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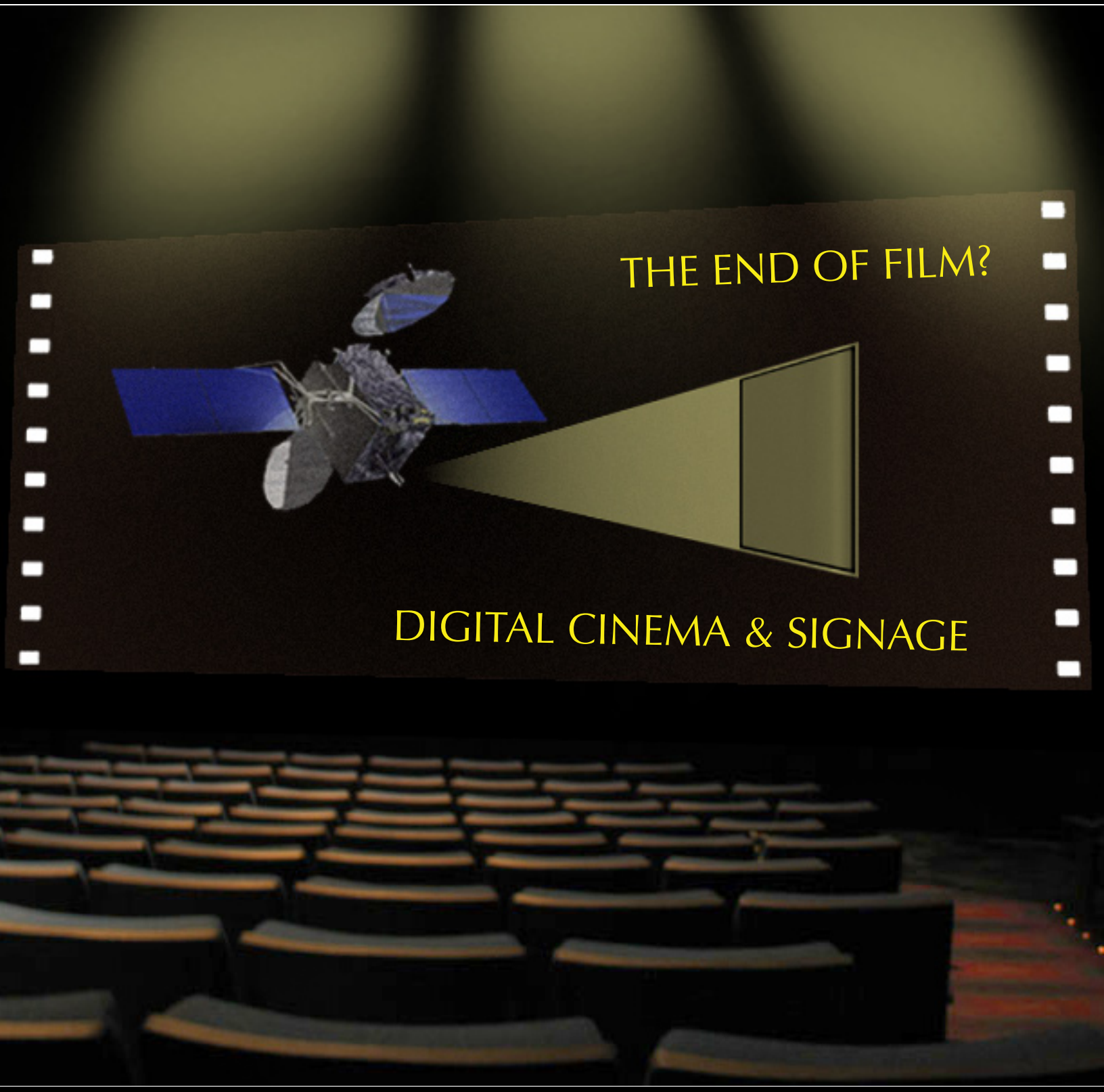

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EDITOR'S LETTER

Welcome to *SatMagazine*. There are a number of articles this month with a focus on new satellite applications. Take, for example, our cover story authored by the President of Application Technology Strategy, Mr. *Bruce Elbert*. He reveals some extremely interesting information regarding digital cinema and how satellites are now, and will be in the future, of ensuring timely delivery of new flicks to digital theaters. With major film players behind this effort, here's an opportunity for the satellite industry to become truly involved in what could well be the next big act.

Ms. *Christy Hartman* is the Director of Market Intelligence and Communications for CapRock and she explains the importance of ensuring remote sites remain within the visual spectrum. The Director of Business Development for Integral Systems, Mr. *Mark Schmitt*, has some ideas regarding how companies may distinguish themselves from their competition in his article entitled *Integrated Solutions: Improving Operations and Quality of Service*.

Following ISIS NY '07, I enjoyed a discussion with Mr. *John Mattingly*, the Vice President of Satellite Services for Mobile Satellite Ventures wherein we delved into all things related to his company's moves into the future. If nanosats, microsats, minisats, litesats, or whatever moniker you wish to assign to the lighter weight space vehicles is of interest, be sure to read Ms. *Janet Marsillo*'s focus on a company deeply involved in this work, MicroSat.

The president of TMF Associates, Mr. *Tim Farrar*, examines the financial side of new mobile satellite services and what investors may wish to consider before committing to a presented MSS business model. Our featured satellite for this issue is Intelsat 11, built by Orbital Sciences Corporation.

We also obtain a rare peek inside the work of first responders and how ND Satcom provided the necessary equipment to ensure the most recent G8 Summit was fully prepared for any emergency situations, authored by Mr. *Ulrich Kiebler*, the Vice President of Government and Commercial for that firm. And there's an in-depth look at the Unity 550-2 Enterprise Media Receiver, authored by Ms. *Kamy Merithew* and *Gary Pelkey*, both of WEGENER.

We welcome our regional editors and columnists who appear within these pages with their info-packed content. Ms. *Tara Giunta* offers helpful advice for those outside the U.S. thinking about investing in a satellite operation within the U.S.; Mr. *Peter Galace*, our Editor in Asia, offers a most interesting report on iPTV in Asia; Mr. *Chris Forrester*, European Editor, once again provides our readers with his terrific insight into the European environs, this time examining the halt of new channel launches by BskyB; and Mr. *Martin Jarrold*, the Chief of International Program Development for GVF, gives us a preview of the upcoming 3rd Annual West Africa Satellite Communications Summit to be held in Lagos.

The December issue of SatMagazine is our annual "Year In Review" issue. Great events were marked, new products galore, company moves, and all warranting coverage. Is there a momentous event you wish our readers to know about? What did you experience during the past year that you feel should be included in this review? Whether from a personal or a company perspective matters not... perhaps you have some thoughts as to how this year's new products or discoveries will impact our industry next year and in the decades yet to come.

I would truly appreciate our readers sending an email to me to hartley@satnews.com expressing your thoughts regarding our industry's high points during 2007. Many will be published. All will elicit thought. And that's the purpose of any publication, to drive synapses to fire on all cylinders when considering what has occurred, why events occurred, and what such means for the future. Just think about the possibilities that reside ahead for the satcom and ancillary industries based upon the hard work and innovation of our involved companies. Simply astounding!

Sincerely,
Hartley Lesser, Editorial Director

SATMAGAZINE

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COVER STORY

SATELLITE APPLICATIONS FOR A WORLD GONE DIGITAL

by Bruce R. Elbert, President, Application Technology Strategy, Inc.

As content of all types becomes digital, the satellite communications industry finds itself at the center of an explosion that impacts the nature of entertainment and marketing. This article focuses on several applications for satellite bandwidth that all benefit from its inherent security, speed and simplified logistics for point to multipoint connections.

Digital signage in a retail location (courtesy of JSAT International, Inc.)

The first is the emerging field of digital cinema, which eliminates the need for physical film distribution and offers an ideal distribution model for big, live events. With satellite-connected *digital signage*, businesses can communicate more effectively with their customers while enhancing branding and the in-store experience. Improvements in satellite broadband have the capacity to tap new markets in electronic games and entertainment. Beaming content by satellite provides true mobility within the footprint to all forms of transportation – vehicles, boats and ships, and aircraft; as a result, digital content can be accessed nearly anywhere there is power to run the equipment.

Digital Cinema is "On the Air"

This segment of the entertainment market is growing slowly but steadily. Currently, there are approximately 3,700 digital-capable screens in the United States, representing approximately 10 percent of the total. Delivery to a location with one or more of these enhanced screens works in one of two ways. The first is through the physical delivery of the files on an external hard drive. The other is to broadcast the files through a point to multi-point satellite connection and store them on a hard drive at the theaters.

Hollywood releases an average of five major films a week. On "celluloid" film, a movie takes up multiple reels, which weigh in the hundreds of pounds; contrast this with a single 180 GB hard drive containing the same movie in digital form. The amount of time required to download or transfer that digital movie would be around 8 hours, assuming a 50 Mbps transfer rate. As the movie itself is digital, and the method of delivery is digital, movie makers can continue to "patch" a project until nearly the last minute, even before a simultaneous global release. If that file transfer occurs mainly at night, the same 50 Mbps channel can be used during the day and evening to broadcast live content in an enhanced HD format.

The business models for digital cinema are still being hammered out between the studios and theater owners. Currently, parties other than the cinema owners may pay for the digital equipment installed at the screen. This is partly because the economic structure of big screen entertainment means studios have the most to gain in saved production and logistical costs by switching to a digital format. We will discuss important benefits to theater owners later in this article.

To grasp the economic power of digital distribution, let's initially review how distribution currently works for a standard "print" film:

The studio finishes a movie and sends the master negative to a film lab. The lab makes copies of the film and a distributor sends them out to the various theatres. As described above, films generally consist of multiple reels that are very large, heavy and expensive to ship. The lab/distributor charges the studio a "print fee" for every copy to cover duplication and shipping to the theaters.

With a digital print, the process is as follows:

The studio sends the master to the digital distributor. If the film wasn't shot digitally, the lab converts the film to digital format. As with print film, the movie is then distributed to the theaters. Whether by hard drive or satellite, the digital movie is encrypted to prevent unauthorized copying. Once the theater has the file, they are sent, through a separate channel, a "key" to unlock the movie file and permit the theater to show it. Alternatively, keys can permanently unlock the file, be good for a specific number of showings, or for a pre-determined time period. For each key, the studio is charged a "virtual" print fee.

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Once the theater has the movie, regardless of film or digital format, they show it and pay a substantial percentage of the ticket sales to the studios. Theaters make most of their revenue on concessions, relying on the movies to bring audiences to them.

Steadily dropping technology prices and the fragmentation of content distribution channels are enticing consumers to enjoy more entertainment at home. Their options for home entertainment include home theatres, portable music and video players, computers, and video game consoles. As a result, cinema owners are looking to provide experiences on their big screens that audiences can't recreate with their own equipment.

One of the ways theaters can compete with home entertainment is by using networked digital cinemas to broadcast live events. A shining example of how well this works is the 2007 season of the New York Metropolitan Opera. At the Met's "On Air and On Line" webpage, it is reported that more then 325,000 viewers paid roughly twice the average movie ticket cost to see live performances transmitted from the Met in HD to 300 theaters in the US and around the world. According to *Variety*, these numbers made the Met's production of "The Barber of Seville" number 18 in the box office rankings for the week the opera was performed and broadcast.

While talking to *The Economist*, Bud Mayo of Access IT, America's biggest digital-cinema distributor, acknowledges *"music is just the start. Imagine people watching lectures in cinemas. Cable television provides enormously varied fare; the key to its success is that people know where to go to satisfy their peculiar tastes. If people can get used to the idea that their local multiplex shows something other than flying superheroes and dysfunctional families, those empty seats should fill up."*

The history of digital cinema is a fairly long one and this application has been evolving for more than ten years. What is different today is that there is a robust standard called Digital Cinema Initiatives (DCI). The objective of DCI is that of *"establishing and documenting voluntary specifications for an open architecture for digital cinema that ensures a uniform and high level of technical performance, reliability and quality control."* In recent years, digital compression and digital movie projection have matured to the point that the risks are now greatly diminished and there are a number of companies like Access IT, Sony and Technicolor already active in this field.

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Digital Signage for Out of Home Advertising at its Best

Digital signage is the use of video screens to display advertising and branding information at retail locations where static billboards and posters might have been used in the past. Resembling digital cinema, digital signage embodies a known quantity that has not yet achieved its potential greatness. To obtain a clear picture of this field, I spoke to *Jeff Roberts*, Vice President at **JSAT International**, the US subsidiary of **SkyPerfect JSAT**. JSAT International offers Ku-band services on their **Horizons 1** and soon-to-be-launched **Horizons 2** satellites. The company has also been active in digital signage for several years. Jeff shared his digital signage and satellite distribution experience and viewpoint with me.

Jeff observes that, *"advertisers want new ways to reach consumers. Digital signage emerges as a vehicle to present information and advertising to a more targeted audience. Networking signage through satellite bandwidth creates opportunities to utilize this Out of Home (OOH) medium to reach consumers in ways that traditional advertisements are unable to accomplish."*

The fragmenting distribution channels for entertainment discussed above also make it easier for audiences to skip over advertising. The desire of advertisers to reconnect with consumers OOH is one of the driving forces behind the growth of digital signage.

In a separate interview with a senior executive in retail banking, I was told that content delivered in the retail environment significantly reduces the time between "call to action" and a result. A call to action occurs in most commercials, telling the customer how they can purchase the product. When the product is within feet of the digital message, the time for consumer reaction is greatly reduced and success rates can be measured through contemporaneous purchase transactions.

Digital signage generally falls into two categories: "ad driven" and "brand building" networks. In the ad driven model, the network is owned and managed by a third party that may place the same channels in more than one retail chain. The third party completes the installation and provides a large portion of the content, including selling ad time to other advertisers not necessarily related to the display location. The owner of the location enjoys less responsibility for content creation and upkeep on the equipment, but may sacrifice most of the control over the content. This is something the previously-quoted banking executive finds less than optimum.

The concept of the ad-driven network is not new; it was introduced in the late 1980s in supermarkets using radio channels. The programming, satellite distribution and in-

store installation was provided with no initial cost to the supermarket chain; they would pay a monthly fee per store. Ads were sold to advertisers, or could be provided by the chain itself for an additional fee.

Premiere Retail Networks (PRN) established itself as the outsourcer for in store networks at **Wal-Mart**, **Albertsons**, **Costco** and **Best Buy**. In the case of Wal-Mart, each store receives several channels each of which is customized for a particular department. Advertising time is sold on these channels, with the frequency of placement being highest for the department where the advertised product is sold.

The "brand building" network contains fewer product-specific ads but is intended to tie the customer closer to the retailer and its brand. A third party provider such as JSAT International may still create the network. Jeff Roberts observes that the network and all or most of the content is dedicated to the retailer and can be targeted for a particular location or organization. These highly focused and customer-driven networks not only advertise products and services, but also can enhance branding with corporate messages and useful services as well.

Content for digital signage can be loaded onto hard drives in media players and shown on displays at the location. Another delivery method is a streaming video channel received by the store in much the same manner as a consumer might with satellite television. When the latter method is employed, it is sometimes called a *narrowcast network*. All of the features discussed above are embodied in a network JSAT International has developed with GlobeCast Enterprise Networks.

Some skepticism regarding the effectiveness of simply showing "TV style" ads has lead to innovations in digital signage useful to consumers. *Jeff Roberts* offers the example of a restaurant lobby with screens displaying the order in which parties will be called to their tables, including dynamically updated wait times. This motivates the consumer to look at the screen and provides a positive association with also shown advertising content. Regardless of whether or not the restaurant sells ads on their signage, they can include information about their own products, strengthening their brand and making the customer aware of items and services they might otherwise have ignored. This includes the possibility of up-selling an item they had already planned to purchase. (e.g., instead of simply ordering a margarita from the bar, the customer may order a specialty margarita seen on a dynamic display — providing a higher profit margin to the restaurant owner.)

The benefits of networking signage with satellite bandwidth are similar to those discussed earlier with regard to digital cinema, including an improved distribution method and significant flexibility. Whether the content is displayed directly off the beam or downloaded and stored on a hard drive before use, a point to multipoint satellite network automates content distribution and simplifies expansion to new locations.

Digital cinema is not the only industry expanding the use of their screens to provide live and unique events to drive traffic to their locations. Going to a bar to watch a sporting event is a well-established social activity. Recently, major retailers have also started to get in on this act. In March of 2007, Wal-Mart partnered with **Frito-Lay** and country singer *Tim McGraw* to create a concert that was broadcast over Wal-Mart's narrowcast network to provide in-store entertainment for customers.

The same network can be used to provide employee-training using either displays or desktop computers. In the past, schools that focus on distance learning and who operate *satellite* campuses have used a satellite connection to allow students at multiple universities to sit in on a particular class or speaking engagement, all remotely. Such a system has been in place at Cal State University, Chico since 1975.

Whether the intention is to advertise or educate, a digital signage network is a powerful tool to communicate information to a targeted audience.

Satellite Broadband And The Untapped Electronic Gaming Market

People have been fascinated by electronic games ever since *William Higinbotham* created **Tennis for Two** for a 1958 open house at the **Jet Propulsion Laboratory**. For almost as long as there have been computer networks, there have been computer games available for play and/or download. Satellite networks are something of an untapped resource in this area, though advances in satellite broadband can make playing through a dish more attractive to gamers. But the real issue is the response time of a satellite link as compared to most terrestrial links. Gamers gauge such response time using the *ping*, which measures the time taken for a short signal from the user console or computer to reach the game server and be reflected back to the gamer.

A player in Blizzard Entertainment's World of Warcraft uses the ping indicator to check latency over his cable broadband connection before heading into a busy auction house.

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Currently, the driving force in the industry is the *multiplayer* game that engages many who play against other human beings, rather than versus computer-generated opponents. The principal approach for the multiplier game is where players pay a subscription for the use of a game hosted on the game provider's servers. World of Warcraft (WoW) from Blizzard Entertainment is a strong entrant in this field with millions of gamer subscribers.

An alternative method for the multiplier game is by a direct connection between the games installed on the computers of the players. One player hosts the game on his computer or console, while the other player(s) connect to the host, usually over the Internet. The trick is in finding out who else is playing the same game and wants to engage others at the same time. This issue is addressed by matchmaking services such as *GameSpy Arcade* and Microsoft's **Xbox Live**, both of which provide an on-line waiting room where players can locate one another.

Applications for satellite networks in games hold some interesting possibilities for gamers in rural areas who have no access to broadband. The key is to ensure the *ping* remains within reasonable bounds. Most demanding is the *twitch* genre of fast-action games, where the player can quickly see the effect of his or her actions. Hard core twitch gamers demand a ping of 100 ms or less, while the larger casual segment is considerably more forgiving.

While *twitch* gets a lot of attention, there are a wide variety of games that are more forgiving in the area of timing and reflexes. *Ping* is of prime importance to the hard core twitch gamer as timing is so critical to their style of play. These include shooting games like *Halo*, as well as real-time strategy games like *Warcraft III,* massively multiplayer games such as *WoW,* and puzzle games such as *Tetris*. Thus, there is a substantial segment where ping is less important and current satellite broadband speeds are quite acceptable.

Turn based games where the players act one at a time, such as *Poker*, *Uno*, *Chess*, and *Puzzle Quest*, are even less dependent on timing. With less than optimal ping, a current satellite connection is more than likely to be quite sufficient for the casual gamer playing fast action *twitch*-like games. This can be enhanced if the response time of the satellite service is shaped to accelerate game performance.

As up and download speeds of satellite broadband are brought more in line with what one expects from a conventional Internet connection, multiplayer computer gaming could become the *killer app* that brings a new market segment into satellite broadband. There is also the option of optimizing game performance by tuning the satellite link with special software, similar to what is used to enhance the web page downloads. These steps will likely improve the latency/ping issue over satellite and provide a consistent connection across a wide area.

Making it Mobile and Enjoyable at the Same Time

The first film to be shot entirely on a digital 24-frame system in hi-def and was the first, secure, encrypted digital cinema feature.

