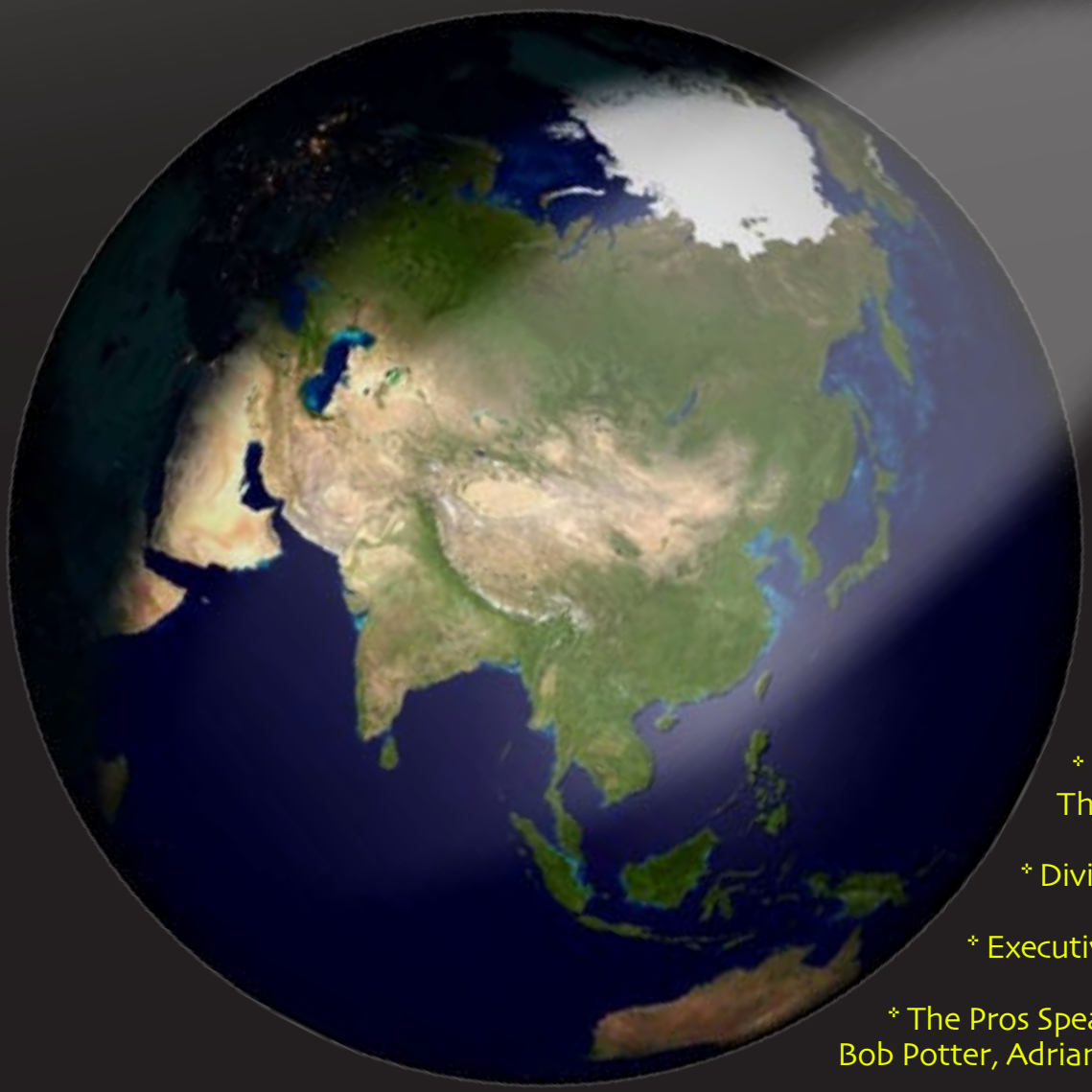
Worldwide Satellite Magazine June 2008

SatMagazine

Spotlight On Asia-Pacific



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SATMAGAZINE

June 2008

Published monthly by
Satnews Publishers
800 Siesta Way,
Sonoma, CA 95476 USA
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EDITOR'S NOTES

Phew, this is one information packed issue... a landmark SatMagazine at 90 pages... reason? A lot of info to cover!

You had to spend a little time downloading this SatMagazine .pdf, but let's be realistic... with video or music files you were intent on possessing, your download to obtain those entertaining tidbits would probably require far more time than to download this enriched brain food for those in the satcom industry. And, let's not forget, we also offer a version that allows you to read the entire issue online, article by article. Go ahead and enjoy the richness of the June issue of SatMagazine... I believe you'll be happy you invested the time to do so...

Hats off to our publisher and the Flecks for their contribution to this mammoth issue. The timliness of an article for the Summer Olympics, which starts on Page 42, was crucial. Without hesitation, Silvano Payne and industry pros Kevin and Michael Fleck assisted us in obtaining the informative content, and came in on deadline. Nice to know there are good folk to count on when you need them!

What's in store for you? Plenty—a feature detailing the Asia-Pacific commercial satellite industry, including a handy reference to the satellites owned and operated by the companies in this region of the world. And, as mentioned above, a look at the Beijing Olmpics.

The expertise of industry leaders Mark Dankberg (CEO and Chairman of ViaSat), Bob Potter (President of SAT Corporation), Adriane Ballintine (CEO of NewSat Limited), Bruce Gibbs (Integral) and Andrew Jordan (President and CEO of SAT-GE) each offer their own insights into this business, insights we know will benefit our readers.

We also have the expertise of those who keep track of, and measure the pulse of, satcom—Tara Giunta, Robert Masters and Erin Sears of aul Hastings Janofsky & Walker LLP—master industry writer and expert Chris Forrester—Northern Sky Research's Jose del Rosario—Technical Director of Futron, Andrea Maléter—and, of course, those of us who drive SatNews Publishers, editorially speaking.

If you are interested in contributing an article, or would like to discuss an idea you have please contact me. Thank you.

Hartley Lesser, Editorial Director, SatNews Publishers

High Stakes Patent Litigation Has Found A Home

by Robert Masters, Tara Giunta and Erin Sears

Like it or not, high stakes patent wars are waging in the global satellite sector, and it is safe to assume that they are here to stay—given the money at stake. Just ask Echostar, DirecTV, and Finisar.

Recently, there has been a surge of patent infringement lawsuits concerning satellite technology, out of court settlement of these lawsuits, and strategic efforts by businesses to license their patented satellite technology. Now, more than ever, businesses in the global satellite sector are considering whether to defend or settle patent litigation, and/or enter into license agreements with their competitors in hopes of avoiding a lawsuit.

A Quick Primer

Patents are intellectual property rights that grant the owner an exclusive right to make, use, and sell their inventions. Any technological advance, from an improved antenna to an information broadcasting system via high-speed satellite links, can be the subject of a patent, provided certain requirements are met.

The **U.S. Patent & Trademark Office** ("PTO"), the government agency that issues patents in the U.S., first looks to see that the underlying application describes the invention with sufficient detail to enable persons skilled in the art to make and use the invention. If it does, then the PTO further determines whether the invention is for something that is new, useful, and non-obvious. Only if these requirements are met does the PTO award patent protection.

While U.S. patents grant exclusive rights within the U.S., foreign countries also issue patents, although the procedure and requirements may be somewhat different than the U.S. It is not uncommon for companies to be awarded patents from several countries to cover their inventions.

Where to file? That depends on your business and how it competes globally, and the impact of foreign companies on your business. In general, you want to consider the market size of each country, and where products are manufactured and sold.

While any patent application process can be lengthy and taxing, the competitive advantage that comes with patent rights is one of the primary reasons that businesses, large and small (and investors), covet them. Without the permission of the patent holder, no one can make, use, sell, offer to sell, or import the patented invention.

Given that U.S. patents remain in force for 20 years from the date the underlying application was filed with the PTO, strategic and economic gains are to be had by forcing competitors to choose which fork in the road they want to take. Competitors may: (a) invest in a design-around to avoid infringement; (b) pay for a license to use the patented technology; or, (c) risk litigation by continuing to use the patented invention.

Rarely is the choice simple, and, oftentimes, companies are not afforded the opportunity to make a choice. In fact, frequently they find they are the named defendant in a patent infringement lawsuit regarding patents that they did not even know existed, much less did they realize that their system, network, or product incorporated the very technology at issue, or something fairly close.

Even more startling for some is learning that the plaintiff that they are up against is a "patent troll". That is industry slang for a plaintiff whose business model is to acquire patents solely for the purpose of either litigating infringement cases, or forcing settlements in order to collect massive monetary damages.

Patent troll or not, patent infringement lawsuits typically involve high-dollar claims, especially in the global satellite sector. The *United States Court of Appeals for the Federal Circuit* ("CAFC"), which is the appellate court with exclusive jurisdiction to hear appeals of patent infringement matters, just ruled on two jury trial verdicts that awarded sizeable damages to the plaintiffs. The CAFC affirmed the $73 million verdict for monetary damages to *Tivo in Tivo, Inc. v. Echostar Communications Corp., et al*.

The court reversed and remanded the combined $103 million verdict for monetary damages and willful infringement to Finisar in *Finisar Corp. v. DirecTV Group, Inc., et al.* It remains to be seen if DirecTV will fare any better when proceedings in the Finisar case are start-

ed anew, or how the CAFC's ruling will affect XM Satellite Radio, Sirius Satellite Radio, Comcast Corporation and Echostar Satellite, LLC, who are involved in suits of their own against Finisar over the same patent.

Moreover, these dollar amounts pale in comparison to the $250 million claim in *Forgent Networks, Inc. v. Echostar Communications Corp., et al*. While a handful of other defendants in the Forgent case settled on the eve of trial — including Time Warner Cable and Comcast (combined $20 million) and DirecTV ($8 million) — Echostar took the case to trial nearly a year ago...and won.

Given the potentially large settlements and/or jury awards, defendant companies are carefully considering whether it is in their best interest to proceed with, or settle, high stakes patent litigation.

Where the merits of a plaintiff's infringement claim appear weak, or there are certain defenses to the claim that appear relatively strong, it may justify defending the lawsuit, in itself is not an inexpensive proposition, but certainly results in less than many awards.

Even in cases where the parties' respective positions are too close to call, companies may nonetheless choose to roll the dice to show the market that they are willing to defend such cases. In those instances, the strategy is twofold; first, signal to the plaintiff (and other patent trolls waiting in the wings) that there will be no fast-cash settlement; and second, force the plaintiff to think twice before filing its next claim against the company. This is particularly true in the case of claims brought by patent trolls.

However, there are risks to proceeding with high stakes patent litigation that must be considered. There is the

obvious risk of losing the case resulting in an extremely high dollar award with the attendant risk that the defendant company may not be able to readily absorb such a loss.

There is the added concern that the company may be enjoined from further selling the infringed product or service, and not have any alternative non-infringing substitutes. There is also the unease about how such a loss would be interpreted by the market. For example, in the Tivo case, following the CAFC's affirmation of the jury award, Tivo's shares rose 13 cents, or 1.5 percent, to $8.91, whereas Dish's shares (Echostar's successor-in-interest) dropped 81 cents, or 2.6 percent, to $30.82.

Practical considerations should play a part in the decision on whether to defend or settle, as well. For example, irrespective of the merits of plaintiff's claim, certain jurisdictions are known for being plaintiff friendly and, thus, where many cases are filed – such as with Tivo and Finisar. They were both tried in the Eastern District of Texas, a mostly rural district generally considered one of the last places in the country you want to be a defendant in a patent infringement lawsuit. If you are a defendant there, then it is critical to develop a sophisticated strategy with counsel experienced in the forum.

The cost/benefit analysis is another practical consideration. There is no denying that patent litigation can be costly. It is not just about the sheer dollar amount of the claim if one loses, but the attorney's fees that are inescapable expenses, win or lose. An out-of-court settlement early in the litigation curtails the cost of attorney's fees.

It also has the added benefit of providing the finality in the resolution of the dispute, and a release as to all claims. However, it may have the ancillary effect of encouraging additional suits, especially if you build a reputation of settling early when sued—something we have found to attract additional suits by patent trolls.

Licensing is an alternative to resolving patent infringement matters and can be a strategic tool in successfully doing business in a competitive field, such as the global satellite sector.

We often recommend and counsel clients to build and maintain strong patent portfolios (independently and through licensing) as a way to protect their technology and grow their business.

Generally, competitors have to either stay clear of the patented technology, or have little choice but to enter into a license to use the technology. In the latter case, the patentee can then leverage a royalty payment, or cross-license, and gain access to certain technology patented by the competitor. If litigation results, there is nothing better than a strong patent portfolio to use as a basis to defend against the plaintiff's claims and/or strike back and level the playing field by filing infringement counterclaims.

Take the steps now to protect your business from the litigious state of the global satellite sector that exists today, beginning with consulting patent counsel. This not only improves the odds of staving off high stakes patent litigation, but in the unfortunate, but probable, event of litigation, in defending it as well. You (and your investors) will be thankful that you did — but those patent trolls . . . not so much!

If you have any questions concerning the information contained in this article, please do not hesitate to contact Robert Masters, Tara Giunta or Erin Sears, of **Paul Hastings Janofsky & Walker LLP**, **Washington, D.C.**

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TBS: Looking At Further Diversification

by Chris Forrester

Internationally, Turner Broadcasting has always walked hand-in-hand with the growth of satellite and cable – and now IPTV. Turner Broadcasting has been active in Europe since 1985 with CNN International, five years after the domestic CNN network launched. Cartoon Network followed, along with Turner Classic Movies in 1999. Indeed, it is fair to say that CNN and Cartoon Network (and probably MTV) were the channels that every multichannel operator needed as part of its core offering. From the CNN, Cartoon and TCM trio of foundation channels TBS has grown and multiplied into dozens of different localized versions, spin-off channels and joint-venture investments such as CNN:Turk and CNN+ (in Spain) and 'Boing', its kids' channel with Mediaset in Italy.

Turner's point man covering Europe and MENA is *Jeff Kupsky*. He's been president of the operation since 2007, a Turner staffer since the very earliest days in 1981 and ensconced in Turner's London office since 1997 as SVP/business development. Ultimately he reports to his old London boss, Phil Kent in Atlanta, now TBS' chairman and CEO.

We met on the day a new DTH (Direct-to-Home) platform was announced in the tiny country of Moldova (sandwiched between the Ukraine and Romania). With the major markets clearly satisfied, as far as signal and programming distribution was concerned, *Kupsky* said broadcasters had to now adopt a slightly different approach: "These [new] markets are growing in lots of different ways, both from the standpoint of traditional multichannel penetration and the advertising opportunity. In a sense they're different from the

traditional developments we've seen in Western countries because all these things are happening at much the same time. I think this is an interesting position for us, as we're able to bring our channels and brands into the market at an earlier stage of the market. They can develop faster, and it's very good for us because as these new services come on board, whether it's digital or multichannel television or whatever, we're right there for them with great choices and content."

Kupsky said that one of the things Turner has always excelled at is, initially, service markets with non-local feeds, and then localize those feeds when the market grows and develops. "Then, when it becomes economical for us to do so, we have something that we can help with the development at the earliest stages."

There was a time when many of the Central and Eastern European versions of Turner's channels were handled by **ZoneMedia** (now part of the **Liberty Media/Chello** cable/DTH operation). *Kupsky* says that, increasingly, Turner is now handling these regions itself.

"Our business model across this region is driven by pay television, basic channels, license fees, distribution, all of which scales and allows us to bring in the advertising business. We do things outside of that, be it in digital new media as well as some free television exposure, but the main point is to publicize the brand, popularize the content and add to the channel."

One of Turner/Time Warner's major rivals (especially on the animation side of the business) is **MTV Networks** and their music and kids' channels. MTV itself and Nickelodeon have recently adopted a free-to-air broadcasting strategy in the Middle East.

Kupsky would not expand on Cartoon Network's plans (or TCM), except to say, "It's something that you look at. You examine the growth and development of a market, and we have to look at all different types of options, but I don't have any specific plan."

The appeal in Turkey is the strength of interest in multichannel TV generally—and a booming ad-market: "Up about 25 percent last year, and very different from Europe's 2-3 percent," says Kupsky.

Nevertheless, Kupsky ruled nothing out, and explained how recently it had launched a TNT service, free-to-viewers in Turkey, as an analogue terrestrial service, in addition to having launched a localized Cartoon Network service on satellite [in a jv (joint venture) with Dogan Group].

