network connectivity on a fully interactive basis; the HTS provides the needed bandwidth expansion by factors of 10 to 100 or more. The broadcast center becomes a gateway to the Internet through which content is discovered and delivered.

Can duplex satellite transmission, for consumers and in backhaul, allow satellites to play a major role in adoption of Over-the-Top (OTT)?

The answer is, "yes" but let's look at what OTT means. According to Wikipedia, "In broadcasting, over-the-top content (OTT) refers to delivery of audio, video, and other media over the Internet without the involvement of a multiple-system operator in the control or distribution of the content." The delivery/interactive network is not involved in the content itself (acting as a third-party, delivering IP packets only). Regarding the content, it depends on the servers employed – it could be serial programming or provided on demand, either streaming or download. The fact that the content is video based means that the added delay of satellite service is not important to the viewer experience. But, link stability and reliability are vital, something that will be questioned with LEO constellations. Like Iridium, LEO constellations require multiple handoffs between beams for a given satellite pass, and between satellites as they fly overhead. This gives many opportunities for handoff failure and the resulting dropped connections. While propagation delay is low (less than 10 ms per hop), the other delays prevent a LEO network from delivering media with near-zero latency. For example, the Internet Protocol itself introduces extra milliseconds of latency, which is increased further through switching and routing at nodes and servers. As discussed above, GEO HTS delivers this brand of OTT to users who employ broadband VSAT terminals like those sold by Hughes and ViaSat. Much content is not HD, although HD is certainly available. The expansion of link capacity on the HTS provides the means to offer more HD content to more individual subscribers. Included are mobile platforms, e.g., aircraft, vessels and vehicles, which benefit from improvements in satellite radiated power (EIRP) and receiving sensitivity (G/T) due to HTS technology. Backhaul to local wireless operators is a growing application of HTS, especially

in developing regions where fiber or microwave links are prohibitively expensive or unavailable due to conflict or natural disturbances.

What are the best applications and/or relative merits of Intelsat's Epic vs. ViaSat's Exede? How can you make a satellite futureproof?

All HTS offer bandwidth (in MHz) at a fraction of the cost of traditional satellites, but cost alone will not clinch the battle. In the context of OTT, Epic and Exede as spot-beam satellite systems have important similarities and differences that affect the cost and capability of broadband satellite service to consumers and in the backhaul market. Intelsat introduced Epic (operational in April 2016) to provide their Ku band bandwidth customers with more MHz for the same price. Applications cover the full range of what is available currently, perhaps including OTT direct to consumer. A particular network operator can employ one or more spot beams on Epic to better service end users within the respective coverage. In contrast, the Exede platform uses Ka band spectrum in even smaller spot beams to increase bandwidth per user. The network is provided by a single operator over the region, such as the eastern half of North America. ViaSat announced plans to go global with its third generation of HTS, promising coverage on par with Inmarsat and Intelsat. Per-user bandwidth can be greater than in the case of Epic, and service could be improved for the consumer who happens to live in that particular region. It's a simple matter of MHz and dBW of EIRP available to activate user terminals of the prescribed size, which is better accomplished through Exede than Epic. Epic, on the other hand, would adequately serve the backhaul market especially in under-developed regions not covered by Exede.

So we all know that technology changes are creating interesting opportunities that change the traditional live linear television distribution business, leading us all to non-linear and IP-based production, transport and distribution models. So how are those technology changes showing up in our satellites, our teleports and television creation infrastructures?

All of these functions and services can be addressed by one or more of the HTS architectures, principally based on GEO using either Ku or Ka band. Due to early entrants Telesat Canada, Hughes Spaceway, ViaSat WildBlue, HTS is a reality and the basic infrastructure is in place. In the vane of "build it and they will come," Netflix vaulted off of the terrestrial Internet infrastructure that had already existed but IP delivery was typically less than 1 Mbps. This increased by about 25% per year reaching 50 Mbps or more today, and that's sufficient for UHD. Satellite Internet is catching up but is still behind in raw bandwidth per potential home viewer. The rest of the satellite infrastructure is commonplace in terms of teleport antennas and RF equipment; baseband equipment needs to keep pace as does the backhaul connection to the Internet. It's possible to imagine that satellite broadband providers could host content on servers within the teleport. In the late 1980s, Compact Video served Disney Channel with tape playout and uplinking from the same facility. Major ISPs today are caching podcasts and other content in response to high demand, and some teleports are already hosting OTT content.

What are the key underlying technologies that are changing in satellite design and deployment to try and capture the changing dynamics of the TV distribution business?

HTS and multi-beam satellites in general will change the TV distribution business in coming years. It's already been ten years since DIRECTV introduced a multi-beam satellite to provide spot beam coverage of metropolitan areas (referred to as local into local). This allowed DIRECTV to more effectively compete with cable TV. However, DIRECTV lacked true interactivity through a simultaneous Internet connection by satellite or otherwise. The Epic, Exite and Jupiter HTS platforms remedy this situation where content is both local and interactive.

The simplest and most effective home subscriber antenna is the conventional parabolic dish with feed, which is pointed toward the desired satellite. Owing to the tight stationkeeping box on HTS and other Ku/Ka satellites, these antennas have low-cost fixed mounts. There is a lot of interest in various types of flat panels and especially phased arrays, but these are more suited to mobile applications where a low profile is desired. They also cost substantially more, but innovation by Kymeta and ThinKom promises more competition.

One aspect of HTS worth mentioning is the introduction of greater amounts of radio frequency interference, primarily through frequency reuse with multiple spot beams on the same frequency. This problem is familiar to anyone putting a link budget together, to account for cross polarization and the adjacent satellites. But multiple-beam RFI can be very complex because it depends on locations of earth station transmitters in a range of beams. It is not static because users appear and disappear based on demand. As a result, beam to beam interference becomes the limiting factor, fixing the very capacity that HTS needs to deliver to become profitable as a business.