In an address to the **Association of National Advertisers** on October 11, Microsoft CEO *Steve Ballmer* predicted that all media will be digital by the year 2017. "*We will have rich databases of information to deliver the right message to the right person at the right time in any communication,*" The devices that people use to communicate, get news, watch video, and play their games are increasingly mobile. With digital *traffic* increasing, there is a greater need for wireless infrastructure in areas that are not currently economical to serve.

Mobile products from companies such as **KVH Industries** and **XM/Sirius**, which provide satellite video and audio, can impact markets for digital content. Currently, satellite delivery is one-way on a broadcast basis, but two-way interactive delivery is developing quickly. Yet satellites remain an ideal backhaul medium in existing and expanding markets in rural and remote areas, especially in developing countries. The appropriate ground elements can be obtained on the commercial market and the necessary satellite capacity rented on a wholesale basis, thus reducing time, risk and cost.

Acknowledgements

I want to thank **Michelle Elbert**, associate consultant at **ATSI**, for her considerable contributions to this article, particularly with regard to the computer games market. Also, **Jeff Roberts** of **JSAT International** was extremely helpful with comments on digital signage and digital cinema.

Author Biography

Bruce Elbert has more than 30 years experience in satellite communications and is president of the consulting firm Application Technology Strategy, Inc. (ATSI), which assists major users and developers of satellite systems and applications. He is an author and educator in this field, having published seven titles and conducted technical and business training around the world. During 25 years with Hughes Electronics, he directed major technical projects and led business activities in the US and overseas. He is the author of "The Satellite Communication Applications Handbook, 2nd edition" (2004, Artech House).

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THE BITS & BYTES OF DIGITAL CINEMA THEATER

by Hartley Lesser

For digital cinema projection, there are currently two projector technologies that actually conform to the **DCI** (Digital Cinema Initiatives) Standard. In April of this year DCI released their updated version of the digital cinema specification, which is based on many SMPTE and ISO standards. This is known **as D-Cinema** and its guidelines have been created to withstand the test of time, ensuring a technology with the already historic staying power of 35mm film. Other digital cinema formulations are known as **E-Cinema**. Those technologies can be comprised of almost any element, with some close to D-Cinema in quality.

Companies who formed the joint venture known as Digital Cinema Initiatives, LLC, in March of 2002 included **Disney**, **Fox**, **Paramount**, **Sony Pictures Entertainment**, **Universal** and **Warner Bros. Studios**. DCI worked with the *American Society of Cinematographers* to create material for evaluation as well as 2K and 4K playback tests as well as compression technologies.

E-Cinema, or the DCI Standard, requires:

- ISO/IEC 1544-1 "JPEG2000: (.jp2) encoding
- CIE XYZ color space with 2.6 gamma encoding applied when the film is being projected, with 12 bits per component
- "Broadcast Wave " (.wav) audio format, 24 bits and 48 kHz or
- 96 kHz sampling, under control of a XML-formatted Composition Playlist via an MXF-compliant file with a maximum data rate of 250 Mbits

Dr. Larry Hornbeck at Texas Instruments developed the 20-year old technology called Digital Light Processing (DLP), which includes both front and rear projection techniques and competes against HDTV compliant LCD and Plasma flat panel displays. **Barco**, **Christie Digital Systems** and **NEC** have all licensed the TI technology. But **Sony** is just around the corner with their **SCRD** technology, which supports 4096x2160 resolution. Other digital projection forms are in development, but none have been deployed and none are yet commercially available.

Barco DP-3000 digital projector

Barco offers 2K Digital Cinema Projectors for various screen sizes, ranging from 15m (49 feet) with their **D-Cine Premiere DP90** to 30m (98 feet) with their **DP-3000**. The latter unit features a sealed engine that protects the optical path from dirt and dust and reduces maintenance costs, with 3D capabilities.

Christie brings their 2K Digital Cinema projectors into play with their **CP2000**, **CP200-X** and **CP-2000ZX** systems. The latter unit is their latest system and is designed for small to mid-sized

Christie CP2000-ZX digital projector

screens, has a universal switching power supply and is 50 percent smaller in size with improved airflow and better cooling.

NEC offers their **STARUS** product line for digital cinema projection and these 2K units (**NC2500S**, **NC1600C** and **NC8000C**) support screen sizes ranging from 26 feet to 82 feet in width. The NC2500S, for the largest screens, has memory functions for both lens position and lamp output and also has a web server for basic control from any authorized browser. There is also a self-contained liquid cooling system.

NEC NC2500S digital projector

Under the DCI spec, there are three playback levels supported. They include...

2048x1080 – 2K at 24 fps
2048x1080 – 2K at 48 fps
4096x2160 – 4K at 24 fps, 36 bits per pixel XYZ

Currently operating within the digital cinema distribution business are **Access Integrated Technologies**, **Deluxe**, **Technicolor** and **SDC**. Other firms also involved in this distribution method include **Arts Alliance Media** (signed first commercial digital cinema agreements in Europe with Twentieth Century Fox and Universal Pictures)**, Dolby** and **Kodak**.

This year, we have seen...

- By October of this year, more than 5,000 DLP-based digital cinema systems have been installed worldwide, according to the October 19th issue *of Dcinematoday.com*
- More than 1,500 Digital Cinema Systems delivered to European- and India-based UFO Moviez Ltd.
- There are about 1,400 screens with digital projectors in the U.S. installed as of last July
- The Sony 4K projector can now be found in about a dozen theaters
- Disney's *Meet the Robinsons* feature was shown on approximately 600 screens equipped with Disney's **Digital 3-D** brand, the **Real D Cinema**'s stereoscopic 3D technology
- Real D has just signed on with Odeon and UCI to install as many as 500 Real D 3D cinema systems throughout Europe over the next two years — last February, the **Odeon** theater

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complex in Hatfield and Surrey in the United Kingdom opened with 18 digital screens

As far as what firms are involved in digital cinema manufacture, integration and systems are concerned, we note...

THEATER SYSTEM INTEGRATION
- Access Integrated Technologies
- Arts Alliance Media
- Dolby Laboratories
- Kodak
- XDC
- Ymagis

PLAYBACK SYSTEM MANUFACTURER
- Doremi Laboratories
- GDC Technology
- Qube Cinema, Inc.
- QuVIS

Certainly of interest should **Technicolor** and **Qualcomm** who developed the *Auditorium Management Systems* (AMS). This was the first digital cinema server that could reliably operate in a projection booth and also be seen as "user friendly."

Leading digital cinema distributor, via satellite, **Microspace Communications Corporation** has already distributed the **DreamWorks** feature film *The Heartbreak Kid* to theaters across the US. Expect the **Warner Brothers** and **Zemeckis**' *Beowolf* feature, as well as the re-release of **Tim Burton**'s *The Nightmare Before Christmas*, to be partially released to Real D systems already installed in about one-third of **Odeon** and **UCI** cinema venues.

There certainly seem to be a number of opportunities for satcom folk to investigate the up and coming digital cinema and game distribution business. Just look at the numbers for those industries... a piece of the movie and game biz would certainly fit well into the $220 billion satellite industry... such would be quite "entertaining" to become involved with, as well!

Hartley Lesser, Editorial Director for Satnews. He is responsible for all Satnews editorial activity worldwide including SatMagazine, MilsatMagazine, and Satnews.com's daily and weekly offerings. Hartley brings 20 years of experience as a senior technology writer, editor, videographer and publisher to SatNews Publishers. He can be reached at: hartley@satnews.com

NATIONAL SECURITY AND SATELLITES

by *Tara Giunta*

Over the past several years, the satellite industry has seen consolidation that has resulted in a stronger industry, an industry that is, once again, expanding networks, services and operations. These, in turn, require further investment, which often arrives from outside the satellite operator's domestic borders. Satellite networks are also recognized as fundamental, both to national (and global) economies and, given our collective dependence on these networks, to a country's national security.

The United States has taken an increasingly proactive approach to analyzing the national security of its telecommunications infrastructure, including satellite systems. That oversight has intensified with the passage of new legislation this past summer. Foreign investors in U.S. satellite businesses should carefully consider the evolving landscape of national security in the U.S. They should plan for the additional time and resources required to navigate the investment process before acquiring a US satellite operator or applying for a license or other authorization from the U.S. Federal Communications Commission (FCC).

Under the U.S. federal statutory provision commonly known as **Exon-Florio**, the President has the authority to suspend or prohibit any foreign acquisition, merger or takeover of a U.S. corporation that is determined to threaten the national security. The **Committee on Foreign Investment in the United State**s ("CFIUS") is an inter-agency committee (comprised of 12 agencies led by the **Department of the Treasury**) charged with implementing Exon-Florio. While CFIUS review is voluntary, if the parties to an acquisition do not seek CFIUS review and, in the future, it is deemed of concern to national security, then the parties can be ordered to undo the transaction.

This summer, the US Congress modified Exon-Florio in a manner designed to strengthen CFIUS' national security review. While no significant changes were made to the procedures used by CFIUS, there is now increased scrutiny. The changes have already caused delay in the review and clearance of transactions.

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There are several reasons for the delay. First, the CFIUS agencies are in the process of drafting regulations to implement the new law. This has distracted some of the key agencies from reviewing and clearing transactions. Further, the legislation expanded the definition of "critical infrastructure" warranting national security review, as "systems or assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems or assets would have a debilitating impact on national security."

While implementing regulations are expected to provide guidance as to what constitutes "critical technologies", telecommunications (including satellite systems) are already inviting detailed scrutiny and are expected to be included in some fashion. Additionally, given the criticism of the CFIUS agencies by the US Congress and the public regarding their handling of the CNOOC/Unocal and Dubai Ports transactions, CFIUS agencies are erring on the side of broadly applying their mandate.

Prior to clearing transactions, CFIUS may require an agreement designed to mitigate any national security concerns. The lead agency with expertise in the area affected by the transaction will take the lead in negotiating and enforcing these agreements. The expert agencies overseeing national security reviews of acquisitions of U.S. satellite companies consist of a smaller subset of the CFIUS agencies: the Departments of Homeland Security, Justice (including the FBI) and Defense. Referred to as "**Team Telecom**", these agencies take the lead in negotiating national security agreements (or for transactions involving less perceived risk, letters of assurance) involving satellite companies.

Importantly, Team Telecom review is not limited to a proposed acquisition of a U.S. satellite business by a foreign entity, as with CFIUS. Rather; Team Telecom reviews any application or action by the FCC to license or otherwise authorize an entity where there is foreign involvement. As a result, if there is foreign ownership, even authorizations historically viewed as standard or "low risk" will require national security review and pre-clearance by Team Telecom before the FCC will act. Further, while there are statutory time periods that apply to CFIUS review, there is no such mandated timeline for Team Telecom review. Therefore, an acquisition or application to the FCC can be held up indefinitely until Team Telecom completes its review and notifies the FCC that it has cleared the particular transaction.

Consequently, when an entity is acquiring a US-licensed satellite operator, applying for a space station or earth station license, seeking approval to transfer control of a satellite licensee or to assign its licenses to a third party, it must take into consideration the national security review that will be undertaken by Team Telecom. The parties must be prepared to complete a comprehensive questionnaire disclosing information covering ownership and affiliations, details on the networks including location of facilities and type of equipment deployed, and major customers contracts. Team Telecom will then assess whether there are national security concerns requiring an agreement prior to notifying the FCC that it may issue the requisite authorization or approvals.

In short, the national security review is comprehensive and the agreements negotiated can be extensive, particularly if common carrier services are provided. Therefore, satellite companies must factor into their planning the time and resources needed to analyze their potential areas of exposure, compile all information requested and negotiate with Team Telecom, and potentially with CFIUS. While the procedures appear straight forward, the process can be arduous and time consuming.

Tara Giunta is a partner of the Washington, DC office of Paul, Hastings, Janofsky & Walker LLP. Ms. Giunta has extensive experience in advising clients operating in, providing services to, and/or financing companies in the satellite sector. She has expertise in structuring international satellite projects and developing and implementing strategies for commercializing those projects on a global basis. This includes structuring strategic alliances, partnerships and joint ventures; negotiating the full range of commercial contracts; structuring projects to accommodate legal and regulatory requirements and obtaining required licenses and authorizations; and conducting due diligence, internal audits and compliance investigations and advising clients and their officers and directors on compliance in a broad range of areas, including regulatory and licensing and the foreign corrupt practices act and related laws.

Ms. Giunta received her J.D. at Columbus School of Law, Catholic University in 1986 and her B.A., cum laude, at Tufts University in 1980. Ms. Giunta is Legal Council to the Pacific Telecommunications Council (PTC) and is active in many other industry organizations.

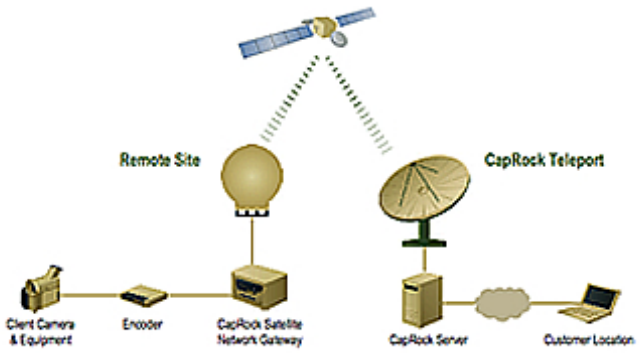
KEEPING REMOTE SITES IN THE VISUAL SPECTRUM

by Christy Hartman, CapRock Communications

The need for remote communications has long been a key driver of the satellite communications industry. As industries continue to expand globally, they demand high bandwidth communication solutions and capabilities only satellite can provide. In an effort to meet this demand, satellite communication service providers must optimize their existing networks and incorporate new services to support these industries and their increasing number of remote locations.

As operations push into more remote and isolated areas, there is a growing demand for communication providers to deliver more than equipment and a broadband "pipe." Technical experts can't be on-site within an hour. Spare parts are *not* located in the warehouse next door. Clients need tools and services at their fingertips to make working at remote sites seem as though they are working at corporate headquarters. Satellite providers are adapting to this trend by developing communication platforms delivering managed products and services as integral components of critical business operations.

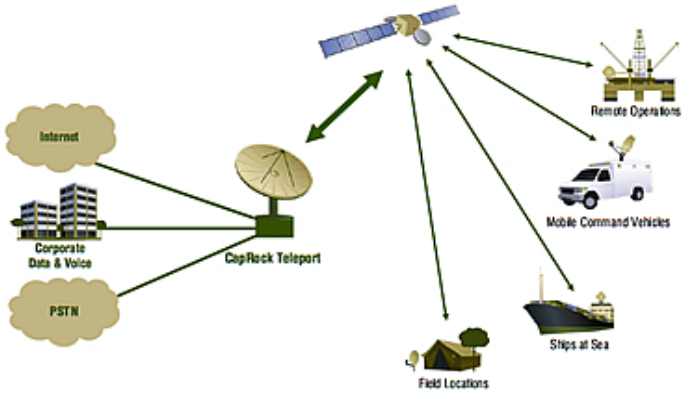
Two of the more popular managed services provided on communication platforms in industries with distant operations are video streaming and video conferencing. Most businesses view video services as a way to enhance communications capabilities and increase operational efficiency. Although video services have been used in the corporate office for more than a decade, they are more recently being applied in remote and isolated environments. Due to their practicality in areas such as technical support, personnel safety, as well as analysis and collaboration, remote businesses have found new applications for these services.



A typical equipment configuration for video streaming at a remote location

For many companies, the most advantageous aspect of video streaming and conferencing is their visual link into crucial offsite operations. Remote engineering and problem diagnosis is now far simpler. Quicker, more educated decisions can be made. As requirements can change drastically from one remote job to the next, satellite communication service providers should offer scalable solutions, whether it's to support the inspection of subsea structures or to collaborate on a conference call with experts onshore.

While video services have been proven to increase the productivity at remote sites, they are of no benefit if the network can't reach the clients. Luckily, due to a coverage area often larger than other available communication methods, satellite services already have a leg-up on the competition when providing remote communications. Still, there are a few considerations remote operations clients located around the world should understand.



The common types of remote locations that use satellite communications

First and foremost, satellite communication providers should be capable of offering a global network for their customers. The next oil or military hotspot can seldom be predicted. The communications network has to be available anywhere and everywhere to ensure video services and other communications can be provided. Additionally, companies in highly mobile industries, such as maritime, will have ships that travel to several continents and often require communication services throughout the entire trip. By providing a global network, the provider ensures the vessel will have minimal service downtime during its voyage and also removes the burden from the client of having to partner with another provider, halfway through the voyage.

Finally, clients with important remote facilities should look to their provider to offer round-the-clock customer service backed by regional support centers in key global hotspots. Advances in satellite technology have allowed for many providers to solve most client problems remotely, especially when the services are part of a total managed solution. By having 24/7 network operation centers, the provider is able to deliver proactive network monitoring and management to

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its clients at all times. In situations where remote assistance cannot fix the problem, remote support centers should be spread out across multiple continents, rather than be resident at only one or two locations. Multiple support locations allow for the quick dispatch of technicians to the remote site(s). This reduces provider and client costs.

As new technologies become available and remote operations continue to require advanced applications, the need for video services to provide remote technical support and troubleshooting continues to grow. By minimizing technical support staff onboard rigs, or the need to fly them out to remote sites when complications arise, providers could save millions of dollars. The cost savings alone suggests video services are not used out of convenience, but rather necessity.

Managing platforms that effectively deliver new services, providing a global network, and delivering worldwide service and support, are all components of managed services offered by communication providers. Clients with remote operations will increasingly rely on effective providers to manage such turnkey services. This will make working a thousand miles offshore just as efficient as working a few blocks away.

Christy Hartman is the Director of Market Intelligence and Communications for CapRock Communications, where she is responsible for managing the company's market research and planning as well as developing CapRock's global communications strategy. Hartman, who has served in various marketing positions within the financial and technology industries, holds a Bachelor of Business Administration degree from the University of Texas and a Master of Business Administration degree from Rice University.

THE REPORT FROM ASIA

The Silver Bullet: IPTV in Asia

by Peter Galace, Editor, Asia

We can talk about IPTV tech specs all we want. We can debate IPTV tech issues beloved by boffins (H.264, ADSL 2+, QoE, 1080p24 and whether 24mbps is sufficient bandwidth, among others), but in a region as diverse as Asia/Pacific (and anywhere else, for that matter), it's the Quality of Experience (QoE) that will ultimately make or break IPTV. The differentiator of IPTV from digital cable and DTH are the marketing efforts, which could be the key factor in whether telcos have a mainstream moneymaker in IPTV, or just another cute, niche technology masquerading as a winner.

IPTV is one of two new silver bullets that should finally enable telcos to break cable and satellite's hold on the lucrative, but very competitive, multichannel, pay-TV industry. The other is HDTV.

For telcos, however, IPTV is undeveloped territory, both in the infrastructure and marketing aspects. But as IPTV sits on the leading edge of IP advancements, new infrastructure and applications give IPTV a leg up on cable. Cable remains (mostly) wedded to the old MPEG-2 codec — too slow for bandwidth intensive IPTV.

With world standards for IPTV more or less settled, attention is turning toward the tougher job of creatively marketing IPTV to subscribers with an abundance of multichannel pay-TV choices, and who mostly don't give a hoot about IPTV.

Product differentiation is the challenge. Vastly improved QoE is the Holy Grail.

Toughest challenge

Clever marketing is seen as the toughest challenge telcos face in winning marketing share as they intensify their struggle versus cable and satellite offerings. Surprisingly, IPTV has made significant progress in the marketing fight. The DSL Forum last October announced worldwide, IPTV subscribers jumped a huge 179 percent to 8.22 million in June, up from 2.95 million year-on-year.

Europe accounted for most of this surge, with IPTV customers climbing to 4.98 million from 1.51 million for the same period. Some 660,000 broadband customers signed up for IPTV services in the Americas, giving the region a total of 1.07 million subscribers. Asia/Pacific added 1.19 million subscribers, giving the region 2.18 million subscribers. IPTV pioneers, such as Hong Kong's PCCW and France Telecom, together account for around 1.5 million users. Both firms, however, have built fiber-to-the-home (FTTH) networks to support their IPTV offerings.

DSL Forum marketing director *Laurie Gonzalez* said they are excited about these figures.