"CNN International has expanded its newsgathering operations around the world and will continue to do so, but along with this message, we're also interested in finding new ways of collaborating going forward. The door is open, and we might well look at doing partnerships in different ways than we ever have done before."

TBS, on Africa

There's no logical progression that says there's a limited number of analogue channels, or it's either digital, or satellite, or cable, or whatever, and then comes the Internet, then wireless... In the African market, all these things can happen together and probably the wireless technologies, including DVB-H, which are not dependent upon building infrastructure to the same degree than cable, would probably be a likely bigger factor in those markets."

Questioned on whether European viewers would see other jv activity, along the line of **CNN:Turk** or **CNN+**, and *Kupsky* again stressed that nothing would be ruled out: "There's a model of a global news channel and a regional news channel and a local news channel and we are a global one but we can have relationship with the others. The general proposition is that CNN can add a lot of value to news operations so that's something that we're always interested in, and we believe that deals and relationships can be built around that and a full fledged Joint Venture with some others.

"CNN is expanding its news coverage and spending a lot of money doing this and that positions us to be a potentially much better partner (not necessarily in terms of Joint Ventures) to local TV news operators, or local TV news channels."

Exciting as Central and Eastern Europe are, there's another region that's proving increasingly interesting. "Africa is probably a bit different on the scale, maybe a bit behind in terms of the growth and development, but there's lots of discussions about other satellite platforms launching local pay TV operations and free TV operations.

"It's always interesting as markets develop that there are so many different choices. In fact there's not a logical progression that says there's a limited number of analogue channels, or it's either digital, or satellite, or cable, or whatever, and then comes the Internet, then wireless... In the African market, all these things can happen together and probably the wireless technologies, including DVB-H, which are not dependent upon building infrastructure to the same degree than cable, would probably be a likely bigger factor in those markets," said Kupsky.

But if TBS' trio of core channels were noted as the early pioneers of multichannel TV, now there are a zillion competitors. *Kupsky* says the model has changed.

"Our channels are represented on, and appeal to, most platforms. We continue to look at innovating terms of content ownership and development so that we have the resources necessary to think about new platforms, and how we can deliver our brands and our content to these platforms.

"There's no question that the business is a little bit more difficult because the incremental costs to service one cable company compared to another cable company with the same video feed, those incremental costs were once minor. But now whenever you talk about new platforms, in some cases you have to be prepared to service them, and in some cases they have to have separate programs in each individual case.

"The good news is that most of these platforms enable a more direct connection with your customers, so the users of the service, there's a greater opportunity to understand them better. Even though it's harder to service them individually you can get information feedback more directly, and because you can get their feedback more directly, you can respond to it better, you can improve your products better."

TBS is nothing if not progressive:

- It has linked with Joost to offer cult [Adult Swim] content to Europe
- Turner has a news/entertainment *YouTube* deal
- A similar deal is in place with Daily Motion
- It is linked with Turkey's Dogan Group on news and entertainment jv channels
- *Boing* is a kids' jv with Mediaset
- Cartoon Network now has 14 localized versions over EMEA
- TCM is on eight feeds and 13 language options over Europe

However, there's one development that *Kupsky* isn't so keen on – HDTV. "Our channels, with cartoon animation, find that classic movies in high definition (HD) is not the first [choice] given the expense behind it. CNN has HD feeds in the U.S., but there hasn't really been any demand yet. I know it's distributed in Japan, so there's a technical capability, but we haven't brought it to Europe. We haven't begun to do that yet."

Kupsky confirmed that **CNN** is making considerable investments in HD for its domestic channel and even closer to home. "We want the system to have more HD content. The [CNN-commissioned documentary features] that are produced and reportage that's gathered are increasingly in high-def. Certainly the groundwork is being laid for us to have an increasing amount of our content assets in high-def but at what point and how we deliver that and bring it to the European market? That's a tough question. Many of our specials are now being shot in high-def, so there is some of that, but at what point do we bring that to the main stream? If a platform comes to me and wants something badly enough, and expresses that in a way that I can understand, I wouldn't say no, we would certainly look at every proposal."

Turner has recently launched a new concept in the U.K., *Nuts TV,* a spin-off of the popular 'lads'' magazine from its AOL/Time Warner-owned IPC publishing house. Nuts TV launched last autumn, although it is fair to say that there have been challenges (ratings on the first night of just 9,000, and a recent peak of 28,000 viewers, neither of which are impressive).

On further expansion, "We are in a position to be able to grow beyond the genres that we're in now. We've launched TNT in Spain, in Turkey, we had Nuts TV here in the UK, so all that's part of our looking to use the assets."

An April 11th story in *Nuts* magazine said the channel was dropping its 'live' studio content. *Kupsky* confirmed that some fine-tuning is taking place, but was very supportive of the overall plan to diversify into new concepts. "We want to use the expertise, relationships and assets that we have both locally as well as globally, be it the US or Latin America where the operation is bigger, and more multi-faceted, than we are in Europe, and this includes more activity in the general entertainment business.

"In Latin America for example, they have a TNT service – they've just done an acquisition of seven or eight channels, different genres to the Latin American operation. So we have those types of assets, so we are in a position to be able to grow beyond the genres that we're in now and we've launched TNT in Spain, in Turkey, we had Nuts TV here in this market so all that's part of our looking to use the assets that we have to get into

thematic strands beyond what we have now as a way to better deploy our resources for growth. *Nuts* is an initiative that works for us and for IPC, as they have a brand and they're looking to diversify and grow their business. It makes sense from that standpoint."

AOL/Time Warner's IPC operation has dozens of respected print titles in its portfolio, almost any of which could receive the 'Nuts' treatment. Kupsky says there are plenty of opportunities for EMEA growth. "The playing fields are levelling to a certain degree, things are changing everywhere, there's still challenges that we have, but in many places we have as good a shot at building new businesses as anybody else does, maybe even more as we already have something to build on, and that gives us our advantage.

"The real challenge is finding something where we are advantaged, but maybe where we have to work faster. We work very hard to be flexible. We have to look at a wide span of assets from kids, to movies and now other types of channels, it's just a question of how you deploy the assets you have— it's exciting!"

About the author

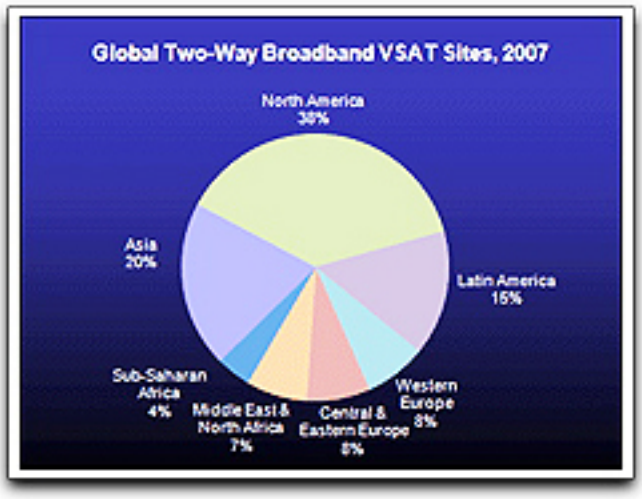
London-based Chris Forrester is a well-known entertainment and broadcasting journalist. He reports on all aspects of the TV industry with special emphasis on content, the business of film, television and emerging technologies. This includes interactive multi-media and the growing importance of web-streamed 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.

by Hartley and Pattie Lesser

The opportunities, and challenges, facing the Asia-Pacific satellite market are enormous. Issues are significant and include everything from; capacity; installation and support of new technologies; and investments required by firms, both long imbedded as well as new to the market. This article presents the thoughts and the view of leading company executives and research analysts — those "more than knowledgeable" — regarding operations in this market. Also included is a review of operators based in the Asia-Pacific market as well as their services and in orbit satellites.

Chats With The Experts

Northern Sky Research (NSR) reports that markets other than North America are growing quickly when it comes to broadband VSAT networking services. NSR's Broadband Satellite Markets: 7th Edition reports they are . . . "expecting Asia to outpace North America within six to seven years given the strong growth coming from government USO, rural connectivity and educational networks." This account offers a worldwide analysis of industry trends as well as market forecasts from 2007 to 2017. Click on their Global Two-Way Broadband VSAT Sites chart, below, for additional information.



In NSR's *Global Assessment of Satellite Demand, 4th Edition,* they find . . . "demand growth delayed in markets like South Asia and Sub-Saharan Africa because of a lack of supply. This in turn is leading to a wave of satellite operators rushing to launch new capacity to capture this demand and even raising the specter of potential oversupply two to three years down the line." The C- and Ku-band TPE demand share by region in 2006 reveals East Asia with 10 percent, South Asia with 5 percent, Southeast Asia and the Pacific Ocean region with 3 percent of the total market share.

We asked *Wally Martland*, President of **NewPoint Technologies** (a firm well known for their suite of network management solutions products) how he perceived the market growth for Asia-Pacific. He replied, "With the recent satellite launches that have taken place over the past 12-18 months, we are seeing a flurry of activity by the network providers to install the ground networks to take advantage of the bandwidth that is now available. This is mostly in installing the cellular back haul networks and smaller remote terminals to bring the voice data and video out to remote regions in countries such as Vietnam and Korea where there is not a lot of terrestrial infrastructure. Management of these remote unmanned facilities has always been one of the strong points of the Newpoint Network Management Solution, and I think this trend will continue for the next few years, and expect we will see the demand for these types of solutions going forward for the next few years."

He added, "Many of our customers in Asia are very concerned at the bandwidth, and the cost of bandwidth, as they are rolling out these services to the public. They do have the need to monitor and control these remote sites, and do it from a centralized facility. (Newpoint's Compass product provides that capability.) The focus of most of our R&D efforts over the past year has been to reduce the amount of bandwidth required to manage these remote sites using the inband ESC or overhead channels. We also provide the means to manage the sites through 'out of band methods', such as through the Iridium or Inmarsat terminals as well as using cellular GSM and CDMA networks. By doing so, we can keep the ongoing costs of managing these networks to an absolute minimum but still allow them to ensure a high Quality of Service (QoS) on the network.

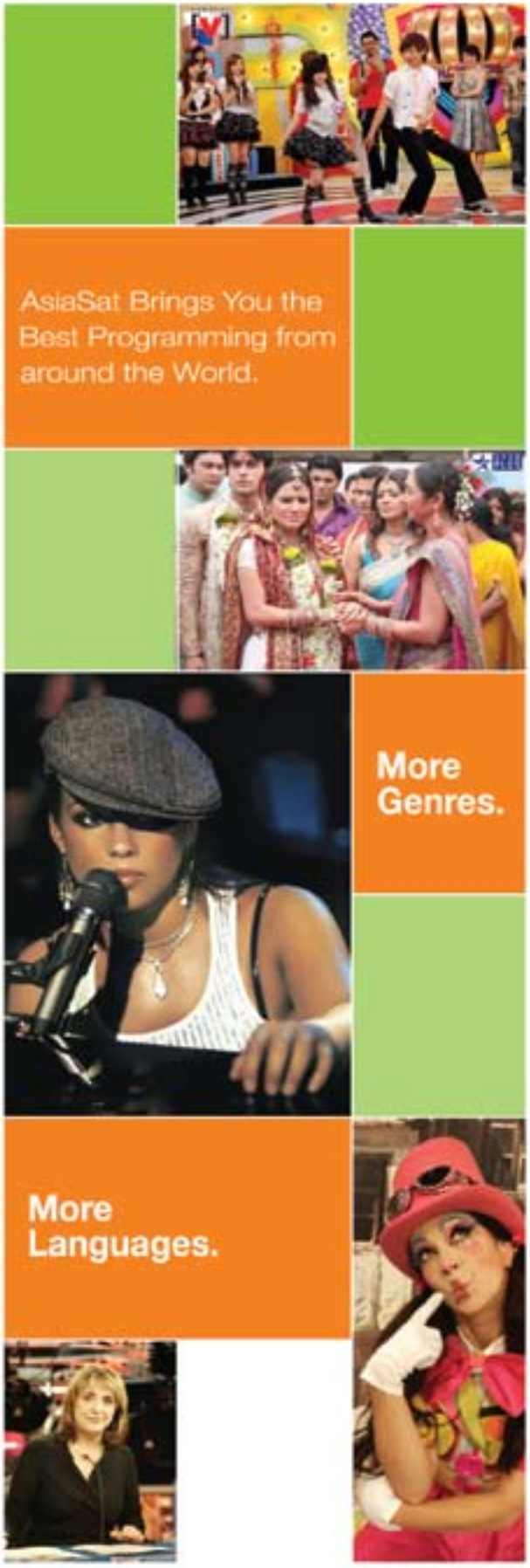
"For the Asia-Pacific Marketplace, I think the initial issues are simply to meet the demand of a very large, and bandwidth hungry consumer marketplace before

other technologies move in and fulfill this need," Martland answered when asked about the prospects for this segment over the next five years or so. "The Asian community, in general, has many of the same issues that are faced in Africa, where sites are difficult to reach and access, and yet people still want their access to mobile phones, data and video. Meeting these needs by providing reliable and affordable services to the consumer is a big challenge—that is why having a remote monitoring solution like our Mercury product can help these operators keep the cost of managing the site down, while increasing the reliability of the overall network."

A satellite operator with a huge investment in the Asia-Pacific market is **AsiaSat**. *Peter Jackson*, the CEO of AsiaSat, offered his ideas regarding the future of this crucial market segment. "With the economies in the region improving, the Asian transponder market is showing some signs of encouraging development. We see notable growth in the broadcast sectors in terms of the number of new channels introduced by local or foreign TV operators to the region, new distribution platforms including DTH, cable, IPTV and mobile TV being created, and in addition we see the introduction of HD channels to Asia."

Regarding growth areas, he added, "The growth driver for satellite services comes largely from the broadcast sector, stimulated in part because of the new policies implemented by the Asian governments to promote competition and deregulate the media sector. This has encouraged new players to create additional distribution platforms, and that, in turn, has stimulated the demand for new and exclusive content. The telecommunications sector is increasingly looking to satellites to provide back-up and emergency networks.

"The recent terrible natural disasters that have occurred in the world have proven that satellites can provide communications when the terrestrial systems fail. The telecommunications operators that had such back-up systems in place, or had the capability available, were immediately able to meet the communications'



needs of the emergency services in the very important first few days of relief efforts."

What strategies will **AsiaSat** have in place to meet upcoming satellite industry "challenges"? Jackson answered, "We still see an imbalance of supply and demand in certain Asian markets, and with additional supply from national satellites being launched in the next 12 months; the competition will remain demanding. Our strategy is to achieve growth by continuing to exploit the advantages of satellites for television distribution and private networks. We must also further differentiate ourselves from our competitors by offering high quality services with emphasis on value, good coordination and the superior market access that our satellites provide.

"The construction and launch program of our new satellite AsiaSat 5 is in full swing. This new satellite will be a replacement for AsiaSat-2, which is currently operating at the orbital location of 100.5° E. When AsiaSat-5 is launched, now scheduled for the first half of 2009, we will be able to expand the C- and Ku-band capacity on our AsiaSat fleet. AsiaSat-5 will offer an additional, very powerful Ku-band beam over South Asia and a similarly powerful in-orbit steerable Ku-beam capable of supporting DTH and broadband services to any country within our coverage area.

"We are also presently installing equipment that will further diversify our services and provide additional transmission solutions to our clients by expanding our facilities at our Tai Po Earth Station in Hong Kong. This will further improve our capability to provide uplink and turnaround services for our clients' traffic. This new capability will be in addition to the AsiaSat-2 and AsiaSat-3S MCPC platforms that are currently operated from our Tai Po station."

Even regional issues for satellite providers affect the global scope of our industry. Jackson addressed this inquiry by stating, "There are several unsettling economic factors appearing globally that will have some effect on Asian market growth. Besides these economic factors, regulatory barriers and satellite coordination issues have always affected the healthy growth of the satellite market. In certain Asian countries, we see slow progress on deregulation and protected domestic markets continue to exist where foreign satellite operators are either discriminated against, or simply not allowed to provide capacity to local service providers, whether it's for broadcast or telecom applications."

He added, "Another worrying issue is the entry into the Asian market of a satellite operator who appears to be blatantly ignoring the ITU rules on satellite coordination. We are aware of the situation in that new satellites are being planned to launch into orbital slots without completing the required international coordination with their neighboring satellites. From previous experience of such cases without coordination, these new satellites may well cause interference to the existing satellites and, in that case, they have to switch off the interfering transponders. This reduction in the number of available transponders inevitably causes the satellite to become uneconomic causing their financial backers to become disillusioned, and this reflects badly on the whole satellite industry."