It may be fair to say that the days of the "fat, dumb and happy" satellite model predicated on just leasing bent-pipe satellites is coming to an end. How are satellite operators and service providers adapting their offerings to these new technologies?

The contribution and distribution markets employ classical area coverage bent pipe satellites. The economics of these satellites are based on the operator achieving a fill fast enough to reach breakeven in about five years. More recently, VaiSat adapted their HTS system for contribution with satellite news gathering (SNG), a good fit. The DTH model is much different because customers are acquired one at a time, and revenue ramps up much more slowly. Breakeven takes much longer, possibly 10 years; yet after this point, the business is robust and throws off cash at a high rate.

The economics of building, launching and operating a satellite as a business are driven by three variables: the physical size (and resulting cost), the lifetime, and the capacity. We were fat, dumb and happy in ramping up revenue to a sum total in the range of two to three times the cost. This results in recovery of all of the capital and operating cost, yielding a ROI in excess of 10% per year. The bent pipe works for broadcast media; HTS works for broadband. There is a difference in business strategy between the conventional space segment operator vs. the overall end-to-end service provider. Intelsat and SES proved the value of the former; DIRECTV and Sky the latter. SES has worked the interactive media game for a decade or more but lacked a solid broadband platform. Now, we have ViaSat Exede, Hughes Jupiter and Inmarsat GlobalXpress offering true interactive broadband from space, yet the jury is still out on wide market acceptance and strong financial results. One consideration is that satellite revenue is vital for the conventional operator, but the individual subscriber drives revenue for the service provider of a broadband platform. It is commonplace that the later, e.g., DIRECTV, may achieve tremendous gross revenue and penetration, but the crossover to profitability takes longer.

Will 4K be the next HD.... Or the next 3D? What are the implications on satellite demand? Will the consumption come from live Sports or non-linear programming offers, like Netflix and Amazon?

We know that 4K, also known as UHD, is already available on reasonably-priced flat screens. The penetration of this hardware will, of course, increase as more 4K content is made available to viewers. The implication on satellite demand is a net positive increase in thoughput per 4K channel. Some improvement in compression and transmission technology (e.g., bandwidth efficient modulation and improved forward error correction) may allow 4K to employ about the bandwidth of a current HD channel, but that's still in the future. This is the same for normal linear delivery and OTT steaming, although 4K benefits the big screen more than desktop and handheld devices.

What might the next-generation technologies be that show up in satellites that might be better optimized for the Brave New World?

Here is a list of emerging technologies that are past the drawing boards:

1) Wide band or narrowband amplifiers? The more relevant question is if solid state amplifiers will completely take over. The answer is yes at some point. For area coverage, traveling-wave tubes are still the best because of their power and efficiency. Innovation in device (GaN) and design (Class F and Dougherty) has made SSPAs more competitive, initially on the ground and eventually in space.

2) Bent pipe or active switching?
Currently, the bent pipe leads because of the flexibility of what you can transmit through it (it's future proof). Intelsat is now using a Boeing digital payload composed of a frequency division channelizer that uses digital filtering instead of analog. We may see a return of packet switching in space, but some standards will be needed.

3) Beam design? While area coverage is attractive for one-to-many transmission, OTT and interactive media demand greater bandwidth on an individual basis. Therefore, spot beams can be used with more capacity and higher EIRP and G/T. This is precisely what HTS provides using a variety of multi-beam technology in space such as produced by Space Systems/Loral for ViaSat 1. All of these are proven and in use today.

4) Frequencies put into play? Broadband demands Ku and Ka, but L band lives on Inmarsat 4 and Thuraya for flexible and mobile users who can live with under 1 Mbps. In HTS, there is the possibility of using V and Q bands for feeder links, offloading a substantial bandwidth requirement from user spectrum at Ku and Ka.

Bruce Elbert can be reach at: bruce@applicationstrategy.com

The GVF Hub Summit @CABSAT 2016 Highlight the Middle East Satellite Market

by Martin Jarrold

Last month featured once again the largest exhibition and conference event in the Middle East and North Africa region to include a focus on communications technologies and services – CABSAT – was a Global VSAT Forum (GVF) Summit program which, direct from the exhibition floor, provided show exhibitors and visitors with challenging, dynamic, debate and illuminating insights from industry, U.N. agencies, analysts, associations, and solutions developers.

The **GVF Satellite Hub Summit @ CABSAT 2016** was presented over two days and was held in association with PAKSAT, and with the sponsorship support of SES, and also featured the kind participation of the International Telecommunication Union (ITU). Some 30 speakers contributed to the Summit, addressing eight key themes from the top of the current satellite communications industry agenda.

I had the privilege of chairing the event which built successfully on more than 10 years of GVF programs embedded with the annual CABSAT portfolio of conferences and meetings. In particular, amongst recent GVF Summits presented at CABSAT, the 2014 GVF Summit program was filmed by a documentary production team from the Qatar-based broadcast news and current affairs channel, Al Jazeera. The 2014 GVF event was wholly focused on the subject of satellite interference and the filmed Summit content was prominently featured in the Al Jazeera documentary which was transmitted in May 2015, to coincide with the 150th Anniversary of the foundation of the International Telecommunication Union.

On the second day of the **GVF Satellite Hub Summit @ CABSAT 2016** the program featured the English language version of the documentary, which is now available on YouTube and may be viewed by clicking on: https://youtu.be/St9kKCtpGYA. The documentary added to the already high-quality content across the various program themes and this content is also now available online at https://gvf.org/gvf-satellite-hub-summit-cabsat.