"Even a year ago, people were asking whether IPTV would be a compelling application. Today, more than eight million customers are using it in every region of the world. It's gone far beyond testing to a real rollout."

DSL has a 66 percent share of broadband access customers, around 200 million in number. Fiber has an 11 percent share, while cable acquired approximately 22 percent.

Hong Kong leads Asian IPTV

The June numbers for Asia/Pacific are an improvement over the second quarter when it was reported the region's IPTV penetration was "insignificant," except for Hong Kong. IPTV success has been the greatest in Hong Kong where IPTV has 608,000 subscribers, these coming from PCCW's **NOW** broadband TV service. NOW is the largest IPTV deployment in the world and accounts for one third of the total global IPTV subscribers.

Despite a rapid 66 percent increase in NOW subscribers, PCCW reported revenue losses from its TV and content businesses. PCCW also stated NOW subscribers increased to 608,000, but the losses rose to $24 million. PCCW is attempting to generate more revenue from its content services by reselling them to customers of its mobile phone network. This marketing move makes good use of NOW's premium content, such as 24-hour local news, CNNI and mobile ESPN.

Japan's **Softbank BBTV**, with its 180,000 subscribers, is the next Asian success story. Softbank BBTV claims it is adding 18,000 new subscribers monthly.

IPTV made it to Singapore this July when dominant telco **Singapore Telecommunications** (SingTel) launched "**mio TV**". Described by SingTel as the next generation of TV watching, mio TV provides a range of VoD titles, including movies from major Hollywood movie studios that include **Sony Pictures Entertainment**, **Twentieth Century Fox** and **Disney**. The service will also offer HD content obtained from partnerships with Mega Media and VOOM HD Networks. The mio TV platform has the potential to allow communications using video conferencing and instant messaging, displaying photos and playing music from PCs, all on the TV set.

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"We believe the launch of mio TV will open up more channels for interactive content creation and media services, benefiting both consumers and industry with greater choice and content flexibility," said *Christopher Chia*, CEO, **Media Development Authority of Singapore**.

SingTel said new BBC channels such as BBC Knowledge and BBC Lifestyle will make their global debut on mio TV. BBC Kids' channel *Beebies* will also be launched. Singapore is among the world's first to have a free-to-air HD channel carried on an IPTV platform.

IPTV in China

South East Asia is Asia/Pacific's current leader in IPTV adoption, with seven of 13 countries having rolled out some form of IPTV service, including NOW. Asia is expected to lead other regions with more than 40 percent of global IPTV subscribers by the year 2010. There were less than three million IPTV subscribers in the world in 2006, a third of which were accounted for by Hong Kong's PCCW.

IPTV is set to grow 26 fold by 2010, with 63 million subscribers worldwide, according to researcher firm **iSuppli**. The company also said the number of IPTV subscribers worldwide should more than double every year from 2005 to 2009, when it could reach 69 million.

Apart from Hong Kong and Singapore, so far IPTV rollouts in Asia have been small in scale and uptake has been puny in most markets. The reality on the ground is that IPTV faces tough challenges from incumbents and their relatively cheap cable and satellite offerings. Incumbents remain the key driving force behind IPTV growth in Asia/Pacific

Cable remains entrenched in Taiwan and Korea as the main method of TV access. In other countries, free TV broadcasts are also dampening incumbents' interest in IPTV. Incumbents, however, are looking to provide improved broadband network and service penetration to fend off triple play services from cable players.

The bright spots for IPTV remain Hong Kong, Taiwan and Japan. China will continue to

face strict regulatory constraints, while India will remain bedeviled by poor infrastructure.

China, which is IPTV's largest potential market in Asia, is still years away from solving thorny regulatory issues that will enable telcos to create realistic business models where IPTV can compete against the heavily entrenched cable industry. Cable is dirt cheap in China. To IPTV's advantage are indications Chinese subscribers appear willing to pay for some of IPTV's premium services, such as VoD and interactive gaming.

China's communist leadership still tightly restricts content, whose breadth is the key advantage IPTV offers subscribers. One executive working in China said that if China doesn't relax on content, "there is no business model, and there will be no demand for IPTV".

While Chinese telcos, most of which are state owned or controlled corporations, attempt to persuade the central government to grant more leeway on content, they're focusing on increasing bandwidth and improving the reliability of their access networks. Overall, the status of China as a feasible market for IPTV remains in doubt. Key issues such as regulatory hurdles, content restrictions and the government's apparent focus on implementing digital cable services will tend to put a brake on IPTV growth in the short term.

IPTV over satellite

According to **Northern Sky Research** (NSR), IPTV via satellite is a niche offering likely account for a relatively small percentage share of the market potential that terrestrial-based platforms are likely to generate.

Revenue estimates for terrestrial-based services are forecast at some $7 billion for 2010 alone. On the other hand, satellite-based total revenues from 2005 to 2010 are expected to exceed $1.6 billion.

Nevertheless, said NSR, IPTV does provide a unique and growing opportunity for the satellite industry to target. The growing preference for IP that satellite service providers are incorporating in their offerings, and the compelling role of satellite services in the video markets worldwide, make IPTV via satellite services a compelling value proposition for select regions.

"Given the proven broadcast economics of satellites in delivering content cost-effectively to large geographic footprints, particularly in underserved areas, growth of IPTV via satellite services should increase at a steady rate," said *Jose del Rosario*, NSR senior analyst.

Firms setting up infrastructure to enable IPTV via satellite services will, for the most part, generate initial demand. These services mainly require transponder lease contracts from satellite operators for the delivery of content to IPTV gateways.

Once the infrastructure is in place, the market is expected to move quickly to retail business models. This is due to the fact that revenue-sharing arrangements between satellite companies and the owners of content will lead to higher margins, as satellite players participate in revenue sharing from the subscribers' monthly service fees.

"Since 'content is king' in the pay-TV business, content aggregation and distribution rights are, and will continue to be, more important from a revenue generation perspective compared to actual service provisioning of IPTV," *del Rosario* said.

"The 'battle for eyeballs' in any pay-TV platform is where the bulk of revenues will be earned, and IPTV is no exception. The market entry strategy for IPTV via satellite players is to provide a compelling business proposition to the owners of content. Once this has been established, the revenue-sharing arrangements will ensure a healthy market for satellite players".

In addition to being the Asia Editor of Satmagazine, Peter I. Galace writes extensively on telecommunications developments in Asia for numerous international publications. He is also co-author of "Heavens Fill with Commerce," a brief history of the satellite communications industry published in the U.S. He can be reached at peter@satnews.com.

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INTEGRATED SOLUTIONS

Improving Operations and Quality of Service

by Mark Schmitt

In today's increasingly competitive SATCOM (Satellite Communications) marketplace, satellite service providers are continually looking for new ways to distinguish themselves from their competition. They need to operate more efficiently, while also offering a better QoS (Quality of Service) across a wider range of services.

Use of commercial SATCOM worldwide has increased tremendously over the last 15 years and is a critical part of today's industry and government infrastructure. As a result, QoS is a significant and growing issue for commercial, civil, and military users. High reliability, high QoS, and the ability to prevent or resolve any issue quickly, efficiently, and with as little impact to service as possible, are paramount.

As a result of this increased commercial SATCOM use, and the growing number of service providers, many customers are requiring better customer service and a higher level of QoS than they required in the past. This demand has resulted in more stringent SLAs (Service Level Agreements) and related financial impacts based on the QoS provided.

The demands on operations of the service provider to cost effectively meet these SLAs are becoming more challenging every day. The difficulties are further compounded by the need to support an ever-increasing number of geographically diverse networks for varying applications. These include voice, data, video, and hybrid SATCOM terrestrial services, each of which use equipment and systems of varying design and manufacture.

The classic approach employed by many operations is a stovepipe implementation. That is, a unique system is put in place to support each specific operational function (e.g., each network has its own management system). Typically, these stovepipe systems are one or more standalone systems. Each is characterized by limited focus and functionality and contain data that cannot be shared with other applications or each other.

For many organizations, it is easiest to procure a stovepipe system to meet their immediate needs. Regrettably, the stovepipe approach often engenders long-term negative impacts. For exam-

ple, a company may initially develop or procure an earth station that includes a proprietary equipment monitoring and control system developed by the antenna manufacturer. A few years later, when their operation has grown, the company may find themselves with several earth stations from different vendors, each with a unique monitoring and control system.

Similarly, a service provider who plans to own and operate their first satellite may initially procure a proprietary satellite control system from the satellite manufacturer to operate the satellite. As their satellite fleet grows, they may end up purchasing multiple, unique control systems—one for each satellite. Additional parallels can be drawn with VSATs (Very Small Aperture Terminals), terrestrial networks, and so on.

The end result is increased procurement costs, as the same functionality cannot be reused and must be repurchased as the operation grows. Recurring maintenance, operation, and training costs also increase to support each unique system. Furthermore, when the data cannot be shared easily between systems, the operator cannot use the information in each system to provide the most effective and timely support possible across the entire operation. Figure-1 illustrates a representative stovepipe approach to operations for a commercial satellite operator/service provider.

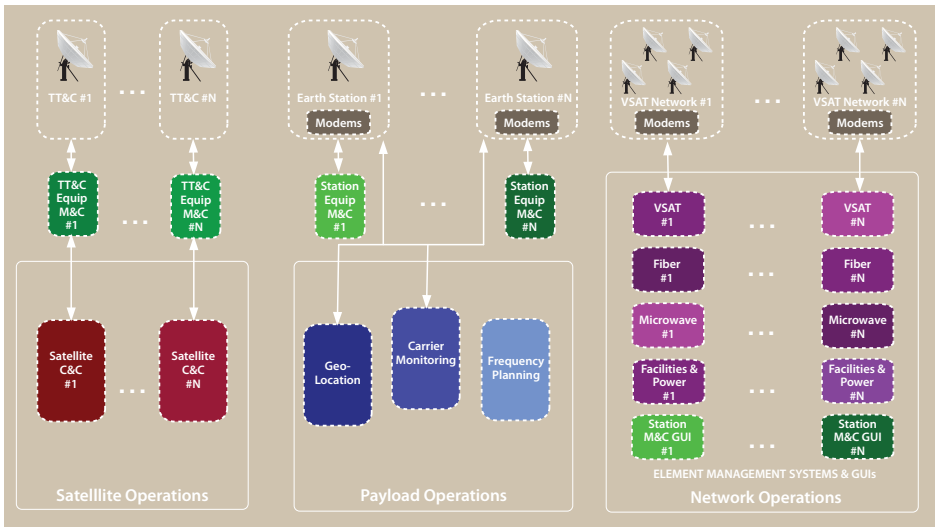

Figure-1: Stovepipe Approach to Operations
Stovepipe architectures may be attractive when first starting up, but result in increased procurement and operations costs in the presence of long-term growth and become an ever increasing impediment to efficiency, responsiveness, and QoS.

An equally important consequence of the stovepipe approach is that it often results in stovepipe organizations within each operation. That is, each organization is focused on one specific operational aspect, such as customer support, network management, communications spectrum monitoring, earth station operations, or satellite control. Typically, real-time communication between these organizations or the systems they use is limited and increases the difficulty in identifying and resolving problems or changes. This is because events in one area of operation often manifest in other ways in other systems and areas of operation.

This problem has become even more apparent as routine operations become automated. For example, in August 2003, Futron Corp. reported that, "operations staff spend 20 to 40% of their time on anomaly related activities." In the January 2004 issue of *SatMagazine*, Harold McDonnell stated that, "The analysis and resolution of these (operator) errors as well as hardware anomalies drive up the staffing demands and consequently, operating costs."

One company, Integral Systems, Inc., of Lanham, MD, leads the way in addressing these issues for satellite operators and service providers. Integral Systems and its subsidiaries, Newpoint Technologies, Inc., and SAT Corporation, are market leaders in the areas of network and equipment management, CSM (Communications Spectrum Monitoring), interference detection and characterization, and satellite command and control systems. The systems they provide are some of the most technically advanced in the industry and are designed from the outset to be flexible, scalable, and open systems that can readily and cost effectively grow with a customer's business.

In the last few years, Integral Systems has begun to provide integrated solutions spanning two or more of these market areas. As a result and in the presence of continued growth, their customers have been able to reduce operating costs, provide real-time situational awareness, and improve customer support and QoS across their operations.

For example, take the case of a simple equipment failure that impacts the performance of a customer's carrier. In a stovepipe scenario, the operations teams responsible for carrier monitoring, equipment management, and technical support, each independently launches an investigation into the problem as they each separately become aware of it. The CSM operator sees abnormal signal characteristics. Earth station personnel receive an alarm from faulty equipment. Customer support staff receive calls from the customer whose service is being affected but cannot clearly tell them what the cause is or when it will be resolved. Each operations team is dedicating resources to determine the cause of the problem as they see it and take corrective actions with only one team knowing the true cause. In the end, not only is each operation impacted and expending resources while this is being investigated but so is the customer and potentially the service provider's revenue as well.

In an integrated system approach, these teams can immediately correlate events like degraded carrier performance and faulty equipment related to that service, enabling them to quickly and efficiently diagnose and respond to the problem and keeping the

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customer informed. Similarly, should an interfering signal impact the QoS a customer is receiving, or transponder performance itself, the various operations teams would be able to access and correlate this information from the CSM, equipment management and payload control systems in real time to rapidly address the situation. In this case, potentially characterizing, identifying or locating the interfering signal and possibly even protecting the satellite payload from harm. An example of Integral Systems' integrated approach for the satellite operator/service provider is shown in Figure-2.

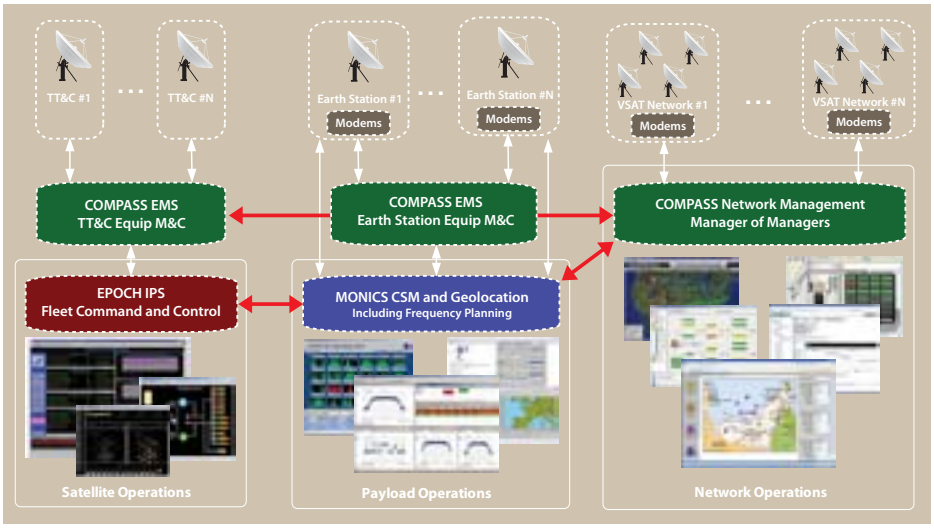

Figure-2: Integrated Approach to Operations

Integral Systems' approach not only reduces operations and procurement costs, both short and long-term, but enables higher QoS, more responsive customer service, improved real time situations awareness and real time access to performance data critical to one's business.

This approach has other benefits as well, by mining the combined data from each of the systems, Integral Systems' solutions offers managers direct, real-time access to KPIs (Key Performance Indicators) regarding their operations and business. They no longer must wait days or weeks for staff to compile and fuse this data in a meaningful way. This is common in many business enterprise systems (e.g., accounting and finance), as it allows management, sales, and support staff to make informed decisions based on the most current data available.

Integral Systems has not limited integration to their own products. Rather, they have included interfaces to a variety of other related systems, including element management systems from various VSAT manufacturers, specialized equipment management systems, and leading complimentary systems, like those used to support transponder frequency and network planning or geolocation. Integral Systems' solutions also offer interfaces to billing, sales, marketing, and other business systems.

ProtoStar Ltd. of Bermuda recently procured from Integral Systems such an integrated system to operate its ProtoStar-1 satellite. This satellite will provide DTH (Direct to Home) television, broadband Internet access, and transponder leasing services across the Asia-Pacific region.

Steven Smith, Vice President of Technical Operations at ProtoStar, describes ProtoStar's experience with Integral Systems and the solution which is being developed for the ProtoStar-1 satellite: "As a new satellite operator, ProtoStar has no pre-existing ground equipment, and is therefore able to implement a complete, new satellite control and QoS system without being constrained to integrating a mix of new systems with old legacy applications. ProtoStar is taking advantage of Integral Systems' fully integrated solution because it: provides state of the art capabilities in both satellite control and customer QoS functions; is quick to implement; is fully integrated in the sense that data can be shared between all of the components, allowing operations and engineering staff to easily share information; and is an affordable solution for satellite operators.

The large range of data, reports, and general situational awareness, provided by this modern ground system will allow ProtoStar to run efficient operations teams for satellite control and customer operations support, each having access to relevant information from any system, such that they can rapidly focus on the event and determine the necessary action. The one-time entry of manual data to populate all systems, the sharing of all pertinent data with the responsible teams, and prompt and focused investigation, are essential to providing an overall high quality of service to the customer."

Mark Schmitt is the Director of Business Development for Integral Systems, Inc. of Lanham, Maryland U.S.A. supporting the activities of the company and its' subsidiaries (Integral Systems Europe, SAT Corp., Newpoint Technologies, Inc. , RT Logic and Lumistar) worldwide. Mr. Schmitt has worked in the satellite ground systems and operations field for over 20 years. He can be reached at schmitt@integ.com.

THE REPORT FROM EUROPE

BSkyB halts new channel launches

by Chris Forrester, European Editor

The United Kingdom (UK) has no more room for new DTH television channels on its current DTH/DBS platform. **BSkyB** is specifically putting the brakes on new third-party channel launches on its platform, potentially affecting 100's of waiting channels that are already in the pipeline. Citing "set top box memory capacity", BSkyB said on October 3rd they will "cease to take further applications for places in the EPG launch queue" and any channels already in the launch queue – and thus nominally approved for launch – will be preceded with, but with "extreme caution". The problem seems to be the limited ability of these older boxes with limited caching memory in place of volatile memory.

BskyB Teleport at Chilworth, United Kingdom

The news comes at a crucial point in UK television with a joint-venture satellite operation about to start, backed by the BBC and ITV (Britain's main commercial TV broadcaster). Called '**Free-Sat'**, it will launch in February and provide hundreds of TV and radio services *WITHOUT* charging a subscription fee of any sort. FreeSat is designed to replicate the Freeview digital terrestrial platform, which has been a huge success in Britain.

However, Sky is understood to have more than 100 TV and radio channels in its queue, in addition to a large number of channels that have already been allocated launch dates. Sky warns would-be broadcasters that there is a considerable risk that it will not be able to launch all of the services currently in its launch queue, as the increased volume "could pose an unacceptable risk to some set-top boxes".

Sky added that it would not now accept applications to add any further TV or radio stations to the launch queue. Moreover, any broadcaster who does not now launch a new service onto the

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EPG when offered the opportunity to do so will be "permanently removed" from the launch queue.

There are already complaints being made, with more than one broadcaster grumbling to UK television regulator Ofcom arguing that the decision is a major breach of Ofcom's 'fair and equitable access' rules to the Sky Digital platform. One well-placed insider also questioned the set-top processing argument, suggesting that Sky could make a virtue out of necessity by heavily promoting newer models of STB that were able to handle "hundreds of new channels". "Box prices are now low, and if poorly specified boxes are in use, then now is the time to start replacement," said one source.

Another described the decision as "horrendous", and potentially "very damaging" to the industry. "Ofcom must surely defer any decisions of such magnitude until it conducts a full review of the whole platform markets - only then will it's own detailed questions be answered. And only then will the real power (and intent) of Sky become visible."

Another complainant argued: "Sky has had a request from [us] for another channel since August. So, a company which has paid them over half a million pounds over the last few years is told to go away. Is this a way to behave with any client?"

The Sky letter:

"After very careful consideration, we have taken the decision to make these changes in order to safeguard the interests of both viewers and platform users. Our goal is to provide a high quality viewer experience and a stable environment for all platform users, while maintaining the principle that access to the EPG should be available without discrimination to all broadcasters.

