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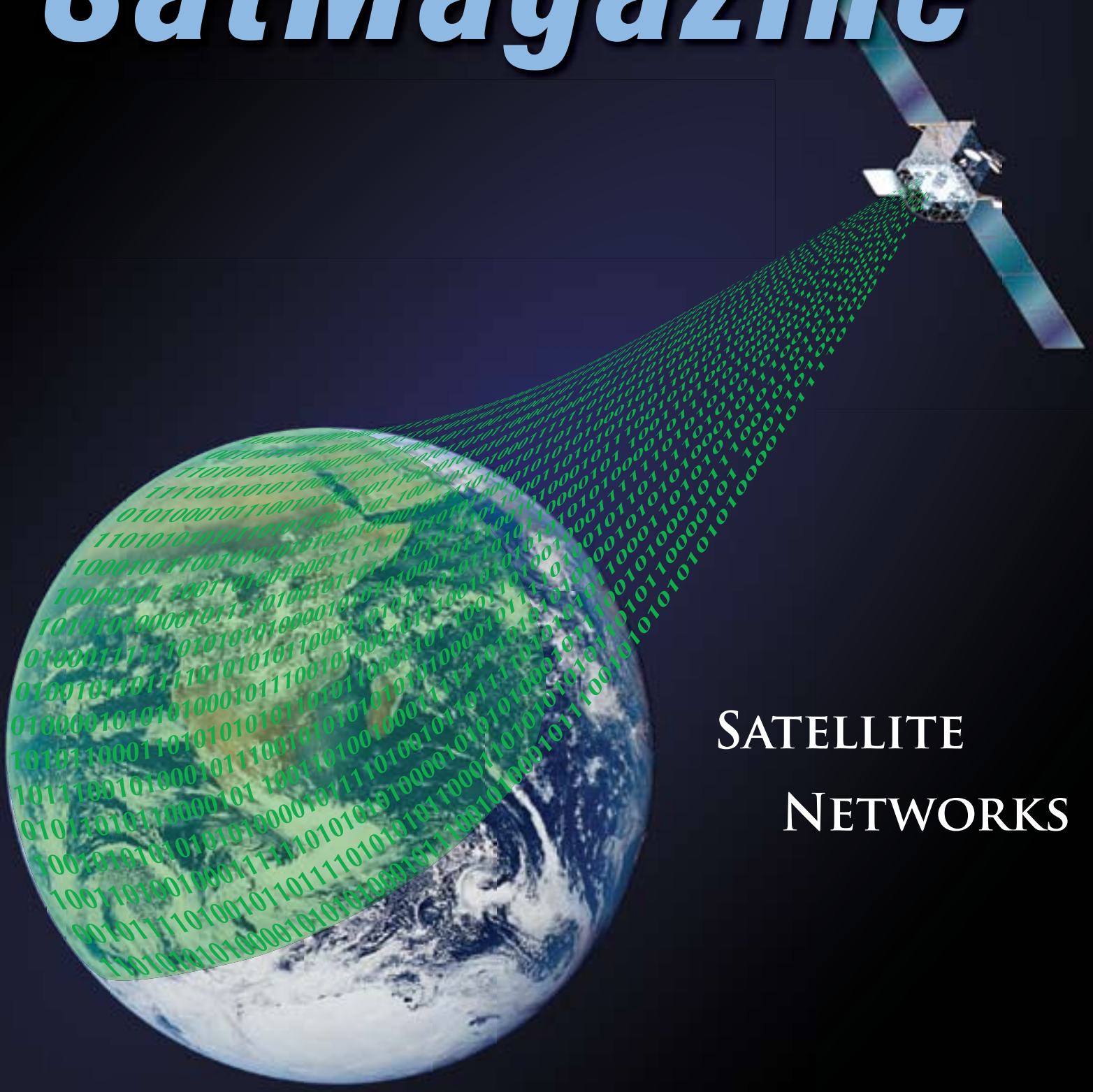
SatMagazine



Satellite Networks

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THE NEW REVOLUTION OF SATELLITE PAY TV

by Pacôme Revillon, Managing Director, Euroconsult

A reference industry for digital TV delivery

After a decade of satellite TV platforms launches, the satellite TV industry has reached critical size and has become truly global. The 92 TV platforms currently in service cover more than 100 countries in the different regions of the world, with 80 national TV platforms and seven regional platforms primarily in the Middle East, Africa, Central and Eastern Europe and Latin America.

The success of satellite TV was built upon specific technical advantages that combined the benefits of digital TV (video compression, large TV offers) with the ability to cover a whole country or region for a limited capital expenditure. These advantages over terrestrial networks allowed satellite TV platforms to build strong market positions within short timeframes. With about 95 million subscribers and revenues of approximately $59.2 billion in 2007, the industry has become a reference for the distribution of digital entertainment.

While the majority of historical platforms in the most mature satellite TV national markets have reached operational profitability, emerging digital markets are facing a burgeoning number of new satellite TV platforms vying for position in national markets some of which are already served by three or four satellite TV players.

The takeoff of satellite pay-TV in emerging digital TV markets

Satellite TV platforms were the first to introduce digital TV in almost all emerging digital TV markets. They remain the sole digital TV providers in many countries. Satellite appears to be the most cost effective way to introduce digital TV in developing countries. Moreover, the cost of digital set-top-boxes (STBs) has dropped by more than 80 percent in the last six years, facilitating take-off by lowering a barrier for new entrants. Consequently, satellite TV platforms have multiplied in emerging digital TV markets in the last three years. From 30 in number in 2000, the number of platforms reached 63 during 2007. Last year, new platforms were introduced in Colombia, Brazil, Serbia, Croatia, Russia, Romania, Sub Saharan Africa and India.

Subscriptions to satellite TV platforms have also ramped up in the mean time, from 6.1 million in 2000 to 27.7 million in 2007, i.e. a CAGR (Compound Annual Growth Rate) of 24 percent. Furthermore, this growth has been observed despite the restructuring and consolidation that has also affected emerging markets and the economic crisis that strongly impacted the Latin American market.

In the last two years, growth of satellite TV in emerging markets was supported by the introduction of new services in India, Central Europe and Latin America. The opening of the Chinese market will, in the medium term, likely also give a new boost to the industry.

Telecom operators as key investors in the new wave of satellite services

In the last three years, telecom and cable operators have backed 19 out of the 35 new satellite TV platforms launched. Nine of these were actually launched by telecom operators, while several others are currently under development, as confirmed by recent announcements from **France Telecom** and **Portugal Telecom**.

An example of the new focus of telecom operators on satellite TV is **Telefonica**, which has backed the launch of satellite TV platforms in Chile, Peru, Colombia, and Brazil. Depending on the countries, reasons for investing in satellite TV range from regulatory compliance which prohibited the introduction of IPTV to enabling provision of a full triple play service at a national level, in countries where IPTV could not be delivered in the whole country.

In the mid '90s, telecom operators were involved in satellite TV, while by the early 2000s most of them had disengaged from the industry. Reference shareholders include **BCE** in *ExpressVu* (Canada), **Telenor** in *Canal Digital* (Northern Europe) and **Bezeq** in *Yes TV* (Israel). **France Telecom** was also an investor in the satellite TV platform *TPS* (France) and *Portugal Telecom* owned TV **Cabo**.

The renewed interest of telecom operators in satellite TV is driven by several factors including:

- Telecom operators' desire to offer a triple play package on a national scale,
- The time and cost required to cover remote areas, either through DSL or FTTH,
- The still-limited penetration of digital TV and DSL, offering room for growth,
- The objective to amortize potential programming costs over the largest possible subscriber bases

Low cost platforms as a challenge to existing market players

The most recent key trend in the satellite TV market has been the launch of a number of "low cost" platforms. In emerging digital TV markets, "low cost" platforms are primarily launched to stimulate market takeoff. The impact of "low cost" platforms may be most striking in Central Europe. While **UPC Direct** signed 420,000 subscribers in 10 years of operation, the launch of low cost offering *DigiTV* with a basic package at 3 euros resulting in 3.1 million subscriptions in the last two years. In India, satellite TV platforms have decided to align their prices with analog cable TV in order to stimulate subscriptions. In Poland, subscriptions have accelerated following the introduction of low fees by the new platform **N** and a sharp decrease of basic fees by **Cyfrowy Polsat**.

In some of the most advanced digital TV markets, low cost initiatives are beginning to emerge. In France, the AB Group introduced a low cost satellite TV platform, "AB Bis", at the end of 2007. While historical platforms progressively increased their basic fees and overall ARPU (Average Revenue Per User) in the last ten years, they may have left an opening for services offered at lower fees, especially as penetration of digital TV remains far from maturity in many markets. This low cost approach may also be a response to the emergence of almost free digital services with, for example, the launch of digital terrestrial television (DTT) in an increasing number of markets and the availability of a number of free-to-air channels over IPTV platforms.

While the sharp decrease in equipment costs and the availability of affordable content has allowed low cost platforms to emerge, the business model has its challenges. With revenues per subscriber that can be five to ten times lower than historical platforms, low cost platforms still need to sign a critical mass of subscribers rapidly to recoup equipment and programming costs. In markets where several platforms were launched, difficulty reaching breakeven will most likely encourage consolidation within the next three to five years.

Content diversity and digital recording as key growth drivers, ahead of HD and mobility

In the last ten years, diversity in content offering was key for growth in the satellite pay-TV sector. Overall, more than 1,000 channels had been added by satellite TV platforms worldwide between 2000 and 2007, with the number of channels reach-

ing over 12,000. Even excluding the broadcast of local networks in the US, the figure still stands at close to 9,000 channels. On average, the number of channels offered per platform has increased from 77 to 100 in the last seven years. In order to further increase subscriptions, both historical and emerging platforms are expected to keep adding new channels with a potential focus on HD for certain historical platforms and on new standard definition channels for emerging platforms.

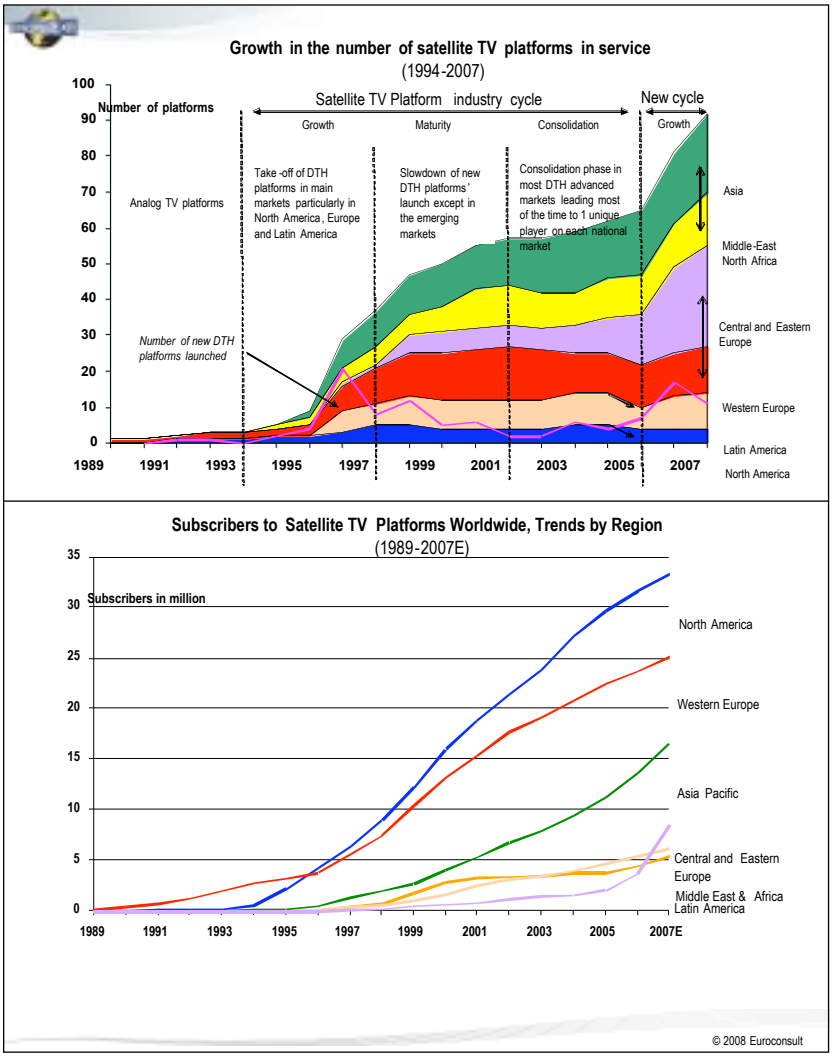
Digital video recording solutions, already introduced by leading satellite TV platforms, will soon become a standard offering worldwide. Currently, 22 out of the 92 platforms in service are offering DVR premium services compared to seven platforms in 2004. The decrease in the equipment costs has also had an impact here, resulting in an acceleration of introductions of DVR services by platforms. It is expected that by adapting the pricing to local market conditions, DVR solutions will succeed in penetrating the different markets.

In the next five to eight years, most platforms should be in a position to reach penetration of at least ten percent. While DVR penetration for most platforms currently stands below 5 percent, a number of platforms have now already passed that threshold, including **Foxtel** in Australia (>16 percent), **Viasat** in European Nordic countries (9 percent), and **MIH/DSTV** in Sub Saharan Africa. For the most advanced platforms, penetration could reach at least 30 percent of the subscriber bases. As is the case for other new services, rapid penetration for DVRs will be more easily achieved by platforms with a critical mass of subscribers.

By comparison, high definition, except in the North American market, is still in the early stage of development and, therefore, is not the core focus for most platforms yet—and certainly not the low cost platforms. However, in 2007, the number of HD channels increased, and a growing number of platforms such as **Cyfrowy Polsat**, **N** in Poland and **NTV+** in Russia have introduced HD channels in their offerings.

As for other services such as mobility, many platforms have taken initiatives to build partnerships with cellular operators in order to access this emerging

market. It nevertheless remains nascent and shall represent a limited growth driver for most platforms in the next few years.



Strong potential for satellite pay-TV in the coming years

Overall, market drivers are positive for satellite TV platforms in most markets, despite a potential weaker economic environment. Except in a few advanced markets, where increasing competition from iPTV is expected to hamper growth, emerging markets appear to hold promise for satellite TV players.

According to our most recent study on the industry, by 2017, close to 180 million households are expected to subscribe to satellite TV for revenues of more than $90 million. However, the number of platforms currently launched may foretell a phase of consolidation.

The ability of market players to position themselves early on and to rapidly build to critical size will be key to secure long-term growth and profits in the market. In advanced markets, lower growth prospects in terms of subscriptions, and the current convergence observed in the telecom and media markets, may lead to a number of mergers and acquisitions that will allow the emergence of new integrated market players mixing terrestrial and satellite services.

Euroconsult has a number of research reports available dealing with the world of digital broadcasting. These may be accessed directly at www.euroconsult-ec.com and include:

- Thematic TV, Key Economicsand Prospects to 2016
- Satellite TV Platforms, World Surveyand Prospects to 2015
- HDTV in Europe, Key Economicsand Prospects to 2015

Euroconsult has more than 500 clients in 48 countries and is the leading international research and analyst company specialized in space, satellite communications and broadcasting. Euroconsult publishes reports, organizes high-level summits, and carries out consulting assignments that include independent assessment of business plans, market analysis, financial valuations, risk assessments and feasibility studies for international companies. Further details on **Euroconsult** are available at their website.