Arnold Friedman, who is the Senior Vice President of Marketing and Sales at **Space Systems/Loral** (SS/L), also provided his thoughts on the Asia-Pacific market. "In the 2008 to 2009 time frame, Space Systems/Loral will deliver a number of satellites that are planned for use in the Asia-Pacific region. These include satellites for ProtoStar, Telesat, and AsiaSat, which are expected to meet the strong demand for direct-to-user entertainment as well as fixed satellite services.

"Growth in satellite demand in the Asia-Pacific is driven by the economics of point-to-multipoint distribution as well as the need for services in areas where it is not practical to build out terrestrial infrastructure. Satellite is also the best solution for all types of communications in areas where countries and regions in close proximity have differing languages and cultures and there is significant demand for a diversity of content and types of programming."

Mr. Friedman continued by addressing some of the significant issues ahead for this market segment. He added, "Space Systems/Loral has been delivering satellites for use in the Asia-Pacific region for more than

30 years. This is a very important region for us and we have a strong commitment to continue to work with operators there. We see a steady demand for both replacement satellites as well as new services. The operators that are replacing satellites that are reaching end-of-life are generally ordering larger and more powerful satellites to keep up with demand for advanced services such as high-definition television and broadband Internet."

Andrea Maléter, the Technical Director, Space and Communications Division, at **Futron Corporation**, a leading consultant firm to the aerospace and telecommunications industries, offered her insight into the Asia-Pacific market and said, "Obviously the big item this year is video, driven by the Beijing Olympics. While everyone is waiting to see how the Chinese manage to sustain the planned Olympics activities and broadcasts in light of their need to pour resources into earthquake recovery efforts, the Olympics program seems to be well enough advanced that it will continue unabated. Thus, the biggest outgrowth of the Olympics efforts will be the dramatic growth in infrastructure and content for HD content production and distribution. This will have a lasting impact on satellite demand around the region, with spillover elsewhere. The convergence of this with the opening of the Indian DTH market will provide a solid opportunity for further growth as locally produced programming expands, not just within China and India, but to overseas populations seeking content from home."

In addition, when it comes to the critical issues facing this market segment, Ms. Maléter added, "The Asia-Pacific market is seeing an explosion in new Ku-Band capacity. The region is overcoming the past resistance to such capacity. Despite the high growth in DTH services, it remains to be seen how all of this capacity will be absorbed, and what the impact will be on pricing in the region. Within the past decade, Asia has seen some serious price declines, and while this has recently reversed, the balance is still somewhat fragile. A lot of this new capacity comes from the somewhat surprisingly high growth in new operators in a region al-

has been sprouting new systems, on both a national and regional level, meaning competition, and not capacity, will be the biggest issue facing this market."

Thomas Choi, the CEO of **Asia Broadcast Satellite** (ABS), believes the next five years for the Asia-Pacific market will be rather challenging. "The Asia Pacific region will continue to be challenged by pricing pressures due to the continual investments in additional satellite capacity by new national and commercial operators. The emergence of the newly merged Chinese satellite operator (composed of the merger between SinoSat and ChinaSat), along with their new satellites, has resulted in a significant reduction of capacity demand for both AsiaSat and APT Telecommunications. The companies used to be the dominant satellite operators for video distribution in the China market.

"This reallocation of satellite capacity outside of China will result in an increase of supply into the rest of the Asia Pacific region. Both Indonesian satellite operators will be launching new and larger satellites in the next three years and they'll be adding significant amount of Ku-band capacity over Southeast Asia. Protostar will be launching two satellites in 2008 and 2009 and VinaSat just successfully launched their new satellite VinaSat-1. Ku-band over China and C-band over Asia will continue to be under pricing pressure for many years to come.

"The demand for satellite capacity in Asia is currently being driven by growth in cellular trunking, VSAT, and local cable TV distribution channels," Choi said. "Currently a lot of C-band capacity in Asia Pacific is being used for IP-transit point-to-point backbone services, but this segment of the market is diminishing in profitability as well as volume. From the 75° E position we see a lot more of the world than only Asia, and Asia remains a relatively small market for us. However, we are bullish in the growth of CATV distribution, DTH cellular back-haul, as well as the emergence of low cost Ku-band VSAT terminals for affordable rural connectivity services."
Given such issues, the manner in which a company confronts the "challenges" is important in the terms of future growth. Choi responded, "The satellite market in Asia will continue to be a fiercely competitive landscape, with the emergence of new, domestic operators as well as other regional operators joining the market. The CATV distribution market is being fragmented on domestic/local levels and the days of paying premium for one or two satellite positions for a pan-Asian distribution will diminish over time. The IP-backbone market will continue to dwindle and result in low revenue yields per transponder, due to increasing competition from fiber. The cellular backhaul market segments will stay strong, if not actually growing in the intermediate future. This segment, too, will be substituted with domestic fiber and microwave links.

"ABS will strive to be competitive in the local video distribution markets for both CATV and DTH services, while seeking profitable niches in serving our customers in the data communications services sector. We already have more than 90 CATV & DTH channels on our satellite, with most of these channels coming on line during the past 24 months. We are planning to expand this by a factor of 150 percent in the next 24 months. We also boast one of the largest Ku-band VSAT networks in the Asia Pacific market." He continued, "We will also be launching, shortly, service for broadcasters to deliver their programming to IPTV and mobile operators. This will enable a low-cost and low risk ways to reach these emerging and growing market segments for the broadcast community."

The CEO of ABS added, "In the past 12 months, ABS has seen unprecedented growth of our business. We achieved our fill factor from 50 to 90 percent and increased the number of television channels available on our satellite to more than 90 channels.

"ABS is now one of the top satellite distribution platforms for CATV distribution in the Indian Ocean Region. ABS has also made significant investments to the tune of $5M in teleport facilities for video and data distribution services. We've invested in MCPC platforms to access our satellite from Germany as well as Hong Kong using MPEG-2/DVB-S as well as MPEG-4/DVB-S2 for SD and HD video distribution for our customers. From our orbital position at 75° E, we can access 4/5ths of the world's population, so we feel that we provide significant value to our customers."

ABS has also been working diligently to complete the financing work for their new satellite ABS-2, which will be collocated at the 75° E location with ABS-1. Packing more than 60 C- and Ku-band transponders, ABS-2 will provide dedicated beams over Southeast Asia, India, Russia, the Middle East, and Africa (MENA). The spacecraft will have significant power to enable DTH services in those markets.

Choi continued, "ABS-2 will also act as an in-orbit spare and back up for ABS-1. We feel our customers will receive a lot of value for placing their traffic on a satellite operator with two collocated satellites. We are reviewing the final proposals from the satellite manufacturing industry and negotiating the procurement contract. We hope to announce the contract award sometime in Q3 of 2008 for an in-orbit delivery by Q4 of 2010. With new, high powered satellite project investments close to $300M, we believe that this will be the most significant development for ABS and the future."

Euroconsult's *Pacome Revillon* believes it is difficult to make a blanket statement regarding Asia, "as growth dynamics can be highly different between different areas. This year, the fastest growing area is terms of capacity requirements is expected to be India, due to the launch of additional platforms and to the global increase in the number of channels broadcast by each DTH player, including Dish TV, Tata Sky, Big TV... A double-digit growth in capacity used there would be likely in 2008.

"The most challenging market could prove to be North East Asia (Japan and Korea). Despite the planned introduction of HD channels by SkyPerfecTV in Japan and Skylife in Korea, merger processes in Japan, as well as a strong competition from terrestrial infrastructure for telecom services should continue to limit growth."

Revillon adds some thoughts regarding how the Olympics will impact this segment. "In the China area, this year should be boosted by the Olympic games, and by the increase in the number of channels broadcast in the area, as well as by the introduction of a few HD

channels. On the telecom side, the installation of VSAT networks could be accelerated by the current natural disasters that impact communication networks. However, an issue will be to see which, and how, foreign operators could benefit from growth of the Chinese market. On the broadcasting side at least, the transfer of channels from AsiaSat to the newly formed ChinaDBSat impacted growth for the operator last year.

"In South East Asia, requirements for both telecom traffic and video services, driven by Astro in Malaysia but also potentially by TrueVision in Thailand and competition in Indonesia, could support growth." He continued, "In the Oceania and Pacific regions, limited growth in video services could come with the addition of content by pay-TV platforms in Australia and New Zealand, with HD initiatives, as well as from several niche players. Growth in demand for telecom traffic should remain limited."

As all of these subject matter experts have indicated, there are, indeed, challenges ahead for all concerned, worldwide and in the Asia-Pacific region. Pacome's thoughts on key issues for the global and Asian satellite markets included:

- *WiMAX & C-band, notably in Asia where C-band is largely used for telecom traffic.*
- *Regulatory restrictions to the access to a number of markets will remain a key Asian issue.*
- *The subprime crisis, in the case of a global impact on telecom and media markets, could impact a number of growth initiatives.*
- *The adoption of new compression standards for video services will certainly be monitored with attention.*
- *Limitations in the supply of launch solutions, and potentially of manufacturing solutions, will also impact the market.*
- *For new projects, coordination of frequencies is an increasingly difficult issue.*

Asia-Pacific Satellite Business Participants

Here are the Asia-Pacific operators and their active, commercial satellites that provide coverage and services for this area of our globe...

APT Satellite Holdings Limited (APT)

The APT Group has been offering satellite communications services, satellite TV broadcasting, and transponder use service, since 1992. The firm was incorporated in October of 1996 and the principal shareholders include...

- **China Telecommunications Broadcast Satellite Corporation**
- **China Aerospace Science & Technology Corporation**
- **SingaSat Pte. Ltd., a wholly-owned subsidiary of Singapore Telecommunications Limited**
- **CASIL Satellite Holdings Limited, a wholly-owned subsidiary of China Aerospace International Holdings Limited**
- **Kwang Hua Development and Investment Ltd, a Hong Kong corporation jointly owned by the Ruentex Group and China Development Corporation**

The services are offered to broadcasting and telecom operators in Asia-Pacific, Europe, and the United States. APT has completed the construction of teleports and a TV broadcasting center. The Group operates a fleet of satellites: **APSTAR-IIR**, **APSTAR-V**, and **APSTAR-VI**. Service coverage extends to Asia, Oceania, the South Pacific, and Hawaii, and includes satellite-based broadcasting and telecommunications.

The company offers 24x7 monitoring and tech support through the firm's *Satellite Control Center and Network Operations Center*, plus occasional use transponder service is offered. The original center provided *Telemetry, Tracking, and Control* (**TT&C**), monitoring of communication traffic, and tech support for the satellites. The location provides three 13-m, one 5.5-m, one 11-m, one 6.1-m, and one 9-m antenna for C-band. There are two 9-m and one 8.1-m antennas for Ku-band, plus 10 sets of transmit and other related equipment. *Select the satellites for footprints.*

Apstar-IIR

Contractor: Space Systems/Loral
Model: FS-1300
Launch: 10/17/97
Operational life: 15 years
Payload: 28 C-, 16 Ku-band transponders
Power: 8,300W
Orbital slot: GEO—76.5° E

Apstar-V

Contractor: Space Systems/Loral
Model: FS-1300
Launch: 06/29/04
Operational life: 15 years
Payload: 38 C-, 16 Ku-band transponders
Power: 8,300W
Orbital slot: GEO—138.0° E

Apstar-VI

Contractor: Alcatel Space Industries
Model: SB-4100C1
Launch: 04/12/05
Operational life: 15+ years
Payload: 38 C-, 13 Ku-band transponders
Orbital slot: GEO—134.0° E

Asia Broadcast Satellite Limited (ABS)

ABS, headquartered in Hong Kong, was given birth when the company acquired the **Lockheed Martin Intersputnik** (LMI) satellite operations from Lockheed Martin in September of 2006. Those involved in the acquisition included:

- Thomas Choi (ABS founder)
- Gregg Daffner (ABS founder
- Citigroup Venture Capital International (CVCI)
- Asia Debt Management (ADM)

LMI was renamed **Asia Broadcast Satellite Limited** (ABS) and the LMI-1 satellite renamed **ABS-1** satellite. ABS serves a global customer base with representatives in Asia, the Middle East, Europe, and North America. ABS offers a complete range of services that include broadcasting and telecommunications, including GSM backhaul, IP backbone, Maritime, DTH, CATV, IPLC, and VSAT.

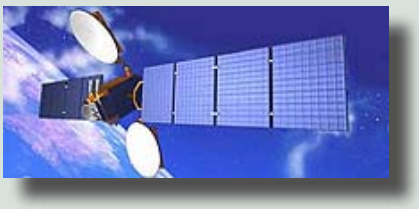
ABS has the following teleport partners:

- **MTI, Munich, Germany**
- **RRSat Global Communications, Israel**
- **ST Teleport, Singapore**
- **PCCW Global, Hong Kong**
- **Asix, Hong Kong**

Lockheed Martin Space System Co. in Newtown, Pennsylvania, is the primary Tracking Telemetry & Control (TT&C) uplink center. Primary satellite monitoring is conducted by RSCC in Dubna, Russia. *Select satellite graphic for footprint.*

ABS-1

Contractor: Lockheed Martin
Model: A2100-AX
Launch: 09/26/99
Operational life: 15+ years
Payload: 28 C-, 16 Ku-band transponders
Power: 7,200W
Orbital slot: GEO—74.96° E



Asia Cellular Satellite (ACeS)

The first regional geo-mobile, handheld satellite system to provide digital voice, facsimile, and data transmission using a small handset was created through the combined forces of **Pasifik Satelit Nusantara** (PSN) and **Jasmine International**. This resulted in the creation of **Asia Cellular Satellite**, otherwise known as **ACeS**. The company's services are via its National Service Providers.

The partners include:

- **PT. Telekomunikasi Indonesia (PSN)**
- **The Philippines Long Distance Telephone Company (PLDT)**
- **Jasmine International**
- **Lockheed Martin Global Telecom**

The company accesses the **Garuda-1**, **Agila-2** (see **Mabuhay Satellite Corporation** later in this article), and **Palapa-C**.

Garuda-1

Contractor: Lockheed Martin
Model: A2100-AX
Launch: 02/12/00
Operational life: 12 years
Payload: 2 L-band transponders
Power: 14,000W, dual-power source (solar array + battery)
Orbital slot: GEO—107.63° E
Additional
140 spot beams for Asia-Pacific mobile telephone coverage, can support 11,000 simultaneous telephone channels

Asia Satellite Telecom. Company (AsiaSat)

This company was formed in 1988 and was Asia's first, privately owned, regional satellite operator. A wholly owned subsidiary of **Asia Satellite Telecommunications Holdings Limited**, the firm has two major shareholders, those being **CITIC Group** and **General Electric Company.** The company has two business segments, one for broadcasting and telecommunications services, and the other for broadband access services. Additionally, AsiaSat completed their acquisition of **SpeedCast**, a company involved in two-way VSAT and backbone broadband access services.

AsiaSat offers services to the broadcast and telecom industries, serving more than 100 public and private TV and radio broadcasters from the world. There are more than 240 TV channels served by the AsiaSat system, with additional telecom services including public telephone networks, private VSAT networks, high-speed Internet, and multimedia services available to customers. AsiaSat's three in-orbit satellites are **AsiaSat-2**, **AsiaSat-3S** and **AsiaSat-4**. These satellites are designed to deliver performance, coverage, and connectivity across the Asia Pacific region. In April of 2006, AsiaSat awarded a contract for the building of **AsiaSat-5**—this will be a replacement satellite for AsiaSat-2 and is scheduled for launch in 2009.