The context for these changes is the rapid growth in the number of services listed in the Sky EPG. As you will be aware, there are already over 600 television and radio services listed in the Sky EPG, compared with fewer than 200 at launch of the platform. When taking into account regional variants and interactive services, there are currently almost 1,000 services on the platform. We consider that this sustained growth is a testament to the success of the platform in meeting the needs of viewers and broadcasters. No other TV platform in the UK provides this level of access for broadcasters or of diversity for viewers.

Every additional service listed in the EPG increases the amount of set top box memory needed to display the EPG. The amount of memory contained in each set top box is, however, finite. While Sky continues to take steps to ensure that memory is used efficiently, there are very significant memory constraints in several models of boxes, which are currently in use by viewers, and shortly we will have realized all of the significant gains that are to be made through software modifications. There is a risk of malfunction if the amount of data needed to display services in the EPG approaches or exceeds the amount of memory available."

BSkyB says that it is looking to add certain approved third-party channels onto the EPG at a rate of two services a week during 2008, but stresses it might not be able to maintain this rate.

Another broadcaster, in a letter to Ofcom seen by us, said Sky's reasoning for curtailing access is "extremely weak". The letter to Ofcom states: "BSkyB estimate there are some 2.5m out-dated boxes in the market, which they must have known about for a while and couldn't have suddenly have come to their attention. Ofcom must be very concerned as this could potentially have a very wide damaging effect to the UK independent broadcasting sector."

This EPG agreement transfer scheme would now allow what had been a highly informal trade in EPG positions to become more 'official'. The trading scheme would allow existing broadcasters to sell their existing EPG positions. Sky says they will relax their previous rules about the 'trading' in EPG numbers, permitting a would be broadcaster to enter into an arrangement with an existing EPG holder – and in effect 'buy' that EPG slot. Sky says this is the fairest and most efficient way to enable new broadcasters to gain access to an EPG number. These relaxations come into effect on January 1st.

However, Sky's changes to their 'Open Platform' policy will affect dozens of would-be broadcasters seeking access to the UK's growing digital audience. It is also unclear just yet as to how the new terms will affect would be broadcasters seeking access to an EPG listing on the BBC and ITV-backed 'FreeSat' proposition, as mentioned, and due to come to air in early 2008.

Clearly, one of Sky's problems is a legacy set-top box perhaps possessing inadequate memory or processing ability. Many of these boxes are around eight years old. However, it is also likely that some will question Sky's obligations under its 'fair and equitable' access to its platform. This problem's timing, when added to the basket of other regulatory issues (see below) on its plate, is far from ideal.

The complaints seem to be focusing on Ofcom's 'fair, reasonable and non-discriminatory' (FRND) obligations on Sky. In essence, these rules require Sky to carry any channel, provided it meets Sky's technical standards, is adequately funded and insured, and pays Sky's Technical Platform Service fee – and, of course, se-

cures satellite space segment from the likes of SES Astra or Eutelsat or one of their affiliated service providers. (The summary rules and regulations may be viewed at: **http://www.ofcom.org.uk/consult/condocs/tpsguidelines/statement/** or the full 78-page formal rules at: **http://www.ofcom.org.uk/consult/condocs/tpsguidelines/statement/statement.pdf**

There's nothing in the rules and regulations that talks about set-top box memory issues, with more than one potential complainant grumbling that this might be something of a red herring designed to circumvent the Ofcom obligations. Ofcom estimates there are about 2m set-top boxes that are not in one of Sky's pay-TV subscription schemes. These include second-boxes in homes as well as those serving viewers keen to get high-quality satellite feeds of the main (terrestrial) broadcast networks but not wishing to pay Sky's subscriber fees.

However, on the other hand – and in Sky's defence – there's little merit in Sky closing the door on would-be broadcasters from whom it earns a perfectly decent fee for the provision of such technical services without good reason. Sky earns a raft of fees for technical access to its platform starting at £78,000 per channel ($159,000) with extra charges levied according to a broadcaster's needs.

A counter argument from one embryonic broadcaster asked whether, if the set-top box argument was a real problem, Sky couldn't turn this to their advantage by promoting 'new' set-top boxes that were capable of receiving these extra free-to-view channels. In other words the new – and potentially appealing niche services - were restricted to those boxes able to easily these new transmissions.

As already mentioned, Sky's decision also directly affects the value to existing broadcasters of their allocated EPG numbers. Indeed, for some poorly performing channels, they might be sitting on a potential goldmine given that they can now openly trade their EPG position to a new entrant. Figures of £50,000-£60,000 ($100,000-$120,000) have been mentioned as being the 'open market' price of an EPG position.

It is also known that some of the satellite service providers closely involved in this sector are also watching developments closely, as Sky's decision closes a lucrative business segment from them. Teleport operators such as Arqiva, Globecast and others, as well as satellite operator SES Astra, must also be concerned, given

FEATURES

Fans at concert—but are they digital??

that it has allocated a fresh satellite to the UK in order expressly to allow for expansion. Astra 2C is now in position at 28.2 deg East, and 'open' for business. Astra 2C's first client transmissions will be towards the end of October.

But, as ever in the world, there is an alternate in the shape of 'FreeSat'. Launching in February, FreeSat is backed by the BBC and ITV, the UK's two largest broadcasting organisations – and they've plenty of space in their line-up. FreeSat uses the same video transmissions stream as BSkyB, but is NOT dependent on their EPG system. FreeSat uses an MHEG-based system which will have as a by-product an attractive-looking on-screen menu system.

There's another factor. The UK is turning towards HDTV. There are already 13 HDTV channels on air (all on DTH satellite) and more are planning to launch. New HD channels, whether on Sky or FreeSat, jump straight to the top of the queue, first because they can only be received by 'modern' MPEG4-equipped boxes and, secondly, because Sky (and FreeSat) wish to promote high-def, and this applies to the satellite operators. SES Astra has 10 full transponders ready to go and is happy to see them leased to Sky clients or FreeSat.

This means broadcasting in Britain is in an interesting phase at the moment. Freeview is delivering almost 30 free channels to about 9m homes. BSkyB's subscriber numbers are about 8.5m homes (cable has just 3.5m), and FreeSat is about to start. That there will be hurdles ahead, few doubt, but most also agree the UK now has real digital TV choices open to them.

London-based **Chris Forrester** is a well-known entertainment and broadcasting journalist. He reports on all aspects of the TV industry with special emphasis on content, the business of film, television and emerging technologies. This includes interactive multi-media and the growing importance of web-streamed and digitized content over all delivery platforms including cable, satellite and digital terrestrial TV as well as cellular and 3G mobile. Chris has been investigating, researching and reporting on the so-called 'broadband explosion' for 25 years.

JOHN MATTINGLY, MOBILE SATELLITE VENTURES

Interviewed by *Hartley Lesser*

After the most informative ISIS '07 symposium in New York, the President of Satellite Services for **Mobile Satellite Ventures**, Mr. *John Mattingly*, was able to spend some time with *SatMagazine* and answer a few questions about the success his company has realized.

Some facts concerning Mobile Satellite Ventures are needed. **Motient** formed the company in June of 2000 with its goal to develop and test new approaches for providing mobile satellite services. The company is owned and controlled by **Sky Terra Communications** [OTCBB:SKYT] and is based in Reston, Virginia. Their satellite-based wireless communications network offers voice and data services across North America, the Caribbean, Hawaii and coastal waters. The company is currently developing the first FCC-licensed hybrid satellite-terrestrial communications network and they plan to provide wireless voice and high-speed data services to conventional handsets throughout the US and Canada beginning in the 2010 timeframe.

MSV owns two current generation satellites, **MSAT-1** and **MSAT-2** with plans to launch **MSV-1** and **MSV-2**, which will offer multi spot-beam frequency as well as standard cell phone handset communication capabilities when out of terrestrial coverage areas. (See the sidebar)

HARTLEY
What is your background in this industry, Mr. Mattingly?

JOHN
I joined the satellite industry in 1982 with **American Satellite**. ASC was a domestic US fixed satellite operator responsible for many leading edge service developments in the area of satellite telecommunications networks in the late 1970's and early 1980's. American Satellite became **CONTEL ASC** in the mid eighties and then, in 1991, merged into **GTE Spacenet**, another US fixed satellite operator. During this period of time, I filled a variety of positions, including general management during this time.

I moved on to **Orion Network Systems**, an International fixed satellite operator, which would later be acquired by **Loral**. Then, in 1994, I joined **COMSAT Corporation** and, in 1995, became the General Manager of **COMSAT World Systems**. I was responsible for COMSAT's investment in Intelsat. In 1997, I was named President of Satellite Services and became responsible for COMSAT General Corporation, COMSAT Mobile Communications as well as COMSAT's investment in **Inmarsat**. During the period from 1995 to 2001, I was involved in the privatization of both Inmarsat and Intelsat and the spin-off **New Skies Satellites** from **Intelsat** in cooperation with our partners from all over the world.

I worked for **Lockheed Martin** for two years after they acquired COMSAT in 2000. I left Lockheed Martin in the summer of 2002 and became a management consultant for the industry and a private investor.

In March of 2007, I joined **Mobile Satellite Ventures** (**MSV**) as President, Satellite Services. I can tell you this, the 25 years I have spent in the industry have been interesting and exciting times, all highlighted by the major business cycles that have marked the history of the industry.

HARTLEY
What is MSV's role in the satellite communications industry?

JOHN
MSV is Redefining Wireless Communications. Unlike the traditional mobile sat-

Comparison of MSV Satellites

	MSAT	MSV
Number of Satellites2/0 (in-orbit / Spare)	2/0	
Principal Coverage Areas	N. & C. America Caribbean	Western hemisphere landmass
Orbital Position	101° W 106.5° W	101° W 107.3° W
Service link bandwidth	29 MHz	34 MHz
Spot Beams	6 regional	Any number and size (500 0.4° spots typical)
Power (AEIRP)	57 dBW	79 dBW
G/T (dB/K)	2.5	21
L-band reflector diameter	Two 5 x 6 m	22 m
First Launch	1995	2009
Design Life (yrs inclined)	10/12	15
EOL Power (W)	2500	11,900
Manufacturer	Hughes	Boeing
Launch mass (kg)	2500	5325
Launch Vehicle	Atlas II AS, Ariane IV	Sea Launch, Proton

Spacecraft Features

Bus
- 702 Geo-Mobile bus
- 11000W (5-panel solar array wings, triple-junction GaAs solar cells
- No north-south (N/S) station keeping

Payload
- 1.6m Ku-band antenna providing 4 beams to feeder links
- L-band antenna for mobile terminal links
- 22m reflector
- Multi-element feed array
- Ground-based beamforming
- Flexible EIRP per beam using hybrid matrix
- Flexible channelization and routing

NOVEMBER SPOTLIGHT

ellite service (MSS) providers, MSV is going to target the mass consumer market and offer seamless and transparent satellite/terrestrial service that use conventional-sized handsets.

HARTLEY
What are the challenges to being the first to develop an integrated satellite communications network using conventional handsets? Who were the partners involved in this endeavor?

JOHN
This is a distinct industry competitive advantage for MSV in that we are the first to file and be recognized (via patents) for this technology. By being first and possessing the patents, any competitor wanting to deploy effectively a hybrid satellite terrestrial network would require a license from MSV to do so. However, this also presented some specific challenges. In example, being first, our service description, technology benefits and proof of concept had to be 'air-tight' to pass the FCC litmus tests.

MSV's MSAT-G2 Mobile Satellite Radio

HARTLEY
Exactly what is your definition of a hybrid network?

JOHN
A hybrid network, for us, is an integrated satellite and cellular communications network. With such, we can offer higher data speed, lower cast per bit, plus a wide range of applications and services. Simultaneously, the network must be transparent to the users. This is essential! Our hybrid network target will be the mass consumer market.

HARTLEY
Would you discuss some of the technology patents MSV possess?

JOHN
MSV began its developments on ATC spectrum reuse patents, and a host of other system enhancement patents, beginning in 2000. MSV's patent portfolio includes 25 issued patents, and over 100 additional patents that have been filed, in the United States and in a multiple of other foreign jurisdictions. Among MSV's 4,000 plus patent claims includes: interference cancellation, inter-system sharing of frequencies, mobility management methods for lower interference and improved link margins, use of two-way repeaters and advanced hybrid network methods (specialization, centralization), support of multiple air interfaces, transparency adaptations, extra capacity methods and multi-mode hybrid system architecture.

The most recently announced patents awarded in Canada and Australia reflects technology advances to support the seamless handover of communications between satellite and terrestrial systems. This is most beneficial as dropped calls are avoided and, thanks to MSV's unique spectrum re-use techniques, end users will realize lower costs. The MSV domestic and international patent portfolio continues to expand.

HARTLEY
What are your company's current services?

JOHN
MSV's MSAT-1 and MSAT-2 current generation geostationary satellites deliver mobile wireless voice and data services, primarily for public safety, security, fleet management and asset tracking in the U.S. and Canada. We have wholesale and retail customers who operate approximately 300,000 terminals, all of them on our current-generation MSAT satellite network. MSV also offers two-way radio; voice telephony; circuit switched data; and fax and mobile data. Our current-generation of satellites will continue to operate even after the launch of our next generation MSV satellites. We have determined that existing fuel reserves on our MSATs will allow the satellites to operate in inclined orbits well into the next decade.

HARTLEY
MSV is building two satellites for North American coverage and they are expected to launch in 2009. Could you discuss these satellites, their capabilities, and what will be accomplished with their launch?

JOHN
MSV-1 and MSV-2 will be two of the largest and most power commercial satellite ever. They are currently on order and on schedule for their launches in 2009 and 2010. We anticipate our next-generation MSV satellites to begin operation in 2010. They will provide coverage for North America for both our hybrid satellite-terrestrial network.

Additionally, the satellites will support our recently announced Custom Capacity Service (CCS) that is designed to offer customers satellite capacity that can be fully customized according to bandwidth, satellite downlink power, and beam coverage. Furthermore, customers may contract such capacity for the life of the satellite system. This service represents a part of the future of the MSS market in which customers will realize maximum flexibility by reconfiguring satellite beams as needed during the life of the contract. In the past, satellite operators have not had the technical ability to segment their bandwidth and configure unique coverage beams in the manner in which MSV will be able to with its planned satellites. The power and flexibility of MSV's next generation system, and especially the ability to do ground based beam forming, will enable MSV to respond uniquely to the needs and desires of customers with its satellite spectrum reuse capabilities.

MSV's overall beam coverage includes the entire North American continent. CCS will permit commercial customers to focus their bandwidth and power on specific geographic areas that are of interest to them and not waste bandwidth or power on areas that are not part of their business plan. As their business plans change over time our customers will be able to modify their beam coverage. For government customers, MSV can provide near real time beam coverage changes throughout North America allowing authorities to focus their bandwidth and power on specific geographic areas of interest at any particular point in time.

The introduction of the CCS, however, is a complement to, not a replacement of, our planned hybrid satellite/terrestrial offerings. Both satellites will bring power and flexibility to typical cellular-sized devices, with the ability to seamlessly switch between satellite and terrestrial operation. With focused spot beams and the largest reflector ever deployed, these two next generation satellites will be the foundation for MSV's entering and serving new markets with ATC deployment.

We are focused on development and enablement of our L-Band spectrum for the purpose of developing an integrated 4G terrestrial network in conjunction with our MSS capability. MSV is committed to bring satellite communications to millions of consumers with its hybrid terrestrial wireless and satellite service that will eliminate the white space of terrestrial wireless networks when the satellite capability is enabled. We understand that the terrestrial network will drive the overall network requirements and we are committed to delivering the network of tomorrow, not the network of yesterday or today. We know our vision of a very low cost satellite capability, added to a standard terrestrial handset, is very real. As you can see from this vision, MSV is redefining wireless communications™.

HARTLEY
What can you tell me about the recent agreement with Sprint to provide public safety communication solutions?

JOHN

By way of background, this is a strategic distribution alliance and may well be the first of its kind between a cellular service provider and satellite service provider. We will help provide wireless connectivity for public safety personnel in situations where the public switched telephone network (PSTN) becomes congested, damaged or totally non-existent.

Sprint has been a MSV customer using terminals to augment their disaster response services. Sprint's ERT stands ready with personnel, equipment, and rapidly deployable infrastructure to restore communications during disaster response and recovery. Now, through an agreement with MSV, Sprint ERT now sells MSV's push-to-talk radio services to governmental agencies. This

NOVEMBER SPOTLIGHT

business arrangement, which is non-exclusive, is an important milestone in advancing our reach to the public safety sector.

HARTLEY
Have any of the services been implemented with any agencies yet? If not, when do you see such occurring?

JOHN
MSV has hundreds of our push-to-talk units deployed across the United States and throughout North America. In the U.S. alone, MSV enables communications via satellite to numerous federal, state and local public safety, public service and emergency response organizations. Recently, we announced an initiative sponsored by the US Department of Justice and its Federal Bureau of Investigation (FBI) for a satellite mutual aid radio talkgroup (designated SMART) on MSV's nationwide push-to-talk satellite network. The SMART program allows law enforcement and public safety officials authorized by the DOJ to participate in a nationwide two-way satellite radio talkgroup. Each group member can join in conversation taking place over the talkgroup.

The addition of SMART greatly improves "practical" interoperability for first-responders and other government agencies, facilitating the ability to communicate and coordinate quickly and effectively in times of emergency. The SMART initiative validates our initiatives and the role MSV can play in the public safety arena. While the SMART initiative uses our current generation of satellites, we look forward to offering similar enhanced interoperable communications solutions with the launch of our next-generation of services.

HARTLEY
Would you run down all of the services MSV offers clients?

JOHN
Currently, MSV offers telephony voice calling to and from the PSTN as well as satellite two-way radio push-to-talk, enabling simultaneous communications within talkgroups for as many as 9,999 members. This is the only push-to-talk communications solution available on any mobile satellite system. It is important to note that our two-way radio service is interoperable with land-mobile radios. MSV also provides asset tracking and fleet management services for trucking, coastal fishing fleets, trains and so on.

For the next generation suite of products, expect telephony, data and video, all via traditional handheld devices. Additional features will include support for multimedia streaming, emergency management, conferencing, navigation and multiple IP applications.

It's quite apparent there is plenty to look forward to, both for MSV and for users. Thank you for your time, Mr. Mattingly.

MICROSAT SYSTEMS

Low Cost Satellites — Nanos, Minis and Micros Making Headway…

by *Dr. Todd Mosher*

With technologies changing so rapidly, low cost satellites are viable in today's marketplace. **MicroSat Systems, Inc.** is serving the needs of customers that aren't being met by large aerospace companies. In addition to military customers, MicroSat is actively pursuing the commercial and civil satellite markets.

MicroSat was founded in April 2001 as a spin-off to a high technology research and development company, ITN Energy Systems, in order to execute an Air Force contract for three, high performance 200kg class satellites with Synthetic Aperture Radar (SAR) payloads. This was named the **TechSat 21** program and provided MicroSat its foundation in the satellite business.

Are Microsats a Disruptive Technology?

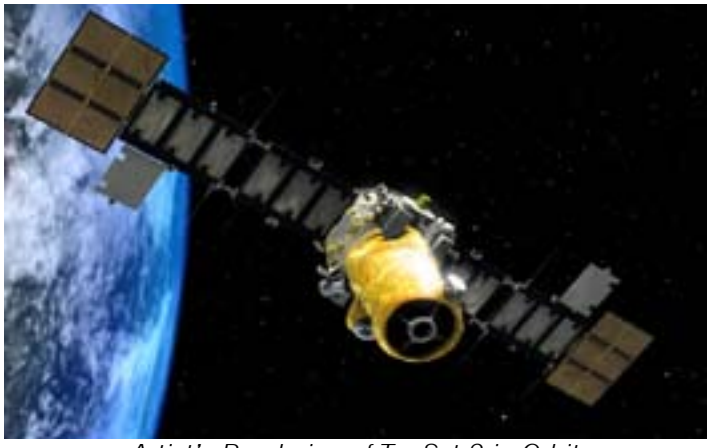
MicroSat's spacecraft bus products have the potential to be a disruptive technology. MicroSat is providing reliable and capable spacecraft at an affordable price with merely an 18-month lead-time. The missions they support are not necessarily as complex as larger spacecraft, but for the price and schedule, they still meet important needs. MicroSat provides the satellite industry a product line of small satellite buses based on a modular bus design that enjoys proven flight success. The bus can be customized as needed for different mission applications and customer requirements. Unique capabilities of MicroSat's buses include: better payload mass fraction, power, data processing, and pointing accuracy than comparably priced satellites.