The eight key themes covered in the Summit were as follows:

- **MENA's Satellite Broadcast & Telecoms: Overview of an Evolving Market Environment**
- **Spectrum: Satellite and the Outcomes of the 2015 ITU World Radiocommunication Conference**
- **High Throughput Satellites: Leveraging Advancing Technologies for Innovative Services – Mature, Evolving & Emergent Markets**
- **Constellations for Connectivity: A New Dawn for Low Earth Orbit Solutions?**
- **From Niche to Mainstream: New Strategic Markets for VSAT with Communications-on-the-Move**
- **Ensuring an Interference-Free World of Satellite Services**
- **Integrating the Digital World: Satellite, Big Data, the Internet of Things**

Major inputs to the Summit program themes of satellite spectrum, low earth orbit satellite constellations for connectivity, and interference-free satellite services, were provided by the ITU Radio Communication Bureau, presented by Mitsuhiro Sakamoto, Head, Space Systems Coordination Division, Space Services Department. Sakamoto set out a detailed analysis of the World Radiocommunication Conference of November 2015 (WRC-15) which attracted 2780 participants from 162 ITU Member States, and 495 participants representing 130 other entities, includ-

ing industry, attending as observers. The Conference addressed over 40 topics related to frequency allocation and frequency sharing for the efficient use of spectrum and orbital resources. His detailed presentation also set out details of the mobile broadband spectrum agenda for the next WRC in 2019.

For the global satellite industry the prime focus of 2015 was on WRC-15. This focus was led by the Satellite Spectrum Initiative (SSI) – the GVF-led consortium of other (regional and national) satellite industry associations, and supported by a wide range of stakeholders.

The SSI sought the protection of fixed satellite service access to spectrum in the C-band frequencies, and opposed a global identification of C-band for International Mobile Telecommunications (IMT). It was successful in its mission, as reflected in the world's governments resoundingly affirming a clear vision for the importance of many vital and irreplaceable services provided today over satellite and by agreeing to preserve and create new additional valuable spectrum for fixed and mobile solutions used to support services that include the expansion of access to the Internet, and the bridging of the Digital Divide.

The inter-governmental decisions in support of satellite spectrum reflected a comprehensive strategy in which the unique value proposition of satellite-based connectivity was recognized as an integral part of a portfolio of synergistic technologies, encompassing terrestrial wireless solutions.

Also contributing to the Summit panel session entitled **'Spectrum: Satellite and the Outcomes of the 2015 ITU World Radiocommunication Conference'** was Laith Hammad, Director, MENA, Access Partnership; Patrick van Niftrik, Vice President, Spectrum Development, EMEA, SES; Zahid Zaheer, Director, GMPCS Affairs, Thuraya; Guido Baraglia, Director, sIRG; Jawad J. Abbassi, Head of MENA, Government & Regulatory Affairs, GSMA; Dr Mohaned Juwad, Regional Director, GVF 5G Initiative, GVF.

"...Satellite has always worked synergistically with other, that is to say terrestrial, technologies, including mobile wireless. Backhaul for mobile networks is critical to ensure speed and capacity as it relates to the transport of data (and, of course, voice) from distributed network sites to the network core..."

The welcome inclusion in the Summit program of the contribution from the GSMA, together with the participation of a representative of the GVF's 5G Initiative, was strongly indicative of the positive collaborative opportunities for satellite and mobile broadband arising out of the outcomes of WRC-15, and GVF is now vigorously pursuing these collaborative opportunities.

Satellite has always worked synergistically with other, that is to say terrestrial, technologies, including mobile wireless. Backhaul for mobile networks is critical to ensure speed and capacity as it relates to the transport of data (and, of course, voice) from distributed network sites to the network core. In turn, for backhaul, satellite has become ever-more essential. One of the most significant challenges in the mobile services market is achieving scalable, flexible backhaul, particularly as markets move to 4G 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 rural expansion to relieve congestion.

This topic is of such magnitude for the satellite and wireless communications industries that the GVF-EMP Conference Partnership's successful portfolio of events focusing on the application of satellite communications technologies to a brave new world of ever expanding vertical market opportunities, will include on 21st June **'Cellular Backhaul: Smartphones and Tablets – To the Satellite Network and the World'** in London.

The one day, roundtable style conference, will explore the current interaction between the satellite and wireless industries, the current and future growth of data traffic from these devices and how that will impact both cellular and satellite networks. The panels will explore the problems, risks and opportunities that this continued growth offers to both industries and the businesses that will rely on these future networks – ranging from Fortune 500 to government and military, and from planes, trains and automobiles, to schools, restaurants and businesses around the world. The conference will take the form of a series of themed roundtable discussions to include such issues and questions as:

- LTE, 3G and 2G networks over satellite – What is the state of play today?
- The satellite dilemma – High pricing and limited bandwidth have historically made satellites unappealing to wireless carriers in the past, in all but the most challenging of geographic areas. Is that changing, and how?
- Is satellite a niche adjunct to the wireless market of the future or an embedded core component of a wider network?
- The latency debate – New platforms are rapidly reducing satellite

latency to bring services closer in performance to terrestrial services. Legacy platforms are enjoying the fruits of acceleration and improved network tools to allow LTE and other traffic to operate over almost any satellite network. So what can and what can't be integrated over modern satellite, and what are the trade-offs?

- How can the addressable market be expanded through HTS?
- What are the associated challenges of facilitating 3G/4G services outside ground network footprints?
- How do we address the contrasts of the Asian market – Some countries looking into 4G while others are still deploying 2G?
- Optimizing solutions for media content – Traffic acceleration, caching of popular content, prioritization... How do we go about it?
- Is satcom ready to serve the mobile traffic boom ahead?
- Who will be the winners in the battle of bands, and architectures (C-band, Ku-band, Ka-band; FSS, GEO-HTS, non-GEO-HTS)?