AsiaSat's satellites are monitored and controlled around the clock from its state-of-the-art satellite control facilities in Hong Kong. The ground stations are the **Stanley Earth Station** and the **AsiaSat Tai Po Earth Station**, located at the *Tai Po Industrial Estate* in the New Territories of Hong Kong. The antennas include four 7.3-m, one 11.3-m, and one 6.3-m. These are for tracking and monitoring AsiaSat's satellites as well as other value-added services, such as C- and Ku-band traffic uplinking and backup services for customers. *Select the satellite images for footprints.*

AsiaSat-2

Contractor: Lockheed Martin Astro Space
Model: 7000
Launch: 11/28/95
Operational life: 13 years
Payload: 20 36MHz + 4 72MHz C-, 9 Ku-band transponders
Power: 7,100W
Orbital slot: GEO—100.52° E

AsiaSat-3S

Contractor: Hughes Satellite Telecommunications Co. Ltd.
Model: HS-601HP
Launch: 03/21/99
Operational life: 15 years
Payload: 28 36MHz C-, 16 54MHz Ku-band transponders, switchable
Power: 10,000W
Orbital slot: GEO—100.52° E
Additional steerable beam over Australia

AsiaSat-4

Contractor: Boeing Satellite Systems
Model: BS-601HP
Launch: 04/13/03
Operational life: 15 years
Payload: 28 C-, 20 Ku-band (4 BSS, 4 FSS)
Power: 9,500W
Orbital slot: GEO—122.2° E
Additional
6 C- + 4 Ku-band spares

Broadcasting Satellite System Corporation

Based in Tokyo, Japan, B-SAT was established in April of 1993. The company operates broadcasting satellites (BS) in the 12 Ghz BSS band in Japan. It's stockholders were firms involved in Hi-Vision broadcasting—the founding of **B-SAT** was their methodology to obtain and control broadcast satellites.

- **Japan Broadcasting Corp. (NHK)**
- **WOWOW Inc.**
- **Tokyo Broadcasting Systems, Inc.**
- **TV Asahi Corp.**
- **BS Nippon Corp.**
- **BS Fuji, Inc.**

B-SAT's main satellite control center is at *Kawaguchi*, with an unmanned, backup station at *Kimitsu.* The main Earth station is at *Shibuya* and the second at *Shobu. Select the satellite graphic for beam coverage.*

BSAT-1A + 1B

Contractor: Hughes Space & Communications Int'l
Model: HS-376Launch: 04/13/03
Operational life: 10 years
Launch: 04/16/97 (1A), 04/28/98 (1B)
Payload: 4 Ku-band (4 active + 4 spare) transponders
Power: 1,200W
Orbital slot: GEO—109.61° E (1A), 109.80° E (1B)

BSAT-2A + 2C

Contractor: Orbital Sciences Corporation
Model: Star-1
Launch: 03/08/01 (2A), 06/11/03 (2C)
Operational life: 10 years
Launch: 04/16/97 (1A), 04/28/98 (1B)
Payload: 4 Ku-band transponders
Power: 1,200W
Orbital slot: GEO—109.89° E (2A), 109.80° E (2C)

BSAT-3A

Contractor: Lockheed Martin
Model: A2100A
Launch: 08/14/07
Operational life: 13 years
Payload: 12 Ku-band transponders, 8 simultaneous
Power: 130W
Orbital slot: GEO—110.0° E

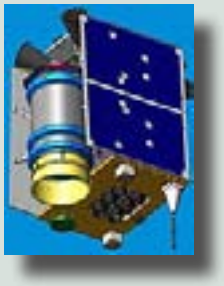
Beijing Landview Mapping Info Tech

The **Chinese Ministry of Science and Technology** (MOST), **Beijing Municipal Government**, as well as other government sectors, support **BLMIT**.

This is a high-tech firm that manages and offers technical support to the microsatellite, **Beijing-1**.

Beijing-1 (BeijinGalaxy-1, Tsinghau-2, China DMC+ 4)

Contractor: Tsinghua University + SSTL (University of Surrey)
Model: SSTL-30
Launch: 10/27/05
Operational life: 7 years
Payload:
two imagers: 32-m multispectral
4-m panchromatic, developed by SIRA Electro-Optics
Power: 50W
Orbital slot: LEO, SSO



China Aerospace Science & Technology (CASC)

CASC was established on July 1, 1999, by the Chinese government to reform the nation's defense industry. More than 130 organizations and eight primary research and design centers, factories, and commercial companies joined forces to create CASC.

CASC is the main contractor of the Chinese space program and is the government authorized investment organization falling directly under the direct supervision of the State Council. The group brought together:

- **China Academy of Launch Vehicle Technology (CALT) —1st Academy is a complex located in southern Beijing that performs the R&D functions for liquid-propellant ballistic missiles and space launch vehicles**
- **China Academy of Rocket Motor Technology (ARMT) —4th Academy is where the design of solid rocket motors is performed**
- **China Academy of Space Technology (CAST)—5th Academy is responsible for all spacecraft development management**

and they develop and manufacture most of the Chinese satellites

- China Aerospace Propellant Technology Academy (CAPA)—6th Academy oversees 11 factories and research facilities as well as handles the R&D for inertial guidance systems and liquid engines

- China Great Wall Industry (CGWIC) Shanghai Academy of Space Flight Technology (SAST)—8th Academy designs, develops and manufactures various spacecraft as well as the Long March-4 family of launch vehicles, the FB-1 launch vehicle and components

- China Academy of Space Electronic Technology (CASET)—9th Academy develops integrated circuits and microelectronics for CASC projects\China Academy of Aerospace Navigation Technology (CAANT)—10th Academy is also known as the Aerospace Time Instrument Company

- Sichuan Space Industry Corporation (SSIC) handles R&D and production for liquid-fuelled ballistic missiles, launch vehicles, electronics and satellite ground stations\Xi'an Space Science & Technology Industry Corporation

BeiDou-1A, -1B, -1C, -1D

Contractor: *Chinese Academy of Space Technology (CAST)*
Launch: *10/30/00 (A), 12/20/00 (B)*
05/24/03 (C), 02/02/07 (D)
Operational life: *5 years*
Payload
12-36MHz + 6-72MHz C-band and
16-36MHz + 4-72MHz Ku-band transponders
Orbital slot: *GEO*
140° E (A), 80° E (B), 110.5° E (C), 58.75° E (D)
Additional— *operated by Chines Defense Ministry and these satellites are also the current Chinese satellite navigation system*

China Direct Broadcast Satellite (CHINA DBSAT)

A joint venture of **China Satellite Communications Company, Limited** and **Sino Satellite Communications Company, Limited**, **CHINA DBSAT** was established in December of 2006. Then, in 2007, both companies agreed to consolidate, creating the new firm, which happens to be the exclusive, domestic, satellite operator in China.

There are four in orbit satellites operated by CHINA DBSAT as well as the ground facilities required to manage the spacecraft. Clients include telcos, broadcasters, government agencies, enterprises, with services including DTH and DBS, emergency, business continuity, Internet access, and other IP-based operations for the country and the region. CHINA DBSAT operates **ChinaStar-1**, **–6B**, **–9**, and **Sinosat-1** and **–3**. *Select sat-*

ChinaStar-1 (Zhongwei-1)

Contractor: Lockheed Martin
Model: A2100A
Launch: 05/30/98
Operational life: 15 years
Payload: 12-36MHz + 6-72MHz C-band and
16-36MHz + 4-72MHz Ku-band transponders
Power: 6,797W (EOL)
Orbital slot: GEO—87.47° E
Additional: solar shades are "pleated" and TWTAs are radiation cooled

ChinaSat-6B (Zhong Xing-6B, ZX-6B)

Contractor: Thales Alenia Space
Model: Spacebus-4000C2
Launch: 07/05/07
Operational life: 15 years
Payload: 26 36MHz standard +
14 extended C-band transponders
Power: 9,500W (EOL)
Orbital slot: GEO—115.5° E

ChinaSat-9 (Zhong Xing-9, ZX-9)

Contractor: Thales Alenia Space
Model: Spacebus-4000C2
Launch: 07/05/07
Operational life: 15 years
Payload: 18 36MHz standard + 4 54MHz Ku-band transponders
Orbital slot: GEO—92.2° E

SinoSat-1 (Xinnuo-1)

Contractor: Thales Alenia Space
Model: Spacebus-3000A
Launch: 07/18/98
Operational life: 15 years
Payload: 23 36MHz + 1 54MHz C-,
14 54MHz Ku-band transponders, 1 switchable
Power: 5,100W
Orbital slot: GEO—110.5° E

SinoSat-3 (Xinnuo-3, XN-3)

Contractor: Chinese Academy of Space Technology (CAST)
Model: DFH-3
Launch: 05/31/07
Operational life: 8 years
Payload: 10 36MHz C-band transponders
Orbital slot: GEO—125.0° E

China Meteorological Administration

CMA
www.cma.gov.cn

This is a public service agency directly affiliated with the **State Council of the People's Republic of China**. Established in 1994, the CMA is responsible for the organizational and operational management of Chinese meteorological services. They have bureaus established in 31 provinces, autonomous regions, and municipalities.

FengYun-2C + -2D

Contractor: Shanghai Academy of Space Flight Technology (SASTO
Model: DFH-3
Launch: 10/19/04 (2C), 12/08/06 (2D)
Operational life: 3 years
Payload:
(2C) 5 radiometer scanning channels
(2D) weather forecasting for Beijing Olympics
Power: 300W
Orbital slot: GEO—104.2° E (2C), 86.5° E (2D)

FengYun-3A (FY-3A)

Contractor: Shanghai Academy of Space Flight Technology (SASTO
Model: DFH-3
Launch: 05/27/08
Operational life: 3 years
Payload: 11 remote sensors, 2 X-band transponders
Power: 300W
Orbital slot: GEO—125.0° E

GE International Holdings (SAT-GE)

A subsidiary of GE, this company offers capacity on their GE-23, which was formerly known as AMC-23.

The satellite offers an uplink in any of the Ku-band beams and a downlink in the same, or another, beam. There are teleports in Hong Kong, Japan, two on the U.S. west coast, and one in Switzerland (accessed via U.S. fiber connectivity).

GE-23

Contractor: Alcatel Alenia Space
Model: Spacebus-4100
Launch: 12/29/05
Operational life: 16 years
Payload: 18 C-, 20 Ku-band transponders
Power: 13,000W
Orbital slot: GEO—172.0° E
Additional: Ku-band tailored for Boeing Connexion

Indian Space Research Organization (ISRO)

In 1969, the **ISRO** was established as India's primary space R&D organization. They became responsible for developing launch and propulsion systems; launch sites, the satellites themselves, as well as the tracking networks. **Antrix Corporation, Ltd.**, founded in 1992 handles the company's marketing activities and commercial efforts. In April of 2008, the ISRO managed the successful launch of a single mission whose payload was 10 satellites, which included eight nano satellites manufactured in Canada and Germany as well as two Indian spacecraft, the **CARTOSTAT-2** and **IMS-1**. In addition to domestic payloads, the ISRO also offers launch services.

Cartosat-2

Contractor: ISRO
Model: IRS-1 Bus
Launch: 05/05/05
Operational life: 5 years
Payload: 2 panchromatic cameras, stereoscopic
Power: 1,100W
Orbital slot: LEO, SSO
Additional: two solid state recorders, 120GB

Cartosat-2A (IRS-P7)

Contractor: ISRO
Model: IRS-2 Bus
Launch: 01/10/07
Operational life: 5 years
Payload: 1 panchromatic camera, 1-m spatial resolution
Power: 1,100W
Orbital slot: LEO, SSO
Additional: solid state recorder

Gsat-2

Contractor: ISRO
Model: I-2K Bus
Launch: 05/08/03
Operational life: 3.5 years
Payload: 4 C-, 2 Ku-band, S- + C-bands for MSS
Power: 1,100W
Orbital slot: 47.95° E
Additional: 4 experimental payloads: Total Radiation Dose Monitor, Surface Charge Monitor, Solar X-Ray Spectrometer, Radio Beacon Experiment

Insat (Indian Nat'l Satellite) -3A, -3B, -3C, -3E

Contractor: ISRO
Model: Insat-2 / -3 Bus
Launch: 04/09/03 (3A), 03/12/00 (3B), 01/23/02 (3C), 09/27/03 (3E)
Operational life: 15 years—3E=12 years
Payloads 3A=12 normal, 6 extended C-, 6 Ku-band transponders
3B=12 extended C-, 3 Ku-, S-band (MSS) transponders
3C=24 normal, 6 extended C-, 2 S-band (MSS)
3E=24 normal, 12 extended C-band transponders
Power: 3,100W (3A), 1,700W (3B0, 3,200W (3C), 2,400W (3E)
Orbital slots: 93.5° E (3A), 82.98° E (3B), 73.97° E (3C), 55.06° E (3E)
Additional: 3 VHRR for meteorological observation + Ku-band beacon

Insat-4A + -4B

Contractor: ISRO
Model: I-3000 Bus
Launch: 12/21/05 (4A), 03/11/07 (4B)
Operational life: 12 years
Payload: 12 C-, 12 Ku-band transponders
Power: 5,500W
Orbital slot: GEO—83.0° E (4A), 93.46° E (4B)

Insat-4CR

Contractor: ISRO
Model: I-2000 Bus
Launch: 09/21/07
Operational life: 10 years
Payload: 12 Ku-band transponders
Power: 5,500W
Orbital slot: GEO—74.05° E

Indovision — PT MNC Skyvision

Incorporated in August of 1988, **INDOVISION** initiated its service with five-channel C-band DBS analog service. The **Palapa-C2** satellite was used for its transponder and broadcasting system.

With headquarters in Jakarta, Indonesia, INDOVISION offers DTH, **SMATV** (Satellite Master Antenna TV), and hotel and hospital access via SMATV. In 1997, **Cakrawarta-1** was launched, managed, and operated by **PT Media Citra Indostar** (MCi), which was established in July of 1991.

Cakrawarta-1 (Indostar-1)

Contractor: Orbital Sciences Corporation
Model: STAR-1
Launch: 11/29/97
Operational life: 14 years
Payload: 5 S-band transponders
Power: 3,200W
Orbital slot: GEO—107.63° E

JSAT Corporation

Established in February of 1985, **JSAT** was Japan's first, private-sector satellite operator. Satellite communication services started in 1989 directly after the JCSAT-1 launch. The company owns nine communications satellites, including a backup satellite. JSAT Corporation's Group company list includes:

- JSAT International Inc.
- Satellite Network, Inc.
- Horizons Satellite Holdings LLC
- Horizons-1 Satellite LLC
- Horizons-2 Satellite LLC

JSAT International is based in Washington D.C. and handles sales and marketing activities that target digital video transmission as well as IP-based content distribution and other fields in North America that use the **Horizons-1** satellite. Satellite Networks offers services that include two-way VSAT1 satellite communications, sports, and events live coverage for SKY *PerfecTV*! **Horizons Satellite Holdings LLC** is a joint venture between the company and I**ntelsat Corporation** and both companies own the Horizons-1 and Horizons-2 satellites. The company operates the *Yokohama Satellite Control Center* and an earth station in Hawaii.

Jsat-1B

Contractor: Boeing Satellite Systems
Model: 601
Launch: 12/02/97
Operational life: 12 years
Payload: 16 27MHz + 16 36MHz Ku-band transponders
Power: 5,200W (EOL)
Orbital slot: GEO—150.01° E

JCSat-2A (JCSat-8)

Contractor: Boeing Satellite Systems
Model: 601
Launch: 03/29/02
Operational life: 11 years
Payload: 11 36MHz + 5 54MHz C-, 16 57MHz Ku-band transponders
Power: 5,200W (EOL)
Orbital slot: GEO—154.0° E

JCSat-3A

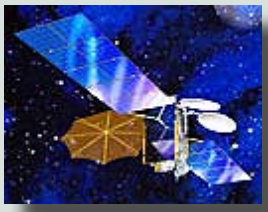
Contractor: Lockheed Martin Commercial Space systems
Model: A2100AX
Launch: 08/12/06
Operational life: 15 years
Payload: 12 36MHz C-, 18 27MHz + 12 36MHz Ku-band transponders
Power: 7,200W (EOL)
Orbital slot: GEO—128.0° E

JCSat-4A (JCSat-6)

Contractor: Boeing Satellite Systems
Model: 601
Launch: 02/16/99
Operational life: 14.5 years
Payload: 32 27MHz Ku-band transponders
Power: 5,200W (EOL)
Orbital slot: GEO—124.0° E

JCSat-5A (JCSat-9)

Contractor: Lockheed Martin Space Systems
Model: A2100AX
Launch: 02/16/99
Operational life: 12 years
Payload: 1 S-, 20 36MHz C-, 8 54MHz + 12 36MHz Ku-band transponders
Power: 7,200W (EOL)
Orbital slot: GEO—132.0° E



JCSat-110 (N-Sat-110, Superbird-D, Superbird-5)

Contractor: Lockheed Martin Commercial Space Systems
Model: A2100AX
Launch: 10/07/00
Operational life: 15 years
Payload: 24 Ku-band transponders
Power: 7,200W (EOL)
Orbital slot: GEO—110.05° E
Additional: SKY PerfectTV/110 DTH service

JCSat-R

Contractor: Boeing Satellite Systems
Model: 601
Launch: 02/19/97
Operational life: 12 years
Payload: 12 36MHz + 16 27MHz C-, 12 36MHz Ku-band transponders
Power: 5,200W (EOL)
Orbital slot: GEO—127.48° E
Additional: backup satellite for JCSat-3A

Korea Aerospace Research Institute (KARI)

For the country of South Korea, this is the nation's aeronautics and space agency, which was established in 1989. Their concentration is in the development of satellites, space launch vehicles, and aircraft. **KARI** is located in the Daeduk Science Town (in Daejon), some 140-km south of the nation's capital city of Seoul. KARI has collaborated with 34 organizations within 12 countries that include the U.S., Russia, U.K., France, Germany, Israel, and China.