"Time will tell if MicroSat's offerings will prove to be a disruptive technology in the satellite industry the way that things like digital cameras and personal computing devices have been in other high-tech markets," said MicroSat President *John Roth*. "However, we do study and incorporate practices from those disruptive innovations from other industries directly into the way MicroSat does business."

TacSat-2 Is An 814 Pound Eye in The Sky

MicroSat gained flight heritage on December 16, 2006 with the launch of **TacSat-2**, the first operationally responsive space satellite. The launch and operation of TacSat-2 demonstrated MicroSat's ability to provide a high performance satellite in a rapid development timeline, for a low cost.

The TacSat-2 program was the first Air Force Research Laboratory (AFRL) flight demonstration program under the Operationally Responsive Space initiative. TacSat-2 was specifically designed to allow military commanders on a battlefield to request and obtain imagery and other data from a satellite as it passes overhead. Collected data could be delivered to field commanders in minutes, rather than hours or days. The sensor on TacSat-2 can collect color images sharp enough to distinguish ground objects as small as one meter in diameter.

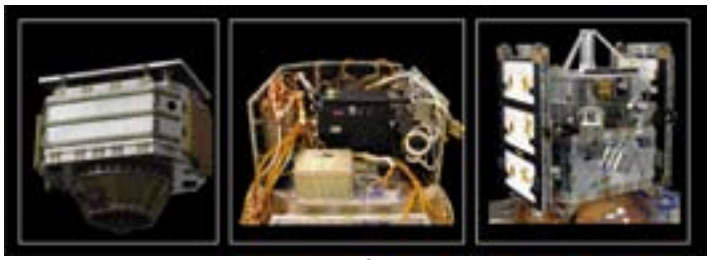


Artist's Rendering of TacSat-2 in Orbit

"I am excited because Tacsat-2 is another demonstration of a new way of doing business," said *Neil Peck*, AFRL's Tacsat-2 Program Manager. "The push that we are getting from high levels will cause real change in how we procure space systems. Tacsat-2 is step one in that process."

MicroSat Systems designed, built, and environmentally qualified the satellite bus with a 59 percent payload mass fraction, delivered the basic bus structure to AFRL in 12 months, and built the primary solar arrays and the experimental thin-film solar arrays.

MicroSat demonstrated its ability to significantly reduce satellite bus costs on TacSat-2 through the reuse of a modular, common bus structure and subsystems from its prior program, **TechSat 21**. The reuse of specific components and subsystems, and MicroSat's continued evolution of a bus development process for a high performance spacecraft, resulted in a flexible design that is easily adapted to accommodate a variety of military, scientific and commercial applications.



Different Views of MicroSat's Modular Platform

FOCUS ON

AFRL's TacSat-2 Program will complete its tenth month of flight operations in October. Over 95 percent of the mission objectives have been accomplished to date and each of the 13 hardware and flight software experiments have been operated.

Results from some of those experiments have already been made available to the aerospace community in technical publications and at conferences. The MicroSat bus is operating normally and has surpassed the flight lifetime requirement. MicroSat, and their subcontractor **Advanced Solutions Inc**., continue to support Air Force mission operations from their Littleton, Colorado facilities. In addition to individual experiments, TacSat-2 has participated in several military exercises to demonstrate Operationally Responsive Space concepts in support of the Warfighter.

TacSat-2 Satellite During Testing at AFRL

A key objective of the Operationally Responsive Space concept is to provide space-based resources and products directly to the tactical user at their demand. The potential benefits of TacSat-2 revealed by the military exercises have resulted in an extension of the mission through 2007 to perform more complex tactical user support demonstrations. The spacecraft is expected to operate beyond 2007. Options for a transition of the spacecraft operations from experimental status to an operational status are under consideration.

Their Air Force has recognized MicroSat with several awards celebrating this significant milestone, including the Aviation Week and Space Technology Magazine Small Company Product Breakthrough Award for the TacSat-2 Satellite.

Ready, Set, Launch

Following this launch success, MicroSat has additional satellite contracts underway, as well as the **Road Runner** bus product, (a generic version of its TacSat-2 satellite), being offered via NASA's **Rapid Spacecraft Development Catalog** (RSDO).

The **Demonstration & Science Experiments** (DSX) Mission will research technologies needed to significantly advance Department of Defense (DoD) capability to operate spacecraft in the harsh radiation environment of medium-Earth orbits (MEO). The ability to operate effectively in the MEO environment significantly increases the DoD's capability to field space systems that provide persistent global targeting-grade space surveillance, high-speed satellite-based communication, lower-cost GPS navigation, and protection from space weather on a responsive satellite platform. DSX uses a modular design that allows for launch either as a primary satellite on a smaller launcher, such as a **Minotaur**, or as a secondary payload on a larger rocket, such as the **Evolved Expendable Launch Vehicle** (EELV). A key enabler to this modular design is the use of a standard micro satellite bus.

A Non-Conventional Orbit with a Non-Conventional Spacecraft

MicroSat's role is the design, fabrication, testing and delivery of the spacecraft bus for DSX, which is built around the Evolved Expanded Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) Ring. The ESPA ring was originally designed to accommodate secondary payloads, which were to separate and fly as individual spacecraft after the upper payload separated from the launch vehicle.

The DSX concept is to use the ESPA as the primary structure of the spacecraft. In other words, instead of deploying secondary microsatellites, the ESPA ring becomes part of the spacecraft. The spacecraft avionics and science payloads are housed in a pair of modules that are mounted on opposite ends of the ESPA ring. The Avionics module will provide the primary bus functions for DSX payloads and experiments. This includes power generation and storage, power management and distribution, attitude determination and control, thermal control, communications, command and data handling, and structural support and mechanisms, thus providing an 800 kg "satellite" for the cost of a 180 kg bus.

The two modules are derivatives of the bus developed by MicroSat for the currently flying TacSat-2 mission. This innovative approach demonstrates the versatility of the bus design and validates the primary design goal of developing a spacecraft bus that could easily be adapted to accommodate a variety of spacecraft mission and science objectives. The bus will be delivered to AFRL in the spring of 2008 and the complete satellite is scheduled to be flight ready in 2009.

The Calibrated Orbiting Objects Project Spacecraft

MicroSat Systems is also developing the core spacecraft system for the **Calibrated Orbiting Objects Project** (COOP) for the **Missile Defense Agency** (MDA). The primary intended purpose of

COOP is a flight mission incorporating a target simulation payload that will send down encrypted truth data to validate the data acquired using the Ballistic Missile Defense system. The spacecraft has been officially manifested for launch in 2009.


COOPS Spacecraft Configuration

MicroSat has been innovative not only in producing a spacecraft for this unusual mission, but also by using an extensive coordinated set of Small Business Innovative Research (SBIR) grants in partnership with the MDA sponsor to fund much of the program.

All Board MicroSat's Modular Bus

Earlier this year, MicroSat's Road Runner bus was added to the NASA RSDO bus catalog. This catalog allows mission designers to rapidly compare with current available bus offerings to determine mission feasibility and to choose a bus once a mission goes forward. MicroSat's Road Runner bus is a modular, reliable bus capable of accommodating a large payload mass. The bus design utilizes components with proven flight heritage that enable parallel processing of components on separate panels, allowing for a great deal of the bus and payload production and testing to be performed in parallel.

Road Runner's launch vehicle adapter has a standard interface size that accommodates multiple launch vehicles and separation systems including Falcon 1/Minotaur 1, larger launch vehicles, and secondary flight opportunities. The Road Runner bus can be flight ready in 18 to 24 months.

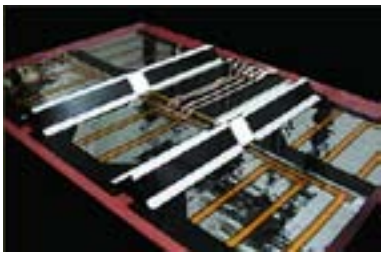
Unique Subsystem Products

MicroSat is also starting to offer some of the subsystem technologies that have helped make their satellites extremely capable as stand-alone products. One example is MicroSat's unique space qualified thin-film solar array that can provide power to a spacecraft from an array that can be stored in a small volume and weighs far less than comparable rigid arrays. MicroSat was able to fly a small demonstration of this technology on TacSat-2 and is looking at several future missions in which this may be used as the primary array.

Another subsystem technology that shows promise is MicroSat's **Intelligent Power and Data Ring** (IPDR) avionics architecture. IPDR is a low cost, modular alternative to mission unique, highly specialized, high cost avionics. IPDR provides inputs and outputs for spacecraft components and the payload interface as well as the power management and distribution function. Demonstrations of this technology are planned for the **TacSat-3** and **TacSat-4** satellites planned for flight in 2008.

The Future of MicroSat?

MicroSat's future business horizon could include building replenishment satellites for numerous commercial constellations in orbit. MicroSat has already been recognized as one of the finalists for the Orbcomm replenishment, which would start with the purchase of 18 satellites plus an option for 30 more. The company has also been working with **Iridium** on their early efforts to define how to replace their 80-satellite constellation with the Iridium **NEXT** system.


MicroSat Thin Film Solar

MicroSat continues to stretch the missions it can perform with its Road Runner modular bus. MicroSat is currently working on a project with two of the country's top universities call the **Mars Gravity Biosatellite Program**. This program is a collaboration between the **Massachusetts Institute of Technology** (MIT) and the **Georgia Institute of Technology Space Systems Design Laboratory**. The goal of the Mars Gravity program is to investigate how Martian gravity — about one-third that of Earth — will affect mammalian health, helping to pave the way for human missions to Mars and beyond.

"The opportunity for students to work side-by-side with such a terrific industry collaborator is just amazing," said *Erika Wagner*, **BioSat** program manager at MIT. "MicroSat's dedication to affordable small satellites and their commitment to education are the perfect fit for Mars Gravity."

Working together, MicroSat and the Mars Gravity Team aim to launch the small research satellite into low Earth orbit in 2010 for a 5-week mission with a crew of 15 mice on-board. Once in orbit, the satellite will spin, simulating Mars gravity. When the five weeks are completed, the mice will return to Earth in a re-entry capsule. Data gathered on-board and following reentry should provide the first information on how mammals are affected by Mars' reduced gravity environment.

While MicroSat spent most of the first six years of its company life attempting to get its first mission into space, the next six years hold great promise for flight of two more innovative Department of Defense missions, significant new satellite orders, and even helping to gather biological data that could prove useful as humans look to fly to Mars. MicroSat is an innovative small company worth watching!

MARKET INTELLIGENCE

SAFEGUARDING THE EVOLVING WEST AFRICAN SATELLITE SOLUTION

by, Martin Jarrold, Chief of International Program Development, GVF

Approximately one year ago, in an article entitled *Evolving New Satellite Connections for West Africa*, I wrote of West Africa's command of center-stage position in the rapid development of the African continent's telecoms arena. I pointed out that this had largely resulted from unprecedented levels of private sector demand for satellite-based voice, data and video solutions. I am pleased to be able to report one year later that the trend continues. This is the reason why the GVF will be further expanding its activities in the region during the fourth quarter of 2007.

The **3rd Annual West Africa Satellite Communications Summit (WASCS3)** has been confirmed for November 20th and 21st of this year and will take place at The Protea Hotel Oakwood Park in Lagos, the commercial capital and heart of Nigeria. **WASCS3** will again be jointly organized by GVF and UK-EMP. The focus will be on the latest developments in the evolutionary deployment of satellite broadband networking to serve the leading commercial and enterprise verticals of the region.

A surge of new satellite capacity has stimulated market growth on the continent. This is particularly due to the successful launch of the Nigerian owned and operated **NigComSat-1** geostationary satellite in May 2007, as well as in anticipation of the results of the recent acceleration of the RASCOM satellite program. The West Africa region is increasingly at the focus of state-of-the-art satellite-based communications, with broadband satellite services assuming an even stronger leading role in the regional socio-economic development agenda.

As the West African private sector continues to seize upon the strategic ICT efficiencies afforded by satellite-based solutions, and while the public sector has been moving to facilitate service providers' efforts through market liberalization and regulatory advances, such leading regional verticals as the oil and gas industry, the banking sector, and enterprise & distribution, will be given particular focus at **WASCS3**.

Taking the example of just one of these important regional verticals, and recognizing the fact that the oil & gas industry grows ever more reliant on satellite delivered ICT applications, the **WASCS3** program will include a range of themed discussion on such exploration & production sector ICT imperatives as:

- Broadband Satellite: Enhancing Oil & Gas Sector Vertical Communications
- Enabling the Digital Oilfield
- Planning & Implementing Roadmap Operation Support Centers
- OSC for Drilling Operations
- Collaborative Visualization Environments
- Remote Collaboration Solutions
- Global Connectivity – Reliability for Operations Support
- Wireless Connectivity Solutions – Real World Implementation

The original commissioning of the **NigComSat-1** spacecraft to service the now rapidly accelerating requirement for cost-effective connectivity within the West Africa region and the continent, as well as between Africa and Europe. Such reflects a universal recognition that access to information and knowledge through affordable communications represents a significant opportunity for social and economic development, for regional cooperation and integration, and for increasing the participation of people in the emerging global information society. Across all regions of Africa, the imperative of overcoming the barriers to, and fixing the manifold current deficiencies in, the means of access to low-cost communication services is top of the agenda. This is true for both improving the quality of life in African countries and for significantly enhancing the mission-critical, productivity capabilities of a range of African vertical markets – including, though by no means exclusively, oil and gas.

There's always a however…

Now, just as these evolutionary trends are combining to create a communications marketplace that brings satellite-based solutions even more into their own, a new and potentially damaging development has arisen – parts of the radio communications spectrum that are an essential resource in continuing to challenge Africa's *digital divide*, and provide its key verticals with imperative communications solutions, are under threat.

All around the world, the 'standard' (3.7 to 4.2 GHz) and 'extended' (3.4 to 3.7 GHz) C-band frequencies have been identified for use by new terrestrial broadband wireless services, as well as for the deployment of next generation terrestrial mobile.

Satellite systems that operate in these frequency ranges are suffering substantial interference, sometimes to the point of system failure. This is occurring in places where national administrations are allowing Broadband Wireless Access systems such as Wi-Fi and Wi-Max to share the same spectrum bands already being used to provide satellite services. The same scenario will happen if 3G and the planned 4G mobile systems (also referred to as IMT systems) are allowed to use the frequencies used in the C-band for satellite downlink services.

Antennas, which receive satellite downlink signals in the C-band, are, by necessity, extremely sensitive devices. They are designed to receive a low-power signal emitted by small transmitters located in orbit 36,000 km above the equator. In the C-band, satellite services have co-existed with domestic microwave links and radar for many years. This is because the latter systems operate via tightly focused beams from fixed points, and de-confliction can take place when necessary.

By contrast, terrestrial wireless applications are, by definition, ubiquitous and increasingly mobile/nomadic. Mobile and base stations for terrestrial wireless applications emit simultaneous signals from many locations, in all directions. They are powerful enough to saturate the sensitive C-band satellite receiving systems, causing a potential for total loss of service.

Government administrations across the African continent are in a powerful position to counter this development. They can also guarantee continued access to a multitude of satellite-based applications, the key to the continued economic advance of millions of people.

It is critical for Africa, as well as elsewhere, that governments and spectrum management authorities recognize the very real damage caused, and tremendous threat posed, to satellite services by use of the Standard C and Extended C-bands for terrestrial wireless systems. Now, in the build-up to the World Radiocommunication Conference (WRC-07) in Geneva, the satellite industry is keenly focused on influencing the opinion and positions of the governments of Africa, and elsewhere. Such will determine the future viability of satellite C-band. GVF will be in Geneva, and with many other organizations, will be lobbying the member nations of the ITU not to re-allocate C-band, thus maintaining it for essential and existing services.

Similarly, the peoples of West Africa and the African continent should right now be actively lobbying their national administrations to support the "No Change" position on C-band frequency allocation. The future of a further developing and viable communications infrastructure, based on satellite all the way across the continent, is at stake.

If you would to access more information on the "No Change" position on C-band, please visit http://www.no-change.info

Martin Jarrold joined the GVF in June If 2001 and was appointed to the position of Chief of International Programme Development. Prior to joining the GVF, Mr. Jarrold was Commissioning Editor and Head of Research for Space Business International magazine.

FEATURES

NEW MOBILE SATELLITE SERVICES...

Valuing Spectrum Assets

by Tim Farrar

ICO GEO satellite illustration

In 2008 we will start to see the first results of recent multi-billion dollar investments in new, more advanced MSS satellites in North America. There's the launch of Reston, Virginia-based **ICO Global Communication's** satellite, scheduled for January 2008.

Then **TerreStar**'s first satellite, **TerreStar-I**, is scheduled for launch in September of that year. Both systems secured investments based on the promise of **Ancillary Terrestrial Component** (ATC) services, whereby the FCC has formulated a set of rules for MSS operators to re-use their satellite frequency allocations on terrestrial cell towers.

TerreStar's Coverage Map

Investors were attracted by the potential for a re-valuation of MSS spectrum, bringing it closer in value to the multi-billion dollar prices paid by cellular operators in recent FCC auctions. Indeed, both ICO and TerreStar have made investor presentations indicating if their respective 20MHz spectrum allocations were valued on the same basis as the Advanced Wireless Services (AWS) spectrum auctioned by the FCC in summer 2006, then their spectrum would be worth over $4B to each company.

While much of the AWS spectrum was bought by cellular operators, such as **T-Mobile**, **Cingular** and **Verizon**, for use in 3G cellular voice and data networks, ICO and TerreStar are adopting somewhat different approaches to differentiate their offerings. Specifically, ICO is proposing to offer a **Mobile Interactive Multimedia** (MIM) service, delivering mobile video and navigation services to cars and portable media players. TerreStar is developing **a two-way 4G network**, supporting handheld voice and data services for government and commercial users.

This move to consider deployment of both broadcast and interactive services in MSS spectrum is part of a wider trend. It follows the recent success of satellite radio in North America, where XM and Sirius have gained 15 million subscribers in just over five years. Then there's the development of the satellite-based TU Media handheld mobile video service in South Korea, which has reached 1.2 million subscribers after two years of operation. In Europe, competition for the 2GHz MSS spectrum band has already been joined between the **SES-Eutelsat Solaris** joint venture, which is seeking to provide handheld mobile video, and **TerreStar Global**, which plans a two-way satellite system offering similar voice and data services to its North American operation. ICO maintains a legacy claim to the European 2GHz spectrum, while we also expect **Inmarsat** to enter the fray with a rival European mobile video project.

In assessing the true value of MSS spectrum holdings, it is critically important to consider the potential return from an operator's proposed business model, as the discounted value of the operator's cash flows indicates how much its assets (including spectrum) are worth. A mistake often made in assessing spectrum values is to take a market price, for example from an FCC auction or a transaction such as Aloha's recent sale of its assets to AT&T, and simply apply it as a benchmark for the value of another wireless business. Even for the same application, incumbent cellular operators will place a higher value on spectrum than new entrants. This is because the incumbent is likely to have a lower cost of capital and will be able to deploy the spectrum across its existing network and customer base more rapidly than a new entrant who will have to undertake a lengthy build-out and customer acquisition process.

When different applications are considered, the business case is likely to look completely different and therefore the spectrum value can vary considerable. For example, a WiMAX business plan, which derives 80 percent of revenues from high speed data, will likely generate far less revenue per MB than a 3G cellular business plan, which derives 80 percent of revenues from voice and SMS. Thus, even after adjusting for the greater efficiency and potentially lower cost of WiMAX equipment, the value of a MHz of spectrum for WiMAX applications is likely to be much lower.