Pacôme Revillo has been the Managing Director of Euroconsult since 2003. He spent several years as analyst and consultant prior to his current position, with a specialization in satellite communications, TV broadcasting and financial analysis.

Pacôme is the editor of several Euroconsult research reports and has contributed to numerous consulting assignments in the satellite broadcasting and communications markets for international companies including satellite operators, satellite TV platforms, TV channels, media groups, manufacturers, investment banks, private equity funds and public institutions.

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TRENDS IN MANAGEMENT AND CONTROL

STOVEPIPE SYSTEMS ARE OUT—NET-CENTRIC IS IN!

by Scott Herrick, Director of Government Business Development, Newpoint Technology.

Traditional satellite Network Management Systems (NMS) that may have served mission unique, closed network systems, or focused exclusively on the management of discrete point-to-point SATCOM links, are increasingly called upon to support network centric applications. The Defense Acquisition Guidebook defines this as "...a shift to a "many-to-many" exchange of data, enabling many users and applications to leverage the same data-extending beyond the previous focus on standardized, predefined, point-to-point interfaces. Hence, the net-centric data objectives are to ensure that all data are visible, available, and usable-when needed and where needed-to accelerate decision cycles".

Department of Defense (**DoD**) requirements for net-centric solutions offer the NMS provider many potential business opportunities. They span everything from border security and worldwide military operations to emergency response and disaster relief operations. With the opportunity comes the challenge of remaining competitive and being able to maintain a viable NMS solution that is adaptable, scalable, and cost effective from a product development perspective.

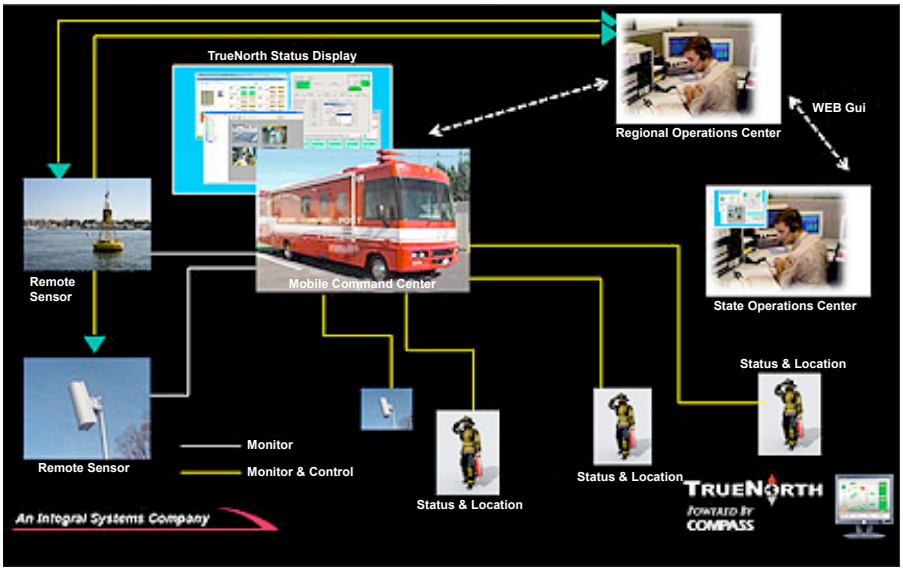


Figure 1

In the net-centric environment, the NMS provider that can offer solutions that support a variety of interface protocols, can control diverse systems, and share or distribute information vertically and horizontally across platforms and organizations will have the advantage. As I see it, the landscape for doing business as NMS provider is shifting, demanding fewer point-to-point *Monitor and Control* (**M&C**) systems to more service oriented network architectures capable of managing systems-of-systems.

As recently as 2006, the report to the President on the Federal response to Hurricane Katrina outlined actions for the *Department of Homeland Security* (**DHS**) to establish a deployable communications capability to quickly gain and retain situational awareness when responding to catastrophic incidents. Specifically the report stated, *"To restore operability and achieve interoperability, there is a strong need for rapidly deployable, interoperable, commercial, off-the-shelf equipment that can provide a framework for connectivity among Federal, State, and local authorities".* Since Hurricane Katrina and the report to the President, considerable work has been done to resolve communications interoperability issues. Federal, State and service organizations have demonstrated and used Hybrid networks to rapidly establish critical communications in response to disaster and emergency situations. The use of Hybrid networks to provide voice, video and data services to first-response organizations offers part of the solution to the interoperability problems brought to light by Hurricane Katrina.

A key enabler supporting these ad-hoc and Hybrid networks that can be initiated at the onset of a crisis, and then disbanded when no longer needed, are net-centric management systems. They link together multiple technologies to provide an integrated view of an operator's entire network. This may require the combination of satellite and/or microwave links, leased lines, and frame relay connections. They have the ability to incorporate legacy and next generation equipment with a large variety of standards and non-standards based device interfaces (such as TL1, SNMP, GPIB, contact closure and serial communications protocols), or even the ability to integrate with an existing point-to-point M&C system.

As the situation changes, the NMS structure should be able to add additional capability (through a thin client web inter-

face for example), allowing any number of authorized users access to the system from any computer with an Internet connection and a compatible web browser, irrespective of the computer's operating system. Additional capability includes such things as the monitor, control, and display remote sensor status, webcam video, sending voice and email notifications based on operator defined parameters, or incorporate and display existing SNMP IP equipment into the network monitoring structure. This is where we begin to see net-centric benefits.

Consider a simple notional example outlined in **Figure 1**. A Hybrid network is established in response to a disaster scenario to provide voice and data capability to the first responders. The systems-of-systems approach to NMS allows the *Network Operations Center* (**NOC**) operator (on scene, for example) to monitor and control any number of networks, down to the individual piece of equipment, providing communications and local situational awareness. Through a web interface, other authorized users at different locations can log in and view the identical status in real-time, without interfering with the ongoing situation.

Figure 2

Figure 2 shows notional screens that users could display information on, from a single console (webcam, map overlays with status, block and level status screens, alarm status and individual equipment status) at one or multiple locations. This offers a capability that can be very beneficial to organizations at the city and state level, or fire and law enforcement agencies that may not have access to classified networks or a common operational picture.

The systems-of-systems approach starts to address what was called for in the Katrina report to the President. "*...the net-centric data objectives are to ensure that all data are visible, available, and usable-when needed and where needed-to accelerate decision cycles*", blurring the lines slightly between traditional management of satellite equipment networks and terrestrial networks into a system capable of sharing information vertically and horizontally using a common structure.

Newpoint Technology provides products and services for managing communications infrastructure. They include satellite, terrestrial, Internet, and broadcast services. The company recognizes the need for flexibility in the next generation NMS and are actively evolving their traditional satellite NMS product line to manage and control systems-of-systems.

Remote site management is one area where Newpoint has had considerable success and where the company is looking to build synergy with the system-of-system concept. Newpoint's *Compass* network management system and *Mercury* suite of products (*Mercury Element Manager* and *Remote Site Manager*) used for managing remote sites and portable communications terminals operate in the net-centric environment. For example, Newpoint has fielded a number of systems that provide NOC operators the capability to initiate low overhead connections using satellite links to any location in the world over the **Iridium** network. This allows operators to restore services remotely, or at a minimum identify, the cause of a failure and, in the event of a loss-of-communication event, to dispatch technicians with the proper equipment to remedy the situation. By itself, this is traditional M&C. When we integrate this capability into a NMS solution working across applications, we begin to see the benefits of the systems-of-systems approach.

A recent example is the integration and deployment of Newpoint's Compass network management software into military communications terminals deployed to Southwest Asia. After a terminal is deployed to the field, an operator with minimal training can quickly set up the terminal from a laptop or PC through a simple menu driven *graphical user interface* (**GUI**).

The Newpoint software then allows these terminals to be controlled and monitored from a NOC located safely away from hostilities and in many cases from locations within the United States. Remote monitoring is usually done through the engineering service channel or a small amount of bandwidth on the terminal using the primary data link. However, if the primary link is lost, or the terminal is no longer communicating, the operator can access the terminal via the Iridium network and can access the link through a secure, alternate connection and recover the terminal.

NOC operators can monitor the entire network and manage multiple communications terminals from a remote location. The efficiencies are clear—if you have 30 terminals that can be remotely supported by one or two personnel, and you don't have to deploy an IT person to support each terminal, you've dramatically decreased your forward deployment footprint. Because of built in flexibility in the Network Management system, the NOC can remotely maintain the same level or provide a higher level of service to the end user. Such frees up the operator or soldier in the field to focus on their primary mission objective.

Other applications of Newpoint Compass management systems provide monitor and control of sensors to control domestic oil pipelines. The NMS interfaces with all remote site equipment from legacy serial interfaces, to contact closures for sensor and alarms, to SNMP IP equipment combining gateway earth stations, marine radio, transmitter/repeater sites, microwave, VHF/UHF, fiber, and copper cable into an integrated system that provides status and real-time situational awareness to a single operations center. Status information can be shared or distributed across organizations simply by providing users (defined and controlled by the administrator) the network's IP address.

As a NMS system provider, there is not much difference between monitoring hundreds of miles of oil pipeline and monitoring sensors and data links along hundreds of miles of border. Because this commercial-off-the-shelf technology is already fielded and operationally tested, it can, with little or no modification, be applied to other applications where there

is a need to monitor and manage remote assets. Examples include, but are not limited to, along a border, at sea, or in austere locations around the globe where military or government personnel are deployed.

In terms of market positioning strategy for NMS providers in general, there is a clear requirement to continue to refine the move toward a systems-of-systems solution. Look at any ongoing or future DoD program; they all require some degree of net-centric network management capability. The DHS Secure Border Initiative (SBI) and the SBInet being deployed by **Boeing** will link mobile sensors, command, control and communications elements, vehicles, satellite phones, and remote ground systems and feed this information into a common, operational picture, as just one example. To meet these types of requirements will require network management solutions that can incorporate and link divergent technologies, including legacy standalone M&C systems, and present them as an integrated, operationally transparent, network.

From a strategic perspective, Newpoint is looking at the expansion and evolution of our core products that were originally developed as satellite Network Management System tools serving a niche market into a net-centric system that has many applications outside of our traditional business area. We see the potential to provide value-added capability and meet diverse network management requirements across a very broad spectrum of government systems and activities.

Scott Herrick is the Director of Government Business Development for Newpoint Technology. One of his primary functions is to identify new Government market areas and applications for the Company. Prior to joining Newpoint Technology, he served for more than 20 years as an Air Force Officer in various Space and Command and Control assignments.

‘FOR SALE’: SATELLITE, ONE CAREFUL OWNER…

by Chris Forrester

Norway’s Thor 5 satellite, built by Orbital Science, was launched into orbit February 11. It’s a tangible return to health for International Launch Services and the Proton launch system. It also means Thor 2 will soon be available for re-use, of which I’ll explain more later.

The satellite industry uses a wonderfully understated English word when everything is going well with a launch—“nominal”, they say—indicating all’s well. The launch on February 11th of *Thor 5* was “nominal” every inch of the way to its geo-stationary position, initially for testing at 16.5° W and then onto its workstation at 1° W. If all continues to perform “nominally”, then *Thor 5* will come into service just after the Easter holiday.

The successful launch from the *Baikonur Cosmodrome* in *Kazakhstan* also resulted in more than one or two smiling faces at *International Launch Services* (**ILS**), and their partners at the *Khrunichev Space Centre*. Most notably, there was relief that the *Breeze M* upper stage, manufactured by *Khimmash*, and the component responsible for the *JCSAT-11* catastrophe last September, performed ‘nominally’. That particular failure put a halt to Proton launches, although there have since been three successful launches of the Proton+Breeze M unit, including that of a *Sirius* satellite for **SES Sirius**. The firing on February 11th was further confirmation that all now seems well for ILS and future launches—and an SES **Americom** *AMC-14* launch on about March 14th.

Indeed, ILS is intending to expand out of Pad 39 at Baikonur to accommodate the heavy launch backlog, which includes contracted launches for **Arabsat**, **Ciel**, and *CMBStar* for **Echostar**. This in addition to another unspecified Echostar contract, a Eutelsat ‘*W*’ craft, *Inmarsat 4F3*, *Nimiq 5* for **Telsat**, *MSV-1* for **Mobile Satellite Ventures** as well as an option for *MSV-2*, *Protostar 2*, *Yahsat*, and a 5-launch contract for SES. There are also two launches “for unnamed customers”, adds ILS. Increasing the frequency of commercial launches from the current half-dozen a year to nearer one a month is now the immediate revenue-generation goal. In fact, there have been four *Proton* launches in two months, a record for the vehicle indicating that an aggressive launch rate is certainly possible.

There were also huge smiles at **Telenor Satellite Broadcasting**, the largest of which were to be noted on *CEO Cato Halsaa* and his team. He said the successful launch of his **Orbital Sciences**-built satellite justifiably makes a huge difference for Telenor.

“The new satellite, and the capacity it carries, means we can now press ahead with expansion. We can now fulfill our plans, allowing customers to add more HDTV services as well as new channels for the Nordic region. Importantly, we can also go for international expansion. We have sufficient capacity to look for new DTH platforms in these new markets. We also have spot-bean capacity looking at greater Europe. As far as the Middle East is concerned, we can now free up some old capacity [Thor 2] and use this for customers in that region. The capacity is for more than just backhaul, and allows for Internet backbone and data, and DVB-RCS systems, a business that I’m happy to say is growing well.”

Three years or so ago, **Telenor Satellite Broadcasting** was effectively on the sales forecourt.. Stig Eide Sivertsen, then EVP

International Launch Services

ILS is based in McLean, Virginia, and its j-v partners are ***Space Transport Inc*** *(BVI),* ***Khrunichev State Research & Production Space Centre****, and engine-builders* ***RSC Energia****. ILS says their launch backlog, as of January this year stood at an impressive 22 orders worth more than US$2B. Going forward, ILS is marketed as the “only commercial launch operation with two launch pads” at the same location.*

Undoubtedly, ILS is on a roll, helped, oddly enough, by the slew of launch problems this past 12 months or so. Its own loss of JCSAT-11 on September 6th of last year (with a manufacturing failure of the Breeze M’s 4th stage) did nothing to help trim the backlog of satellites waiting for launch following on from the Sea Launch catastrophe back in January 2007.

ILS flight manifest includes:

AMC-14	March 14
Inmarsat 4 f3	April 2008
Astra-1M	Spring 2008
EchoStar 13	Summer 2008
Nimiq-4	Later 2008
Ciel-2	Later 2008
Sirius-FM5	Winter 2008-9
Protostar-2	Early 2009

and head of **Telenor Broadcast**, and his colleagues fought hard to retain the division as part of Telenor Broadcast Holdings, when many of Telenor's main board wanted to dispose of the asset. Sivertsen was also at the launch, but it was his swansong weekend at the company. He resigned back on September 11th, after 10 years with Telenor, and was wrapping up his last days as a member of the Telenor team. He has not, as yet, revealed what his next plans are.

As far as the market is concerned, Halsaa and his team are now seeking "new uses" outside the 1° W position for *Thor 2* (which *Thor 5* replaces). "We have no firm position in mind, but we are talking to prospective customers about the craft, and how it might fit in with their own frequency expansion needs. Our engineers tell us that Thor 2 has full manoueverability until the end of this year, but it could have a DTH mission even in inclined orbit for a year from now, after which it could be used as an inclined orbit craft for about 5 further years," adds Halsaa.