Kompsat-1 + 2

Contractor: KARI + TRW (1), EADS Astrium (2)
Launch: 12/21/99 (1), 07/28/06 (2)
Operational life: 3 years
Payload: (1) 2 S- + 2 X-band transponders
electro-optical camera, ocean scanning multi-spectral imager
ionosphere measurement sensor, high energy particle detector
(2) 2 S-, 2 X-band transponders + multi-spectral camera
Power: 1,000W
Orbital slot: LEO, SSO

KT Corporation

From its establishment in December of 1981 as **Korea Telecom**, **KT Corporation** provides telephone services, broadband Internet services and access, as well as LM, wireless and data services. The company launched the world's first wireless broadband service, named *WiBro*, they also instituted their "*Internet Family Doctor*" service. Technicians from the company make regular house calls to customers as well as meeting them at their convenience. They also have female technicians on hand to visit female customers who would prefer someone of their gender at their home to fix a problem.

KoreaSat-2 (Mungungwha-2)

Contractor: Lockheed Martin Astro Space
Model: AS-300
Launch: 01/14/96
Operational life: 10 years
Payload: 15 Ku-band transponders (12 FSS, 3 DBS)
Power: 1,600W (EOL)
Orbital slot: GEO—112.97° E

KoreaSat-3 (Mungungwha-3)

Contractor: Lockheed Martin Astro Space
Model: A2100A
Launch: 09/04/99
Operational life: 15 years
Payload: 30 Ka-band transponders (24 FSS, 6 DBS)
Power: 4,800W (EOL)
Orbital slot: GEO—116.03° E
Additional: steerable antenna

KoreaSat-5 (Mungungwha-5)

Contractor: Alcatel Alenia Space
Model: Spacebus-4000C1
Launch: 08/22/06
Operational life: 15 years
Payload: 4 Ka-, 8 SHF-, 24 Ku-band transponders
Power: 4,800W (EOL)
Orbital slot: GEO—113.03° E
Additional: includes Syracuse III program technologies

Mabuhay Satellite Corporation

This company began in 1994 to establish, own, operate, and maintain an international satellite facility and other telecom services. The company is owned by the **Philippine Long Distance Telephone Company** and, with their full support, MSC launched **Agila-2** in August of 1997 with full commercial operations initiated on January 1st in 1998. **MSC** is the first, and only, Philippine satellite operator. The company offers video, IP, and telecom solutions for clients in Asia and North America.

Agila-2

Contractor: Space Systems/Loral
Model: LS-1300
Launch: 08/19/97
Operational life: 15 years
Payload: 30 C-, 24 Ku-band transponders
Power: 9,000W (EOL)
Orbital slot: GEO—146.03° E
Additional: handles 50,000 simultaneous telephony links + 190 HiFi channels

Malaysia East Asia Satellite (MEASAT)

In 1993, a team of experienced and motivated experts met to develop a communications infrastructure for Malaysia. The project was named the **Malaysia East Asia Satellite**, or **MEASAT** for short. In 1996, two satellites were launched and they started to provide satellite services across South East Asia that same year. The satellite control facility is in Gunung Raya, Langkawl, and the company launched the world's first DTH multi-channel TV service, Astro. In 1998, the satellite division became independent and the operating company **MEASAT Satellite Systems Sdn Bhd**, under the holding company **MEASAT Global Bhd**, came to fruition.

Measat-2

Contractor: Hughes Space and Communications
Model: HS-376
Launch: 11/14/96
Operational life: 11.5 years
Payload: 12 C-, 6 Ku-band transponders (1 spare)
Power: 1,200W (BOL)
Orbital slot: GEO—148.00° E

Measat-3

Contractor: Boeing Satellite Systems
Model: BSS-601HP
Launch: 12/11/06
Operational life: 15 years
Payload: 24 36MHz C-, 24 36MHz Ku-band transponders
Power: 10,800W
Orbital slot: GEO—91.5° E

Mobile Broadcasting Corporation

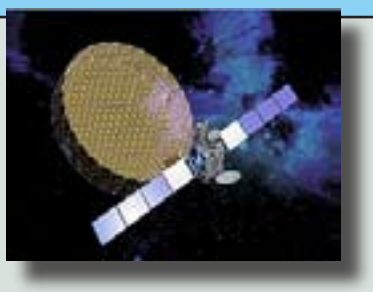
This company was established in May of 1998 and is based in Tokyo, Japan.

The company started their service in October of 2004 after they had successfully launched their satellite in March of that year. For the Japanese market, **Toyota** introduced a Mobile Broadcasting tuner as an option in their car navigation system in 2006. Then, in 2007, the company announced their plan to offer an earthquake early warning S-band emergency service.

The shareholders include:

- ß Usen Corporation
- ß Toshiba Corporation
- ß SK Telecom Co., Ltd.
- ß Sharp Corporation
- ß Toyota Motor Co.
- ß Yokogawa Electric Co.
- ß Matsushita Electric Industrial Co.
- ß NTT Data Corporation

MBSat

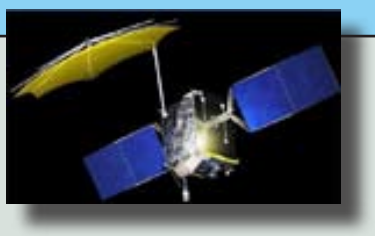


Contractor: Space Systems/Loral
Model: LS-1300
Launch: 03/13/04
Operational life: 12 years
Payload: 16 25MHz S-band transponders
Power: 7,400W
Orbital slot: GEO—144.0° E

Nippon Telegraph and Telephone

NTT DoCoMo is a world leader in mobile communications, and in 2001, initiated the world's first 3G mobile service based on W-CDMA. The firm has branch offices throughout Asia, Europe, and North America. The company also offers i-*mode*, their mobile Internet service.

N-Star-C



Contractor: Lockheed Martin Commercial Space Systems + Orbital Sciences (Bus)
Model: STAR-2 Bus
Launch: 07/05/02
Operational life: 15 years
Payload: 1 C-, 20 S-band transponders
Power: 2,600W (BOL)
Orbital slot: GEO—135.94° E

PT Satelit Palapa Indonesia (SATELINDO)

This is an Indonesian private satellite operator based in Jakarta and is owned by **Indosat**. **Satelindo** has three national licenses for satellite service, international gateway service, and GSM cellular service. Satelindo owns and operates the **Palapa-C2** satellite. The company's control station is located at Daan Mogot, West Jakarta.

Palapa-C2

Contractor: Boeing Satellite Systems
Model: HS601
Launch: 05/15/96
Operational life: 15 years
Payload: 30 C-, 6 Ku-band transponders
Power: 3,700W
Orbital slot: GEO—113.07° E

Republican Center For Space Communications

In January of 2005, a Russian-Kazakhstan summit meeting resulted in an agreement to developed the **Karzat** communications and broadcasting satellite. In addition, the countries agreed upon the protection of intellectual property being used and gained through bilateral military technical cooperation.

The **Russian Federal Space Agency**, the **Ministry of Information Technology, Communications,** and Kazakhstan's **Agency for Communications Informatization** and the **Ministry of Education and Science** appointed authorization bodies to build, launch, and operate a satellite. The executors were Russia's **Khrunichev** state production center and **Space Communiactions** state unitary company as well as Kazakhstan's **Karzsat** and **Republican Center of Space Communications and Electromagentic Comatibility of Radio-electronic Systems.**

KazSat-1

Contractor: Krunichev State Research and Production Space Center
Launch: 06/17/96
Operational life: 12 years
Payload: 12 72MHz Ku-band transponders
Power: 1,300W
Orbital slot: GEO—102.99° E
Additional: KazSat-2 is scheduled to launch in 2009

Russian Satellite Communications Company (RSCC—Kosmicheskiya Sieves)

In February of 1968, the **USSR Ministry of Communications** established "*The Union Communications Node No. 9*" when, one year previously, the **Molnia-1** satellite transmitted TV and radio programs. That node became **Russian Satellite Communications Company State Enterprise** and was given the name known by today. In 1998, RSCC signed a contract with **NPO PM**, the Russian national spacecraft manufacturer, for the design and production of new **Express-A** satellites. **Alcatel** produced the payloads. The main concentration of this national satellite communications operator is on the deployment of satellite networks for Russia and C.I.S. countries. Their constellation of geostationary communication and broadcasting satellites, combined with teleports and fiber-optic communication links, allows RSCC to offer TV and radio broadcasting, telephony, high-rate data transmission, video conferencing as well as corporate network deployments.

Express-A2 (Express-6A)

Contractor: NPO PM Bus, Alcatel Space payload
Model: MSS-2500-GSO
Launch: 03/12/00
Operational life: 10 years
Payload: 12 C-, 5 Ku-band transponders
Power: 2,500W
Orbital slot: GEO—103.0° E

Express-AM1, -AM2, -AM3

Contractor: NPO PM Bus, Alcatel Space + NEC payload
Model: MSS-2500-GSO
Launches: 10/03/04 (AM1), 03/29/05 (AM2), 06/24/05 (AM3)
Operational life: 12 years
Payloads:
9 C-, 18 Ku-, 1 L-band transponders (AM1)
16 C-, 12 Ku-, 1 L-band transponders (AM2 + AM3)
Power: 6,000W
Orbital slots: GEO—40.0° E (AM1), 80.0° E (AM2), 140.0° E (AM3)

Singtel Optus Pty. Ltd.

Tracing its heritage to 1879 when Singapore became one of the first cities in the East to obtain telephone service, just three years after Alexander Graham Bell patented his invention. In 1955, the Singapore Telephone Board was incorporated with exclusive rights to operate telephone service within Singapore. In 1974, they merged with Telecommunications Authority of Singapore and, in 1988, the subsidiary Singapore Telecom International was formed. SingTel became incorporated in 1992. Singtel concluded their largest overseas investment ever when the company acquired Optus, the second largest telecom supplier in Australia.

In addition to Optus, SingTel subsidiaries include SingTel Mobile, NCS Pte. Ltd., SingNet and associated company, Singapore Post .SingTel is also an investor in APT Satellite Holdings of Hong Kong and has a 20.33 percent overall interest, and has six C-band transponders on APSTAR-V.

Optus-B3

Contractor: Boeing Space Systems
Model: BS-601
Launch: 08/14/92
Operational life: 10 years
Payload: 1 L-, 15 Ku-band transponders + 2 experimental payloads, a Ka-band beacon + a laser retroreflector
Power: 4,100W
Orbital slot: GEO—164.0° E

Optus-C1

Contractor: Mitsubishi Electric + Space Systems/Loral (Bus)
Model: LS-1300
Launch: 06/12/03
Operational life: 15 years
Payload: 24 civilian Ku-band + 8 military bands in X-, UHF- + Ka-band transponders
Power: 10,600W
Orbital slot: GEO—156.0° E
Additional: carries 16 antennas, 50 percent owned by Defence Ministry

Optus-D1 + -D2

Contractor: Orbital Sciences Corporation
Model: STAR-2
Launch: 10/13/06
Operational life: 15 years
Payload: 24 Ku-band transponders
Power: 4,800W
Orbital slot: GEO—160.0° E

Space Communications Corporation

Space Communications Corporation (SCC)

In Japan, in 1985, the satellite communications industry started. **SCC** is a fixed satellite service operator currently operating four satellites and a ground network infrastructure. The company is headquartered in Tokyo, Japan. In February of 2008, SCC became a subsidiary of **SKY Perfect JSAT**. The company has two satellite control centers. The *Superbird Platform East* is located in Ibaraki and the *Superbird Platform West* is in Yamaguchi. There are mini-footprint maps for each listed satellite at this link.

Superbird-A (Superbird-A1)

Contractor: Space Systems/Loral
Model: LS-1300
Launch: 12/01/92
Operational life: 10 years
Payload: 23 Ku-, 3 Ka-, 2 X-band transponders
Power: 3,400W (EOL)
Orbital slot: GEO—158.0° E

Superbird-B2 (Superbird-4)

Contractor: Boeing Satellite Systems
Model: HS-601HP
Launch: 02/18/00
Operational life: 13 years
Payload: 23 Ku-, 6 Ka-band transponders
Power: 5,400W (EOL)
Orbital slot: GEO—161.98° E

Superbird-C (Superbird-3)

Contractor: Boeing Satellite Systems
Model: HS-601
Launch: 07/28/97
Operational life: 10 years
Payload: 24 Ku-band transponders
Power: 4,600W (EOL)
Orbital slot: GEO—143.95° E
Additional: maneuverable spot beam

Superbird-D (Superbird-5)

Contractor: Lockheed Martin
Model: A2100AX
Launch: 10/07/00
Operational life: 10 years
Payload: 24 Ku-band transponders
Power: 1,200W (EOL)
Orbital slot: GEO—110.0° E

Thaicom Public Company Limited

Formerly known as **Shin Satellite Public Company Limited**, the original name of this company was **Shinawatra Satellite**. Shin was founded in 1991 when Thailand's *Ministry of Transport and Communications* permitted the firm to launch and operate satellites. This was the first Thai company to be allowed as a satellite operator and was the first privately owned satellite company in Asia. The firm operates four businesses: Internet, telephone, media distribution and satellite transponder leasing and related services. The company's subsidiaries include:

- IPSTAR Company Limited ("IPSTARCO")
- CS LOXINFO Public Company Limited ("CSL")
- DTV Service Co., Ltd.
- Shenington Investments Pte. Ltd. ("Shenington")
- Cambodia Shinawatra Company Limited ("CamShin")
- Lao Telecommunications Company Limited ("LTC")
- Cambodian DTV Network Limited ("CDN")

Thaicom-1A (Thaicom-1), Thaicom-2

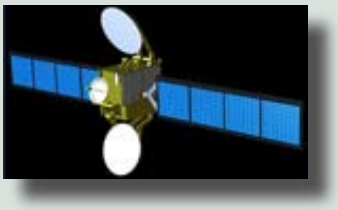
Contractor: Hughes Space and Communications Company
Model: HS-376
Launch: 12/18/93 (1A), 10/08/94 (2)
Operational life: 15 years
Payload: 12 C-, 3 Ku-band transponders
Power: 8,000W
Orbital slot: GEO—119.91° E (1A), 78.47° E (2)

Thaicom-4 (IPSTAR-1)

Contractor: Space Systems/Loral
Model: LS-1300S
Launch: 08/11/05
Operational life: 12 years
Payload: 94 Ku-, 18 Ka-band transponders
Power: 14,000W
Orbital slot: GEO—120° E

Thaicom-5

Contractor: Alcatel Alenia Space
Model: 3000A
Launch: 05/27/06
Operational life: 12 years
Payload: 25 36MHz C-, 2 54MHz + 12 36MHz Ku-band transponders
Power: 5,000W
Orbital slot: GEO—78.5 E



Vietnam Post and Telecommunications Group (VNPT)

In January of 2006, **VNPT Group** was established to build a strong economic group within Vietnam to become the key state economic group for telecommunications and IT. Provided through VNPT are a variety of services: VSAT, **Inmarsat**, data transmission, International TV, telephony, mobile, CDMA, VoIP, and NGN-based services.

Vinasat-1

Contractor: Lockheed Martin
Model: A2100A
Launch: 04/18/08
Operational life: 15 years
Payload: 8 C-, 12 Ku-band transponders
Power: 7,200W
Orbital slot: GEO—132.0° E

Executive Spotlight On...

Andrew Jordan

Chief Executive Officer
SAT-GE

Andrew Jordan is President and CEO of SAT-GE and has more than 20 years of experience in the management and development of new markets and products throughout Asia. He has a degree in Chinese from the School of Oriental and African Studies in London, England. Andrew has put his studies to good use, as his entire career has focused on the Asia Pacific region working with most of the major broadcasters and telecommunications operators in the Asia Pacific and globally. His experience includes 18 years in executive management roles in the Asia Pacific satellite industry.