Returning to the discussions at CABSAT, Mr Sakamoto also contributed to the Summit session **'Constellations for Connectivity: A New Dawn for Low Earth Orbit Solutions?'** He reported that beginning in November 2014, the ITU Radiocommunication Bureau has been receiving an increased number of coordination request submissions for non-Geosynchronous Orbit (NGSO) satellite constellations featuring a large number of frequency assignments and orbits. Also contributing to the dialogue on 'Constellations for Connectivity' was Diederik Kelder, Senior Vice President, Business Development, LeoSat Enterprises. This was a very significant event profile for LeoSat Enterprises as it was only the second occasion on which the company had talked about its plans in detail in an open forum environment.

"...For the global satellite industry the prime focus of 2015 was on WRC-15. This focus was led by the Satellite Spectrum Initiative (SSI) – the GVF-led consortium of other (regional and national) satellite industry associations, and supported by a wide range of stakeholders..."

The Internet access via broadband satellite future is evolving and may not be confined to high throughput technologies in geosynchronous and Medium Earth Orbits (MEO) for much longer. In 2015 OneWeb, and SpaceX, as well as LeoSat, announced separate plans to build hundreds of new satellites for Low Earth Orbit (LEO). OneWeb, led by O3b Networks founder Greg Wyler, and backed by Qualcomm and the Virgin Group, announced plans to build a constellation of around 650 micro satellites to bring broadband access to the unconnected/unserved population around the world. SpaceX, backed by Google, revealed plans to build thousands of micro satellites to bring Internet connectivity all over the world too. Additionally, the LeoSat (partnered with Thales Alenia Space) planned constellation of 80-120 Ka-band satellites will provide high-speed, low-latency, broadband services worldwide, specifically for large private corporations and government agencies.

Prior to GVF's showing of the Al Jazeera documentary cited above, the ITU additionally participated in the Summit dialogue on **'Ensuring an Interference-Free World of Satellite Services'**. Mr Sakamoto's presentation on *Prevention and Resolution of Harmful Interference* included a profile of the ITU Interference Resolution and Reporting System, a Radiocommunication Bureau project to facilitate communication relating to harmful interference and maintain them in a database.

As with the other two ITU presentations, and as noted above, *Prevention and Resolution of Harmful Interference* is available for download in PDF format from the GVF website at https://gvf.org/gvf-satellite-hub-summit-cabsat, but in summary, the key messages in the ITU perspective are that the: Mechanism in the Radio Regulations to prevent harmful interference is working; Procedure to resolve harmful interference relies on Member States' Goodwill and cooperation; International monitoring system will be reinforced; Reporting of harmful interference will be more effective; and, further discussion on the issue will take place at a symposium on interference-free satellite frequency spectrum on 13 -14 June 2016.

Also contributing to the dialogue on satellite interference was Mazen Nassar, Managing Director & CEO, MenaNets, and GVF Master Trainer for the MENA region; Erwin Greilinger, Product & Sales Manager, Siemens Convergence Creators; Guido Baraglia, Director, Business Development & Sales, Kratos Networks; Andreas Voigt, Director, sIRG. These presentations, along with others given in all the Summit sessions, are available for download at the above web address.

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

Roscosmos Sell Troubled Sea Launch

Moscow, Russia, April 1, 2016--Russia's space agency costs. Roscosmos has found a buyer for Sea Launch, the agency's director Igor Komarov said in a report by the TASS news agency.

"I cannot tell you who the investor is, or the value of the contract, due to certain obligations. I hope that we will have something to say about it by the end of April," Komarov said. He did, however, say that investors from the U.S., Australia, China and Europe have expressed interest in the project.

Sea Launch was founded in 1995 as a joint-venture between Russia's largest space company Energia, U.S. aerospace giant Boeing, with participation of firms in Norway and Ukraine. The concept is simple: a floating launch platform that sails to the Earth's equator to reduce launch costs.

But despite the commercial promise, Sea Launch has struggled to take flight. It filed bankruptcy in 2009, and has undergone several periods of inactivity due to technical failures. The company emerged from bankruptcy a year later with Energia taking control of 85% of the company.

But the problems continued. In 2014, the company faced procurement difficulties as relations between Russia and Ukraine collapsed in the wake of Moscow's annexation of Crimea. Sea Launch is designed to work with Zenit rockets — built in Ukraine, but some 70 percent of the components are Russian.

Roscosmos has at various times indicated it might refit the platform to support the lightest version of its new Angara rocket, but a change in ownership of the project may put these plans on hold, according to Moscow Times.

RR Media to Merge with SES Platform Services

Luxembourg, March 1, 2016—SES Platform Services (SES PS), a wholly-owned subsidiary of SES, announced an agreement whereby RR Media, a leading provider of global digital media services to the broadcast and media industries, will merge its operations with those of SES PS.

SES will pay a consideration of USD$ 13.291 per share to acquire a 100% interest in RR Media. The consideration corresponds to an Enterprise Value of US$ 242 million, which will be funded from the group's existing financial resources. The acquisition is subject to regulatory approvals, which are expected to be completed in Q2/Q3 2016.

RR Media provides scalable, converged digital media services to more than 1,000 media companies globally. Every day, the company manages and delivers over 24,000 hours of broadcast content, over 4,000 hours of online video and VOD content and over 350 hours of premium sports and live events including major global sporting events such as the Super Bowl and the FIFA World Cup. RR Media provides coverage for over 95% of the world's population, reaching viewers of multi-platform TV operators and populating content to over 100 Video-on-Demand (VoD) platforms, as well as delivering content to online video and Direct-to-Home (DTH) services.

The company's services cover four main areas: global content distribution network with an optimized combination of satellite, fiber and the Internet; content management and playout services; management and delivery of premium sports, news and live events around the world; and other advanced online video services. This state-of-the-art offering supports the diverse service requirements of some of the world's leading media companies, broadcasters and content rights owners holders including the BBC, Disney, Fox, IMG, ITV, MP Silva, NFL, and Viacom. RR Media operates from four principal media centres (in Bucharest, London, Pennsylvania and Tel Aviv).