The counter-argument from those who dispute that the benchmark price is most relevant, is that any bidder who wants to be successful in an auction or other spectrum transaction would simply have to pay the going rate for spectrum. Otherwise, they would not be able to acquire the spectrum necessary to develop their business. The implication is that such an operator would be forced to accept a lower return on investment. At some point, no (rational) operator is going to make an investment which will produce a loss. There is certainly some scope for operators to make more aggressive assumptions about business prospects, and this has clearly led even to experienced operators overpaying for spectrum in the past (the classic example being European 3G spectrum auctions in 2001). However, in general, bidders will drop out of an auction when they reach the point at which the spectrum price is equal to the value that can be generated from their business plan. Thus, in the FCC's AWS auctions, we saw **DirecTV** and **Echostar**, who were considering deployment of a

WiMAX network, exit from the auction when outbid by incumbent cellular operators planning to use the spectrum for 3G networks.

The only circumstances in which such a premium to a business plan-based valuation would be applicable, is when there is a clear exit option, via sale to an operator (such as an incumbent cellular player) who can re-use the spectrum in a higher value application. The recent Aloha sale of its 700MHz spectrum holdings to AT&T is an obvious example. The spectrum could be readily repurposed and combined with spectrum acquired in the upcoming auctions. The value of the spectrum to AT&T vastly exceeded any value that could be realistically be created from Aloha's existing mobile TV business plan.

Returning to the value of MSS spectrum, the first consideration is whether this "exit option" is readily available to MSS players such as ICO and TerreStar. Simple re-use of MSS spectrum in a terrestrial cellular network is certainly constrained by the FCC's rules on ATC. They require terrestrial use to be ancillary, with no terrestrial-only subscriptions and all devices being satellite-capable (unless a separate specific showing of "substantial satellite service" is made). While the large satellites being built by **TerreStar** and **MSV** are potentially capable of supporting handsets with only a minimal burden from the size and cost of the components necessary to access the satellite service, concerns over these technical issues may cause some terrestrial operators to shy away from engagement with MSS providers.

More importantly, potential partners who may consider exploiting MSS spectrum to develop a new wireless venture, have much less security than if those companies were to use terrestrial options such as AWS or 700MHz spectrum (which have been readily available via FCC auctions in recent years). Leading cellular operators are already building out networks in those bands and would certainly be willing to acquire additional spectrum if the new venture was unsuccessful, whereas they could not easily make use of MSS spectrum in these circumstances.

Finally, the sheer quantity of spectrum held by operators seeking to exploit ATC (including ICO, TerreStar, MSV and Globalstar), which totals roughly 100MHz even excluding Inmarsat and Iridium's holdings, is likely to make cellular operators reluctant to endorse these new spectrum bands as an alternative to their exist-

FEATURES

ing spectrum holdings, which are worth tens of billions of dollars and whose value could be undermined by such a sharp increase in supply. Only if faced by a clear and present threat from a new network operator deploying services in the MSS spectrum are cellular operators likely to respond and buy up MSS spectrum as a defensive measure.

For all these reasons, the value of MSS spectrum is largely dependent at present on the value that can be created from the business plans of each operator. With satellite radio and mobile TV providing more concrete examples of how MSS can successfully deliver consumer applications, it is clear there is a strong motivation for MSS operators to consider this path. However, it is unclear whether these applications will support high spectrum valuations.

The history of XM and Sirius, who made cumulative losses of over $3B each in the five years to June 2006, is a cautionary lesson that, despite the companies' success in acquiring subscribers, their overall financial return to investors has been negative. In particular, if multiple players enter the handheld mobile TV market (as seems likely in Europe, especially if **Inmarsat** moves forward with a project similar to the SES-Solaris venture), then the returns to all parties may be negatively impacted.

The history of interactive MSS services, as shown by Iridium and Globalstar in the late 1990s, is even less encouraging. TerreStar and MSV have a lot to prove. These operators are hoping to ensure that mandates or contracts are provided from the federal government to incorporate satellite capabilities into equipment for first responders, in order that communications can be maintained in a disaster situation. This market alone will not be sufficient to support either operator and both are developing terrestrial networks in Washington DC and other cities to demonstrate their capabilities for commercial providers.

TerreStar and MSV are looking to adopt a wholesale approach in the commercial market, whereby partners will be secured to develop and resell their services. However, it is hard to find an example in the terrestrial wireless market of any network operator that has been able to establish a successful pure wholesale business model without a retail brand of its own.

The next few months will be key for the new MSS operators. If they can secure prominent partners who can reassure investors that major contracts and mass market distribution channels are in place, then funding for their commercial service launch should be accessible, even in the current financial climate. However, if these partnerships are not forthcoming, then mergers or restructuring between the operators may be a more likely outcome. With several satellites now almost ready for launch, the capabilities of these new MSS networks will significantly change the MSS market, in either scenario.

This article is extracted from our new report on "ATC, satellite radio and other hybrid MSS networks: business cases and spectrum valuations" published October 2007,which explores these issues in more detail, developing business cases and deriving spectrum valuations for all of the leading proposed broadcast and interactive MSS networks, including ICO, TerreStar, MSV, Solaris, TU Media, XM and Sirius.

Contact Tim Farrar by phone on (650) 839 0376 or by email at tim.farrar@tmfassociates.com or visit www.tmfassociates.com/ATC to find out more details about the report.

Tim Farrar has more than 14 years consulting experience across the satellite and telecom industries. He has worked for leading technical and strategy consultancies in both the UK and US. Tim has an M.A. and a Ph.D. from the University of Cambridge, UK and runs his own consulting company, Telecom, Media and Finance Associates, Inc. (www.tmfassociates.com), based in Menlo Park, California. His consultancy specializes in the technical and financial analysis of telecom ventures. He is also President of the Mobile Satellite Users Association (MSUA).

Over the last decade, Tim has worked with almost all of the leading players in the MSS sector, developing business plans and assisting in optimization of the technical design for new systems. He has also published extensive research on the MSS sector, including reports on ATC and other new technology developments.

FEATURED SATELLITE

INTELSAT 11

C-band and Ku-band hybrid satellite

by Hartley Lesser

Intelsat 11 is one of six comsats ordered by **Intelsat** from **Orbital Sciences Corporation**.

There are two payloads on this vehicle. The first serves the continental United States (CONUS), Mexico and South America and is the C-band payload. The second payload is Ku-band and serves DirecTV's Latin America downlink coverage in Brazil. Also supported are spot beams for portions of Florida, Mexico and Venezuela.

Intelsat 11 Specifications

LAUNCH INFO:

Launch Vehicle:	Ariane 5
Launch Site:	Spaceport, Kourou, French Guiana
Launch Date:	October 5, 2007
Launch Mass:	2,500 kg (5,512 lb.)

SPACECRAFT DETAILS:

Batteries:	Two >3850 W-Hr capacity Li-Ion batteries
Mission Life:	15 years (fueled for 16 years)
Orbit:	43 degrees West Longitude
Propulsion:	Liquid bi-propellant transfer orbit system; Monopropellant (hydrazine) on-orbit system
Solar Arrays:	Four panels per array, UTJ Gallium Arsenide Cells
Stabilization:	3-axis stabilized; zero momentum system

SATELLITE PAYLOAD:

C-BAND

Antenna:	2.3 m dual gridded deployable reflector with corrugated feed horn assembly
Repeater:	12 active transponders with 16-for-12 redundant TWTA's
TWTA Power:	110 W RF at saturation

K-BAND

Antenna:	2.3 m dual gridded deployable transmit antenna; 0.9 m Dual gridded deck mounted receive antenna
Repeater:	9 active transponders with two groups of 12-for-9 TWTA's
TWTA Power:	110 W RF at saturation

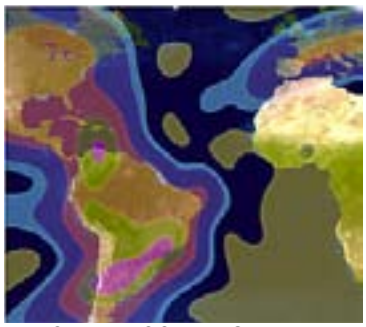
Intelsat's headquarters:
Wellesley House North
2nd Floor
90 Pitts Bay Road
Pembroke, HM 08
Bermuda
+1 441 294 1650 phone
+1 441 292 8300 fax

Environmental testing on Intelsat 11 at Orbital's Satellite Manufacturing Facility in Dulles, Virginia

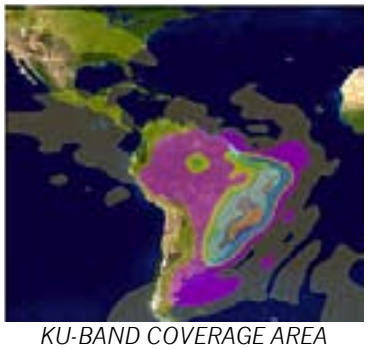
Intelsat also has offices in Washington D.C. and Ellenwood, Georgia

Intelsat 11 Contour Coverage Maps

(courtesy: Orbital Sciences Corporation)



C-BAND COVERAGE AREA



KU-BAND COVERAGE AREA

FOCUS ON

ND SATCOM & THE G8 SUMMIT

by *Ulrich Kiebler*

Background

During the recent **G8 Summit** in Heiligendamm, Germany, (June 6-8, 2007), the heads of state and governments from the *Group of Eight* leading industrialized nations held their annual meeting. More than 500 volunteers from the **German Federal Agency for Technical Relief** (THW), Germany's official civil state disaster protection organization, provided their technical assistance. During mega events, THW staff members, together with fire departments and mobile medical units, ensure smooth operations among all of the responder teams.

THW's remote operations site in Helligendamm

As part of the G8's security plan, the THW's first responders were on site to support fire departments, the **German Federal Police** and the **German Federal Foreign Office** in activities such as communication, electricity for field hospitals, illumination of operational sites (such as airport and helicopter airfields), security fencing and mobile checkpoints, logistics and maintenance of the infrastructure.

The Issue

THW first responder on site

In the event of a crisis or disaster, of utmost importance is the officer-in-charge of first responders to be informed up-to-the-minute of the required details to make systematic, sustainable decisions. For this reason, the THW staff members in Heiligendamm were connected, via satellite, to their headquarters in Bonn to constantly assess the situation, report back to headquarters and authorities, and be prepared to react in case of an emergency.

Why Satellite?

The THW's operation site in Heiligendamm offered neither terrestrial lines nor reliable, permanently available, GSM connectivity. Satellite communications enabled site first responders to remain independent of any traditional terrestrial telecommunications infrastructure or radio link systems. Moreover, for a short-term mega event such as the G8 Summit, when additional and secure communications equipment is only needed for a limited time, communication via satellite allows for the most mobile, cost-effective and flexible infrastructure. The setup of complex and expensive conventional communications infrastructure for a single use event is no longer required.

In general, a satellite link is the only means available to guarantee reliable communication under any circumstance, even if the terrestrial infrastructure fails due to technical problems, a natural disaster or, in the event of a governmental mega event, a politically motivated threat.

From a box wagon to a mobile emergency control center

Together with the international fire and rescue equipment supplier **Gimaex-Schmitz**, **ND SatCom** equipped a mobile communications van supporting THW's need for onsite telephony (VoIP), Internet access and data exchange via satellite. The mobile communications van is based on a Mercedes Benz box wagon and offers first responders a communication area and a meeting room with projector and screen equipment.

The Gimaex-Schmitz fire and rescue supplier with ND Satcom equipped mobile communications equipment

The satellite link SkyWAN® as the technology of choice
The satellite communications equipment employed is based on ND SatCom's core technology *Sky*WAN, a versatile MF-TDMA VSAT system that enables various end-user communication applications. *Sky*WAN offers instant bandwidth-on-demand through dynamic bandwidth allocation. The THW command center in Bonn, and the mobile unit in Heiligendamm, was equipped with compact fixed and mobile satellite terminals using *Sky*WAN Indoor Units. The network between Heiligendamm and THW's headquarters was established by ND SatCom's *Sky*RAY Light antenna subsystem, which was integrated into the communications van. The antenna subsystem is robust, quick to deploy and easy to use – features which are of utmost importance for critical and secure government applications. In addition to the plug and play concept, antenna pointing is based on ND SatCom's Antenna Pointing System, which works using a one-button operation and is suitable for non-technical personnel.

Benefits and user feedback

With its disaster response vehicle in Heiligendamm, the THW provided first responders on site with flexibility for changing circumstances, an always-on network, plus a variety of office communication tools for its tasks during the G8 Summit. Via satellite link, the system offered full office communication capabilities with as many as 96 telephone extensions (transmission speed 0.8 Mbit/s) and one data line with download speeds of up to 2 Mbit/s.

The workplace as well as the work in the Mobile Communications Van

"We received very good feedback from the THW users. The first responders, all volunteers and not satellite communication professionals, pointed the antenna by pressing a button, were on air within minutes, and started telephoning and accessing their home databases. Georef-data, press reports, satellite maps, radio recordings, pictures and mission data were transmitted to THW's headquarters in Bonn," reports *Ulrich Kiebler*, VP Government & Commercial of ND SatCom.

Successful management was the end result, courtesy of satcom innovation and ND Satcom.

First responders in communications and control center in Heiligendamm

Ulrich Kiebler is the Vice President, Government & Commercial of ND SatCom, a leading global supplier of satellite-based broadband VSAT, broadcast, government and defence communication network and ground station solutions. He can be reached at ulrich.kiebler@ndsatcom.com.

FOCUS ON

THE UNITY 550-2
ADVANCING PRIVATE SATELLITE BROADCAST NETWORKS

by Kamy Merithew, Vice President of Marketing & Gary Pelkey, Vice President, System Architect WEGENER

Designed for live broadcasts within satellite-enabled private networks, WEGENER's new Unity 550-2 Enterprise Media Receiver offers many unique features.

The Unity 550-2 supports native MPEG-4 (h.264). This technology is a dramatically improved and efficient video coding method when compared to MPEG-2, the legacy standard for video broadcasting compression. The Unity 550-2 supports standard definition and high definition video as well as DVB-S2 modulation, the next-generation digital television standard for satellite broadcasting, superseding the established DVB-S.

Strong Market Demand

Prospective customers for the Unity 550-2 span a wide use range: gaming, faith-based worship, education, government, medical, and retail. The ideal client for the Unity 550-2 is an operator who needs to broadcast live video via satellite within a secure, private network environment. More importantly, network operators looking for dynamic addressability and the ability to control multiple live broadcasts will find new opportunities to serve their audience with the COMPEL network control system. This control system is a key feature within WEGENER's Unity line of satellite receivers.

Powerful Network Control

With COMPEL, network operators are able to remotely monitor and manage hundreds or thousands of individual field deployed Unity receivers from a central operations site. Operators can configure, troubleshoot, and even fix individual field units from the remote central operation site. This results in a hands-free satellite downlink operation. In addition to minimizing downtime, COMPEL allows operators to reconfigure their network instantaneously, a crucial element when broadcasting live events.

Increased Efficiency

Even with the most advanced industry standards supported, the Unity 550-2 is also backwards compatible with MPEG-2 and DVB-S. This new product is positioned to replace the Unity 550-1 and Unity 500 satellite receivers.

The step up from MPEG-2 to MPEG-4 video compression, and from DVB-S to DVB-S2 modulation means the next-generation Unity 550-2 Enterprise Media Receiver is more efficient than its predecessors. This saves broadcasters money by slashing their bandwidth usage by approximately 50 percent. In real world terms, private network operators will now be able to cost effectively launch more services than previously possible. They can now easily accommodate multiple standard definition video channels, or more importantly, offer their audience a true, high definition viewing experience. By supporting multiple standards, the end product becomes far more attractive for operators expanding into new markets while continuing to support legacy audiences. Plus, using the same Unity 550-2 receivers, operators can convert to high definition video without the need to upgrade receivers.

Live IP Multicasts

WEGENER's Unity 550-2 can pass multiple IP video streams to low-cost, addressable WEGENER IPTV decoders within a facility over a local IP network. The unit offers operators more opportunities to launch low cost-per-monitor solutions for live broadcasts. Additionally, the Unity 550-2 can accept streaming video via IP multicast and decode it natively.

Gaming Example

The Unity 550-2's capabilities are particularly relevant and applicable to the global gaming industry. This is also known as simulcast, pari-mutuel broadcasting.

When players are placing bets, simulcasts *must* be live. Superior video and quality of service must be offered so audiences can clearly observe the race. Pari-mutuel program distributors also benefit when they have the ability to accurately schedule access to video signals from multiple racetracks. COMPEL allows for more than 6,000 operator-determined criteria to filter which unique, addressable receivers on the private network have access to which live event. This tight control makes possible a variety of business models as well as protecting revenue and ensuring compliance with local gambling regulations.

Customers who place Unity 550-2 receivers in their gaming locations—such as off track betting facilities, casinos, and sports bars—can now employ HD-ready flat panel displays and HDTVs to present the races. In an increasingly competitive gaming environment, offering HD video, as well as additional live events, makes wagering on races, poker games, and sporting events even more attractive and compelling to the general public.

Kamy Merithew is Vice President of Marketing for WEGENER. Her focus is on strategic product planning, from product placement and pricing to advertising and promotion.

Gary Pelkey is a System Architect for WEGENER and has worked at the company for 22 years. Prior to joining WEGENER, Gary worked for Loral, a manufacturer of military avionics equipment.

CALENDAR OF EVENTS

Visit: http://www.satnews.com/calendar.shtml for additional listings

Date	Event	Location	Contact	Web Address
November 5-7, 2007	**Global MilSatCom 2007**	Millennium Conference Centre, London, UK	Teri Arri Tel: +44(0) 20 7827 6162 Email: tarri@smi-online.co.uk	
November 6-8, 2007	**Offshore Communications 2007**	Houston, Texas	Technology Systems Corporation Tel: 1 (772) 221 7720	http://www.offshore-coms.com/index.php
November 11-16, 2007	**EuCAP 2007 - The Second European Conference on Antennas and Propagation**	Edinburgh, UNITED KINGDOM	Emily Woodman Tel: +44 (0)1438 765648 Email: eucap@ietevents.org	http://www.eucap2007.org
November 12-13, 2007	**The Space Commercialization Conference**	Jack Morton Auditorium, 805 21st ST NW, George Washington University ,Washington DC.	Randy Johnson Email: reachtospace@auburn.edu	http://www.reachtospace.org/
November 13-15, 2007	**DoD Commercial Satellite Users Workshop**	Renaissance Hotel, Washington, D.C.	David Bross Tel: +1.301.916.2236 E-mail: dbross@hfusa.com	http://www.sia.org
November 13-15, 2007	**3rd Annual DoD Commercial SATCOM Users Workshop**	Renaissance Washington DC Hotel 999 9th Street NW, Washington, DC 20001	Rick Felperin Phone: +1 (301) 515-1154 E-mail: rfelperin@hfusa.com	http://www.dodsatcom.com/
November 20-21, 2007	**3rd Annual West Africa Satellite Communications Summit (WASCS3)**	The Protea Hotel Oakwood Park in Lagos, Nigeria	Martin Jarrold E-mail: martin.jarrold@gvf.org	http://www.gvf-events.org/
November 27-29, 2007	**SUIRG 2007 Satellite Interference Conference**	Cosmopolitan Hotel, Hong Kong	SUIRG, Inc. Tel: 1-941-575-1277F E-mail: bobames@suirg.org	
November 28-29, 2007	**Aerospace & Defense Finance Conference**	New York, NY, USA	Lydia Janow Tel.: 800-240-7645 212-904-3225 E-mail: janow@aviationweek.com	http://www.aviationweek.com/conferences/
November 30, 2007	**ISCe India SatCom Forum @ INFOCOM**	HITEX Convention Center, Hyderabad, India	David Bross Tel: +1.301.916.2236 E-mail: dbross@hfusa.com	http://www.isce-india.com
December 03-06, 2007	**ITU Telecom Europe**	Sofia, BULGARIA	Fernando Lagrana	http://www.itu.int/EUROPE2007/
December 3-5, 2007	**Satcom Australia 2007**	Sydney, Australia	Vanessa Riley Tel: +61 2 9021 8808 E-mail: vanessa.riley@terrapinn.com	http://www.terrapinn.com/2007/satcom%5Fau/index.stm
January 13-16, 2008	**PTC 2008**	Hilton Hawaiian Village Beach Resort & Spa, Honolulu, Hawaii, USA	Phone: +1.808.941.3789 Email: info@ptc.org	http://www.ptc.org/
January 22-25, 2008	**Network Centric Warfare 2008**	Ronald Reagan Building and International Trade Center, Washington, DC	Tel: 1-973-256-0211 Email: info@idga.org	http://www.idga.org/cgi-bin/templates/single.html?topic=329
January 30-31, 2008	**Mobile & Deployable Communications**	Marriott Prague, Prague, Czech Republic	Nicolas Pianet Tel: +44 (0) 207 7827 6032 Email: npianet@smi-online.co.uk	http://www.smi-online.co.uk/mdc4.asp
February 5-7, 2008	**WEST 2008**	San Diego Convention Center, San Diego, California, USA	Tel: (703) 449-6418 Email: westregistration@jspargo.com	http://www.afcea.org/events/West/

RECENT NEWS

BACK OF THE BOOK

There is so much more to *Satnews* than what you read between the covers of *SatMagazine*. Our daily and weekly news is designed to give you a quick read of the important news stories for our industry, from new projects and events to business activities ranging from financial information to new products brought to the light of day.