"Telenor and Canal Digital have agreed with ViaSat to have more of one another's channels available to viewers on a non-exclusive basis. This is good news for both operators. HDTV is also one of the most important aspects of our business, and will surely be a major driver for growth in the future. The take-up of HD is perhaps slower than some might have anticipated. We have expected the slow take-up, which we see as being down to the new MPEG-4 set-top boxes, but it will happen, and we look forward to it." Cato Halsaa: Telenor Satellite Services

However, Telenor's market position over Scandinavia (and its expansion further a field) is not alone or free from intense competition. On its Scandinavian doorstep it has **SES Sirius** (now 90 percent owned by the giant **SES** operation), and tending to prove the eat-or-be-eaten drive towards further and greater consolidation amongst satellite operators.

Halsaa says there's a third way for Telenor: "There are smaller operators that are doing well. What we have seen is that launch rates and insurance costs are not a disadvantage to us as a smaller operator. Suppliers, naturally enough, like to

see a lot of customers and potential customers out there. So, we are happy at the equal rates that we can achieve alongside the big players, we believe. Secondly, our business is in a strong position and so do not see any threats in that direction. This does not mean we are not looking for expansion, we are. Thor 5 gives us the first step to seek expansion geographically, and later next year with Thor 6. We'd like to think this will pay dividends, and then perhaps we can also be looking for partners. As is well known, the 1 deg West slot is not ours alone. Intelsat also operates frequencies alongside us. The slot is perfect for the whole of Europe, and someway beyond, and is an excellent spot from which to expand."

The Joys of Baikonur

"On no account bring a GPS unit to Baikonur. It will be confiscated." That was the firmly stressed message from all of the organizers prior to a visit to Kazakhstan to watch the launch of Thor 5. This worried me. First, because my sexy *Nokia n95* mobile phone has added facilities such as a MP3 music player and a 3G television device, radio (and phone). But second, and more relevantly, I thought in this day and age (and probably for decades past), every espionage agency in the western world probably has all of Baikonur's missile silos carefully locked into the rival ICBM's missile guidance software.

True enough, I brought up *Google Earth* on my PC, and there, in the west of the country, and just east of the drying out Aral Sea, is a perfectly inscribed circle that represents a not-so-tiny chunk of Russia—and the Cosmodrome—inside Kazakhstan. The site is about 2100 km (1300 miles) from Moscow (and located at 45.37° N, 63.2° E, in case you are interested) and is truly massive, stretching about 160 km east to west (about 100m) and 88 km north to south (55m). Certainly, the Thor 5 launch party spent hour upon hour in buses travelling back and forth across the bleak terrain. You can do the same by simply zooming in on Google Earth and visiting the launch pads as well as the tiny, on-site living quarters of Yuri Gagarin. Just think of the challenges in getting a news story out of the town on a single 56 kb/s dial up line shared by everyone else in the hotel!

Baikonur's place in history is rightfully assured due to the brilliant success of successfully orbiting Yuri Gagarin on *Vostok 1* on April 12, 1961, and the subsequent *Voskhod*, *Salyut*, *Almaz* and *Mir* space programs.

But, as mentioned, Baikonur is a horribly bleak spot, made a little prettier by a snowfall just prior to our visit. Baikonur City's population is about 70,000 people, totally devoted to the nearby Cosmodrome and keeping themselves alive in the –25c winter. ILS took us to the city's beauty spots: the wall commemorating the four names the city has been known under since 1955 (including Leninsk, Tyuratam and Baikonur, since 1995).

The launch of Thor 5 was delayed 24-hours by a glitch, which taxed the ILS for about a nanosecond. Their dilemma was simple—if you have exhausted all the region's available beauty spots (and don't forget the –25c temperature) somewhat forbad a leisurely stroll along the banks of the nearby river. What do you do on Day 2? Pizzas were conjured up, a pub quiz organized, and great fun was had by all. And then, to crown it all, a 'nominal' launch—such an inadequate word.

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.

MOBILE SATELLITE VENTURES AND INMARSAT PLAY NICE

by John Stone, Near Earth LLC

Mobile Satellite Ventures (MSV) managed to pull off a very interesting deal with their sometimes competitor, Inmarsat, LTD. When it was announced on December 21st, the market clearly liked the deal, sending the shares of Inmarsat up 7 percent and the shares of SkyTerra (MSV's public trading vehicle) up a whopping 24 percent that day. This begs the question: Should it have? Let's take a look...

To address this question, a little history lesson is in order. From the public filings of **SkyTerra**, **MSV**, and **Inmarsat**, we can learn that these companies all share a portion of the spectrum known as the L-band, (Mexico and Russia also have some use of the L-Band over North America). This sharing process is known as coordination, and through 1999, was governed through a process known as *Spectrum Sharing Agreements*, which were prepared annually. However, from 2000 through last year, no new Spectrum Sharing Agreements were reached, and interference complaint filings at the FCC were, to use a term, rancorous.

With no new agreements, MSV and Inmarsat remained bound by their last agreement, which was a product of its era in the sense that it did not anticipate the widespread adoption of *WCDMA*, *UMTS* and other *3G* transmission formats that require large contiguous chunks of spectrum. (At the time, Inmarsat and MSV both operated earlier generation satellite systems that used narrowband channels.) While MSV did have nearly 20 MHz of contiguous spectrum, their remaining spectrum (approximately 10 MHz) was sliced into narrow intervals that had significantly less utility per unit of spectrum (and thus commercial value). Because similar sliced portions of Inmarsat's spectrum created these chunks, Inmarsat suffered a similar problem, albeit to a lesser extent. Thus, as technology evolved the 1999 agreement actually destroyed part of the spectrum value for MSV and Inmarsat.

Turning now to the agreement itself, it identifies several new spectrum plans (and associated payments) between the respective firms. To the extent that our conversations with MSV and the document allow, we also discuss what we believe to be the significance of each plan in the adjacent table:

	Timing and Payments	Potential Significance
Phase 0 Plan	Immediate Payment of $31.25 million in stock (or cash if both parties agree) upon subsequent completion of MSV financing exceeding $100 million.	MSV retains access to the same ~30 MHz of spectrum they previously claimed, but cleans up 1999 Spectrum Sharing Agreement to have both firms migrate their operations toward contiguous spectrum bands. We believe most (between 26 MHz and 30 MHz) of this spectrum becomes contiguous.
Phase 1 Plan	At MSV option, any time up until 9/1/2011. Initial payment of $31.25 million in stock (or cash if both parties agree). $250 million in additional payments over 24 months, plus a completion payment of $56.25 million in stock (or cash if both parties agree).	The Phase 1 plan is an intermediate plan that probably provides MSV with accelerated access to the contiguous spectrum with much more favorable and flexible operating rules, but less aggregate spectrum that the 46 MHz of phase 2, by Inmasat scaling back its expansion plans for BGAN service in the region MSV covers.
Phase 1A Plan	Same as Phase 1 except with 15 month timetable.	We believe the Phase 1A plan is very similar to the Phase 1 plan, but with slightly different implementation to reflect its further compressed timetable.
Phase 1 Alternative Plan	9/1/2011 if a Phase 1 option is not exercised b MSV by then. No additional payments.	We believe the Phase 1 Alternative Plan has greater contiguity than the Phase 0 Plan, but note that it provides for MSV to cede certain spectrum rights currently in dispute. As a consequence, we believe it preserves over 20 MHz of contiguous spectrum, but has somewhat less spectrum that Phase 0.

Phase 2 Plan	At MSV option, beginning 1/1/2010 though 1/1/2013. At Inmarsat option, beginning 1/1/2013 through 1/1/2015. $115 million per year, with MSV retaining the right to terminate after 5 years.	Based on public documents, this plan provides MSV with ~46 MHz of continuous spectrum. Given the magnitude of the payments involved, Inmarsat is probably deliberately ceding planned business in lieu of the magnitude of the payments.
Default Plan	Upon MSV default on its payment obligations following completion of transition to Phase 1.	We believe this plan is probably somewhat punitive to MSV, but that MSV would not have entered into the agreement if it did not preserve the 20 MHz of continuous spectrum MSV currently controls.
Alternative Default Plan	Upon MSV default on its payment obligations prior to completion of transition to Phase 1.	We believe this plan is probably similar to the Default Spectrum Plan, but is closer to the Phase 0 plan since it is implemented prior to the completion of Phase 1.

Although there is substantial uncertainly regarding Phase 1, we know that Phase 2 provides for MSV to gain access to an additional 16 MHz of spectrum, and on a practical basis probably a bit more than that of valuable contiguous spectrum. If we compare that to the approximately $1.25 billion present value of the payment MSV must make to secure this benefit, it comes to ~$0.25 per MHz-POP. This is a modest premium to the valuation implied by the current trading price of SkyTerra, MSV's public trading vehicle, as well as recent transactions in the WCS band. Additional details regarding spectrum valuations will be discussed further in the forthcoming Near Earth LLC white paper entitled "*Spectrum: Invisible Real Estate*". For more details on the valuation case for MSS/ATC spectrum, as well as a full discussion of ATC in general, please visit www.nearearthllc.com to download our white paper "*Mobile Satellite Service w/ Valuation of Ancillary Terrestrial Components (ATC)*".

Quite apparently the MSV team is bullish enough to at least want to secure the option to that spectrum, which provides an excellent segue to another feature of the agreement—its built in optionality. As written, the plan allows MSV wide latitude to "bolt on" spectrum in two chunks, using three different time scales (admittedly at considerable and probably escalating marginal expense) as it evaluates its business case. In the alternative, this agreement resolves existing issues regarding spectrum, and through the phase 1 alternative plan caps MSV's payments at $31.25 million.

Overall, at today's valuations, we view the plan as a mild positive for both MSV and Inmarsat, but with substantial upside potential for both. To begin with, the plan makes for more immediate efficiency gains in spectrum use for all parties – a "no brainer" as it were. However, if spectrum values for MSS/ATC spectrum rise over the next several years, this plan gives MSV a way to enhance appreciation for its owners by exercising options to increase its holdings – steps it is only likely to pursue if it gains enough to offset the Inmarsat payments.

Likewise, from Inmarsat's perspective, it gains some stake in MSV's success – both though direct ownership in stock but also by very substantial cash payments that are likely to occur to the extent MSV exercises its options. Plus, Inmarsat itself gains some optionality to effectively "put" spectrum to MSV in the event MSV exercises its first option, but not the Phase 2 option (i.e., Inmarsat gets the option to exercise if MSV exercises accelerated contiguity under Phase 1). In the end, Inmarsat, which has always wanted an ATC play, gets participation in one with very little downside indeed.

Returning to our original question about the moves in stock prices, it all depends on what one thinks these options are worth. In any case, it's certainly good to see these companies cooperating to build value. While it may be premature to really celebrate at MSV and Inmarsat, this deal appears at least to be worth a few congratulatory toasts—with the real party to be deferred...

THE WAY WE SEE IT…

by Near Earth LLC

It has been an active few weeks on the satellite transactional front, as **SES Global** makes an offer for **Spacecom** of Israel, **Hughes** acquires **Helius,** and **Globalstar** and **MSV** each secure financings of $150 million to support their 2008 needs. Additionally, **MSV** and **Inmarsat** teamed on L-band spectrum (see article inside), while **Viasat** announced a contract for **Loral** to build Viasat-1, a super high bandwidth Ka-band spot beam satellite for North America. We believe this last deal is particularly noteworthy, as it represents a transition at Viasat from pure equipment provider to service provider as well – and also will place Viasat in competition against its customer **WildBlue**.

In the world of telecommunications, according to published reports, **Sprint** and **ClearWire** are at it again – purportedly with help from ClearWire investor **Intel** and potentially **Google**. We think some kind of tie-up or even marriage makes sense to strengthen the offerings of both firms and put their wide swaths of 2.5GHz spectrum to use. **Verizon**'s FiOS (Fiber Optic Service) offering passed the 1 million-subscriber threshold, making it the 10th largest "cable" company in the US. While 1 million is a drop in the proverbial bucket of video households, the strong rollout of FiOS and its IPTV brethren represents a gathering competitive storm for cable and DBS operators, though still on the distant horizon.

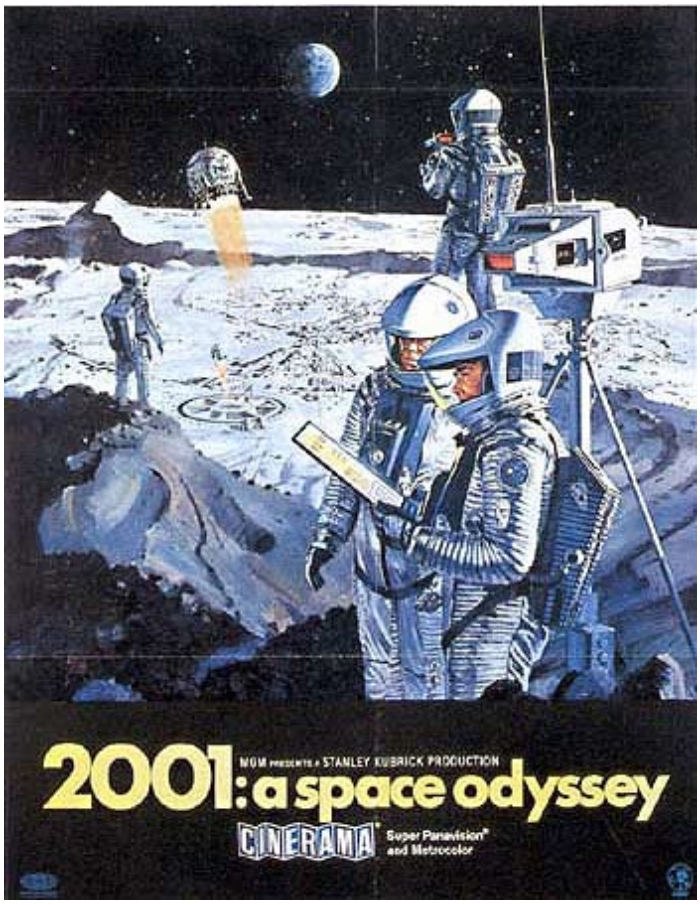
Near Earth LLC provides clients with senior-level attention throughout every aspect of their transactions and projects. Our team has nearly five decades of experience on the Street with such firms as DLJ, CSFB and BMO Capital Markets, in addition to experience within the industry at such firms as Lockheed Martin and Hughes Electronics. The company can offer companies and their Boards independent advice free of the conflicts that can arise when firms also lend funds to their clients, provide research coverage or actively trade a company's securities.

HAL WOULD BE PROUD

by Dr. Len Losik

In the 1968 movie, 2001, ***A Space Odyssey***, moviegoers were treated to a vision of what the future could as far as computer advancements were concerned for improving the safety of NASA's astronauts. 2001 revealed a future wherein technological advances dominate the world.

The sound and visual special effects were spellbinding for the film standards at that time. Aside from the technical plusses, the movie stands strong as one that has something important to say about humankind, where the human race is heading, the increasing reliance on machines, and our unquenchable thirst for discovery.