On completion of the transaction, RR Media and SES PS will be combined to create a new, stand-alone media services provider, offering full continuity and enhanced service to their existing customers. With a comprehensive range of innovative video and media solutions on a global scale, the new organization will focus on offering its customers highly optimized content management and distribution solutions that utilize the combined network of SES PS and RR Media leveraging their multiple satellite positions as well as a large fiber network and the Internet, in order to maximize audience reach and add monetization capabilities.

Gilat Appoints Yona Ovadia as New CEO

Petah Tikva, Israel, March 17, 2016 -- **Gilat Satellite Networks** announced that it has appointed **Yona Ovadia** as its new Chief Executive Officer, effective March 31, 2016, replacing Dov Baharav, who shall remain Gilat's Chairman of the Board of Directors.

Yona Ovadia

On behalf of Gilat's Board of Directors, Dov Baharav stated, "We are very excited by the appointment of Mr. Ovadia as Gilat's next CEO. Yona, as a business leader with a strong track record of delivering results, will be taking Gilat forward to materialize its promising strategic directions. Yona and I have worked closely together for many years, and recently at Gilat. His experience and capabilities will be crucial to Gilat's continued long-term profitable growth, building and expanding Gilat's strategic business pillars."

Ovadia added, "I am both honored and excited at the opportunity to be Gilat's next CEO. I am positive that Gilat has the strategy, the leadership, the technology, the global presence, and most importantly - the people - to deliver upon its vision, expand the success we already see and achieve long term profitable growth as well as make Gilat a place of excitement and fulfillment for its employees, all over the world."

Ovadia joined Gilat in April 2015 and had previously served in various managerial posts at Amdocs for 30 years, including as Amdocs Executive Management member. In the past, Mr. Ovadia managed thousands of employees and projects of hundreds of millions of dollars. Yona holds a BSc in Math and Computer Sciences from Tel Aviv University.

Thuraya Shareholders Elect Chairman

Dubai, UAE, March 24, 2016--Mobile Satellite Services operator **Thuraya Telecommunications Company** announced the election of a new Chairman, **Eng. Saleh Al Abdooli**. Al Abdooli, who has served as Chief Executive Officer of Etisalat UAE since 2012, joined Thuraya's Board of Directors at a Board meeting held today and was elected Chairman.

The Chief Executive Officer of Etisalat UAE, Al Abdooli is also the Deputy Chairman of the Board of Directors, Chairman of the Executive Committee for Etisalat Misr, and a Board Member for Etisalat Services Holding Company. He was recently appointed as Etisalat's representative on the Mobily Board of Directors.

Saleh Al Abdooli

Al Abdooli designed and launched the first 3G network in the Middle East and Africa, in December 2003. He has been associated with the Etisalat Group since 1992, where he has been pivotal in creating technological integration strategies as well as corporate and global expansion investments.

Eng. Saleh Al Abdooli has previously served as Chairman of the Etisalat Group's technical committee, which oversees its international expansion. He also served as Chairman of the committee responsible for preparing Etisalat's proposal to establish the second GSM network in Saudi Arabia.

Al Abdooli holds a Master's Degree in Telecommunications Technology with Honours and a Bachelor's degree in Electrical Engineering from the University of Colorado Boulder.

WTA Appoint Board Members

New York City, NY, April 1, 2016– The **World Teleport Association** (WTA) announced the election of two new members of its Board of Directors for three-year terms beginning April 1, 2016: **Michael DeMarco,** Senior Vice President, Operations, Intelsat and **Jose Edio Gomes,** Technical Director, Hispamar Satélites.

Avi Cohen, CEO of RR Media, was also appointed to fill a vacant seat on the Board.

Also serving on WTA's Board of Directors are:

- James Trevelyan, Sales Director, Arqiva Satellite & Media (Chairman)
- Roger Franklin, President & CEO, Crystal
- Richard Hadsall, Chief Innovation Officer, EMC
- Robert Kubbernus, CEO, Signalhorn
- Marzio Laurenti CEO, Telespazio Brasil S.A.
- Kian Soon Lim, Head, Satellite, Business Group, Group Enterprise, Singtel
- Tomaz Lovsin, Managing Director, STN
- Mark Rathert, General Manager, Ground Operations (US), SES
- Francis Rolland, Executive Vice President, Satellites & Networks/ Strategy, GlobeCast
- Jose Sanchez Ruiz, Director of Service Operations, Eutelsat
- Jorge Luis Villarreal Schutz, CEO, Elara Comunicaciones
- Serge Van Herck, CEO, Newtec
- Alan Young, CTO, Encompass Digital Media
- Koby Zontag, Vice President, Media Sales and Business Development, PCCW Global

Directors on the WTA Board serve three-year terms, and are elected by the membership.

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ND SATCOM

Satellite-based IoT Asset Tracking Transforms the Supply Chain and Enhancing safety

Gavan Murphy, Director of Marketing for EMEA at Globalstar explains how the latest satellite-enabled asset tracking is helping industry truly harness the power of IoT to work smarter and safer.

In recent times, the big GSM/mobile providers have loudly publicised their M2M/IoT achievements, and with good reason. The blue-chip players are developing services, and forming heavyweight partnerships, with an eye on the virtually endless commercial applications for IoT in areas with good land based infrastructure.

But the story is different where mobile network coverage is patchy - even in territories that are said to have near-ubiquitous GSM coverage, you often don't need to travel far beyond metropolitan areas to experience mobile 'black spots'.

Moreover, companies in many industry sectors, such as those in oil and gas, operate in areas including North Africa, the Nordics and across the Eurasian landmass, where mobile coverage is often non-existent.

The marketplace is waking up to the fact that to stay connected from anywhere in the world's thousands of kilometres of sparsely populated and inhospitable terrain, as well as at sea, satellite communications are needed.