SatMagazine

GE has a long history within the satellite industry, but the sale of shares back to SES looked like the end of its interests. However, GE now appears to have retained a foothold in our industry with SAT-GE. Can you explain the motivation for this latest move?

Andrew Jordan

SAT-GE is a relatively new business for GE. After a long history dating back to the mid 1980s, that saw the acquisition of Americom from RCA, GE entered into a transaction with SES in 2007 worth over $1.6bn in which SES bought back shares from GE in return for cash, assets and investments in other satellite operators.

The assets in this transaction included Satlynx (a satellite managed network services business) and a satellite (AMC-23). In April 2007, these disparate parts were brought together as GE International Holdings. The management team of Satlynx immediately began the creation of a new company to manage the satellite, and to grow GE's interests as a satellite operator. Hence, SAT-GE was born and the satellite was renamed to GE-23.

SatMagazine

What attracted you to SAT-GE?

Andrew Jordan

Certainly the opportunity to be in on the ground at the beginning of a start-up operation under a successful global business was very compelling. To lead a small entrepreneurial team backed-up by the experience of the best in business has opened many opportunities to succeed. In less than a year we established offices in Singapore and Washington D.C., created a strong brand and significant market awareness for SAT-GE and GE-23. When GE-23 was transferred, its inventory of transponder capacity was only about 20 percent occupied. We have more than doubled this since its launch in 2005, a huge achievement from a first-class team.

SatMagazine

Why is GE-23 such an interesting satellite?

Andrew Jordan

GE-23 is a unique satellite, to be certain; positioned at 172 degrees East, it sits over the Pacific Ocean and has coverage from the West Coast of the USA across the Pacific into Asia, and covers Japan, Australia, and New Zealand. It is the ideal platform for commercial, governmental, and military applications such as remote site connectivity via VSAT, high bandwidth trunking, and communications-on-the-move to vehicles in the air, on the water, or on land. Despite its strengths in primary, or secondary long distance telecommunications, GE-23 has capacity for TV and video distribution that is growing in importance with the advent of HD in the Asia-Pacific region.

SatMagazine

What are you doing to promote the use of GE-23 for TV and video distribution?

Andrew Jordan

SAT-GE has recently begun a collaboration effort with Arqiva on a new state-of-the-art platform that will enable broadcasters to distribute and contribute HD and Standard Definition (SD) channels to Asian-Pacific broadcasters and cable head-ends.

From **Arqiva's Digital Media Centre** and teleport facilities in Los Angeles the new HD platform is uplinked to GE-23 and can deliver MPEG-4 encoded streams in a flexible range of bit rates. The complete solution is a very cost-effective way for content providers to reach their audiences across Asia. The uplink uses high order, DVB-S2 8PSK modulation for maximum bandwidth efficiency, and a range of services can be put together to complete the perfect solution such as; backhaul, standards conversion, local connections and remote cable head end antenna placement.

SatMagazine

How do you see the development of HD TV taking off in the Asia-Pacific market?

Andrew Jordan

We have seen HD programming capture the imagination of audiences in the United States and in European markets such as the United Kingdom; the same experience is starting to happen in Asia. Currently, the vast bulk of HD content is being produced in the U.S., which is significantly enhancing the viewer experience with clear, high quality pictures. Asia, as we know, is not one homogenous market, and is in varying stages of development. Some markets such as Japan, South Korea, Australia, Singapore, and Hong Kong have already established various HD services.

Others are in the process of introducing them to consumers. Distribution is through a variety of means: DTH, cable, IPTV and, terrestrial, depending on individual markets. Now we are beginning to notice affiliates demanding HD 16 x 9 format content from their Asia based content providers, and this will help drive HD services across Asia.

SatMagazine
Which Asian markets do you see leading the development of HD?

Andrew Jordan
Despite the varying stages of HD development in each country's markets, we are realizing a growing demand for the distribution of content to Asian DTH platforms.

The cable companies require HD content across the whole of Asia. The most advanced, to date, are Japan and South Korea, followed by Australia, Hong Kong, and Singapore. Of particular interest is the Beijing Olympics, which will be the first Olympic games to be broadcast solely in HD.

This means SD viewers will receive a center cut picture, reformatted to 4 x 3, and therefore losing some of the action. HD viewers, on the other hand, will receive spectacularly sharp 16 x 9 pictures that will provide a tremendous viewing experience. The cost of HD sets has come down to the price point where many people will upgrade, just to watch the Olympics.

And if they don't buy their HD set before the Olympics, the 4:3 viewing experience may be the motivation to upgrade, thus creating a surge in HD manufacturing, and demand for more HD programming.

SatMagazine
What new technologies do you think will move the industry toward the next phase?

Andrew Jordan
Clearly the mobility markets are growing at a tremendous pace. There has been a proliferation of transportable and mobile antenna systems developed over recent months, and these are finally finding their way to the users of mobility applications.

The military markets are usually at the forefront of adoption of new technologies and this is evidently the case in the uptake of COTM and UAV technologies. It will be interesting to see how the military sector will use VSAT technology in cellular configurations as the volume of Ka capacity increases, enabling very high throughputs in small focused, but overlapping, footprints.

SatMagazine
Where do you see the opportunities for the future of the satellite industry?

Andrew Jordan
They seem clearly defined in places where either (a) there is a large population to address with a simultaneous message (TV being the classic application), or (b) where wired and wireless terrestrial are not available and are not practical. In the case of "addressing the unconnected", the drivers for this are, as always; extremely remote locations with small populations; reaching temporary locations where business is conducted in remote locations but only for fixed periods; and of course connecting people who are on the move.

The key markets that will enjoy the technology include military, aeronautical and maritime. With TV, the economics of addressing a population with a satellite are much better than the terrestrial alternative.

There will always be an underserved minority that are too far from a central office, or even beyond terrestrial trunking. GE-23 on the other hand, is very much a hybrid where we can serve the unconnected, address the mass market, and still deliver to remote areas where traditional BSS operators simply are unable to make the connection. This is a most interesting time to be active in the Asia-Pacific market.

To view the GE-23 footprint, select this link.

The Asia-Pacific market deserves your close scrutiny, as this region is a superb environment for the technologies and capabilities of satcom. To help us wade through the complexities of this market segment, the CommunicAsia2008 event is upcoming and will meet in Singapore from June 17th through the 20th. Since 1979, the information and communication media industries have been brought together to share information that has been rapidly evolving.

Technology has emerged from the realms of involving only the biggest players — to the inclusion of a broader range and wider variety of various sized industries. Technology has increasingly made the world a smaller place, and this gathering enables all who participate to participate on an even playing field.

This year's exhibition and summit will serve market-specific technology clusters with programs that address IPTV/mobile entertainment, WiMAX, and more, with group pavilions and displays. Sure to be one of the hot topics will be the transition to HDTV and interactive services

The Summit provides conferences such as: Access Networks and Technologies; Mobile and Interactive Services; Convergence and IMS; Satellite Communications; Applications, Delivery and Devices, and more. Speakers will include prominent leaders and CEOs who share their perspectives on key issues that impact their business, and offer initiatives to the development of the Asia-Pacific satellite market.

Some of the latest products from **Ericsson**, **PCCW Global**, **Samsung**, **Singtel**, **Tandberg TV**, **Thaicom Public Company Limited,** and **Yahoo** will be on display, as they move into the next chapter of infocomms. Satellite industry participants include **GlobeCast**, **IntelSat**,

MEASAT, **Speedcast,** and **Thuraya**, providing the latest in communications' products and services to some of Asia's leading broadcasters and telecom operators.

In addition, this year will herald some newcomers whose offerings will include upcoming products and services for the region and world.

CommunicAsia products debuts will be presented from **Yahoo**, **Navteq**, **TeleAtlas**, **Sandisk**, **SK Telesys**, and local **Sirius Multimedia**.

Running simultaneously, *BroadcastAsia2008 International Conference* will focus on the evolution and future of broadcasting.

Programs will address the challenges and solutions to transition to high definition (HD), and showcase workflow and production examples including a virtual studio in HD, and pan and scan technology for mobile devices.

Internet Protocol (IP) will be addressed, as it will be an important part of driving the digitization of media in the future. IP will provide more flexibility in terms of monitoring and control for operators looking to manage the quality and efficacy of their broadcasts.

"CommunicAsia and BroadcastAsia is the choice platform for the leading companies to address the upcoming agenda for the information communications and media industries in the next year," said *Victor Wong*, Project Director at show organizer **Singapore Exhibition Services** (SES).

"Besides being an ideal business and networking forum, the typical exhibitor and visitor to the shows are looking out for industry insights and feedback on where technology will be headed in the next 12 to 18 months," *Wong* added. "This is an integral part of the sustaining appeal and value that the shows have consistently offered each year.".

Make your timely presence felt at Asia's unparalleled one-stop ICT platform which attracted over 50,000 attendees in 2007.

CommunicAsia2007, held in conjunction with **EnterpriseIT2007** & **InteractiveDME**, was a great success and attracted 1,677 exhibiting companies from 60 countries/regions, covering 5 halls, with 47,000 square metres of exhibition area.

Make Your Best Business Decision and Attend CommunicAsia2008.

by Silvano Payne, Hartley & Pattie Lesser, Kevin and Michael Fleck

According to legend, the ancient Olympic Games were founded by Heracles (the Roman Hercules) — one of Zeus' sons. The first Olympic Games, for which we still maintain written records, were held in 776 BC.

Approximately 1,500 years later, a young Frenchman named *Pierre de Coubertin* decided to revive the games, thereby giving him the moniker, *le Rénovateur*. In 1892, Coubertin constructed an international committee to organize the *Games*.

Two years later, this committee became the *International Olympic Committee* (*IOC*) and *Demetrious Vikelas* from Greece was selected to as the organization's first president. Athens was selected as the site for the revived Olympic Games and the planning was underway

for this, now annual, mega-sporting event where the "best of the best" compete.

The *Beijing Olympic Games* are expected to find some 800,000 visitors arriving in town for the 17-day event. China is spending approximately $160 billion for public works' improvements and the event's venues, including refurbished and new roads, subways, and sports' stadiums.

With three-quarters of the games' tickets set aside for the home market, overseas sales of the remaining available tickets are being handled by each country's *National Olympic Committee* (*NOC*). Oh, by the way, don't attempt to get into the games using a forged ticket! Each ticket will have embedded within it a wireless memory chip and specialty ink to dissuade counterfeit tickets.

In order to maintain a high level of services for the world's press, the International Olympic Committee maintains a strict quota, as far as the media is concerned.

For the Beijing 2008 Olympic Games, the IOC has set a limit of 5,600 for written and photographic press—the same held true for Athens 2004 and Sydney 2000. The accreditation numbers for rights' holders are defined within the rights holders' contracts, which total 4,000 for **Beijing Olympic Broadcasting Co, Ltd**. (*BOB*) and 12,000 for Rights' Holding Broadcasters (RHBs). The **Beijing Organizing Committee of the Olympic Games** (**BOCOG**) has estimated that an additional 10,000 non-rights' holding journalists will attend the Games. The BOCOG has also stated they will provide a media press center for non-registered journalists alongside the center for accredited media.

More than 200 countries will be represented at the Olympics through 12 rights-holding broadcasters. When the Games get under way, the staff will swell to more than 4,000 from approximately 35 countries.

With a little time remaining, BOB is now in its last stretch of planning for the 2008 Beijing Olympic Games. BOB is a cooperative joint venture established by the Beijing Olympic Committee and Olympic Broadcast Services, the broadcast arm of the International Olympic Committee. BOB serves as the host for the 2008 Olympic Games and the Paralympic Games.

As host broadcaster, BOB is responsible for producing and distributing unbiased radio and television coverage of the games, and for providing broadcasters with the necessary facilities and services.

"Such an intensive workload in a limited period of time needs a large amount of skilled staff, especially those with broadcasting experience of large sports events," says BOB's Chief Operating Officer (COO), *Ma Guoli*.

According to the BOB website, the Rights Holding Broadcasters include:

- European Broadcasting Union (EBU)
- National Broadcasting Company (NBC)
- Canadian Broadcasting Corporation (CBC)
- Seven Network Ltd. (SEVEN)
- Japan Consortium (JC)
- Organización de Telecomunicaciones Iberoamericanas (OTI)
- Television New Zealand (New Zealand)
- Asia-Pacific Broadcasting Union (ABU)
- African Union of Broadcasting (AUB)
- Arab States Broadcasting Union (ASBU)
- Korean Broadcasters Association (KBA)
- Chinese Taipei Broadcast Pool (CTBP)
- Caribbean Broadcasting Union (CBU)
- South African Broadcasting Corporation (SABC)

As stated earlier, the IOC owns the broadcast rights for TV, mobile, and the Internet for the games. They must ensure the broadest news coverage of the event to the widest possible audience, with the TV rights sold to those broadcasters who can guarantee such coverage in their respective markets. The current estimate is that some 220 countries, or territories, will be broadcasting the games with the estimated broadcast revenue projected to be US$1.7 billion.

BOB is expected to provide international TV and radio signals with a combined total of 4,000 hours over 17 days. It is projected that a cumulative worldwide audience of more than 40 billion will watch the Olympics. The **XXIX Olympiad** in Beijing will find more than 16,000 employees of rights'-holding TV broadcast companies covering the games, which occurs from August 8th through the 24th, 2008. Olympic broadcast revenue distribution finds the IOC contributing 49 percent to the **Organizing Committees for the Olympic Games** (**OCOG**), and 51 percent to the Olympic Movement.

Additionally, back in December of 2007, the IOC signed an agreement with **China Central Television International** (**CCTV**) for Internet and mobile platform exhibition rights for the Beijing 2008 Olympic Games. With seven channels scheduled to blanket the games, their programming will also include a new HD channel as well as two payTV channels dedicated to

soccer and tennis. The company estimates approximately 45 million subscribers outside of China watch their programming. The company's satellite signals were converted to **ChinaSat 6B** (C-band) last August, a satellite owned by **China Satellite Communication Corporation** dedicated for TV broadcasting, and based on **Alcatel Alenia Space**'s *Spacebus-4000C2* platform. The satellite packs 38 transponders and beams signals throughout Southeast Asia, Oceania, and the Pacific Ocean. BOB will provide the programming for approximately 200 TV broadcast companies, and employment for about 12,000 workers.

The *International Broadcast Center* (IBC) is the heart of the Olympic broadcast operations, and also the headquarters for the world broadcasters. This is one of the key supportive venues for the Beijing 2008 Olympic Games and, together with the MPC, one of the first to become operational.

The IBC for the Beijing 2008 Olympic Games, with a usable space of 90,000 square meters, will be located in the newly-built National Convention Centre within the *Beijing Olympic Green*. To the west are the Main Press Center (MPC) and two media hotels. Located in the same complex, and to the south of the IBC, is the *Fencing Hall*. The IBC will offer easy access to Rights' Holding Broadcasters to multiple sporting venues within the Beijing Olympic Green, including the **National Stadium** and the **National Aquatics Centre**.

Beijing 2008's International Broadcast Center

The IBC will contain studios and production facilities for BOB as well as Rights Holding Broadcasters and will operate 24 hours a day. These games will be the first to be totally broadcast in HD.

This is partially due to the agreement between BOB and **Panasonic** regarding the use of the latter's **DVCPRO P2 HD** series' cameras. The DVCPRO P2 HD was named as the official recording format for the games back in 2006. This will allow the IBC the delivery of 1080/50i HD format video to all global rights-holder broadcasters. Panasonic is expected to provide 250 records, 100 camcorders, and 1,500 monitors.

Also granted "admission" to the Beijing event is *MTV Networks China*, which will produce a 20-episode entertainment guide to the city, and a nationwide contest for photos and videos that signify the spirit of the games. As far as Olympic Games' broadcast coverage is concerned, what information we do have, as of this writing, is...

A joint venture between **Seven Network Australia** and **Beijing Television** (owned by the *Beijing City Government*) is about to deliver substantial revenues through the **Beijing International Media Services Company** (BMC) established for August's Beijing Olympics. Dubbed an "opportunist production group" by one of its competitors, the BMC has become the one-stop shop for global broadcasters and the prime live site for telecasts during the Games. The BMC will provide broadcast expertise, locations, studios, wiring, translators, transport, accommodation and anything else non-Chinese broadcasters need during the Olympics.

There is an embarrassing situation developing for the **Beijing Organizing Committee** for the Olympic Games (a national organization). The 5000 sq. meter BMC site in the *Pangu Plaza* will provide tenants (presently including the **Nine Network**, **ESPN**, and **Fuji TV**) a better backdrop than the backdrop seen from the International Broadcast Centre within the official green zone.