Hal, the persona of the onboard computer, controlled the spaceship transporting astronauts to the moon. Hal talked to the astronauts in a calm and surreal voice that provided information and control of the spaceship. Hal was able to explain to the astronauts what was happening to the spaceship and why—*t*his was the first popular concept as to computers predicting spaceship equipment behavior.

Fifty years after Hal, two Space Shuttle accidents killed 14 astronauts—science fiction has become science fact. We are now a lot closer to having a "Hal" protect our astronauts. Talking computers are available today as is the technology to protect astronauts. Proactive diagnostics, also known as prognostics, use a technology that is certainly of "Star Wars" class. Prognostics offer information for prognosticians to predict when, and what, electronic equipment is going to fail—a computer can then tell the astronauts what is happening.

The technology that will protect astronauts from harm also benefits everyone. When electronic equipment failures can be identified before such occurs, both high reliability aerospace equipment and consumer electronic products can benefit. Televisions, automobiles, in fact, all electrical equipment that is going to fail can quickly be identified while the products are still at the factory. This will eliminate the frustrating experience of anyone having to return a defective product.

Whys and Wherefores

Defects occur in satellites and launch vehicles. Third-party manufacturers and suppliers at other then the prime contractor's facilities produce most of the equipment in satellites and launch vehicles. As infant mortality failures occur in satellites and launch vehicles, the factories that are shipping their equipment to satellite and launch vehicle builders are the one's responsible for the defects. Satellite and rocket equipment are rigorously tested before they launched into space. However, as there continues to be infant mortality failures, equipment testing must be improved to prevent such from occurring.

One-in-four satellite owners file a claim with their insurance company within the first year of satellite operation for a substantial loss to their equipment. This totals billions of dollars a year. The failure rate is so high, satellite builders have to be ranked by insurance companies on the number of failures per year those companies suffer. There is no warranty for satellites and launch vehicles if they fail quickly as is common for consumer electronics. Purchasers can't return them to the factory for a refund—there's only the insurance—which is absorbed by the American taxpayer. In fact, American taxpayers are forking over $10B/year in failed, taxpayer-owned satellites and launch vehicles.

Prognostics developed when engineers, intimately familiar with the design and performance of their equipment, took an expanded look at data after an electrical or electro-mechanical system failed. Engineers originally only looked at the information available immediately surrounding a failure

while conducting their analysis. When they expanded their view to include behavior from long before the failure, they found a surprising connection between precursors and subsequent malfunctions.

The Mortality Of Equipment

Infant mortalities occur when products and equipment fails after first use. They occur in all complex electrical systems and, when they do, we should be reminded there is , it should remind us that there is something wrong with the manufacturing processes that allow these to occur. To minimize such problems for consumer electronic products, companies offer a return policy or a warranty on a product to counter a defective unit. When a satellite or launch vehicle suffers an infant mortality failure, the builder takes no action unless the purchaser pays for the activity.

The organizations that should be interested in eliminating infant mortalities are the customers who purchase satellites and launch vehicles—NASA, Intelsat and the U.S. Air Force (the U.S taxpayer) as well as the private insurance companies insuring comsats for the first year of in-orbit operation. Private insurance companies offer a warranty to purchasers of satellites and launch vehicles, which NASA and the U.S.A.F. avail themselves of using appropriated funds. Certainly, they should be highly motivated to evaluate any technology that promises a cessation of taxpayer losses.

A Historical View

Today's process for the design and test of high-tech electrical equipment was a result of Germany's Adolf Hitler and Russia's Joseph Stalin. In the 1930's, the German government designed the roadway system known as the autobahn. American transportation specialists flew to Germany to learn about them and our freeway systems are based on Hitler's autobahn.

Developed and used in missiles, rockets and satellites, our manufacturing process evolved out of the cold war. In 1953, U.S. intelligence services were caught unaware when Russia mounted nuclear bombs on their ICBMs and pointed them at the U.S. The U.S. missile program finally

had its first enemy to focus their actions upon and this reinvigorated the U.S. government to support missile production. The Army Air Corp created the Western Development Laboratory in Los Angeles, CA (now Space & Missile Systems). All U.S. missile development and installations were consolidated into that organization.

Using antiquated processes for recording vehicle test data, which consisted of teams of data processors hand-logging and hand-plotting, the process developed an industry reputation as expensive, unreliable, complicated, and unnecessary. As instrumentation was meager and information was inadequate for identifying failure mechanisms with certainty, engineers created a list of the most likely failure mechanism and offered to redesign them—if the military was willing to pay for them.

Using this approach, the need for test instrumentation data to identify exact failure mechanisms was undermined. As a result, the necessary information that would have led to the ability to predict individual vehicle performance was not developed.

Needing missiles quickly, due to the Cold War, the Army Air Corp forced missile builders to use a radical manufacturing approach called concurrent manufacturing. This meant simultaneously designing, manufacturing, testing and fielding missile systems.

Using concurrent manufacturing process, American missiles reliability was at about 25 percent. To offset a huge failure rate, rather than demand from industry the ability to predict individual vehicle performance, the U.S. military simply purchased 4 times as many missiles as they had targets. This action, the only one that seemed appropriate at that time, discouraged any improvement in missile reliability by builders, as there would be far fewer missiles purchased if they became too reliable.

Missile builders said they were unable to predict the performance for any one, single, vehicle. With a 75 percent failure rate, vehicle unreliability validated their conclusion. As there was no need to improve processes or practices, because missile reliability was countered with larger contracts, missile builders used the least demanding processes for equipment manufacture and test. These same processes are used today in missile, rocket, and satellite factories.

In 1957, jet aircraft under test at the Dryden Air Force Base in California were flying so quickly they were crashing and killing test pilots before aircraft performance information could be recorded. Jet aircraft under test were fitted with instrumentation to transmit test data back to the aircraft factory during flight test to counter this problem. Recognizing the importance of test data during flight, missiles were back-fitted with telemetry systems providing important information to determine equipment performance as well as equipment failures.

After 1958, missiles were back-fitted with telemetry systems and then used to launch satellites into space. The same missile builders became rocket suppliers and satellite builders, applying the same minimal processes that were used to build unreliable missiles. As a consequence, rockets and satellites suffer from the same unreliability as missiles.

The Origins Of Telemetry Prognostication

In 1973, the Global Positioning System was created by the U.S.A.F., combining into a single program three satellite navigation-based projects. In 1974, North American Rockwell (now Boeing) won a contract to build 12 Global Positioning System satellites. The first was successfully launched in 1978 and was followed by many others.

The Air Force Satellite Control Facility, Mission Control Center, Sunnyvale, California - where telemetry prognostics were developed and used on the GPS Block I satellites

In 1980, the U.S.A.F. officers in charge of the GPS program asked a very important question of the Boeing GPS satellite engineering team—could atomic clock failures be predicted for GPS satellites? At the time, the GPS Air Force program was competing against both the Navy NRL TIMATION and APL's TRANSIT satellite-based navigation programs for funding.

The atomic clocks were the weak link in the all-new GPS satellite technology. If multi-services testing could be done while the atomic clocks were operating at their peak performance, results would be spectacular, ensuring program funding for GPS by the Department of Defense (DoD).

Nuclear scientists created quantum mechanics in the 1940's to explain why electrons emit RF radiation and do not orbit an atom's nucleus. Quantum mechanics explains the how and the why of GPS atomic clocks operation.

The author collected and processed satellite telemetry and Kalman filter data for more than six years, while leading a group of more than 80 engineers from Boeing, Lockheed Martin, General Dynamics, Aerospace Corporation engineers, and the Air Force personnel. This team analyzed the functional and performance behavior of every satellite Bus, payload and atomic clock and completed failure analysis and root-cause analysis. Accumulating more than 25 years of in-orbit research data, the results were published by Boeing engineers and then used by the Air Force to schedule future multi-service system testing and to improve satellite equipment and atomic clocks planned for use in future GPS satellites. The results of the atomic clock and satellite data engineering analysis developed failure analysis and root cause analysis, which were used to identify the presence of suspect precursors.

As there was no a priori (before examination or analysis) information available for satellite equipment measurements once they reach space, model-based approaches for identifying changes from normal behavior were not appropriate. Pattern recognition technology uses a priori information, as well. For some electronic equipment, factory specialists do develop a definitive understanding and predictive capability for their equipment, but this isn't true for aerospace equipment, which is built in low quantities and have numerous design changes.

The Boeing engineering team, having little in the way of real-time data, but did have some stored historical information available, developed data-driven algorithms that could identify failure precursors. The GPS in-orbit satellites shared telemetry collection resources with U.S. spy satellites and couldn't acquire the data as needed. Only 40 minutes/day/satellite of satellite Bus data, and almost 8 hours of Kalman filter data, was available for predicting failures. Because of this lack of resources, the Air Force paid for the design of their own dedicated control network, bypassing the spy satellites resources.

Interest in on-board satellite atomic clock performance behavior decreased with the award of the contract of the next 28 GPS satellites to Boeing. Boeing atomic clock engineers had accumulated enough information to increase the reliability to a value that satisfied the Air Force and their GPS groups. Predicting on-board satellite failures was regarded as not needing factory-engineering resources. Instead, those resources were applied to designing the next block of satellites. Boeing engineers dedicated to the performance analysis of GPS satellites continued to provide analysis of atomic clock and satellite behavior to the GPS Air Force officers.

Most of the design changes for the next block of 28 GPS satellites found increased reliability and performance, mostly due to failure analysis, root-cause analysis, and failure prediction technology. However, Boeing management stopped the effort for its satellite factory engineers when the GPS Air Force halted funding of the contract.

In 1984, the author took failure prediction technology to Space Systems/LORAL and used the process from 1984 through 1994 in the design, test, and launch of NASA GOES Next geostationary weather satellite, the INTELSA 7 & 7A geostationary communications satellite, and the SCC SUPERBIRD geostationary communications satellite.

In 1994 and 1995, the author used telemetry prognostic technology while at the U.C, Berkeley Space Sciences Laboratory on the NASA/U.C. Berkeley Hubble telescope sister satellite, the Extreme Ultraviolet Explorer low earth orbit satellite, and was able to predict many satellite failures. Failure prediction has now become popular in industries such as nuclear power, commercial and military aircraft and the high reliability telecommunications computer servers.

The Approach and Application

There are two approaches currently available for prognostics; model-based and data-driven. Model-based prognostics uses a priori information to determine what normal behavior is and then compares actual with normal behavior. If a change from normal behavior has occurred, then a failure is assumed. Experts decide what normal behavior is, and as equipment can operate from 10 to 15 years, the prediction has to be accurate for the long term. That can be extremely difficult and the results are suspect. Long-term behavior must factor in all environmental conditions, operating scenarios, equipment degradation behavior, and sensor aging characteristics. For simple prognostics, upper and lower limits can be effective.

NASA uses a commercially available, limit checking prognostic software program to track Space Shuttle propellant tank pressure and temperatures on the launch pad prior to lift-off. SUN Microsystems uses model-based prognostics for predicting server failures and added more than 1,000 sensors per system to use the technology.

A priori information is usually expensive to generate, requiring an expert's long term time and resources. Model-based prognostics can be modeled using pattern recognition technology—deviations from normal can be easily identified.

Model-based prognostics are appropriate for measurements that are not dynamic, such as circuit voltages and temperature controlled environments. This is a good solution for stationary equipment with little measurement variation.

Data-driven prognostics uses recent data to determine what normal behavior is and does not use a priori behavior. Data-driven prognostics possess the same performance as model-based prognostics but they don't require any a priori information. Data-driven prognostics have the benefit of eliminating the need to factor in such elements as equipment degradation and sensor aging characteristics, which must be accurately applied for the model-based solution. Data-driven prognostics are insensitive to the amount of data available, the reliability of the data as noise reduction algorithm is used, insensitive to the equipment the data is from as well as the type of data available. Data-driven prognostics requires equipment be instrumented with some data from the equipment to be used for analysis.

Telemetry prognostics uses telemetry to provide the information used by prognostic algorithms to illustrate failure precursors, indicating the equipment will be failing. Telemetry is the generation of analog information, which is then digitized and sent to another location for analysis, then reconverted back to analog information and displayed for analysis.

Telemetry is used across many industries, including agriculture for remotely located equipment, medical devices, hospitals, rockets, satellites, aircraft, and computers.
Failure Analysis' telemetry prognostics use the awareness of failure precursors in electrical piece-part performance behavior that's present before equipment failures occur and uses that information to predict equipment failure. An algorithm is used to determine how long the equipment will operate and the day the failure will occur, once the precursor is identified. Piece-part reliability uses probability analysis to predict piece-part reliability.

Satellites and launch vehicles are made of electrical piece-parts to make systems of electrical and electro-mechanical equipment. Reliability specialists are used to quantify the reliability of electronic piece-parts. Their systems provide the information, allowing engineers to compare performance.

The Role Of Randomness

Today's satellites and launch vehicles use hundreds of thousands of piece parts. These parts come from the same factories that produce electrical parts for other products, as well.

In an attempt at predicting the reliability of electrical parts used in satellite and launch vehicles, random analysis and probability theory are used to quantify piece-part reliability for quantities of electrical parts in the hundreds of thousands. Believing that only random failures occur for piece-parts, as long as there are no design flaws or manufacturing process problems, piece-parts duration after power is applied is understandable by using a normal Gaussian distribution.

Not having any better measurements to quantify the reliability of piece-parts, probability theory has provided the only method for information for decision-making. For prognostics, with large quantities of piece-parts (in the hundreds of thousands), this means the duration that a piece-part performance will remain within the bounds needed to meet design life is random.

Research conducted by the author revealed the duration of remaining usable life (RUL) for an electrical piece-part, once the piece-part's performance characteristics have begun to change to a value such that the change in behavior becomes visible in data, is also random. The probability of failure is also a random function, where the duration of remaining life for that piece-part has begun to change performance.

We know that all piece-parts will fail if under long term electrical stress. Some will fail sooner than others, and some will operate longer than others, according to a normal Gaussian distribution curve. Effecting the duration of remaining usable life of each piece-part are random variables, such as environment, operational use and operational conditions. We know that the higher the operating temperature, the quicker the piece-part and the system fails. This is **not** a random influence and is quantifiable and predictable.

The distribution of independent random errors (which exhibit themselves as piece-part failures and identifiable piece-part failure) behavior takes on a normal distribution as the number of piece-parts becomes large in number (again, for space equipment, piece-parts are in the hundreds of thousands).

Satellites can operate in space for many years. When something occurs unexpectedly, only limited information is available from the telemetry system to diagnose what caused the unexpected behavior and why such occurred. When space equipment is on the ground and a problem occurs, additional diagnostic data is directly available to complete root cause analysis.

There is little process improvement done at vehicle factories as the builders seldom receive feedback regarding problems their satellites have suffered in space. The builders assume they have done the best job possible, regardless of how well or how poorly a satellite behaves. Prognostics add a new level of performance to design and manufacturing, replacing still-used, antiquated processes.

Although we cannot predict when an individual piece-part will fail without initially testing the piece-part, which is cost and schedule prohibitive, we can predict with 100 percent certainty the part will fail someday. Recent simulation indicates that an eight-month burn-in period is necessary to eliminate 80 percent of the infant mortality large quantity piece-part failures prior to their integration into equipment.

We can also now also predict the probability of the duration of remaining life, once piece-part performance accelerates to such a value that behavior change can be identified in test data. We also know piece-parts will fail sooner when its behavior changes from the performance specified at purchase. The change in performance of a piece-part is an indication that molecular changes are occurring faster than expected and will continue to occur until the piece-part fails catastrophically.