Our news stories for the last two weeks are available at our website... access http://www.satnews.com/recent_stories.shtml or, if you are elsewhere on the SatNews website, simply selected the menu item **RECENT STORIES** and, well, there you are!

Some of the most interesting stories we've presented over the last four weeks include the following items... if you would like to read the entire story, you can click on the URL at the bottom of the story and then inwardly digest...

Advantech Has Proven They Are Rather Gamey About RF

Advantech AMT manufactures satellite and terrestrial wireless communication equipment. The company, in collaboration with **ProComSat**, their Algerian partner, had successfully installed RF equipment in support of the **All-African Games** broadcasts. The event was broadcast across the African continent. The Advantech high performance Solid State Power Amplifiers, integrated to the **ProComSat C-band** VSAT antenna, were fitted into an SNG vehicle operated by **Télédiffusion d'Algérie** (TDA) and transmitted live video footage of the All-African Games from the **Stade du 5 Juillet**.

The system that was used in Algeria is part of the High-Power C-band SSPA product range. The Advantech SSPAs are characterized by high linearity and by their high thermal dissipation efficiency. This results in best in class Mean-Time-Between-Failure and also features cost effective redundancy—*Montreal, Quebec*

BAE Delivers Truly RAD Command & Control

Two **BAE Systems RAD750** radiation-hardened single-board computers are managing the command and control functions onboard the **WorldView-1** satellite, launched September 18th aboard a **Delta II** rocket. WorldView-1 was built by **Ball Aerospace** and is owned and operated by DigitalGlobe in Colorado. WorldView-1 is part of the National **Geospatial-Intelligence Agency's NextView** program, which will provide high-resolution images of Earth. NextView is a new generation of imaging satellites capable of collecting geospatial intelligence in support of national security.

The first satellite in the NextView program, WorldView-1 will collect, store, and downlink more frequently updated imagery than any other commercial imaging satellite in orbit. RAD750 is a licensed radiation-hardened version of the **IBM PowerPC 750**. A third-generation microprocessor with almost 10 times the performance of current space processors, RAD750 is the follow-on to BAE Systems' highly successful and space-proven RAD6000™ family of processors. WorldView-1 is the 10th satellite now operational in space with RAD750s in control—*Manassas, Virginia*

Boeing's Billions Boost Per Share Value

The Boeing Company's [NYSE: BA] third-quarter net earnings increased to $1.1 billion, or $1.44 per share, from $694 million, or $0.89 per share, in the same period last year. Third-quarter revenues increased 12 percent to $16.5 billion while earnings from operations rose to $1.5 billion, yielding a 9.1 percent operating margin. Excluding last year's charge of $0.22 per share in the period to exit the **Connexion** business, adjusted earnings per share rose 30 percent. Boeing increased its 2007 guidance for revenue, earnings per share and cash flow due to core business performance and lower corporate costs, and now expects earnings per share this year to be between $5.05 and $5.15—*Chicago, Illinois*

Moving On Up... At Boeing

Boeing Chairman, President and CEO *Jim McNerney* has named *Shephard W. Hill* president, Boeing International, replacing *Laurette Koellner*, who is retiring. At the same time, he named *Michael J. Cave* to replace Hill as senior vice president, Business Development and Strategy at Boeing Corporate Offices. Cave moves from Boeing Commercial Airplanes, where he led Business Strategy and Marketing. These changes are effective November 1—*Chicago, Illinois*

Boeing's WGS Effort Signals In Good Health

Boeing [NYSE: BA] has acquired signals from the first **Wideband Global SATCOM** (WGS) satellite. This is a new military spacecraft to help meet the growing demand for military satellite communications by providing a 10x increase in telecommunications capacity over the satellite it will replace.

This satellite is the first of five such vehicles that Boeing is building for the U.S. Air Force. The WGS satellite was successfully launched at 8:22 p.m. Eastern on Oct. 10 by **a United Launch Alliance Atlas V** vehicle from **Cape Canaveral Air Force Base** in Florida. Following a nominal 45-minute flight, the launch vehicle's upper stage deployed the spacecraft. A ground station in Dongara, Australia, received the satellite's first signals 47 minutes later at

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9:09 p.m. Eastern. Boeing controllers in El Segundo, California, confirmed the satellite is healthy—*St. Louis, Missouri*

COM Offers Sat Mobility To A NATO Warfighter

C-COM Satellite Systems Inc. [TSXV: CMI] has received a $475,000 order for its **iNetVu** Mobile units from one of its European resellers. The iNetVu mobile systems have been delivered, installed, and commissioned by this reseller and are now in use by one of the armed forces of a NATO member country. C-COM Satellite Systems Inc. develops and deploys commercial grade mobile satellite-based technology for the delivery of two-way high-speed Internet, VoIP and Video services into vehicles.

C-COM has developed a proprietary Mobile auto-deploying (iNetVu) antenna that allows the delivery of high-speed, satellite based Internet services into vehicles while stationary virtually anywhere where one can drive. The iNetVu Mobile antenna has also been adapted to be deployable from transportable platforms. "We are very pleased to have iNetVu Mobile antenna systems installed for the first time with a NATO country's armed forces for their communications requirements. The performance and reliability of the installed iNetVu Mobile systems has been exceptional. This order could become the catalyst to receiving additional iNetVu mobile orders from the same customer as well as from other NATO countries for similar applications" said *Leslie Klein*, President and CEO of C-COM Satellite Systems Inc—*Ottawa, Ontario*

Comtech Gifted With SatModem Testimonial

A written testimonial is a gift to any company receiving such positive, reflective statements of support for a particular product or line of products. **Comtech EF Data** has just received such from **ST Teleport**. That company happens to be a full-service satellite communications solutions provider. ST Teleport conducted performance measurement testing of the **CDM-Qx Satellite Modem** with **DoubleTalk Carrier-in-Carrier** (CnC) technology. The reason for the test was to study the bandwidth and power efficiency of the product in a **Single Channel Per Carrier** (SCPC) link.

The results revealed a bi-directional link with 512 Kbps data rate will use 921 kHz of satellite bandwidth without CnC. With CnC, the link used 453 kHz, which represents 50 percent bandwidth savings. This means for each 2.048 Mbps bi-directional SCPC link, the total bandwidth savings will be 1.8 Mhz. Through an analysis of cost factors, the end result by ST Teleport revealed a payback period of 3 months, with savings of some US$43,200 annually. The testimonial was signed by Mr. *Peter Heng Trech Chye* who is the Director of Technical Services for **ST Teleport Pte Ltd.** who operates their earth station complex in Singapore and supply services for the Indian and Pacific Ocean regions.

A Lot Of Harmony At ISS

On **Tuesday** evening, **October 23rd**, at **11:38 p.m.** (EST), **Space Shuttle Discovery** lifted off from NASA's **Kennedy Space Center** in **Cape Canaveral**, Florida. Low Earth orbit was successfully entered after almost 8 minutes of powered flight. On this **STS-120 mission**, the third Shuttle flight this year, Discovery carries a crew of seven, including ESA astronaut *Paolo Nespoli*, from Italy. The first day in space is devoted to a series of in-flight inspections to ensure Discovery did not suffer any damage during launch. The orbiter will then maneuver to rendezvous with the International Space Station (ISS). Docking is planned for **Thursday, 25 October, at 14:33 CEST**.

The purpose of the 14-day STS-120 mission is to deliver and install the Italian-built **Node** 2 module, which is the first addition to the Station's work and living space in six years. A second main task is to relocate the ISS **P6** truss section and deploy its solar arrays and heat dispersal radiator. The mission will also see the rotation of one of the ISS Expedition crewmembers. NASA astronaut *Daniel Tani* will replace NASA astronaut *Clayton Anderson*, who has been a resident on the Station since arriving with the crew of **STS-117** last June.

Node 2, or 'Harmony' as it has been named, is the second of three interconnecting elements for the Space Station. The nodes connect the various pressurized modules, allowing for the passage of astronauts and equipment, as well as providing each module with important resources, such as electrical power and thermal and environmental control. Harmony will be temporarily docked to the port side of Node 1 during the first spacewalk scheduled for **Friday, October 26th**. Once the Shuttle undocks at the end of the STS-120 mission, Node 2 will be relocated to its final location using the ISS' robotic art, that being the forward facing port of the US Destiny laboratory.

The arrival of the cylindrical Node 2 module paves the way for the addition of the European **Columbus** laboratory in **December 2007**, and the Japanese **Kibo** laboratory in **April** next year. Node 2 was developed for NASA under an ASI contract with European industry, with **Thales Alenia Space** as prime contractor—*Cape Canaveral, Florida*

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General Dynamics Brings Smarterware to NSA

General Dynamics C4 Systems has been awarded a contract by The National Security Agency (NSA) for their **Sectéra Edge** wireless phone/PDA, otherwise called a "smartphone." This product will be available to DoD, Homeland Security and other government personnel, with initial deliveries expected to occur during Q4 of this year. The Indefinite Delivery/Indefinite Quantity (ID/IQ) contract has a potential value of some *$300 million* over the next five years. General Dynamics C4 Systems is a business unit of **General Dynamics** [NYSE:GD]—*Scottsdale, Arizona*

GeoEye Looks Sharp With Award & Contract

GeoEye, Inc.'s [NASDAQ:GEOY] CEO, *Matthew O'Connell*, has been awarded the **Intelligence Achievement Award for Industry** from the **United States Geospatial Foundation** (USGIF). The presentation to Mr. O'Connell will occur on October 24th at the USGIF's Hall of Fame banquet during the GEOINT 2007 symposium in San Antonio, Texas.

Plus, the company has now contracted with **ITT Corporation** [NYSE:ITT] to start work on the camera for GeoEye's next satellite, **GeoEye-2**. This is a phased development process, which will result in an advanced, thirdgen satellite that's capable of imaging objects on the Earth's surface as small as 0.25-meter (9.75-inch) in size. GeoEye full expects to have a satellite builder under contract next year and to launch the satellite three years later—*Dulles, Virginia*

Gilat Empowers Rural Russia With More SatCom Capabilities

Gilat Satellite Networks Ltd. [NASDAQ:GILT) has announced that one of Russia's largest telecom companies, **North-West Telecom**, is expanding their Gilat SkyEdge satellite network. This will bring telephony and broadband Internet services to a growing number of remote communities in North Western Russia. North-West Telecom originally deployed a **SkyEdge** VSAT network earlier this year to serve several hundred sites in the Arkhangelsk region. The network expansion will serve many more sites in the Murmansk, Karelia, Komi and Vologda regions. Hundreds of SkyEdge Pro VSATs and more than 60 SkyEdge Gateways will provide high-speed mesh trunking and IP connectivity.

North-West Telecom's deployment of the SkyEdge VSAT network fulfills a Universal Service Obligation (USO) to meet the modern telecommunications requirements of rural communities. Russia's leading satellite service provider, **Global-Teleport**, which will use its SkyEdge satellite hub station based near Moscow to operate the network. Gilat has been working closely with Global-Teleport to develop several major communications networks in Russia—*Petah Tikva, Israel*

Globalstar's Four More

Four... that's correct, **four**... satellites were successfully launched from the **Baikonur Cosmodrome** in Kazakhstan aboard a **Soyuz** launch vehicle, and **Globalstar Inc.** is delighted to be able to augment the earlier four satellites launched in May of this year. The secondgen satellites from Globalstar are scheduled for their initial launches in 2009. The Baikonur Cosmodrome launch occurred on Sunday, October 21st, at 2:12 a.m., local time, using the **Soyuz-Fregat** version of the Soyuz launch vehicle. This is the 1,726th successful launch of this particular rocket. Launch services provider Starsem confirmed the upper stage accurately injected the four-satellite dispenser into the targeted low earth orbit of approximately 920 km.

All four satellites have been successfully acquired following the separation of the upper stage and release from the satellite dispenser. The performance of the four spacecraft is nominal at this time, according to Globalstar. Back in December of 2006, Globalstar signed a 662 million Euro contract with **Thales Alenia Space** for the design, manufacture and delivery of 48 new satellites for the secondgen Globalstar satellite constellation, with the expectancy they will provide service until at least 2025. The secondgen satellites will have **Arianespace** handling launch services from their Guiana Space Center complex in **French Guiana**—*Milpitas, California*

Lagos, Nigeria, HQ For Important CommSummit For West Africa

Taking place in Lagos, Nigeria, from November 20th through the 21st, is the **3rd West Africa Satellite Communications Summit** (WASCS3). The organizers of the summit, GVF, have announced the high-level support and participation of major commercial organisations from both the satellite communications industry, and the oil & gas, financial services, and enterprise & distribution vertical markets. The Summit will be held at the **Protea Hotel**, **Oakwood Park** in the commercial capital. Associated with the conference are **NIGCOMSAT** as well as **Schlumberger** and **Accelon**.

WASCS3 is jointly organized by **GVF** and **UK-EMP**. The focus will be on the latest developments in the evolutionary deployment of satellite broadband networking to serve the leading commercial and enterprise verticals of the region. Major internationals from the oil & gas sector which are confirmed as organizing delegations for the Summit include: Shell, Total, Chevron Texaco, ExxonMobil, Agip, Nigeria National Petroleum Corporation (NNPC),

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Pan Ocean Oil Corporation (POOC), and Nigeria LNG—Lagos, Nigeria & London, United Kingdom

Hughes Chipping Away With TerreStar

Hughes Network Systems, LLC has a new agreement with **TerreStar Networks Inc.** This association will find Hughes designing, developing and supplying a satellite chipset platform based on **Universal Mobile Telecomunications Service** (UMTS) standards to enable wireless mobile devices to communicate via the satellite portion of TerreStar's network. Dual-mode mobile devices will be able to operate seamlessly over both multi-generational wireless/satellite networks with support for advanced video and data services as well as voice. Hughes will license the technology to cell mobile handset and device manufacturers. This will allow them to integrated satellite-mode capabilities into their product lines—*Germantown, Maryland*

Russian Investigation Into JCSAT-11 Mishap Is Completed

The **Russian State Commission** investigating the unsuccessful launch last month of a **Proton** vehicle carrying the **JCSAT-11** satellite has determined that a damaged pyro firing cable on the interstage truss prevented the activation of the pyro bolts that were to have separated the first and second stages of the rocket. *Anatoly Perminov*, head of the **Russian Space Agency** (Roscosmos) and chairman of the 18-member investigative commission, announced the findings after meeting with government officials in Kazakhstan. Proton launches will resume with a **Glonass** satellite mission for Roscosmos.

Members of the **ILS Failure Review Oversight Board** (FROB) began their review of the commission's findings in Moscow on Monday. The FROB does not conduct its own investigation, but independently reviews the methods, conclusions and corrective action recommendations of the Russian commission. ILS Vice President and CTO *Jim Bonner*, Chairman of the FROB, said, "I am very confident that the Russian State Commission was able to conclude its investigation thoroughly and in a timely manner. Having not only telemetry, but recovered hardware from the vehicle itself certainly facilitated the investigation and conclusions."

The FROB includes industry experts, representatives from **JSAT Corporation** and the next scheduled ILS customer, as well as space insurance representation. If the FROB is satisfied with the investigation and corrective actions, ILS commercial launches could resume as early as mid-November. After the FROB concludes its review, under a separate licensing authority from the **U.S. Department of State**, ILS will provide briefings to customers and the insurance community.

ILS President *Frank McKenna* said, "We appreciate the full support of our customers during this recovery period, as we act with diligence and determination through the investigation and the return-to-flight activities with our partner, Khrunichev. We look forward to resuming launch services in the near term with complete assurance of mission success."—*McLean, Virginia*

Number 11 For Intelsat And Number Four For Optus Rocket To Success

Certainly is a great feeling when a launch goes as planned... just ask **Intelsat, Ltd.**, whose **Intelsat 11** satellite, and **Optus'** for their **D2** satellite, were successfully launched aboard **Arianespace's Ariane 5** rocket at 6:02 p.m. EDT on Friday, October 5th from the Spaceport in ∫. The Intelsat 11 satellite packs a payload of 25 C- and 18 ku-band transponders for content broadcasting in the Americas and Europe.

Intelsat 11, which was released approximately 28 minutes after liftoff, should enter service during Q4 of this year and will, eventually, replace the company's **6B** and **3R** spacecraft. Customer transitioning should occur once the in-orbit tests have been completed. The satellite has a life expectancy of 16 years. Intelsat 11 will operate from 317° E. The Optus D2 was deployed 32 minutes after liftoff and will make its home at 152° E. This puppy is going to join the Australian fleet of comsats run by telecom provider Optus. Both of these satellites were built using the STAR 2 platform from **Orbital Sciences Corporation** (Dulles, Virginia)—Pembroke, Bermuda

Telecom Satellite Work For India To Proceed

India's **The Telecom Commission** (TEC) has approved the **Department of Telecom** (ToC) to start work on an independent, dedicated satellite that will provide telecom services. The probable winner of this award will be the **Indian Space Research Organization** (ISRO) as the ToC continues to work out the more minute details of satellite development. The DoT had submitted several recommendations to the TEC, including one that indicated a custom-built satellite was a better option than simply leasing transponders, launching an independent satellite, or using terrestrial technologies. Once the points to multipoint systems are operational, there is no additional cost for adding new users.

Currently, transponder slots are booked on multipurpose satellites for telco communication demands. This has found service requirements sometimes being unable to be fulfilled. The timeline currently estimates about 24 months for an actual launch. This will include the actual satellite build for a 24-transponder satellite featuring a mix of C, Ku and Ka-band transponders. The public company BSNL will be the most likely beneficiary of the satellite, as that company has been given the task of completing the government's rural programs—*New Delhi, India*

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The Inmedius Book On Publishing…From A MUOS Perspective

Inmedius announced the adoption of its **S1000D Publishing Suite** by **General Dynamics C4 Systems** to support the **Mobile User Objective System** (MUOS) program's compliance with the **ASD S1000D** lifecycle; from the management of logistics source data, to technical documentation production and publishing of **Sharable Content Object Reference Model** (SCORM) compliant training materials. The General Dynamics MUOS Integrated Logistics Support Team uses the Inmedius Publishing Suite and its **S1000Dimpact** module to map existing **Logistic Support Analysis Record** (LSAR) data, as well as create the managed **Common Source Data Base** (CSDB) for **MUOS Interactive Electronic Technical Manuals** (IETM) and instructor training.