BMC overlooks Beijing's two landmark stadiums, the "water cube" *Olympic Swimming Center* and the "bird's nest" *Beijing National Stadium*; BOCOG's official IBC for rights' holders has a nondescript cityscape view that has official rights' holders, including the **BBC**, scrambling to the BMC. However, there is still some uncertainty about whether the Chinese authorities will permit non-rights holder media access to live shots, including official Olympic infrastructure.

On a smaller scale, **Global Vision Networks** of Sydney, Australia, is providing live, stand-up and tape playout from four 'iconic' locations around Beijing. These are designed to give non-rights' holder media a range of locations from which to select. A relative new comer to the Olympic broadcast game, Global Vision, has been operating across Asia for more than 15 years. They will uplink out of Beijing on Asiasat 4, with turnaround to Genesis fiber in Singapore and Hong Kong for connection to the rest of the world.

Eurovision is committed to bringing a comprehensive Olympic TV, radio, and multimedia coverage of the Olympic Games to the largest possible audience in the Eurovision territory. For the **Winter Olympic Games 2006** in Turin, more than 500 transmissions were booked and more than 800 hours of Olympic coverage was offered on its worldwide satellite and fiber networks.

Eurovision broadcasters and sublicensees also provided live, and deferred, moving images of the games over a number of new media distribution platforms such as broadband Internet, IPTV, and mobile devices. That was in addition to the more than 7,800 hours of TV coverage scheduled across the Eurovision territories.

Through this wide range of sublicensing and cooperative agreements, the EBU provides state-of-the art services to the widest possible audience, complementing extensive TV coverage together with access over new media platforms. Additionally, throughout the games, Eurovision provides production and transmissions' services to both rights'-holders and non-rights' holders through its setup at the International Broadcast Centre and the Eurovision News and Network production services.

The **European Broadcasting Union** remains the Olympic Torch bearer for European broadcasting and is proud to be the European rights'-holder for the **2008 Beijing**, **2010 Vancouver**, and **2012 London Olympic Games**.

Already, Eurovision teams are making plans to ensure that broadcasters will receive the quality production and transmission services for these Games.

Indonesia's major networks determined that a $1.35 million price tag was too expensive, though they are willing to dish out $10 million to air the *2006 FIFA World Cup*.

Using their own satellites, **Russian Satellite Communications Company** (RSCC) and the firm responsible for **FIX** communications services at the games, **China Netcom (Group) Company** (CNC), signed an agreement for international satellite TV transmissions.

Both firms engaged in HD testing from March of 2006 through August of last year to determine the feasibility of using Express-AM satellites and CNC's terrestrial engineering facilities to provide viable transmission services.

As of April 23rd of this year, the **Express-AM33** satellite was made operational at 96.5° E and is now

part of the RSCC in-orbit constellation. The satellite's footprint covers Central Asia, Mongolia, China, as well as Russia and Kazakhstan and offers C- and Ku-band services.

The rights to broadcast the games on the Internet, IPTV, and mobile TV in Taiwan were won by Taiwanese telco **Chunghwa Telecom**. This will certainly afford the company the ability to promo their full range of services. China Television Company retains the payTV platform rights. **NBC** is paying about $800 million for broadcast rights to the Olympics in the U.S. NBC expects to net a record $1 billion in ad sales for its Olympic coverage. The network will also share with **USA**, **MSNBC**, **CNBC**, as well as their **USA HD** and **Universal HD** affiliates. **Telemunod**, NBC Universal's Spanish-language station, will also receive Olympic Game feeds.

NBC has already launched their Olympic Games website which will offer more than 2,000 hours of live streaming. Additionally, **AT&T/NBC** have contracted **SES NEW SKIES** for occasional use services out of Beijing for Olympic coverage through their satellites. This service has also been contracted by the BBC in the United Kingdom, the European Broadcasting Union (EBU) as well as Brazil's **TV Globo**. SES NEW SKIES owns and operates a global fleet of seven satellites in orbit.

Olympics Censorship?

For the 20,000 foreign journalists expected to cover the Beijing Olympics, the most pressing issue will be their freedom to report and analyze the Games without government interference. Government ownership of almost all Olympic-related media infrastructure—from outgoing and incoming wire-line and wireless communications, including telephone and Internet connections, international radio and television signals for broadcasting rights holders, and transmission hardware for all television and radio broadcasts destined for international rights holders—will enable the Chinese to edit what they term offending broadcasts as well as engage in transmission interference.

Global Vision's China manager, *Kevin Fleck*, has been directing the company's efforts to clarify the Chinese authorities position on censorship, as well as more mundane, but no less important matters. These include registration of non-rights' holder media, and

media access to suitable locations such as the Great Wall. He said,"The interesting thing about the whole censorship issue is that the Chinese know they cannot possibly monitor all the traffic, let alone stop transmissions they don't like. For example, we will have both a Rome TV station and Egyptian TV going live at 1800—at 1815, it will be Madrid and Warsaw. That's four-language transmissions in 30 minutes. And that's just our schedule! Censoring such a huge volume of diverse traffic in such a short period of time is just not possible."

In addition, *Fleck*'s sources in the Ministry of Foreign Affairs maintain that outbound reporting from China is not a focus for them.

BIMC (Beijing International Media Center—not the Channel 7 BMC) is charged with registering and assisting the non-rights holder media. They have given assurances to Global Vision that censors will not be assigned to monitor transmissions. In fact, BIMC has gone to some length to assure the company that, "China welcomes the foreign media—we are here to help you."

by Mark Dankberg
CEO and Chairman, ViaSat Inc.

The first time the "radical" concept of a 100 Gbps satellite was introduced was four years ago, at Satellite 2004 with a frank presentation explaining why business as usual in satellite broadband wouldn't work. Continuing with that topic, if we spent time trying to sell what we had, rather than discerning what customers would buy, we were looking at a declining market, rather than an opportunity for growth.

These new ideas conflicted with the traditional view that low cost terminals exclusively were the driver that would enable satellites to compete more effectively,. The new message stressed that the industry should shift its focus to producing low cost bandwidth. In addition, the 100 Gbps satellite would radically change our ability to compete with a satellite that wouldn't require any fantastic technology stretch. As the CEO of a ground systems' company, and in a room full of satellite operators, – the new declaration was pretty risky.

No End in Sight for Bandwidth Demand Growth

However, the past four years have done nothing but validate that message. This was witnessed with the exploding demand for more bandwidth to interconnect a growing array of clever electronic communication and entertainment devices.

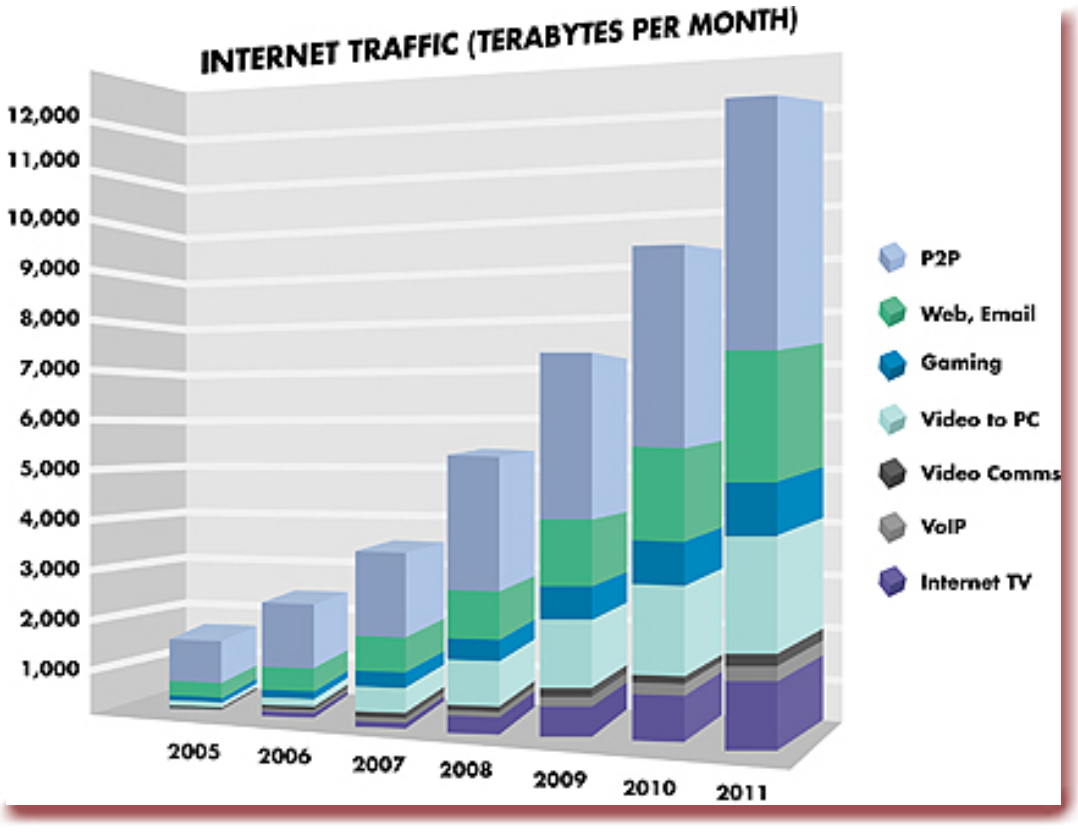
Another key trend is that subscriber expectations for the Internet, for broadband, and therefore for satellite broadband, are much different now than they were just two or three years ago – even compared to when current Ka-band services were designed and launched.

The chart below shows clearly how much consumer use of the Internet has changed – and its anticipated growth. The data was generated by Cisco in its "Global IP Traffic Forecast and Methodology, 2006-2011".

In 2005 there were basically two classes of traffic; web browsing/e-mail/file transfer and peer-to-peer. Peer-to-peer growth is still a major factor, but new categories are driving Internet traffic growth even faster.

The other class includes video communications, video to PC, and gaming. Those combined, increased by a factor of eight from 2005 until now, have overtaken browsing and email.

Note that the chart measures the volume of traffic over the Internet in millions of terabytes per month.



If you divide that by the number of global users, you can measure Internet usage in gigabytes/subscriber/month, which is not the same as speed.

It is a measure of how many subscribers share access to bandwidth, or in satellite terms, how many users are put on a transponder, a spot beam, or a satellite.

If usage doubles, and you don't provide clients more bandwidth, the result is congestion, slow service, or simply denying access (fair access policies) to bandwidth intensive applications.

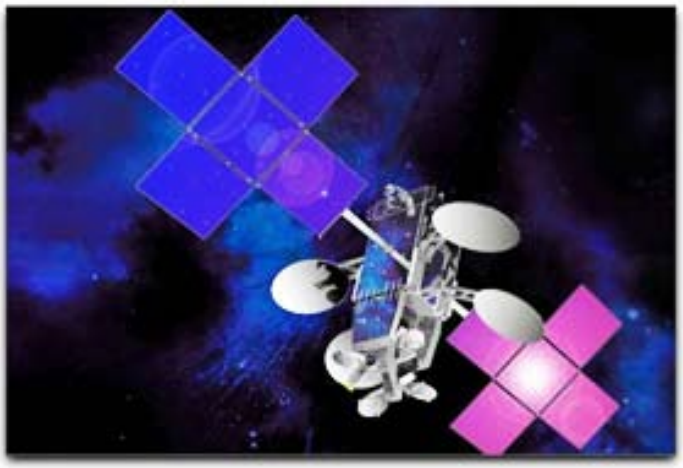
Current Satellite Systems Can't Meet Bandwidth Needs

Unfortunately, satellite has not been able to meet this rising bandwidth demand. Satellite broadband growth patterns, in the past three years dramatically revealed a sharp spike in subscriber uptake each time new broadband satellite capacity was brought to market.

Then within months, capacity was sold out in key geographic areas, and subscriber growth flattened out again.

Also, current satellite systems aren't designed for high bandwidth applications such as video, photo sharing, VoIP, and peer-to-peer networking. It's not just speed that customers want, but more bandwidth.

This is a big problem for our industry when *YouTube*, *Slingbox*, *iTunes*, *Nightfalls*, streaming live events, and other services are some of the biggest attractions on the web. Distributors in the U.S., Europe and every developed country identify abundant bandwidth as one of the most critical measures related to customer satisfaction.



The solution is to increase capacity per satellite, and give people more bandwidth at the same price. By putting additional, less expensive cheaper bits in space, we can propel satellite broadband to provide service quality on a par with DSL and cable.

The 100 Gbps Satellite is Becoming Reality

Now four years after introducing the "crazy" idea of a 100 GBPS satellite, its design and development has begun. This initiative can transform satellite broadband by providing more capacity than all current North American satellites combined, and ten times the throughput of any other Ka-band satellite.

And the design of the satellite can deliver that capacity at a small fraction of the in-orbit costs for even the newest satellites in space.

Close to two million subscribers in the U.S. and Canada will comfortably fit on this new satellite, with unparalleled speeds and service quality.

The gains in terms of service levels indicate the median DSL speed in the U.S. is 768 kbps, and median cable speed is much faster, at about 4.5 Mbps.

Current satellite speeds are mostly below the median for DSL and premium satellite plans barely match it. All are well below the median for cable.

This new satellite will enable distributors to establish the price of basic service at 2 Mbps compared to the current 512 kbps, thus raising satellite to about the 80th percentile of DSL.

Premium plans would easily surpass the best DSL service, and put satellite broadband well above the current median for cable.

This 10X leap forward in satellite capacity can reshape what the world's perception is of broadband by satellite. Demand is proven, and we've learned satellite broadband is not just for people who live in outlying or unserved areas. Millions of underserved households, in more heavily populated areas, are also our target now.

Consumer satellite broadband service providers may never have considered metro Los Angeles to be a market. However, there are hundreds of thousands of customers there who may respond favorably to a satellite service with the pricing and high bandwidth capacity that provides them the great online experience they desire.

Responding to The Changing Market

By responding to the irresistible communication market forces, our industry can offer far more options than we ever thought possible. Additionally, we believe the same combination of cheap bits and better service will appeal just as much to defense, mobility (aviation, trains, ground), and enterprise VSAT customers.

Indications are that the satellite industry has the will, and the insight, to transform itself right along with the changing information technology environment around us.

ViaSat

About the author

Mr. Dankberg cofounded ViaSat Inc. in 1986 and is the CEO and Chairman, having led the company to become one of the fastest growing high-tech companies in the world. He has held the position of Chairman of the Board and Chief Executive Officer since inception. Before its initial public offering in 1996, ViaSat was named three times to the **Inc. 500** *list of fastest growing privately held companies. Since then, the company's continuing superior performance has earned it recognition on the* **BusinessWeek** *"100 Best Small Corporations," the "200 Best Small Companies in America" by* **Forbes**, *the* **Business 2.0** *list of "100 Fastest Growing Technology Companies", and* **Red Herring** *magazine's "Small Cap 100". In 2000 Mr. Dankberg was named Ernst & Young "Entrepreneur of the Year" in San Diego.*

by Hartley Lesser

On January 15th, the third of Thuraya Satellite Telecommunications Company's satellites, Thuraya-3, was successfully vaulted into orbit by Sea Launch aboard a Zenit-3SL rocket.

The **Thuraya-3** satellite was built by **Boeing** and has a designed lifetime of 12 years. **Thuraya**, based in the United Arab Emirates (UAE) and founded by a consortium of national telecom operators and investment firms, offers MSS services to more than 110 countries in Asia, Africa, Europe, and the Middle East.

Thuraya-3 satellite
left: stowed
right: in orbit
credit: Boeing

This powerful satellite was one of the first to use Boeing's **GEM** (*Geomobile*) series, which evolved from the company's **601** and **601HP** spacecraft, resulting in the Boeing 702 design. Power ranges are up to 18 kW through the use of dual and triple-junction gallium arsenide solar cells, developed by Boeing subsidiary Spectrolab, Inc.

Additionally, the satellite boasts an advanced xenon ion propulsion system, which is 10x more powerful than conventional systems using liquid fuel. The satellite requires only about 5-kg of fuel per year.

photo: Sea Launch

Lifting off from the **Odyssey Launch Platform** at 154° W, a **Zenit-3SL** rocket placed the 5,173 kg (11,381-lb) Thuraya 3 satellite into Geosynchronous Transfer Orbit, with the spacecraft separating from the upper stage at 1,388 miles above the Pacific Ocean. The flight plan called for deployment into a 6.2 degree inclined orbit, an optimal orbital location for the Thuraya system.