Once piece-part behavior changes electrically in an active circuit, the duration of remaining usable life is predictable. Using information that identifies failure precursors in test data, electrical and electro-mechanical equipment, the remaining usable life can be determined.

Prognostication Program

In 2006, Failure Analysis began offering telemetry prognostics technology to missile builders, missile equipment suppliers, space equipment suppliers, satellite, and launch vehicle builders as well as to NASA, the U.S. Air Force and commercial spacecraft owners and operators. Using Failure Analysis' telemetry prognostic technology, first year in-orbit satellite failure rate could be reduced from one-in-four to as low as one-in-20. When satellite and launch vehicle telemetry systems are upgraded to use prognostics, first year in-orbit satellite failures could be as low as one-in-40.

The author would like to thank the **Aerospace Corporation** and the **U.S. Air Force** for designing and developing the GPS technology, which has resulted in rewarding work for hundreds of companies, products and services that effect the U.S. military and American citizens in almost all aspects of daily life. For further information regarding Failure Analysis, the author, and the technology, please visit the company website at: www.failureanalysisco.com

Dr. Len Losik is founder of Failure Analysis, a space systems services provider and world leader in Telemetry Prognostic technology. Dr. Losik has instrumented some of the world's most complex satellites and launch vehicles and has used Telemetry Prognostics to predict flight equipment failures on NASA, Air Force and commercial communications satellites and launch vehicles. He has published two books on Telemetry Prognostics, available at books stores and at Amazon.com and EBAY. Dr. Losik will be presenting a paper about telemetry prognostics titled, "Telemetry Prognostics, Upgrading Space Flight Equipment Design, Manufacture, Test, Integration, Launch and on Orbit Operations" at the Space 2008 conference, held in San Diego, CA in September 2008.

FA Failure Analysis

Dr. Losik has earned a Ph.D. in Electrical Engineering, an M.A. in Electrical Engineering, an M.S. in Education, M.A. in Education, B.S. in Physics and Mathematics. Dr. Losik has worked for most of the major aerospace companies in the US with over 32 years in satellite and launch vehicle design and test experience.

DIGITAL APPLICATIONS AND COMMUNICATIONS

Dynamics in the "Oil & Gas Patch"

By Martin Jarrold, Chief of International Program Development, GVF

As a supplier of essential services to the oil & gas industry, the satellite communications sector are acutely aware of the fact that cost-effective and efficient means of communication are essential to mission-critical operational success in the "oil & gas patch". Satellite-based communications, together with satellite-terrestrial hybrid solutions, and terrestrial platforms, play a vital role in oil & gas. They provide essential connectivity and access to vital applications, often in remote geographic environments and challenging climatic conditions.

The search for new reserves of oil & gas necessitates migrating to harder-to-reach offshore locations (most recently in the Arctic Ocean latitudes). Additionally, older production fields are the target of innovative drilling and pumping techniques designed to extract the last drop of oil or cubic meter of gas, making the mission-criticality of ICTs (Information and Communication Technology) even more evident.

Thus, satellite will be an important, but not exclusive, part of the bigger picture at a new **GVF** event focused on the oil & gas exploration and production (E & P) environment. Previously, GVF, in partnership with **UK-EMP**, has organized two successful and widely acclaimed "*Oil & Gas Communications: Middle East and North Africa*" conferences, held in Cairo in 2006 and 2007. Now that same partnership is directing its attention to an event that will examine in much greater detail the nature of the applications that the oil & gas industry must exploit. This is necessary to keep these forms of energy flowing from the subterranean and subsea depths of the planet.

'Oil & Gas Connectivity: Digital Applications and Communications Dynamics' will be ***the*** premier event at which the complex interrelationship between applications imperatives and the communications infrastructures required to support

and deliver them will be investigated. The conference will be held in *Aberdeen, Scotland*, over May 12th and 13th, 2008.

Attendees will be recipients of extended networking opportunities between key leaders of oil & gas companies, the vendors of cutting-edge applications, and the suppliers of state-of-the-art communications links. The conference will create opportunities for companies in the oil & gas vertical to call upon ***all*** ICT solutions providers; terrestrial wireline, wireless, and satellite, in the communications field, together with developers/vendors in the digital applications field. The providers can then match their offerings more closely to the specific demands and requirements of the oil & gas patch.

Enabling the Digital Oilfield

One of the key elements of the conference is the manner in which satellite, and non-satellite, communications solutions can help "enable the digital oilfield", the key mantra of today's energy extraction environment. The first step is to determine if there is a universal agreement of a shared definition regarding the term. The conference will go beyond what is implicit in the "enabling of the digital oilfield"—that is, the imperative requirement for systems resilience and data security—to analyze today's communications product and service environment. These environments are where the players in the solutions vendor community compete to satisfy the efficiency and data risk-management needs of the buyers of *Digital Oilfield ICT* solutions in the E & P environment.

Networking Technologies and Topologies

In today's oil & gas environment voice, data, and many higher bandwidth applications must flow freely between remote sites and other locations in companies' networks to facilitate important and timely decision-making. The design of reliable, scalable, and cost-effective multi-application networks, together with leveraging the latest technologies, is now critical to the *Quality of Service* (**QoS**)-maximized delivery of solutions in the increasingly demanding environments cited above.

For many years, VSAT-based communications systems have been of pivotal importance in the servicing of narrow-bandwidth **SCADA** (*Supervisory Control and Data Acquisition*)-type applications. Higher power, satellite-based systems are the key to the successful deployment of new broadband-based applications with a foundation in the IP environment. In this context, a major task of today's satellite industry is to identify exactly how greater satellite bandwidth supply and cost-effectiveness can be realized in the form of improved bandwidth optimization and oil & gas sector-specific customization techniques.

However, as noted above, the emphasis in this conference is not only on satellite, but also on leading edge developments in terrestrial wireless and fiber communications technology. In addition to this, their current and potential impact on the ICT strategies in the business models of the oil & gas sector end-user, and in the communications solutions vendor offerings environment.

An analysis and understanding of current trends in terrestrial wireless and fiber is an essential foundation for oil & gas ICT managers in the planning of future-use and purchasing decisions in the broadband, IP, applications, and services marketplace. Essential is a clear and expert overview of how all of today's communications technologies, and the associated business models which are facilitating their deployment, are most likely to yield end-users greater operational efficiencies. In this connection, the Aberdeen dialogue will examine how the use of different communications platforms are helped, hindered, and determined by geographically determined supply factors. There will also be an analysis of the potential for spectrum allocation conflicts between terrestrial wireless and satellite solutions in different parts of the global oil & gas patch. In addition, the program will explore the evidence for increasing levels of demand for fiber in the offshore production environment, examining whether or not there is a coherent business model to support the deployment of such infrastructure.

Evolving Commercial Applications to the Satellite Environment

It often seems that the developers of many business mission-critical applications, including those employed in the unique operating environments of the oil & gas industry (e.g., such as *SAP*, *CITRIX*, etc), work very much in a "fiber frame of reference" within the broadband world. Importantly for the oil & gas industry, the evolution in the operating parameters of such applications to render them more compatible with the high latency environment of VSAT would introduce an entirely

new business model. This model would have the effect of radically offsetting any perceived potential advantages of, and create a barrier to entry for, an offshore fiber infrastructure.

The oil & gas industry end-user is essentially communications technology neutral. ICT solutions buyers in the sector are interested in the applications-supporting cost-effectiveness of the solutions they need, rather than the details of the constituent technology platforms that contribute the solution. Therefore they tend to be platform agnostic.

Yet, the physical circumstances of oil & gas resource exploitation, and the industry requirement to link multiple sites such as: inland and offshore; well-head and site office; *Comparative Visualization Environment* (**CVE**) and corporate HQ, necessitate companies in the sector buy wide area networking services. These services use various combinations of wireline, terrestrial wireless, and satellite platforms. It is incumbent on communications industry operators and service providers to ensure their offerings to the industry continue to provide a number of choices. These services include; multi-platform, multiple technology, hybrid solutions to meet the complex and extensive voice, highly data-centric (data gathering, real-time data monitoring, data analysis and manipulation), and video applications needs of this vertical environment.

Design Ergonomics and Robustness in the Convergent Digital Solution

The communications dynamics of the oil & gas sector extend considerably beyond the geology and seismology of locating and extracting raw energy sources from underground or beneath the sea. In fact, the dynamics include the various individual segments of the industry vertical as a whole. Within this, CVE allows for the simultaneous access and sharing of huge volumes of data between the multiple nodes of the oil & gas E & P environment. As a result, this involves close analysis of the practicalities of extending the bandwidth employed by the 'turnkey solutions' that are sometimes preferred by ICT mangers in the sector. This, as opposed to a true, multiple, end-to-end connectivity, is able to serve the entire range of industry applications demands at any one physical location as well as throughout and across an entire networked decision-making environment.

While cost-effective, reliable and scalable communications are one of *the* essential precursors of E & P efficiencies for the oil & gas sector, the fact that exploration and extraction does often take place where the natural environment creates significant physical challenges. Because of this, the consequential impact on communications equipment design and physical resilience must be taken into account. This has been true in, for example, the North Sea oil & gas fields, for which the city of Aberdeen has served as a major onshore center for many years. And this will be even more so in the near future. This is especially true in such emerging offshore environments as the Arctic Ocean, where personal radio, mobile telephony, Wi-Fi, and so on, hardware used at the well-head and throughout rig and field locations must be built to take the roughest of rides. Naturally, this also applies to the design and operational resilience of VSAT equipment.

Oil and Gas Communications for Oil and Gas Continuity
Finally, the conference will explore the real-world realities in the oil & gas environment of maintaining and restoring essential communications pathways during, and immediately after, connectivity interruptions such as natural disasters (such as major storms at sea), and human conflict situations (acts of terrorism). The effectiveness of different communications platforms in making useful provisions for business continuity/disaster recovery/emergency management, particularly the unique contribution of satellite communications in such circumstances, will be of primary consideration in Aberdeen.

For more information, please follow the link from the '*Oil & Gas Connectivity*' banner on the GVF homepage at: **www.gvf.org**.

Martin Jarrold joined the GVF in June lf 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.

Executive Spotlight On...

DAVID RICHARDSON,
VICE PRESIDENT CORPORATE, AND BUSINESS DEVELOPMENT, UDCAST

In his executive role at UDcast, David Richardson contributes to the development of new products, market channels, and alliances, in the rapidly developing fields of Mobile TV and WiMAX. Richardson has more than 20 years of broadcasting and media industry experience. He was previously the Director of Business Development at NDS in North America. There, he co-invented NDS's DVR technology—XTV, now the most widely deployed DVR solution in the world. For this contribution, Cable & Satellite Europe recognized him in 2005 as one of the leaders in European broadband and pay TV broadcasting.

Most recently, Richardson served as the **NDS** liaison for **News Corp**., its corporate parent, as well as with the U.S. entertainment industry. Richardson has also participated in the development of satellite data broadcasting technologies, IP multicast and interactive applications, including new forms of advertising and electronic program guides. During his time with NDS, Richardson contributed a number of granted- and filed-patents. Prior to that, Richardson founded and managed his own company specializing in pre-press systems integration and content workflow.

He has an academic background in economics, history and law. He entered the fields of telecommunications and systems via the Israeli Air Force, where he was trained in communications and security. Richardson gained his media experience in the newspaper industry as a reporter, editor, publisher, and systems developer before entering the digital television technology sector.

We had the opportunity to discuss with Mr. Richardson the Enterprise Network environment and how such meets the changing needs of today's users. In

the conversation, we were able to explore how satellite-based solutions are meeting the needs of the Enterprise private networks, what they bring to their operations as well as address WiMAX TV and hybrid systems.

SatMagazine
The satellite market has evolved rapidly over the last five years, becoming more central to the deployment of Mobile TV. David, what role does UDcast play in this broadcasting ecosystem?

David
UDcast has its roots in satellite and today we are a software company providing IP broadcast solutions for the delivery of content to a broad range of devices over existing and emerging wireless networks worldwide. Satellite networking is a notoriously difficult environment and UDcast has years of accumulated expertise that it has successfully applied to solve the problems of the mobile TV market. Satellite distribution remains a most cost-effective way of moving content and distributing it over a mobile TV network, but poses challenges regarding the insertion of local content and advertising. UDcast was the first to develop a solution to this problem as well.

SatMagazine
Are satellite technologies applicable in other areas?

David
Satellite represents operations in extreme conditions for Internet access. As UDcast was built on applying satellite technology to deliver broadband IP with security and speed, we have the experience and technology innovation to apply it to other networks. Our ***UDgateway*** and the newly launched ***WANxpress*** products are all-in-one appliances applicable in both the terrestrial and WiMAX environments. For example, the company has developed WANxpress compression technology that can be applied in all IP environments. Ipanema, a provider of terrestrial optimization solutions, has adopted this solution. WanXpress can accelerate date exchange by as much as 20 times and can also enable bandwidth savings of 75 percent, on average.

SatMagazine
What, exactly, is WiMAX TV and what role will Satellite play in the evolution of WiMAX TV?

David
WiMAX TV is a solution enabling reception of live video content over standard WiMAX networks. It offers great quality of image for end users, while preserving network capacity at the same time.

There are more than 200 WiMAX networks deploying around the world as of this discussion. This represents large numbers of content feeds and base station use.

Live television will be one of the important value added application for WiMAX, and satellite distribution will enable efficient delivery of the content to the transmitter sites.

SatMagazine
What do you see as the main applications for TV over WiMAX in the short term? Will it be in trials, deployments in areas where other options aren't available, or perhaps backhauling DSL-based IPTV services, or even in-car TV?

David
It is difficult to predict where the initial take-up of WiMAX TV will be, but we can see applicability in the fixed, nomadic, and mobile environments. In developing markets, WiMAX is providing wireless broadband access and WiMAX TV becomes an attractive add-on. On university and other campuses, WiMAX will displace Wi-Fi on laptops and TV seems an obvious option. WiMAX, with its bandwidth and two-way capacity, is a good candidate for many mobile networks, as well.

WiMAX is emerging as one of the most promising wireless networking technologies, designed to meet the demand of mobile broadband IP. However, it is important to remember that broadcast-quality video is a bandwidth hog. Each new customer requires more bandwidth; connectivity sessions grow longer and applications such as video require ever more capacity. Serving thousands of such individual "*unicast*" streams becomes prohibitively expensive. Broadcast is the only proven way to deliver content inexpensively to large numbers of viewers. The viewing times tend to cluster together, depending upon the popularity of the content being broadcast. And this viewing tendency occurs whether at home, or on the go. One way to take full advantage of WiMAX capacity is to implement a hybrid broadcast/multicast/unicast infrastructure.

Executive Spotlight On...

SatMagazine

When looking at the future for satellite and mobile TV, how do you see DVB-SH progressing?

David

The DVB-SH standard (*Digital Video Broadcasting – Satellite services to Handhelds*) is an evolution of the DVB-H standard. The technology offers three key benefits:

- *A much greater choice in terms of spectrum (up to 3GHz)*
- *Better spectrum efficiency, directly translating into significant cost savings*
- *And possible hybrid satellite/terrestrial operation, to extend mobile broadcast reach all across a territory*

In Europe, DVB-SH will use the S-band frequency at 2.2 GHz, available across many European countries Europe's first S-band satellite, owned by a **Eutelsat** and **SES Astra** joint venture company, will be launched in the first quarter of 2009. The S-band allows the use of the DVB-SH standard and is adjacent to the UMTS band, thus allowing reuse of existing cellular sites, towers and antennas. In the US, the first DVB-SH operation will also be based on a hybrid system at 2.2 GHz with an S-band satellite to be launched by **ICO Global Communications** in March 2008.