Improving Supply Chain Relationships

Ubiquitous and reliable IoT asset monitoring has the potential to transform the supply chain as manufacturers, freight and logistics businesses look to introduce operational and cost efficiencies by better understanding the location and condition of their assets or cargo.

Great strides have been made in satellite M2M and IoT with early adoption to track and monitor assets that range from cargo to trucks, oil pipelines, reservoirs, rail cars, cattle and sheep as well as some of the world's most endangered species.

The latest IoT technologies feature integrated sensors that provide businesses with environmental data detailing vital information on cargo's condition, which in turn can affect the supply chain. One valuable metric is movement, with sensors instantly reporting when an asset – such as a rail car or container – has experienced damage or shock.

The key enabler is the satellite chip at the heart of the tracking device. The smaller the chip the easier it can be integrated into discrete energy-efficient monitoring devices cost-effectively for satellite-only or dual-frequency support.

As well as reducing operating costs, satellite enabled IoT tracking enables partners in the supply chain to more effectively collaborate using near, real-time data for better, faster, decision-making. Delivery times can be more predictable and reliable, and the amount of unproductive 'downtime' of any particular asset is minimised.

Improving Safety in Transporting Hazardous Materials

With governments encouraging more transparency in the transport industry, and a constant motivation to improve safety, there is an increase in regulation requiring cargo-carrying vehicles to have trackers installed. Innovative technology providers are creating new IoT solutions to help their customers meet these regulations while improving operational efficiency.

Petrochemical and oil/gas companies in particular are already seeing the business benefits of IoT to monitor potentially hazardous materials in unpowered environments including rail tank cars and tank containers.

For example, leading global supplier of petrochemicals, SABIC, is equipping its entire European fleet of 500 chemical rail tank cars with the ATEX-certified Ovinto Sat tracking and monitoring technology to reduce risk and optimise its supply chain. The new solution enables SABIC to track each vehicle on its journey in real time and supports SABIC in its constant focus on safety. This helps SABIC to maximise the value and efficiency of its assets, while partners and customers can reliably know when the materials they require will arrive.

Judith Kleinen, Category Manager Land Transport & Spot Shipping Supply Chain, Chemicals at SABIC explains: "SABIC is a major provider of petrochemicals and the customers who use our chemicals and plastics for many different applications. One of the transportation means we use is our fleet of rail tank cars. Keeping track of a large fleet of these cars, dispersed all over Europe, is crucial," she said. "The cars

Continued on page 41...

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Set Top Box Market to Reach US$ 24.45 Billion by 2022

San Francisco, Calif., March 10, 2016-The global Set Top Box (STB) market size is expected to reach USD$ 25.45 billion by 2022 according to a new report by Grand View Research, Inc. Technology proliferation and increasing demand for high-quality picture and sound is anticipated to boost global set top box market growth. Increasing demand for IPTV models in developed regions from North America and Europe has further bolstered industry growth. Additionally, abridged prices of smart TVs and growing availability of HD channels across all platforms are expected to push demand for advanced STB devices.

STBs can be categorized into cable, satellite, Internet Protocol TV (IPTV), Digital Terrestrial Television (DTT) and Over The Top (OTT) devices. Digital format transmissions provide better sound and picture quality, as well as an enhanced viewing experience in HD. Additionally, they provide interactive services such as Video On Demand (VoD), and the freedom to pay only for selected channels.

Recent administrative regulations pertaining to digitization in countries such as India are further expected to impel industry growth as these protocols can provide monetary relief to viewers, and in some cases, funding for broadcasters to enable a digital switch over to take place by a given deadline.

However, procurement costs and associated costs of pay channels are expected to pose as challenges for the industry. The inequality in demand and supply of devices across the world is expected to negatively affect the global market.

DTT STB segment dominated the global set top box industry contributing to over 25% of the market revenue in 2014. DTT broadcasts uses terrestrial (land-based) signals and enable efficient use of spectrum providing increased capacity over analog transmission, better quality images, and lower operating costs for broadcast and transmission after an initial upgrade investment.

Vendors are offering various types of STBs, ranging from basic cable to satellite to the ones that record content via IP transmission such as in IPTV. Key operators are deploying new services in response to the threat against OTT service providers. The conventional digital model is emerging into a hybrid version supporting alternative sources of premium content such as OTT video services.

Asia Pacific dominated the global set top box industry contributing to over 35% of the global revenue in 2014. IP transmission recording features and higher storage specifications are expected to ensure a steady growth in North American region. Initiatives by the government and authorities have led to an overall increase in the installation of devices in the select geographies.

Asia Pacific regional STB industry is expected to grow at a CAGR of nearly 2.5% from 2015 to 2022. Major manufacturers in the industry are established in countries from the Asia Pacific region, such China and Taiwan, owing to higher production capacities and cheap labor. This has led to an increased awareness and adoption of STBs in the region.

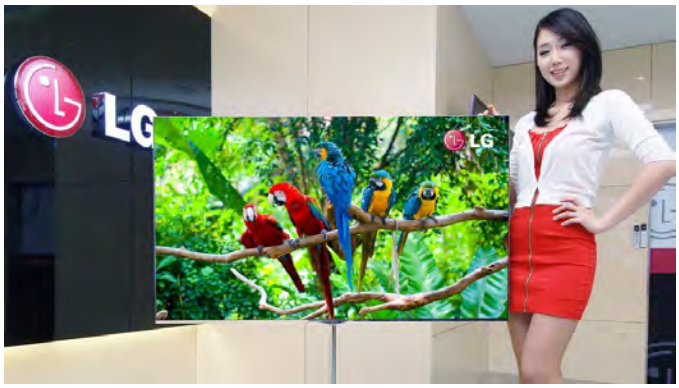
Key industry participants include Samsung, Skyworth, Cisco, Echostar, Amazon, Huawei, ADB, HUMAX, Coship, and Technicolor. Vendors are progressively adopting innovative distribution strategies such as authorized e-commerce retailers apart from traditional retail stores.