The seven-module **S1000D Publishing Suite** is easy to implement, maintain and use. The software supports comprehensive project management, intuitive authoring, quality assurance, engineering data synchronization, migration between file formats, flexible document sharing and viewing, publishing, and the transformation of **S1000D** to **SCORM e-Learning** material. Inmedius S1000Dimpact allows users to easily synchronize and link LSAR and S1000D data. The seamless change management solution ensures that changes in engineering data are tracked and implemented by the technical publication department, so that documentation is up-to-date, accurate and produced in a timely manner. With the addition of Inmedius **S1000Dinstructor**, users author training content from existing S1000D data, publish SCORM-conformant output, and manage both in a generic content repository. S1000Dinstructor unlocks the S1000D information within a Data Module, reorganizes and transforms it into SCORM courseware that is consistent with the technical publication content—*Pittsburgh, Pennsylvania*

Lockheed Martin Nets 16 Percent

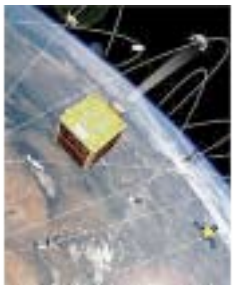
Lockheed Martin Corporation [NYSE: LMT] today reported third quarter 2007 net earnings of $766 million ($1.80 per diluted share), compared to $629 million ($1.46 per diluted share) in 2006. Net sales were $11.1 billion, a 16% increase over third quarter 2006 sales of $9.6 billion. Cash from operations for the third quarter of 2007 was $935 million, compared to $652 million in 2006. Net earnings for the nine months ended September 30, 2007 were $2.2 billion ($5.21 per share), compared to $1.8 billion ($4.12 per share) in 2006. Net sales for the nine months ended September 30, 2007 were $31.0 billion, compared to $28.8 billion in 2006. Cash from operations for the nine months ended September 30, 2007 was $3.8 billion, compared to $3.5 billion in 2006—*Bethesda, Maryland*

Lockheed Martin & Northrop Grumman TSAT Triumph

The Lockheed Martin [NYSE:LMT] / **Northrop Grumman** [NYSE: NOC] team has successfully completed the last in a series of verification tests of its **Next Generation Processor Router** (NGPR). These tests were performed during the **Risk Reduction and System Definition** (RR&SD) phase of the **Transformational Satellite Communications System (TSAT) Space Segment**. The "spiral tests" demonstrated additional NGPR functions and performance beyond those conducted in previous demonstrations. This final test in the risk reduction phase was completed ahead of schedule and met all test criteria with 100 percent success.

The NGPR spiral test culminates a four-year, highly disciplined risk reduction plan, developed in partnership with the **MILSATCOM Systems Wing at the U.S. Air Force Space & Missile Systems Center**. The **Massachusetts Institute of Technology's Lincoln Laboratory** (MIT/LL) independently conducted the verification tests to ensure proper performance, functionality and compatibility with user terminals. TSAT will provide warfighters with extremely high data rate connectivity to thousands of mobile terminals connected in an Internet Protocol (IP) network. Such will enable the information-intensive, network-centric warfare of the future. The NGPR is the heart of the system's network and protection capabilities. Completed in September, spiral tests verified uplink communication performance, information assurance features, interoperability with the Global Information Grid, and router ability to support the required number of terminals.

MDA To Bring A New Jewel To Space



MacDonald, Dettwiler and Associates Ltd. [TSX: MDA] has won an approximately $65 million contract from Canada's **Department of National Defence** (DND) to deliver an information solution called **SAPPHIRE** for the surveillance of space objects. SAPPHIRE is DND's first dedicated space mission and will support Canada's NORAD commitments with the delivery of critical information. SAPPHIRE will feature a space-based data collection platform for continuous surveillance of man made and natural objects in medium to high Earth orbits (6,000 to 40,000 km). The data collected will be processed by a ground-based system and the results will be used to update the U.S. Satellite Catalog that is used by both NORAD and Canada to provide space situational awareness.

MDA will lead a team comprised of **COMDEV** of Cambridge, Ontario, and **SSTL** of Surrey, England. The four-year contract has the potential for a future extension for mission support, operations, and maintenance and follows a design phase previously awarded to MDA—*Richmond, British Columbia*

It's All In The Swing For MEASAT

MEASAT Satellite Systems Sdn. Bhd. now has an agreement with **StarHub Cable Vision Ltd.** for the delivery of the **Golf Channel** to Singapore. StarHub's Golf Channel is a 24-hour channel

featuring tournaments played around the world. With 70 percent of the content made up of live coverage of leading golf events, the channel features events such as the US Professional Golfers' Association (PGA) Tour, European PGA Tour, Ladies Professional Golf Association (LPGA) Tour, Champions Tour and Nationwide Tour. The channel, which is being produced by **Measat Broadcast Network Systems** ("**Astro**"), under a separate agreement, will be carried on the **MEASAT-3** satellite. **Astro** is a subsidiary of **ASTRO All Asia Networks plc**—*Kuala Lumpur*

NAVTEQ To Help Deliver The Mail and Improve Microsoft's Location Awareness

NAVTEQ [NYSE:NVT] is a global provider of digital map data for location-based solutions and vehicle navigation and the company has just been selected by Intelligent Direct to provide map data for use in its **CASS-certified US Postal Carrier Route Boundaries**. **Intelligent Direct**, through its **MarketMAPS** and **GbBIS** divisions, produces printed maps and mapping solutions covering the United States, Canada and countries around the world. With the launch of CASS-certified Carrier Route Boundaries, Intelligent Direct is now able to provide direct marketers with a cost-effective method to improve the deliverability of their mail. Additionally, Intelligent Direct's Carrier Route Boundaries combined with NAVTEQ zip code, census, and street level data result in a suite of products designed to meet the growing needs of direct marketers.

NAVTEQ has also cemented into place a multi-year extension of its agreement to provide real time and historic traffic information to **Microsoft Corporation**. NAVTEQ Traffic remains Microsoft Corp.'s preferred provider of traffic information for its web properties and the agreement extends Microsoft's right to use NAVTEQ's traffic data in online products and services, desktop and mobile applications and appliances. Microsoft's MSN Direct service, Streets & Trips desktop applications, Windows Live Local, Microsoft Automotive and Live Search for Windows Mobile services use NAVTEQ Traffic data today and this multi-year strategic extension of the Microsoft relationship provides for incorporation of NAVTEQ Traffic data in additional Microsoft products—*Chicago, Illinois*

Northrop Grumman Has Multi-Mission System Test Success

NPOESS is the nation's nextgen, low-Earth orbiting, and remote sensing system. NPOESS will provide environmental data to military and civilian users. Prime contractor **Northrop Grumman Corporation** [NYSE:NOC] leads the overall systems engineering and systems integration effort under contract to the IPO, which consists of the **Department of Commerce/National Oceanic and Atmospheric Administration**, **Department of Defense** and **NASA**. Teammate **Raytheon** is responsible for the command, control and communications segment; interface data processing segment; and providing systems engineering support. The first NPOESS satellite is scheduled to launch in 2013.

The company recently completed the **System Acceptance Test** (SAT) of a **Common Command and Telemetry System** (CCTS). This system could, potentially, reduce costs between two programs—**James Webb Space Telescope** (JWST) and the **National Polar-orbiting Operational Environmental Satellite System** (NPOESS). Raytheon's ECLIPSE is a commercial off-the-shelf (COTS) command and telemetry product configured to support both satellite flight operations and integration & test (I&T) on the James Webb Space Telescope and NPOESS. Adding the I&T requirements to a traditional flight operations system is an innovative approach, increasing SAT requirements to accommodate different satellite communication protocols and user needs. Software requirements were verified on spacecraft and ground equipment simulators at Northrop Grumman over a four-week period that ended in August. The test milestone represents the culmination of a four-year Raytheon development effort to bring Northrop Grumman its first true multi-mission command and telemetry system. The test proves the joint team's ability to engineer a system while balancing combined NPOESS and JWST requirements and schedules.

The **CCTS ECLIPSE** has been delivered to science instrument providers at the **Goddard Space Flight Center** who will use it to develop, test, and integrate their instruments for the James Webb Space Telescope. The joint development team includes Northrop Grumman's JWST and NPOESS teams, program customers from NASA's Goddard Space Flight Center, the **NPOESS Integrated Program Office** (IPO) and **Raytheon Mission Command and Control Systems**. The James Webb Space Telescope, designed to succeed the Hubble Space Telescope, will be NASA's premier space observatory after its launch in 2013—*Redondo Beach, California*

Light Noise Can Be A True Communication Friend, Says NuCrypt

There can be no doubt that ultra-secure data transmission is a critical component in military communications. However, for such to be successfully deployed, the technology must be available at reasonable cost and convenience. That is the core innovation of **NuCrypt**. The company has a strong heritage in optical communication systems and has received funding from the Department of Defense. In addition, the Homeland Security Innovation and Entrepreneurship Center at Northwestern University (HSIEC) recently awarded NuCrypt a challenge grant. NuCrypt has four SBIR grants that have reached phase two.

At MILCOM 2007, NuCrypt is going to demo this technology for ultrahigh security over optical communication networks. NuCrypt uses the inherent noise in light to enhance the best state-of-the-art encryption technology while remaining compatible with con-

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ventional optical infrastructure. Its product, **AlphaEta**, interfaces between the transmitter or receiver and the optical channel and makes the transmitted message difficult to eavesdrop on by adding optical noise to the encryption process. AlphaEta uses commercially available off-the-shelf (COTS) components and is compatible with traditional optical infrastructure. It operates at high data rates, making it the first practical, physics-based ultrahigh security optical encryption technology on the market.

Since AlphaEta is built on standard optical communications, it is compatible with current long haul infrastructure. Users can deploy it without investing in additional equipment or leasing new lines. AlphaEta can be deployed over both fiber-optic (wireline) and free-space (wireless) optical networks. Because the system works with a variety of platforms, security among all communication links is assured—*Evanston, Illinois*

SES ASTRA Deliberate In DTH Approach

Because their **ASTRA 1D** satellite is nearing the end of its life, and as the company wishes to further extend their Direct-To-Home (DTH) services for broadcasters across Europe, **SES ASTRA** has undertaken a space move. That's right! Their satellite **ASTRA 1E** is now relocated from its 19.2° East orbital position to **23.5° East**. The ASTRA 1E joins **ASTRA 3A** and will become operational by the end of this month.

This move was made possible by the successful launch of **ASTRA 1L**. That satellite initiated its services at 19.2° East in July of this year. Another satellite, the **ASTRA 3B**, is scheduled for launch by the end of 2009. This will then add 19 transponders to the 37 transponders currently on the 3A and 1E at this orbital position today. The company is building 23.5° East into a new, prime orbital slot for DTH reception, with the focus on Benelux and Central and Eastern European markets. Plus, 23.5° also transmits the Dutch regional broadcasters and the Netherlands' SatTV provider **Canal Digitaal**, with whom SES ASTRA recently concluded an agreement for them to use further capacity on 23.5 ° East for the launch of a new, thematic bouquet at the end of this month and for a new bouquet next year—*Betzdorf, Luxembourg*

SES Sets Specific Single Solution

SES [Euronext Paris and Luxembourg Stock Exchange: SESG] has consolidated their satellite, ground, procurement, engineering and operational services into a single division. *Martin Halliwell*, previously Chief Technology Officer of **SES ASTRA**, is the President of this new entity to be called SES ENGINEERING. Mr. Halliwell will also become a member of the SES Executive Committee.

The new division will be based at SES facilities in Luxembourg. In the U.S., SES ENGINEERING will be responsible for managing satellite and ground infrastructure that are related activities for the SES group. Such will include satellite operations and fleet management as well as satellite procurement and launch scheduling. The new division will be staffed by employees from SES' operating companies and is expected to be fully operational as of January 1, 2008—*Betzdorf, Luxembourg*

SkyBitz One Of Deloitte's Favs…

The first **Deloitte & Touche USA LLP Technology Wireless Fast 50** commendation has been awarded to **SkyBitz**. In partnership with **CTIA**, the awards was presented at the **CTIA Wireless I.T. & Entertainment 2007** show in San Francisco, which also happens to be one of the largest wireless data events in the industry. **SkyBitz** was also named **#2** in the **2007 Deloitte Technology Fast 500** ranking of the fastest growing technology, media, telecom and life sciences company in America, with the company growing **40,314 percent**... yes, that *IS* correct... 40,314 percent over five years, based on 2002 through 2006 revenues. Currently, more than 440 fleets throughout North America rely on patented SkyBitz GLS technology, tracking more than 140,000 mobile assets. Congrats to SkyBitz—*Sterling, Virginia*

Billions And Billions Of… Dollars!

The Space Foundation has released *The Space Report 2007*. Their publication reveals in 2006 the global space industry grew to nearly $220 billion in total revenues. The Space Report 2007 contains global space industry budgets and revenue data for calendar year 2006 and, along with the updated Space Foundation Index, demonstrates dramatic growth in the space economy that is outpacing most other markets and indices. Total space industry revenues of $220 billion in 2006 represent a single-year increase of 18 percent from 2005.

The signature product of the Space Foundation's Research & Analysis division, The Space Report 2007, is an update of *The Space Report 2006*, and contains data showing that nearly every sector of space experienced growth in 2006. Satellite based products and services and U.S. government space investments comprise the two largest segments of the space industry at 50 percent and 28 percent of total revenues, respectively. In addition, The Space Report 2007 provides updated and revised data for 2005. Global space revenues of $179.65 billion in 2005 were reported in The Space Report 2006. Based on the Space Foundation's subsequent acquisition of higher fidelity data, the 2005 global space revenue figure has been updated to $186.31 billion.

A key component of The Space Report 2007 is the *Space Foundation Index*. Now in its third year, the Space Foundation Index is a weighted index that tracks the market performance of 31 public companies that derive a significant portion of their revenue from space-related assets and activities. Since its inception in June 2005, the Space Foundation Index has increased by more than 45 percent, significantly outpacing both the NASDAQ and S&P 500 indices, which grew 31 percent and 28 percent, respec-

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tively. The Space Report 2007 is available for free download, and The Space Report 2006 remains available for purchase at **www.TheSpaceReport.org**.

Starsem Sends Another Aloft

The **1,727th** flight of a **Soyuz** launch vehicle, **Moiniya**, occurred last **Tuesday, October 23rd**, from the **Plesetsk Cosmodrome** in Russia. The lift-off occurred at **8:30 a.m.**, Moscow time. **Starsem**, **Arianespace** and their Russian partners all report the government's spacecraft was accurately placed in target orbit. This launch came directly after the successful **Globalstar** telecom satellite flight on **October 21st**. Starsem plans several additional missions in the coming months. Such will include the launch of the **Radarsat-2** observation satellite and the **Giove-B** satellite.

Now that the Soyuz is at the **Guiana Space Center**, this Russian medium-class launch vehicle becomes an integral member of the European launch fleet. The Soyuz joins the heavy-lift **Ariane 5** and the lightweight **Vega**. The Starsem shareholders include **Arianespace**, **Astrium**, the **Russian Federal Space Agency** and the **Samara Space Center**—*Cedex, France*

TCS Communicates Well With The USMC

TeleCommunication Systems, Inc. (TCS) (NASDAQ: TSYS), a global leader in mission-critical wireless communications, today announced the award of a five-year contract for the **U.S. Marine Corps.** The order is initially funded for $6.7 million with potential for a total of $64 million including all option years. The order requires TCS to deliver systems for use by the U.S. Marine Corps in support of **Operation Enduring Freedom** (OEF) and **Operation Iraqi Freedom** (OIF) and will enable both data and voice connectivity for deployed Marine Corps units.

The order was awarded under contract with the **Army Project Manager for the Warfighter Information Network-Tactical (PM WIN-T) Commercial Satellite Terminal Program (CSTP)** and through the U.S. Army's $5 billion **World-Wide Satellite Systems (WWSS) Indefinite Delivery Indefinite Quantity (IDIQ)** contract vehicle. Within the first 12 months of the 60-month ordering period, TCS has been awarded nine orders now totaling over $30 million of funding and a total $101 million of contract value, including all options—*Annapolis, Maryland*

Thuraya Gets No Shore Leave After Boeing Shipment

The third **Thuraya** communications satellite has now been shipped by **Boeing** [NYSE: BA] from their El Segundo, California manufacturing facility to the **Sea Launch Home Port** located in Long Beach, California. At the Sea Launch facility, the satellite will be prepped for its launch next month. **Thuraya 3** is the third Boeing GEO-mobile spacecraft they've manufactured for **Thuraya Satellite Telecommunications Company** and is based on the already flight-proven 702 satellite model.

Thuraya 1 and **2** started their commercial ops in 2001 and 2003, respectively, and they provide mobile communications from more than 2.3 billion users. Thuraya 3 will serve the key markets of China, Australia, Japan and Korea. Plus, Boeing has incorporated on-board digital signal processing able to redirect coverage to help meet the market demands in more than 100 countries—*St. Louis, Missouri*

Orbital Sciences' Omnipresence

Orbital Sciences Corporation [NYSE: ORB] has been selected by the **California Institute of Technology** (Caltech) and the **Jet Propulsion Laboratory** (JPL) to design, manufacture, integrate and test the **Nuclear Spectroscopic Array** (NuSTAR) scientific satellite. The **NuSTAR** satellite is part of the National Aeronautics and Space Administration (NASA) **Small Explorer** series of smaller-sized spacecraft. They are designed to carry out highly productive Earth and space science investigations. The astrophysics mission of the NuSTAR observatory is to use high-energy X-rays to detect black holes and other energetic phenomena in the universe. The launch is scheduled for 2011. This operation is designed to bridge the gap in astrophysics missions between the 2009 launch of the **Wide-field Infrared Surveyor Explorer** and the 2013 launch of the **James Webb Space Telescope**. NuSTAR should expand our understanding of the origins and destinies of stars and galaxies.

Orbital Sciences Corporation's **Orbital Boost Vehicle** (OBV), which is the booster rocket for the **Ground-Based Interceptor** (GBI), was successfully launched as part of a test of the **Ground-Based Midcourse Defense** (GMD) program. Orbital provides the OBV as part of an industry team led by **The Boeing Company** [NYSE: BA] for the **U.S. Missile Defense Agency** (MDA). The OBV was launched from **Vandenberg Air Force Base**, CA on Friday, September 28th. This action was part of the test designated as **Flight Test Ground-based Midcourse Defense-03a** (FTG-03a). Following its launch from a silo, the OBV flew downrange over the Pacific Ocean and successfully supported the intercept of a target vehicle launched earlier from Alaska. Following a preliminary post-flight analysis of the data collected from the mission, MDA and the GMD team

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confirmed all primary OBV objectives for FTG-03a were achieved. These included pre-launch built-in test functionality, launch and flyout of the OBV, accurate delivery of the Exoatmospheric Kill Vehicle (EKV) payload, and acquisition of telemetry data for further characterization of the OBV's flight characteristics. The OBV and the EKV make up the GBI, assembled by Boeing—*Dulles, Virginia*

Verizon Packs In A Couple Of Potent Products

Verizon has been pretty active... first, the company has a brand new agreement with **Thrane & Thrane** that will find the delivery of portable satellite services to the former's enterprise customers. Called **Verizon Global Broadband Satellite Access, Powered by Thrane & Thrane**, this new offering is immediately available to customers throughout the United States, with specific marketing of their service to specific industry segments such as energy, finance, health care, manufacturing, mining, the public sector, transportation as well as first responders. Connection will be via a Thrane & Thrane terminal to a broadband global network.

Verizon has also introduced a new, symmetrical **Verizon FIOS Internet** service. This new service features upload and download speeds of as much as 20 Mbps and is the first of its kind to be commercially offered to U.S. consumers on a mass scale. Available as of this writing in some areas of New York, New Jersey and Connecticut, Verizon will offer similar services in 13 other states where FIOS is offered—*New York, New York*

Vizada Has Maritime Expectations

Vizada announced the company has been appointed as the official distribution partner for **Inmarsat**'s **FleetBroadband** service, the first maritime communications service to provide cost-effective, simultaneous voice and high-speed data communications through a compact antenna. Vizada will combine the FleetBroadband offering with its own integrated solutions to enhance communications for its maritime customers. FleetBroadband by Vizada will be commercially available on November 19th of this year.

Vizada combines the strengths of two of the industry's longest-standing providers: the former Telenor Satellite Services and France Telecom Mobile Satellite Communications. Vizada's newest maritime broadband offering harnesses over 60 years' combined experience serving maritime customers' needs and developing relevant solutions for use at sea. FleetBroadband is the maritime version of Inmarsat's popular **Broadband Global Area Network** (BGAN) service and provides IP services via a Standard IP connection at speeds up to 432 kbps over a shared channel allowing email, Internet and intranet access. On demand, guaranteed streaming connections at rates up to 256 kbps can be used for applications such as videoconferencing. It also provides a 64 kbps ISDN connection and SMS service—*Paris, France & Oslo, Norway*

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