SatMagazine

When are we going to see large-scale hybrid WiMAX / mobile broadcast deployments and where?

David

ICO and Clearewire initiated the first trial of a hybrid system in 2007. They wanted to validate the possibility of using satellite for broadcast TV services and WiMAX for interactivity. This model has a good chance to become popular on a global scale, as DVB-H and DVB-SH service are now being deployed (there are already eight commercial networks today, and we are expecting more than 20 by end of 2008).

SatMagazine

Looking at the enterprise, how strong is the demand for private network and VPN (Virtual Private Network) over satellite solutions today? Do you see this demand growing over time?

David

There is a growing demand for VPN for enterprises over satellite networks. This is mainly due to:

- *An increasing demand for VSAT connections for branch offices of enterprises. This segment is growing at 10% per year, and in some regions such as APAC it is growing more than 30%.*
- *Awareness of the need for VPN accelerated solutions is also growing. In the beginning the method for accessing internet from remote areas was the slow dial-up service, then the VSAT solution started to be popular (and cheaper)*
- *Knowledge in companies about the intrinsic problems of such networks and of the solutions available such as UDcast's UDgateway and WANxpress technology)*

Security issues are key not only for big enterprises but also for SOHO. The increased sophistication of small companies shows their increase interest in VPN solutions over satellite networks.

Companies are used to using VPN solutions for connecting all of their remote sites, both over terrestrial networks and satellite networks. The main issue is that there are still many enterprises not aware of the low performance of VPN solutions over satellite networks, which can decrease performance as much as 80 percent. They use the same terrestrial networks equipments without coordination with the SSP (*Satellite Service Provider*), When they complain about the slowness of the satellite connected network, the SSP is unable to immediately help them as they are not aware of the VPN added by the end customer.

That's why satellite-aware VPN solutions are needed, in order to accelerate the applications before the encryption. The first appliance from UDcast to secure and accelerate satellite-connected networks is called UDgateway and 75 percent of UDcast's customers have invested in this product, mostly due to its VPN capabilities. This continues to be a major part of the new generation of our appliances: WANxpress, that further accelerates date exchanges through an advanced, storage-based, compression algorithm.

SatMagazine

Satellite solution providers have a chance to increase their penetration of the private network market simply by responding to the growing demands of customers and providing new satellite-enabled services to the market. But what are the best services for satellite providers to focus on?

David

There are several benefits of the satellite networks, which SSPs need to boost to increase their penetration. The instal-

lation time of a satellite private network is less than one week and is even possible to complete in one day for those urgent to critical installations. The availability time could reach 99.85 percent, much higher than a DSL or cable line.

On the other hand, intrinsic problems endemic to satellites brings new issues requiring solutions:

- *Price of satellite bandwidth: the transponder price is still expensive, making satellite internet access more expensive than terrestrial access*
- *Slowness of enterprise applications: applications were not designed to be used over networks with long delay making some applications as SAP, Citrix, CIFS unable to work over satellite networks.*
- *Security: in a satellite network there are usually two different parts, the satellite to get connected to the SSP hub and the terrestrial to get to the internet or intranet. When branch offices need to get connected to the company's intranet over satellite, a VPN solution is mandatory for matching the level of security of the enterprise.*

These listed issues can be addressed by the UDgateway, which provides standard IPsec tunnels end-to-end from the remote branch offices to the headquarters of the company. In addition, payload compression and techniques of ACK suppression save bandwidth (= money) to end customers, or make bandwidth available for new applications. To address specific applications of enterprises, there are specific optimization techniques for applications as HTTP and CIFS, or the applications can benefits of QoS, compression, and TCP acceleration to get accelerated.

SatMagazine

David, from a cost standpoint, what is the target satellite companies must meet in order to obtain a share of this market?

David

It is not a question of money. For offices located in areas where only dial-up connections are available, satellite solutions are the only choice for gaining broadband access. For other kinds of companies looking for a reliable back up solution for their terrestrial access, satellite would be also the right choice.

However, there are other, more price sensitive segments which would be willing to move into a satellite broadband solution if the price for such access becomes morein line with DSL or cable (i.e. Wildblue, with whom UDcast is working closely to deliver enterprise-grade satellite IP access). For including the VPN solution, the payback time is less than one year for UDcast's solutions. How is such possible? The acceleration increases the productivity of end users, the bandwidth savings allows the company to pay less for a better performance, and the security avoids potential threads that can cost very expensive.

SatMagazine

What security concerns are present, and how do you address them?

David

The main concern many enterprises have about security on satellite networks is their internal lack of control of the security equipment. Some hub manufacturers have a solution for encryption in place from the remote modem to the hub. From the hub to the headquarters or data centre of the company, there could be a leased line, an internet connection or a VPN, normally provided by a different actor than the SSP. From the company's point of view, there is security—but who controls the security? Does the SSP assure that the proprietary solution of the hub is secure enough? Does the SSP assure that the connection from the hub to the headquarters is secure enough?

That's why many companies chose to have a dedicated solution from each of their satellite-connected branch offices to their headquarters/data centre. They can choose a solution that's based in standards (IPsec), they can control both ends, and they don't care about any modifications in the network topology of their providers (SSP + ISP). If this VPN standard solution also accelerates and enables applications over the satellite network, they will be closer to the desired LAN-like performance. That's the objective of UDgateway and WANxpress technology, and the wish of many companies that haven't yet found a solution for their remote branch offices.

Not only is the link connection a concern for IT in enterprises, as there's also the security of remote networks which is equally important. Sometimes the remote branch offices are small and there is no IT person available on site to put in place right security tools. The UDgateway includes, in the same box, firewall and antivirus applications ensuring protection of the remote network against external threats..

SatMagazine

What about overall performance and any performance enhancement you offer?

David

Every single network is different— applications and the types of files transferred are different—on the average, UDcast's UDgateway can accelerate in the range of 2x to 7x and save bandwidth as much as 90 percent for some data types. These rates include the overhead of the VPN tunnel. The latest WANxpress technology enables acceleration by up to 20 times.

To get this performance, different techniques are applied:

- *TCP acceleration: it helps to accelerate all applications running over TCP protocol. When bandwidth is available, TCP acceleration helps to fill the bandwidth available (ramp-up, congestion avoidance), thus getting the data faster. When the bandwidth available is small, ACK suppression can still help to use less bandwidth, thus getting the data faster.*
- *Compression: in order to save bandwidth an on-the-fly compression algorithm is applied to the payload of IP packets. The WANxpress compression goes even further thanks to a cutting-edge storage based compression algorithm.. The algorithm compares all new data with what has been previously exchanged through the network.*
- *Application acceleration: as TCP acceleration is not enough for some applications, which are limited by the application layer, http pre-fetch and caching are available in the UDgateway, CIFS acceleration allows performance up to 4 times faster and SMTP relay allows the immediate delivery of emails to the UDgateway to be sent afterwards in a low priority bases.*
- *QoS: 4 different queues can help customers to prioritize traffic depending on their needs. On top of that, traffic shaping is available for reserving bandwidth for the most important hosts, remotes or applications.*

SatMagazine

What roles will Satellite and WiMAX play in the market of the future?

David

The latest wave of convergence pulls together the three, so far distinctive, technology and business areas—IP, Broadcast, and Wireless communication—into a single ecosystem. While the Internet Protocol has established itself as the near universal method of digital, broadcasting remains the only way to guarantee the cost-effective and predictable delivery of high-quality entertainment and information to large audiences. Wireless access too has become an expectation forcing all in the value chain to develop and deploy technologies and solutions, which enable access to content anywhere and at any time.

Looking at how the innovative satellite technologies enable inexpensive Internet access (e.g. WildBlue in U.S.), or immediate mobile TV coverage (announced DVB-SH deployments), and taking into account hundreds of wireless broadband networks being build around the world today, there is no doubt both the satellite communication with its economy of scale, and WiMAX with its flexibility, are placed directly at the heart of the transforming digital industry.

SatMagazine

Thanks for taking the time to speak with us, David. There certainly is a great deal to learn and understand regarding convergence and you've definitely helped us in this regard.

AVANTI COMMUNICATIONS — HYLASONE SATELLITE

by Hartley Lesser
Editorial Director
SatNews Publishers

HylasOne is the first satellite for Avanti Communications and is scheduled to launch in March of 2009. Incorporating the latest satellite technology, HylasOne has been designed to provide two-way data communications for a number of market segments, including home and enterprise broadband to non-terrestrially served areas, government and media networks. In the mix will be a distribution channel for IPTV plus a Ka-band interactive TV return channel.

HylasOne's unique characteristics reduce the overall operating costs of satellite services, both in the bandwidth and the hardware that is required. A flexible combo of ultra-high speed corporate networks, two-way broadband access services, IPTV platform distribution and Ka-band Interactive TV return channel will be delivered.

The satellite will be positioned at 33.5° W and will features both Ka- and Ku-band wide beams, using Ku-band BSS spectrum. Based on ISRO I-2K Platform, which has a 22-year in-orbit history, the satellite will have a launch mass of 2300 kg with 2KW payload power and a 200 kg payload. HyalasOne is expected to have a lifetime service of 15 years.

Some of HylasOne's key features include competitive pre-launch rates, very small, low cost antenna operations (e.g. only 45cm DTH antenna), with only 66cm VSAT terminals being

required. Due to circular polarization of Ka-band, they'll be easy antenna pointing. Additional options will include flexible satellite coverage, bandwidths available up to 740 MHz on a single beam, and, on some routes, broadcast mode from one beam to team beams. VNO (Virtual Network Operator) platform operations will also be available and there's going to be automatic level control on the transponders to compensate for rain interference.

As far as applications are concerned, there will be 250+ DTV channels; 320,000+ broadband users; triple play of voice, Internet and TV as well as access for transportable/mobile use. The satellite coverage will encompass 22 countries in western and central Europe.

Building The HylasOne

EADS Astrium received the contract to build the satellite, the first contract to include the company's latest communications payload technology, Generic Flexible Payload and Next Generation Antenna (allows flexibility for bandwidth and channel assignments, with capacity tailored to meet changing demands). In fact, this satellite will also be a flight demonstrator for the technology. The **ISRO I-2K** small satellite platform will be used, becoming the second order under the cooperative agreement between EADS Astrium (communications payload) and **ANTRIX/ ISRO** (satellite bus, integration and testing). Antrix is the commercial arm of the Indian Space Research Organization (ISRO).

HylasOne's satellite control services will be handled by **Inmarsat** under a five-year contract. This is also a first for Inmarsat, providing real-time operational services for a third-party. The control system to be used is the same one Inmarsat uses to support their own fleet of 10 satellites.

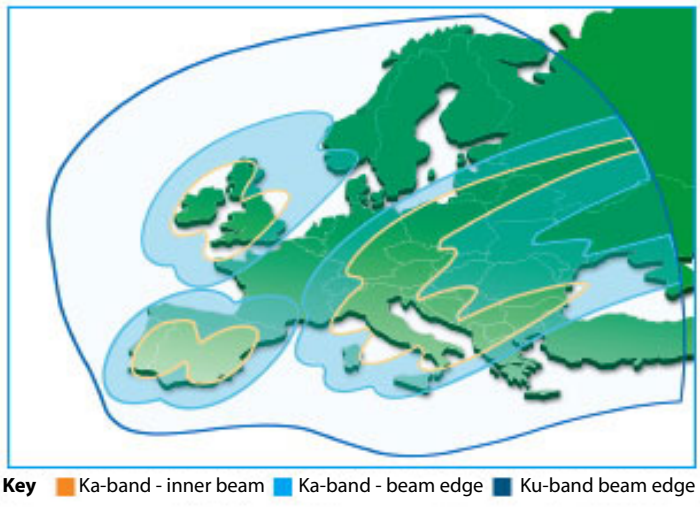
Avanti Communications is a United Kingdom-based firm that supplies satcom services to a variety of business and residential customers and they also offer consultancy services that have been contracted by national governments, corporations and European agencies. The company will be new to the satellite operations business, but they already have 10 years of experience in the satellite indsutry, with commercial delivery to **BNSC**, **ESA** and **EU** projects. The firm currently operates a DVB-RCS platform for data network services throughout Europe with **Intelsat** coverage on **IS-903**. investing HylasOne are the **British National Space Centre** (BNSC) and the **European Space Agency** (ESA).

Summary specifications

Ka-Band performance
EIRP 62dBW at beam centre
8 x 250MHz forward link + 8 x 120MHz return link transponders
Bandwidth and power levels adjustable in orbit to meet market demand
Cross-strap with Ku-band beam
Circular polarisation
Uplink and downlink frequencies

	Gateway	User
Forward	up: 28 - 29.5GHz	down: 19.7 - 20.2GHz
Return	down: 18.6 - 19.4GHz	up: 29.5 - 30GHz

Ku-Band performance
EIRP 54dBW at beam centre
2 adjustable transponders (from 18-120MHz)
Cross-strap with single Ka-band beam at up to 250MHz
Tuneable in-orbit across the entire BSS spectrum
Linear polarisation
Uplink 17.3-18.1GHz
Downlink 11.7-12.5GHz



UNIVERSAL SERVICE

Satellite Service Providers and the FCC Funding Mandates

by Maury J. Mechanick, Counsel, White & Case LLP

This article provides an overview of the critical funding mandates imposed on telecommunications service providers in the sky, as well as on the ground. These funding mandates include the Universal Service Fund (USF), the Telecommunications Relay Services Fund (TRS Fund), the Local Number Portability Administration (LNPA), and the administration of the North American Numbering Plan (NANP).

Historically Speaking

The concept that all Americans should have access to affordable telecommunications services, commonly known as "universal service," traces its origins to the "*Communications Act of 1934*." Congress proclaimed as a matter of general policy that "all people of the United States" shall have access to a "rapid, efficient, Nation-wide communications service with adequate facilities at reasonable charges."

Funding, however, took the form of an internal cross-subsidy imbedded in AT&T's relative pricing structure for local and long distance services with higher long distance charges basically subsidizing lower local telephone rates, including service to low income households and high cost areas. The breakup of the Bell System in the early 1980s meant this approach was no longer sustainable. Such necessitated a new strategy in order to preserve the commitment to universal service.

That was initially accomplished through the access charge, which established that long distance carriers would compensate local exchange carriers for interconnection with their networks. With the passage of the "Telecommunications Act of

1996," the scope of the universal service commitment was significantly expanded to include support mechanisms for rural health care providers and eligible schools and libraries, in addition to low-income households and high cost areas. Moreover, the range of companies expected to contribute to support this program was also expanded to include all telecommunications carriers and providers of telecommunications services.

This expanded legislative mandate ultimately gave rise to the establishment of the USF. The USF assumed its present form in 1999 when the FCC consolidated responsibility for overseeing the various universal service support mechanisms in the Universal Service Administrative Company (USAC), a private not-for-profit organization, which today administers the USF under the auspices of the FCC.