UltraHD via Satellite to Exceed 785 Channels over Next Decade

NSR's UltraHD via Satellite, 3rd Edition report identifies 2016 as a key inflection point for the rollout of UltraHD via satellite. NSR forecasts over 785 UltraHD channels by 2025, and satellite capacity required to carry bandwidth intensive UltraHD channels will drive an added $280M in annual leasing revenues.

While commercial UltraHD channels in East Asia have been available for over a year, the new format expands its geographic reach on linear TV platforms. By next year, almost all regions worldwide will have UltraHD channels available, and even developing regions see content by the end of the decade. Furthermore, the plunging price of 4K TV sets accelerates interest and demand in the new format, setting 4K TV penetration rates to rise faster than the initial introduction of HD TVs.

"Given the exponential increases we've seen on 4K TV shipments, introducing UltraHD channels and packages is a key strategy to retain and grow pay TV subscriber bases in an increasingly competitive environment. Additionally, this is a vital competitive response to OTT platforms' ever expanding online content catalogues," explained Alan Crisp, NSR Analyst and report author.



"While in the short term DTH, Cable TV and IPTV platforms will offer UltraHD for 'free' with existing premium channel bundles, longer term UltraHD will achieve higher revenue streams generated by increasing ARPUs and subscriber levels."

Although UltraHD remains a small component of the video market, with around 1% of overall channel counts, the impact to the bottom line of pay TV platforms and large, through both direct and indirect returns. Short term ROI challenges remain for broadcasters; however, longer term, UltraHD is expected to pay dividends to pay TV providers and will form a critical component of most platforms by 2025. Those without it will be viewed the same way SD-only platforms are viewed in the market today.

NSR's UltraHD via Satellite, 3rd Edition analyses satellite-based UltraHD across three major methods of consumption – DTH, Cable TV and IPTV. With DTH platforms already having commercialized a small number of UltraHD channels, NSR explores end-user requirements, ecosystem development, cost considerations and business model options for satellite operators and video platforms alike. UHD3 offers the most complete analysis of the challenges and opportunities facing the UltraHD market today, and the most comprehensive assessment of the future drivers of this emerging technology.

IoT...from page 39

contain all sorts of materials, so it is absolutely critical that we have the ability to track and monitor their status and their contents at all times."

The Ovinto Sat solution provides details about cargo being transported and its condition, including pressure and temperature, whether it's in the correct location, or has been impacted due to a crash or derailment. Satellite is the preferred option for such communications due to its availability, reliability and low power consumption compared to GSM. Importantly, Ovinto Sat has earned ATEX certification, which means it is reliable and safe even in dangerous, potentially explosive, environments.

If an accident occurs, Ovinto Sat's continuous satellite connectivity ensures everyone in the supply chain, as well as the emergency services, knows the location of the rail car, whether it has been impacted due to a crash, is leaking or whether it is at a safe pressure and temperature.

"It sometimes can be challenging to get real-time information regarding our rail tank cars," Kleinen added.

"We got in touch with Ovinto who offered a new way to track and trace via the Globalstar satellite network. The fact that Ovinto guaranteed global coverage via satellite, combined with the highest ATEX level makes it unique and for us, the best solution," she said.

Not only are supply chain relationships enhanced through such IoT deployments, operational efficiencies improve and corporate reputations are galvanized.

It is increasingly apparent that the number and diversity of ways in which the IoT can be applied is limited only by the imaginations of people who need to monitor 'things'.

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SpaceTech Expo 2016: New Records, New Exhibitors, New Format

SpaceTechExpo 2016
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As the final countdown to Space Tech Expo 2016 approaches, 'America's meeting place for space technology and engineering' is garnering high expectations this year, as the show – co-located with Aerospace Electrical Systems - continues to expand in scope, as well as exhibitor and attendee numbers.

Gaining eminent new companies to the event - such as **BAE Systems**, **Northrop Grumman**, **Honeywell**, **Dassault Systèmes Americas Corp**, **NASA AFRC**, and **Space and Missile Systems Center/SY** - whilst retaining fixed names such as **Glenair**, **Orbital ATK** and **Dynamic Fabrication, Inc.**, the show floor promises to deliver some exciting interactions.

As revenues in space and satellite manufacturing continue to grow year on year, the event looks set to beat last year's 45% increase in attendance figures and 25% increase in exhibitors, with visitor registrations tracked markedly higher than this period last year.

The venue move from Long Beach to Pasadena has been widely supported by the local space and aerospace businesses, with JPL not only exhibiting but also featuring in the Space Tech Conference proceedings; Deputy Director, Gen. Larry James will be presenting a keynote address.

The refined and restructured two-day conference brings together leading representatives of the military, government and commercial space sectors. There will be a focus on examining how military and government organizations can deliver space missions by working closely with the commercial sector, leveraging the latest innovative technologies and business models. The conference also takes a deep dive into the rapidly evolving space-to-space market, and offers specific sessions examining the plethora of emerging on-orbit services and technologies.

Confirmed speakers include Claire Leon, SES, DAF, Director - **Launch Enterprise, Space and Missile Systems Center**; Michael Gazarik, Vice President - Engineering, **Ball Aerospace**; Steve Stich, Deputy Manager, Commercial Crew Program, **NASA**; **Lars Hoffman,** Sr. Dir of Gov Sales, **SpaceX**, and **Emmanuel Sauzay,** Director of Commercial Space, **Airbus Defence and Space.**

The new format sees Day Three switch over to a Free Sessions day, providing attendees with the opportunity to hear the small-business needs of government and military organizations, as well as prime contractors. Confirmed speakers include **SMC, NASA and JPL**; visitors will simply be able to access the sessions with their free expo hall pass to participate.