Currently, all telecommunications companies that provide service between states must pay a percentage – or contribution factor – of their interstate end-user revenues to the USF. Companies providing a mix of domestic and international services also must contribute to the USF. The contribution factor is adjusted quarterly, and is increased or decreased, depending on the needs of the USF.

The TRS Fund, which actually predates the USF, is an outgrowth of the "Americans With Disabilities Act of 1990," which directed the FCC to ensure that telecommunications relay services are available to hearing-impaired and speech-impaired individuals throughout the United States. In a series of decisions in the early 1990s, the FCC identified the services that telecommunications carriers must provide to the hearing and speech impaired, adopted a shared funding mechanism to enable carriers to recover the costs of providing such services, and established the TRS Fund, which is administered by the National Exchange Carrier Association (NECA). The FCC has required all carriers providing interstate telecommunications services to contribute to the TRS Fund based on their interstate end-user telecommunications revenues, including the interstate portion of services such as satellite and international services.

Satellite Industry Applicability

Determining the extent to which satellite service providers are required to contribute to these funding mechanisms has proven to be somewhat more complicated than it might seem at first blush. In the case of the USF, the FCC has been quite emphatic in its view that the USF contribution obligation generally applies to the satellite industry, as evidenced by its unequivocal declaration in a 1997 decision stating that "satellite providers that provide interstate telecommunications services or interstate telecommunications to others for a fee must contribute to universal service." However, the FCC then went on to state that, in response to an issue raised by PanAmSat and some other parties, the leasing of bare transponder capacity to others did not constitute the provision of telecommunications services because it did not involve the transmission of information. Therefore, entities that simply engage in the leasing of bare transponder capacity (i.e., satellite operators) are not subject to the obligation to contribute to the USF, whereas those companies that are involved in the transmission of signals to satellites (i.e., ground segment operators engaging in uplinking activities) are subject to the obligation to contribute to the USF.

In a separate decision in 2003 involving an appeal by **COMSAT**, this reasoning and distinction were expressly extended to the TRS Fund, as well. And while no comparable determinations have been made regarding the remaining two funding mandates (NANP and LNPA), the procedures that the FCC now has in place leave no doubt that satellite service providers would be subject to those contribution obligations as well. The practical effect of this is that the term "satellite service providers," for purposes of these funding mandates, would appear to apply just to ground segment (uplinking) providers, and not to space segment providers.

Compliance Procedures

Companies that are subject to these funding mandates are required to file various reports with the FCC disclosing specified financial information. These filings form the basis by which each administrative body overseeing the mandates determines the amount owed in support of that mandate.

While, at one time, each of the four funding mandates had separate filing requirements in place, the FCC substantially revised and simplified the filing process in 1999, such that today all four mandates are covered by a single form, known as the *Telecommunications Reporting Worksheet, FCC Form 499*. There are actually two versions of this form. One, which is to be filed annually on April 1 of each year, is referred to as FCC Form 499-A. The other, which is to be filed on a quarterly basis on February 1, May 1, August 1, and November 1 of each year, is referred to as FCC Form 499-Q).

Form 499-A is a detailed report in which all revenues derived from the provision of telecommunications services must be reported. All gross revenues for all sources, including non-regulated and non-telecommunications services, must be reported from which revenues arising from interstate and international services are broken out. This report (as well the quarterly reports) is filed with the Form 499 Data Collection Agent in Washington, D.C. They are then responsible for sharing the information with the separate administrators for all of the funding mandates. Each administrator submits an invoice as appropriate for the contribution owed. Companies, therefore, need not submit payment until they receive an invoice.

The obligation to file Form 499, with very limited exceptions, applies to any company that is an intrastate, interstate, or international provider of telecommunications in the United States. Governments, broadcasters, schools, and libraries, system integrators that derive less than five percent of their system integration revenues from the resale of telecommunications, and entities that provide services only to themselves, are exempt from this filing. Inasmuch as most companies are subject to the USF contribution obligation, they are required to file both the quarterly and annual reports. In some instances in which a company may be subject to the funding mandates other than USF but not USF itself, those companies are only required to file the annual report.

There are two instances where an entity may be exempt from the obligation to contribute to the USF: if the amount of the company's annual contribution to the USF would be less than $10,000; and if the company does not provide any domestic U.S. services but only international services. In both cases, however, the company would still file the annual form but would be exempt from filing the quarterly forms.
There are some additional details to note with respect to a firm's contribution obligations and they can be obtained at the World Teleport Website within the organization's full report, which may be ordered at : http://www.worldteleport.org/storelistitem.cfm?itemnumber=10

Funding Mandates Are Forms of Expression

The funding mandates affect a significant number of U.S. satellite services providers, and particularly the teleport operator community. The obligation to contribute and, more importantly perhaps, the timely submission of the appropriate forms (both annual and quarterly when necessary) must be taken very seriously.

Moreover, these submissions require that careful attention be paid to the particulars of the forms, and appropriate professional expertise in the preparation of these forms is highly recommended. Finally, this article has been intended as a general overview of the various contribution obligations associated with the funding mandates discussed above; it is not intended as definitive legal advice as to scope or applicability of any specific filing or funding obligation. In the event of specific questions, companies are encouraged to consult with outside legal advisors.

Maury J. Mechanick has more than 20 years experience in the field of international telecommunications. His practice focuses on representing public and private sector clients in the satellite and telecommunications fields in transactional and regulatory matters in the United States and abroad.

As a senior executive with COMSAT Corporation, and later Lockheed Martin Global Telecommunications, Mr. Mechanick led U.S. efforts resulting in the privatization of the INTELSAT and Inmarsat intergovernmental satellite organizations and the creation of New Skies Satellites, NV, as an INTELSAT spin-off company. Mr. Mechanick served as the U.S. Governor to INTELSAT from 1995 to 2001 and as Chairman of the INTELSAT Board of Governors during the pivotal year leading up to that organization's privatization. This transaction constituted one of the most complex public/private sector transformations ever undertaken, requiring the agreement of 145 governments and more than 200 telecom operators around the world. Mr. Mechanick has, most recently, served as the President and Chairman of the Society of Satellite Professionals International.

This article is excerpted, with permission, from The World Teleport Association's ***Universal Service Satellite Service Companies and FCC Funding Mandates*** whitepaper.

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PRODUCT PERSPECTIVE

UPS & SAFEROUTE

After more than a decade of development work by **United Parcel Service** (**UPS**), the **Federal Aviation Administration** (**FAA**) has given their final approval for the company to start to use a new set of technologies that are expected to significantly improve safety and efficiency, while reducing operational costs. On December 28th of last year, the FAA granted operations approval for *SafeRoute*. This is a software package that works in conjunction with the new electronic flight bags that being installed on UPS' 757, 767, and 747-400 fleets.

SafeRoute was developed by avionics manufacturer **ACSS** and makes use of **ADS-B**, or *Automatic Dependent Surveillance-Broadcast*, which precisely monitors an aircraft's position with onboard transponders and global positioning satellites. The first operational 757 flight took place January 17th. UPS 767 and 747-400 flights using SafeRoute are expected to begin later this year.

"These are the first steps of a marathon that eventually will change the way our flights arrive into major hubs," said *Captain Christian Kast*, **Advanced Flight Systems** Manager. "We hope to prove the concept of the *next-generation continuous descent arrivals* (**NextGen CDA**) so they can be implemented across the country," he said.

NextGen CDA

A "NextGen CDA" allows for precise spacing between aircraft, along a predetermined descent path, managed by the crew with electronic guidance. Instead of "dive and drive" vectoring to the final approach for landing, a designated "tube" of airspace is an express lane into Louisville from high-altitude airspace all the way down to the runway. A precise spacing in arrivals allows runways to be used to their maximum capacity, increasing efficiency.

UPS Worldport sort exceptions area
photo: UPS

"Another benefit is the predictability we're injecting into the air traffic system," said *Captain Karen Lee, Director* of **Flight Operations**, who has been working on ADS-B since 1996. "With a NextGen CDA, the ability for us to configure the aircraft for landing consistently at the same place all but eliminates the missed approaches, overtakes and breakouts that make the system unstable," she said. Tests conducted over the last decade suggest ADS-B-enabled CDAs could increase airport capacity by 10 to 15 percent.

In addition to efficiency, *SafeRoute* will improve safety by giving crewmembers better situational awareness on the ground. The electronic flight bag displays a moving airport surface map showing aircraft and vehicles moving on the runways, taxiways and ramps. Future improvements include an alerting feature to notify operating crewmembers if a runway is occupied or about to be occupied.

UPS also believes ADS-B-enabled CDAs will have a green impact, based on the results of past tests. With throttles near idle during most of descent, a NextGen CDA will reduce an aircraft's noise footprint by 30 percent, reduce emissions by 34 percent and reduce fuel burn by 40-70 gallons per flight.

Implementation

With the first ADS-B-enabled CDA on January 17th, UPS has begun a long phase-in of the new technology and procedures at its main air hub at Louisville International Airport. The company will begin using ADS-B on its arrivals from the United States' west coast in its nighttime *Next Day Air* operation. A total of 55 aircraft are scheduled to have operational EFBs and SafeRoute software by the end of 2008, when the goal is to have 20 to 25 percent of its arrivals using NextGen CDAs.

UPS Airlines

UPS Airlines, launched in 1988, is the *9th largest airline in the world*, using more than 600 aircraft to serve more than 200 countries and territories worldwide. The company's extensive air network includes international air hubs in Cologne, Taipei, Miami (to serve Latin America), an intra-Asia hub in the Philippines and, the UPS Worldport in Louisville, Kentucky (the four million square foot heart of UPS' global air network). In addition to its airline, UPS is also a pioneer in developing aviation technologies to enhance the safety and efficiency of the aviation industry.

UPS 757 at Worldport dock
photo: UPS

THE HISTORY OF SATELLITES

(Ongoing Series)

Reprinted from: *Communication Satellites* (5th Ed.)
Authored by, Donald Martin, Paul Anderson, Lucy Bartamian
Courtesy of **The Aerospace Corporation**

Experimental Satellites

Although the performance of communication satellites could be predicted theoretically, until 1962 or 1963 there was considerable doubt concerning whether their actual performance would match the theory. This was one of the basic motivations for the early communication satellite experiments. Two other important factors were the desire to prove the satellite hardware (since space technology in general was still in its infancy) and the need to test operational procedures and ground equipment. Whereas the first few experiments (SCORE, Courier, and Echo) were very brief beginnings, the Telstar, Relay, and Syncom satellites laid definite foundations for the first operational satellites.

Communication satellites have been in commercial operation and military service since 1965 and 1967, respectively. However, there was, and still is, the need for additional experimental satellites. These are used to prove new technologies for later introduction into operational satellites. Some satellites combine experimental objectives with preoperational demonstrations. Discussions of such satellites are included in this chapter if their emphasis is primarily experimental; those directly continued by operational satellites are described in later chapters.

Courier

The objective of the **Courier** program [**1–3**] was to develop a satellite of higher capacity and longer life than **SCORE**, which could be used for communication tests and assessments of traffic handling techniques. The

concept was similar to SCORE in that the primary operating mode was store-and-dump using onboard tape recorders. A real-time mode was also available. Unlike SCORE, Courier was a self-contained satellite and had both solar cells and rechargeable batteries for power supply. Except for the final amplifiers of the transmitters, the electronics were all solid state. The details of Courier are as follows.

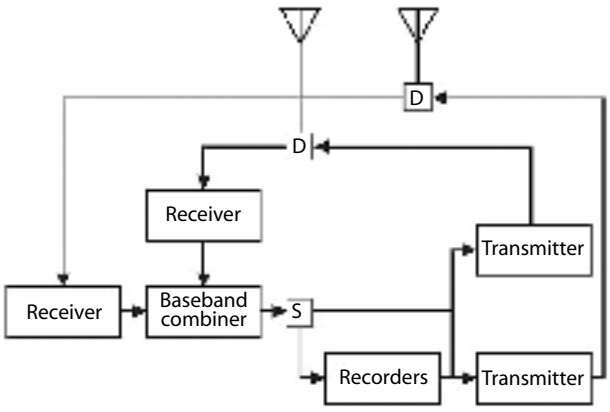
- ***Satellite***
- Sphere, 51 in. diameter, 500 lb in orbit
- Solar cells and NiCd batteries, 60 W

- ***Capacity***
- Real time: one voice channel
- Store-dump: 13.2 Mb/recorder digital, 4 min voice

- ***Transmitter***
- 1700–1800 MHz band
- Two transmitters on, two standby
- Solid state except output tubes
- 2 W output per transmitter

- ***Receiver***
- 1800–1900 MHz band
- Two receivers on, two standby
- All solid state
- 14 dB noise figure

- ***Antenna***
- Two slots at antipodal points, used for both transmit and receive
- –4 dB gain
- Linear polarization



Courier communication subsystem

- ***Recorder***
- Four digital: each 4 min at 55 kbps (13.2 Mb total)
- One analog: 4 min capacity, 300–50,000 Hz

- ***Life***
- One year

- ***Orbit***
- 525 x 654 nmi, 28° inclination (initial values)

- ***Orbital history***
- Courier 1A: launch vehicle failure
- Courier 1B: launched 4 October 1960, operated 17 days
- Thor-Able Star launch vehicle

- ***Management***
- Developed by **Army Signal Research and Development Laboratory**

Courier 1B satellite

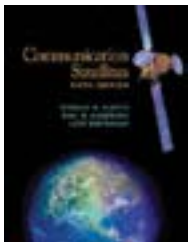
The Courier communication subsystem had four receivers, two connected to each antenna. Signals received through the two antennas were summed in a baseband combiner. The satellite could support a single half-duplex voice circuit in the real-time mode. One analog and four digital recorders, each with a 4 min recording capability, were used for the store-and-dump mode. This allowed any ground terminal to use the satellite for transmission of four separate digital (multiplexed teletype) messages, one to each of four other terminals. Upon command, a recorded message (or the received signal in the real-time mode) would modulate two transmitters, one connected to each antenna. The satellite also had two spare transmitters. The two carrier frequencies were separated about 20 MHz. Various signal-combining techniques were used at the ground to make use of these two signals.

Thor-DM21 Able-Star

The first Courier launch was unsuccessful because of a booster failure. The second, in October 1960, was successful. Two ground terminals, located in New Jersey and Puerto Rico, performed communication

tests. The satellite performed satisfactorily until 17 days after the launch, when communications were stopped by a command system failure.

Donald H. Martin is a senior engineering specialist in The Aerospace Corporation's Architectures and Spectrum Management Office. Martin joined the Communications Department in the Engineering Group at Aerospace in 1968 after receiving B.S. and M.S. degrees in engineering from the University of California, Los Angeles. He has been collecting information on satellite communications since 1972, when his manager offered him a choice of assignments: of the three options, he chose to write a description of communication satellites then in orbit. The assignment grew the next year to include a report describing satellites being built, and gradually expanded to the first edition of Communication Satellites in 1986, with the book now in its Fifth Edition.



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1. *G. F. Senn and P. W. Siglin, "Courier Satellite Communication System," IRE Transactions on Military Electronics, Vol. MIL-4, No. 4 (October 1960).*

2. P. W. Siglin and G. F. Senn, "The Courier Satellite," Communication Satellites, Proceedings of a Symposium Held in London, L. J. Carter, ed. (1962).

3. E. Imboldi and D. Hershberg, "Courier Satellite Communication System," Advances in the Astronautical Sciences, Vol. 8 (1961).