To view the Space Tech Conference agenda please visit: http://www.spacetechexpo.com/conference/conference-agenda

For full exhibition and conference details, or to register to attend, visit www.spacetechexpo.com

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The Satellite Markets 25 Index™

Company Name	Symbol	Price (Apr 07)	% Change from Last Month	52-wk Range	
Satellite Operators					
Asia Satellite Telecommunications Holdings Limited	1135.HK	10.80	(0.03)	9.15	33.50
Eutelsat Communications S.A.	ETL.PA	27.755	(0.03)	25.34	32.71
APT Satellite Holdings Ltd.	1045.HK	6.10	0.01	5.03	9.83
Inmarsat Plc	ISAT.L	993.00	0.00	881.00	1,153.00
SES GLOBAL FDR	SES.F	25.51	0.03	22.02	34.90
Satellite and Component Manufacturers					
The Boeing Company	BA	127.01	0.05	102.10	155.50
COM DEV International Ltd.	CDV.TO	5.86	-	3.68	6.29
Macdonald Dettwiler & Associates Ltd.	MDA.TO	82.28	(0.05)	70.55	100.63
Lockheed Martin Corporation	LMT	226.19	0.04	181.91	227.91
Orbital ATK, Inc.	OA	86.35	0.11	56.06	94.92
Ground Equipment Manufacturers					
C-Com Satellite Systems Inc.	CMI.V	0.92	(0.03)	0.85	1.17
Comtech Telecommunications Corp.	CMTL	22.03	0.03	17.27	32.13
Harris Corporation	HRS	76.05	(0.04)	70.10	89.78
Honeywell International Inc.	HON	111.61	0.06	87.00	113.47
ViaSat Inc.	VSAT	71.6895	(0.02)	56.02	76.58
Satellite Service Providers					
Gilat Satellite Networks Ltd.	GILT	4.40	0.13	3.11	6.88
Iridium Communications Inc.	IRDM	7.44	0.08	5.85	11.36
ORBCOMM, Inc.	ORBC	10.07	0.15	5.27	10.49
TeleCommunication Systems Inc.	TSYS	4.99	-	3.03	5.06
RRSat Global Communications Network Ltd	RRST	7.233	-	6.06	9.60
Consumer Satellite Services					
DIRECTV	DTV	93.55	-	82.04	95.51
DISH Network Corp.	DISH	43.5075	(0.10)	38.85	76.29
Globalstar Inc.	GSAT	1.73	0.15	0.97	3.35
Sirius XM Holdings Inc.	SIRI	3.83	0.02	3.29	4.20
SKY DEUTSCHLAND	SKYD.MU	1,019.00	(0.04)	953.50	1,180.00

INDEX	Index Value (Apr 07)	% Change from Last Month
Satellite Markets 25 Index™	3,068.91	-0.47%
S & P 500	2,035.56	3.29%

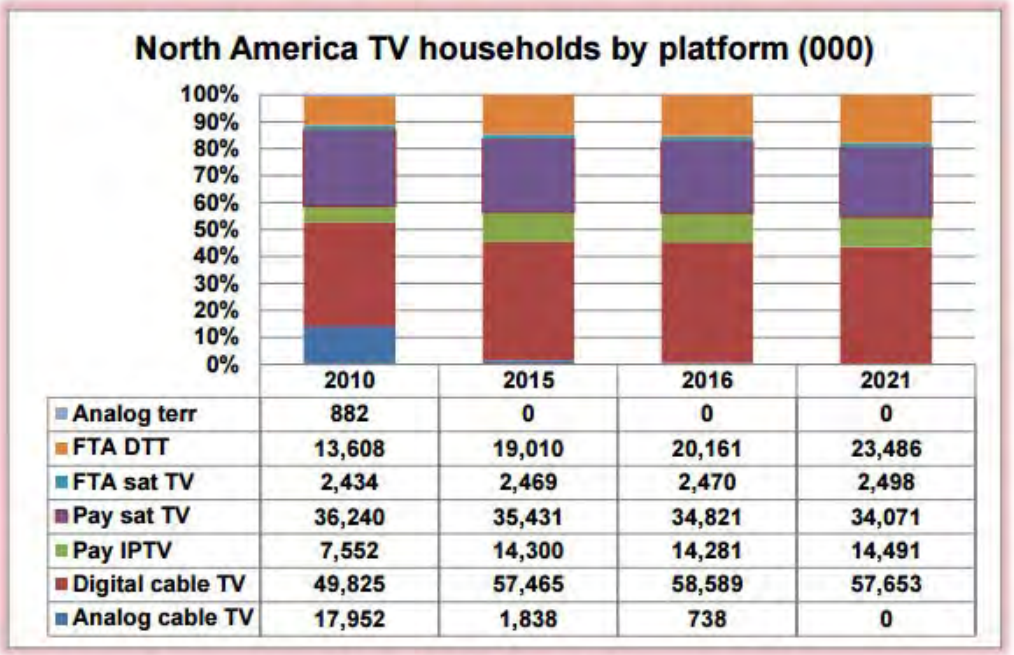
The Satellite Markets 25 Index™ is a composite of 25 publicly-traded satellite companies worldwide with five companies representing each major market segment of the industry: satellite operators; satellite and component manufacturers; ground equipment manufacturers; satellite service providers and consumer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

Advertisers' Index

Vital Statistics

North American TV Households

The number of pay TV subs in North America [Canada and the US] will fall from 112 million in the peak year of 2012 to 106 million in 2021, according to the fifth edition of the Digital TV North America Forecasts report.



	2010	2015	2016	2021
Analog terr	882	0	0	0
FTA DTT	13,608	19,010	20,161	23,486
FTA sat TV	2,434	2,469	2,470	2,498
Pay sat TV	36,240	35,431	34,821	34,071
Pay IPTV	7,552	14,300	14,281	14,491
Digital cable TV	49,825	57,465	58,589	57,653
Analog cable TV	17,952	1,838	738	0

Source: Digital TV Research

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