Photo credits: U.S. Army & U.S. Air Force

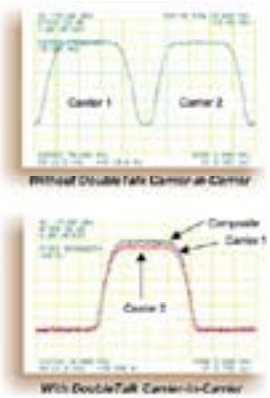
SpySat Deorbitized—The World Is Safe!

According to **Marine General *James Cartwright***, the *Vice Chairman of the Joint Chiefs of Staff*, there is a high degree of confidence that the U.S. Navy missile launched against the failed and falling U.S. spysat scored a direct hit. The order to proceed with the strike was issued by ***Defense Secretary Robert Gates***. Now a "deorbited" satellite, thanks to superb technology and personnel, the small bits and pieces are being tracked over the Pacific and Atlantic oceans. None appear to be of a size to warrant concern or expose our Earth to damage. The General stated the odds were 80 to 90 percent that the fuel tank was struck directly by the missile. In fact, the video clip of the SM-3 missile from the *U.S.S. Lake Erie* reveals the fireball. As General Cartwright stated, "... given that there's no fuel (on the tip of the missile), that would indicate that that's (the fireball) a hydrazine fire." The collision was spectacular between the missile and the spysat, with the two approaching one another at a combined speed of approximately 22,000 miles per hour at about 130 miles above the surface of the Earth. Space operations confirmed the collision at 10:50 E.S.T. As well there should have been, General Cartwright commented, when asked if there was satisfaction among those responsible for the shoot, "You can imagine that at the point of intercept there were a few cheers that went up."

Contract Mods For Boeing + Lockheed Martin

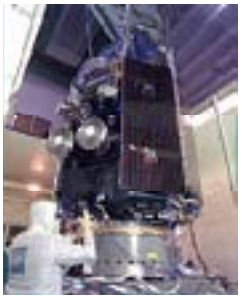
Contract modifications to the tune of $287,997,350 and $210,429,500 have been awarded to **Boeing Launch Services** and **Lockheed Martin Space Systems Company**, respectively. For Boeing, the action is required to continue uninterrupted support of the *Delta IV Evolved Expendable Launch Vehicle Capability* contract, while the same reasoning applies to Lockheed Martin's support of the *Atlas-V Evolved Expendable Launch Capability* contract.

Strike Up The Bandwidth For Intelsat Via Comtech EF Data



Intelsat is going to use **Comtech EF Data**'s award-winning *DoubleTalk* Carrier-in-Carrier technology and compression in its service targeted to wireless operators, known as *RevLinx*. RevLinx leverages Comtech technology and compression from Memotec, a subsidiary of Comtech EF Data, to offer the most efficient satellite capacity in the industry. Carrier-in-Carrier is based on Applied Signal Technology's DoubleTalk bandwidth compression technology. DoubleTalk uses "Adaptive Cancellation." This is a patented technology that allows the transmit and receive carriers of a full-duplex satellite link to be transmitted in the same transponder space.

The ICESat Continueth For Ball Aerospace



The Ice, Cloud, and Land Elevation Satellite (ICESat spacecraft buss during assembly at Ball Aerospace

The *Ice, Cloud and Land Satellite* (**ICESat**) built by **Ball Aerospace & Technologies Corp.** will continue operations until at least 2010, following a **NASA** mission extension contract. ICESat, designed for a three-year lifetime with a five-year goal, was launched on January 12th, 2003. The **Ball Commercial Platform (BCP) 2000** employed for ICESat was built under contract to NASA's *Rapid Space Development Office* (RSDO). ICESat has made significant contributions to the measurement of ice sheet elevation, cloud and aerosol heights, as well as land topography and vegetation characteristics. The mission provides multi-year elevation data needed to determine ice sheet mass balance and cloud property information, and provides topography and vegetation data from around the globe as well as polar-specific coverage over the Greenland and Antarctic ice sheets.

Columbus Finally Gets To Make Journey Aboard Atlantis

The launch of space shuttle Atlantis, mission STS-122, from Cape Canaveral, carrying Columbus lab to the ISS

The **European Space Agency**'s *Columbus* laboratory, developed with **Thales Alenia Space** as the main contributor, was successfully launched from the **Kennedy Space Center** in Florida to the *International Space Station* (**ISS**). The shuttle Atlantis lifted off at 20:45 CET and entered orbit per-

fectly and docked to the ISS after a 2-day journey. The multi-purpose pressurized module Columbus, with its planned operational lifetime of ten years, is Europe's first laboratory for long-term research in microgravity environment. Columbus will be permanently docked to the Node 2 (Harmony). Thales Alenia Space was in charge of the micrometeoritic protection system (MDPS: Meteorite and Debris Protection System), the active and passive Thermal Control System (TCS), the Environmental Control and Life Support System (ECLSS), the harness and all related Ground Support Equipments (GSE).

Failure Analysis Proposes No Failures Technology To NASA

Failure Analysis has submitted a proposal to the **NASA Johnson Space Center**, *International Space Station Program Office*, and Houston, Texas for using telemetry prognostic technology with the *International Space Station* (**ISS**). Failure Analysis wishes to ensure ISS astronauts are protected as never before through the use of telemetry prognostic technology for predicting upcoming catastrophic space equipment failures.

Acquiring Minds Wish To Know... Globalstar...

Globalstar, Inc. has received the necessary **Agencia Nacional de Telecomunicacoes** regulatory approval for its agreement to purchase the Globalstar independent gateway operator in Brazil from **Loral Space & Communications Inc**. and various affiliated entities. The acquisition will pave the way for Globalstar to immediately expand its Simplex data coverage in South America. In addition, the company will be able to engage in future discussions with potential partners to provide ancillary terrestrial component or ATC-type services in Brazil.

THOR 5 Launch Successful!

The *THOR 5* satellite was lifted into orbit successfully from the **Baikonur Cosmodrome**. This is the first mission of the year for **International Launch Services** (**ILS**) and the second *Proton* flight in two weeks. After a 9-hour and 23-minute mission, the launcher released the satellite directly into geostationary orbit. The THOR 5 will operate at 1° W to deliver broadcast and interactive services across the Nordic region, Europe and the Middle East for Telenor Satellite Broadcasting of Norway. The satellite itself was built by **Orbital Sciences Corporation** and is based on their *STAR 2* model.

Major Milestone Marked For Lockheed Martin's SatComs

The **Lockheed Martin** *A2100* communications satellite fleet recently achieved a major milestone—they accumulated 200 years of successful, in-orbit operations. The A2100 satellite series, designed and manufactured at **Lockheed Martin Commercial Space Systems** (**LMCSS**), currently consists of 34 satellites. They feature 1,254 transponders with an accumulated lifetime of more than 7800 years of successful operations in orbit. The first A2100 satellite, *AMC-1*, was launched September 8, 1996 for **SES AMERICOM**. *SIRIUS 4*, the most recent A2100 spacecraft, was successfully launched on November 18, 2007 for **SES SIRIUS**. Upcoming launches include *AMC-14* for **SES AMERICOM** in mid-March and *VINASAT-1*, built for **Vietnamese Posts and Telecommunications Group**, in April. AMC-14 will carry a demonstration active phased array (APA) payload consisting of a receive mode APA antenna, allowing customers enhanced flexibility on orbit. VINASAT-1 represents the first ever spacecraft procurement by the nation of Vietnam.

Skynet Soars + Scores, Superseding Schedule

Skynet 5B
Copyright: EADS Astrium 2008

The first operational traffic was carried successfully on *Skynet 5B* at 05:00 on January 28th, 2008, one month earlier than originally planned. Skynet 5B was launched on an *Ariane 5* launcher on November 9th, 2007, from Kourou, French Guiana. Skynet 5B delivers increased capabilities for secure voice and data traffic and is already being used by *HMS Illustrious*. This is the second of three satellites that will form a new constellation under a PFI deal with the United Kingdom's *Ministry of Defence* (**MoD**) that will run until 2020. Secure communications services will be delivered by the owner and operator, **Paradigm**, who are part of **Telecom Services**, a business division of **Astrium Service**s. The system, including the satellites, was designed and built by **Astrium Satellites.**

Moving On Up... At the NEW Solaris

Steve Maine is the *CEO* of the new joint venture 'tween **Eutelsat Communications** and **SES ASTRA**... the company, **Solaris**, will offer Mobile Satellite Services (MSS) in S-band and will commercialize the first satellite infrastructure in Europe for broadcasting video, radio and data to mobile devices, as well as to vehicle receivers and a range of interactive mobile services.

Hurrah For SES AMERICOM, Via WTA

World Teleport Association (**WTA**) has named **SES AMERICOM** as the recipient of its first *Nova Award* for the development and successful market launch of its *IP-PRIME* satellite-based IPTV service. By bestowing the first annual Nova Award on SES AMERICOM, WTA has saluted daring innovation that significantly expanded the addressable market for satellite service providers. WTA noted that AMERICOM's entry into the U.S. IPTV market took advantage of the move by telephone carriers to compete for video delivery with cable and DTH. SES AMERICOM saw the potential to serve Tier Two and Three telephone carriers, as well as cable and broadband companies that were unable to compete with the technology investments of Tier One carriers. To develop and deliver IP-PRIME, AMERICOM had to go beyond its core competency as a satellite carrier and tackle issues of broadcast rights, content security, program aggregation, and broadband integration.

Launch Excitement Generated With Delivery of AMERICOM-14 To Baikonur

The *AMERICOM-14* (*AMC-14*) satellite, of **SES AMERICOM**, was delivered to Baikonur, Kazakhstan. The satellite is being readied for its *Proton Breeze M* launch scheduled for the morning of March 15, local time (evening of March 14 EST). The *A2100* spacecraft was built by **Lockheed Martin Commercial Space Systems** and is being launched by **International Launch Service**s (**ILS**) for service at the 61.5° W longitude orbital position. AMC-14 is an advanced, high-powered Ku-band BSS satellite, designed for multiple missions to operate across the orbital arc from 61 to 119° W. As the third satellite dedicated to *AMERICOM2Home*, the spacecraft has been optimized to provide Direct-to-Home video services. After the launch, SES AMERICOM will complete the testing of all spacecraft systems and ready the satellite for continental U.S. service from 61.5° W by **EchoStar Corporation** (EchoStar).

New Board Named For SSPI—Tons O' Talent

The Society of Satellite Professionals International announced the election of new officers and members of its *Board of Directors*, following a vote of the membership in January.

- Newly elected directors starting their first terms: Paul Beeman, Senior Vice President, Satellite Engineering and Affiliate Relations, FOX Networks Engineering & Operations; Andreas Georghiou, CEO, Spacenet; and Mark Quinn, Senior Vice President, Willis Inspace
- Directors elected to serve a second term: Barbara Jaffe, Senior Vice President, Advanced Technology and Operations, Home Box Office; and Vice President Membership D.K. Sachdev, President, Space Tel Consultancy LLC
- Newly appointed officers: Chairman Dom Stasi, Chief Technology Officer of TVN Entertainment; President Richard P. Wolf, Vice President, Telecom & Distribution, Broadcast Operations & Engineering, ABC; Treasurer Steven Teller, President, IOT Systems; and Vice President Chapters Dick Tauber, Vice President, Transmission Systems and New Technology, CNN News Group
- Continuing to serve on the Board are: Olivier Badard, Senior Vice President, Thales Alenia Space; Paul M. Bobrowski, Ph.D., Dean, College of Business, Auburn University; Vice President Education Keith Buckley, Managing Director, Blackwater Capital Group; Paul Bush, Vice President, Business Development, Telesat; Vice President Education Don Flournoy, Director, Institute for Telecommunications Studies, Ohio University; Secretary Regina James, Catastrophe Services, State Farm Insurance Companies; Blair Marshall, Manager, Satellite Services, SES AMERICOM; and Clayton Mowry, President, Arianespace, Inc

XipLink Getting Accelerated Over New Products

A XipLink Hub Optimized Gateway

XipLink offers standards based protocol acceleration over wireless networks. The company has announced a new line of acceleration appliances that provide immediate performance gains for TCP/IP based networks supporting all popular broadband capacity ranges and satellite topologies. The XipLink acceleration solution combines SCPS-TP standards based acceleration with advanced data compression, Quality of Service (QoS), HTTPacceleration, and more than ten other values to optimize the link for maximum capacity. The new XA family of accelerator appliances augment XipLink's highly successful line of XE embedded software accelerators for bandwidth optimization over wireless and hybrid networks.

Globalstar To Bring Timely Data To SoDAR

Globalstar, Inc. revealed that **Atmospheric Systems Corporation** (**ASC**) has signed an agreement to provide its customers with timely data within the United States, Canada, and at other international locations, using the Globalstar satellite network. According to the agreement, ASC will integrate the *Glo-*

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RECENT NEWS

balstar GSP-1620 satellite data modem as part of ASC's innovative Doppler SoDAR (Sonic Detection And Ranging) product line. ASC's SoDAR products are designed to monitor and collect data within the atmospheric boundary layer.

Acquisition Mode... COM DEV USA...

The *Passive Microwave Devices* product line of **L-3 Communications Electron Technologies Inc**. has been acquired by **COM DEV USA LLC**, a sub of **COM DEV International Limited** for $12.2 million. ETI-PMD has a 35 year history as a key supplier to the U.S. space market. They have a contract backlog which includes a number of legacy contracts on major, ongoing, U.S. government and commercial satellite programs. The newly acquired company's personnel, assets and equipment will be moved from Torrance, California, to COM DEV's recently purchased production facility in El Segundo, California.

Weather Prognostication Cemented Into Place By EUMETSAT

The *Director General* of the *European Organization for the Exploitation of Meteorological Satellites* (**EUMETSAT**), Dr. *Lars Prahm*, and the *Head of Large Enterprises* at **T-Systems Business Services**, *Paul Laumann*, have signed a 12.8M/euro contract securing the availability of *EUMETCast* services for Europe until 2014. Under the contract, **Media Broadcast**, in partnership with T-Systems, will continue to provide satellite services to EUMETSAT. They will supply a bandwith of 15 Mbits/s with an annual increase of 1 Mbit/s to distribute weather data. To increase service availability, an additional link will be used through a ground station located in Milan, Italy. Media Broadcast will be responsible for operating the system, which has been specially developed for meteorological applications and will also manage communications between the weather satellites and the EUMETSAT control center in Darmstadt.

The Director General of EUMETSAT, Dr. Lars Prahm, and the Head of Large Enterprises at T-Systems Business Services, Paul Laumann, sign the new contract

SatCom Processing Signaled From RT Logic

RT Logic has made available its new *T400MSP Modular Signal Processor* for satellite communications research, training, and analysis. The T400MSP is well-suited for commercial, military, university research, training and analysis applications due to its combination of signal generation, propagation path dynamics, and signal analysis technologies. With additional RT Logic hardware and software, the T400MSP moves easily into operational situations, minimizing operator re-training and maximizing component reusability. The T400MSP produces high-accuracy, multi-channel uplink/downlink signals using any combination of BPSK, QPSK, 8PSK, MSK, FSK, AM, FM, and CW modes. In addition, the T400MSP applies static or dynamic propagation path attributes such as Doppler Shift, Range Attenuation, Range Delay, and Fading.