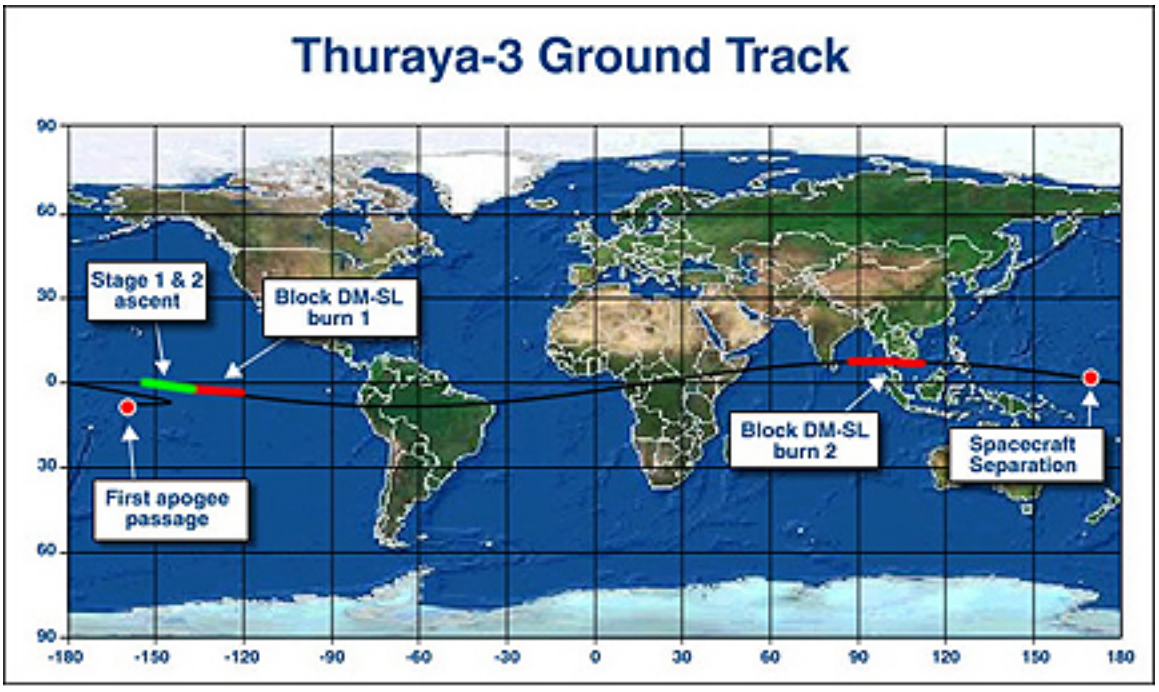
Thuraya-3 satellite
credit: Boeing

Two-and-a-half minutes after liftoff, the first stage, and then the payload fairing separated. Six minutes later, the second stage separated from the Block DM upper stage. After the first burn of the Block DM, the spacecraft coasted in a parking orbit for one hour, performing thermal maneuvers, such as a slow roll, to maintain a benign satellite environment. Following this coast, the Block DM burned a second time for about six minutes and then coasted again until spacecraft separation, over the Pacific Ocean, north of New Zealand. Boeing acquired a signal from the spacecraft at a ground station in Fillmore, California. This was Sea Launch's 25th mission completion.

Thuraya-3 launch aboard Zenit-3SL rocket
photo: Sea Launch

With a designed lifetime of 12.5 years, the satellite will be positioned in Geosynchronous Orbit, 35,786 km (22,236 miles) above the Earth, at 98.5 degrees East Longitude.

For additional imagery and launch information, go to the Sea Launch Thuraya-3 website.



ground track diagram courtesy of Sea Launch

The Thuraya-3 satellite offers cell-like data and voice services such as GSM-compatible mobile telephone capabilities. These are received and transmitted via one 12.25-m aperture reflector, and the spacecraft can handle 13,750 simultaneous voice circuits as well as create more than 200 spot beams, all available to be redirected while on orbit. Digital processing and beam forming are handled

onboard. Thuraya offers satellite, cellular (GSM) service and location determination system (GPS) in a single dual mode handset that is lightweight, elegant, and easy to use. The dynamic handset offers voice, data, fax, and short messaging services.

The company's ground segment includes network operations center and satellite control facility in the UAE, collocated with their terrestrial gateways. Through partnership with leading national telecom and mobile communications companies, Thuraya provides blanket coverage to more than 110 countries in Europe, North, Central Africa and large parts of Southern Africa, the Middle East, Central and South Asia: a landmass inhabited by an estimated 2.3 billion people. The Primary Gateway in Sharjah, UAE, serves the entire Thuraya coverage area, and plans are underway to establish additional national gateways at other locations as necessary.

Thuraya offers a wide range of accessories that complement Thuraya phone, as well as items that are designed to enhance mobility and communication while facilitating the usage of Thuraya products. Thuraya's state-of-the-art Indoor Enabler—**ThurayaFDU-3500**—allows the usage of **Thuraya SG-2520** and **Thuraya SO-2510** phones in homes or offices, and supports all of the standard satellite based services such as voice, fax, data and new supplementary services such as Internet connectivity (i.e. GmPRS) in an indoor environment.

Other accessories are available for the phones, the **Thuraya SO-2520** and Thuraya 2510, as well as Hughes and Ascom phones. The phone accessories include the Car Charger, Travel Charger, Solar Charger, USB Data Cable, Batteries, and Earset as well as their Maritime Antenna and the Thuraya Solar Panel. For complete information on accessories, go to this Thuraya accessory website.

THURAYA-3 SPECS

PAYLOAD

L-band	128 active elements 17-w SSPAs
C-band	C-band 2 active (2 spare) feeder link 125-w TWTAs

POWER

Solar **End of life** **Panels**	11 kw 2 wings of 5 panels each w/triple-junction Gallium arsenide cells
Batteries	328 A-hr cells

PROPULSIONS

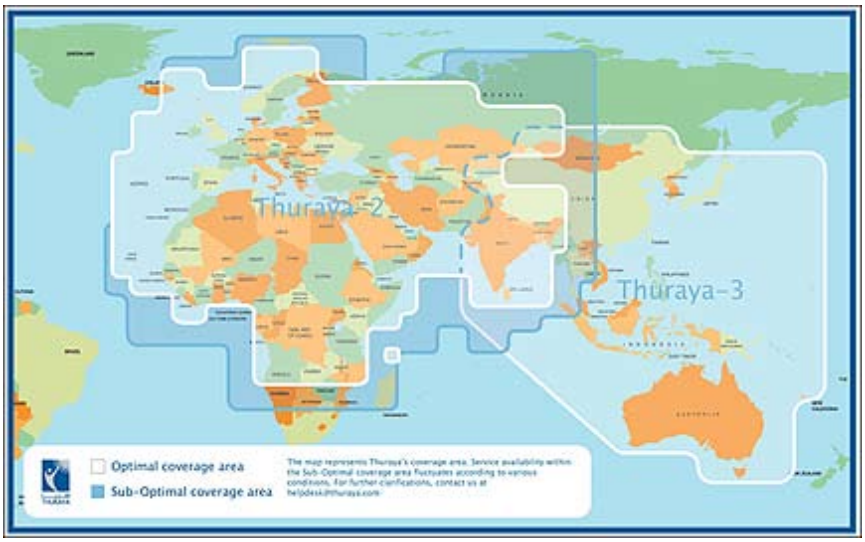
Liquid apogee Motor	98 lbf (436N)
Stationkeeping thrusters (bipropellant)	2 x 2 lbf (10N) 8 x 5 lbf (22N)

ANTENNAS

12.25 m (40 ft) x 16 m (52 ft) mesh transmit-receive reflector
128-element dipole L-band feed array
1.27 m round dual-polarized shaped reflector for C-band communications link

DIMENSIONS

In orbit	L, solar arrays: 40.4 m (134 ft) W, antennas: 17 m (55.7 ft)
Stowed	H: 7.6 m (25 ft) W: 3.2 m x 3.4 m (10.5 ft x 11.1ft)
Weights **Launch** **In orbit** **(beginning of life)**	5250 kg (11,578 lb) 3200 kg (7056 lb)



Southeast Asian O&G Industries Invited...

by Martin Jarrold
Chief of International Program Development, GVF

Nothing succeeds like success. So goes the maxim. Working, then, from this maxim, the upcoming '*Oil & Gas Communications: North Africa & the Middle East*' conference—or **O&GC3**—on June 16th to 17th is certain to be a stimulating event. The conference takes place at the **Grand Hyatt Hotel**, Corniche El-Nile, Garden City, Roda Island, Cairo, Egypt, and is focused on the communications imperatives of the key oil & gas industrial vertical.

The success referenced above pertains to the O&GC3 that takes place just five weeks after the highly acclaimed conclusion to the Aberdeen conference '*Oil & Gas Connectivity: Digital Applications & Communications Dynamics*'. This event is also organized by **UK-EMP** (*UK Event Management Partners*) with the support of *Global VSAT Forum* (**GVF**).

Looking a little further into the future, plans are already in progress to deliver another body of rich conference content in a different location within the global oil & gas patch—namely Southeastern Asia. This particular region is one that offers the exploitation of major new oil & gas discoveries, primarily in offshore environments, and very likely, in hostile deepwater locations. All such discoveries will require the kind of cost-effective, reliable, and scalable communications connectivity solutions that is the subject of debate in Scotland's self-styled "Energy Capital of Europe", aptly named due to being immediately adjacent to the hydrocarbon resources beneath the North Sea.

This fact was further validated as the Aberdeen event bought together more than 40 companies from the communications and applications solution provider market together with companies from the oil & gas user community. These included: **3MS Networks**, **Advantech**, **Arqiva**, **Astra Broadband Services**, **Avanti Communications**, **Baker Hughes Inc**, **BHP Biliton Petroleum**, **BP Exploration, Cameron Oil**, **Canadian Natural Resources**, **CapRock Communications**, **Cisco Systems**, **Comtech EF Data**, **Euroconsult**, **Hermes Datacoms**, **Intelsat**, **Kongsberg Intellifield**, **Macom Consulting**, **Maersk Contractors**, **Nera Ltd**, **Network DNA**, **Parallel Ltd**, **Procomsat**, **Prosafe**, **Redline Communications**, **Remote Data Services**, **RigNet**, **Schlumberger Information Solutions**, **Sematron**, **Skylogic**, **Talisman Energy**, **Thales Alenia Space Italia**, **Thales Security Solutions & Services Division**, **Total**, **Union Fenosa Telecomunicaciones**, **Verizon Business**, **Vizada**, and **YR20**.

O&GC3 is expected to achieve the same success in Cairo, being similarly organized around a two-day program – one that is designed to be regionally complementary to the earlier conference. The Cairo event has already attracted the registration of sizable delegations from **Saudi Aramco**, the world's largest producer, and from **Petrojet**, a multi-disciplinary, integrated, construction contractor that specializes in petroleum related projects in the North Africa and Middle East regions. Also in attendance will be delegates from **International Egyptian Petroleum Company** (IEOC), the **Eni/Egyptian National Petroleum Company** (ENPC) j/v, **Dolphin Energy**, **Ganope Petroleum**, **Khalda**, **Suez RBO**, and **Centurion**, amongst others.

Moreover, on the first day of the conference conference delegates will have the distinct privilege of listening to a special feature presentation on the subject of *'Broadband VSAT Services - New Perspectives for Oil and Gas Applications' from a representative of Saudi Aramco*.

From the solutions provider community the involvement of **Schlumberger**, **Hughes Network Systems**, **Advantech Satellite Networks**, **Hermes Datacomms**, **MobiServe**, **Caprock Communications**, **Thales Alenia, Intelsat**, **Eutelsat**, **Radyne**, **Newtech**, **UDCast**, **YahSat**, **Satcom Group**, and **Paradigm** have been confirmed, and still more companies are registering daily.

A series of themed panel sessions, together with a number of "*Showcase*" presentations, will comprise the Cairo program. In detail, the themes for 'Oil & Gas Communications: North Africa & the Middle East' are:

- *Application & Technology Dynamics: From SCADA to Broadband Data Networking – An Overview*
- *Communications Infrastructures Alternatives in the US$100+ Barrel Environment: Investing in Future Mission Critical Delivery*
- *Enablers of the 21st Century 'Digital Oilfield'*
- *Regulatory & Licensing Solutions: National & Regional Answers in an Oil & Gas Wireless World*

- *Local & Global Connectivity Links: Fibre & Wireless Factors for Oil & Gas Business*
- *Integrated Solutions from the First to the Last Mile*
- *New Training Dynamics for Oil & Gas Communications*
- *Platform-Technology Neutrality in E&P Applications Development*
- *Real-Time Remote Collaboration & Operations Support Centre Networking*
- *Communications Terminals: Installation, Maintenance & Performance Metrics Case Studies*
- *Disaster Recovery, Business Continuity & Environmental Impact in North African & Middle Eastern Oil & Gas*
- *The Energy Industries & GVF Market Sector Initiatives*

Two previous, and successful, Cairo events took place in 2006 and 2007. Now, with the additional success of the 2008 Aberdeen conference, the premier regional oil & gas communications events for Europe and for North Africa & Middle East have been established. Taking the conference to the Southeast Asian oil & gas market, possibly to the Malaysian capital, Kuala Lumpur, is the next logical development.

O&GC3 will be an important event on the satellite communications industry calendar. It will provide extended networking opportunities between key leaders of oil & gas companies, the vendors of cutting-edge oil & gas industry 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. These solutions providers together with developers/vendors in the digital applications field will match their offerings more closely to the specific demands and requirements of the oil & gas patch.

The complex interrelationship between oil & gas sector applications supply, and the communications infrastructures required to support and deliver them, will be comprehensively investigated. In addition, the O&GC3 program poses an absolutely central question— how can satellite, and non-satellite, communications solutions help 'enable the digital oilfield'? The dialogue around this question will go beyond what is implicit in the 'enabling of the digital oilfield', which is, the imperative requirement for systems resilience and data security. This in addition to analyzing today's communications product and service environment in which the players in the solutions vendor community compete to provide for the efficiency and data risk-management needs of the buyers of Digital Oilfield ICT solutions in the E & P environment.

The Cairo dialogue will also consider how the use of different communications platforms are helped, hindered, and determined by geographically determined supply factors. The discussion will also include 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 combination with the consideration of key regulatory and licensing issues, the Cairo debate will reflect facets of the oil & gas operating environment of North Africa & the Middle East that are quite different to the European environment that was addressed in Aberdeen.

Full information about O&GC3, the full program, speakers, sponsors, venue location, and more, can be found at www.gvf.org. In addition, I can be contacted for information about O&GC3 at martin.jarrold@gvf.org.

Reference copies of speaker presentations from the *Aberdeen 'Oil & Gas Connectivity: Digital Applications & Communications Dynamics' conference may be downloaded at www.gvf.org and* from the UK_EMP events web archive at this link.

The Key To DTH Success In Asia

by Jose del Rosario
Senior Analyst & Regional Director, Asia-Pacific
NSR

As the world's attention turns to the U.S. due to the impending recession that could have serious consequences for the global economy, some are eyeing Asia as a haven for economic safety or even economic growth amidst the current global slowdown. Indeed, the region has two budding superpowers with the dynamic economic performance of China and India. The region likewise has countries that have shown impressive economic numbers in recent years that include Indonesia, the Philippines and Vietnam.

Apart from economic statistics, these countries have rising populations, large landmasses, large rural populations, population demographics where the vast majority are below 35 years of age, and rising television ownership. All these factors as well as the development of content from *Hollywood* to *Bollywood* that are making their way to Asian TV sets make DTH services a compelling proposition well into the next decade.

Growing economic power and internal demand that appears sustainable even during global downturns make the region in general and the countries aforementioned in particular, the most attractive consumer markets in the globe for pay-TV services. One of the key markets for DTH lies in rural areas and although urbanization has been on the rise, the vast majority or some 70 percent of Asian populations still reside in rural areas where terrestrial infrastructure is lacking.

Regulatory Environment Dictates Success

Foremost for DTH success as well as expected continued favorable prospects has been the regulatory front. In India for instance, DTH services were first proposed in 1996, but only came into fruition in 2000. After seven years of DTH services, India has fared well such that estimates by the end of 2007 placed the Indian DTH market at 3.5 million paying subscribers. If **Doordashan**'s free-to-air services are included, the figure could be as high as 8.1 million.

In Indonesia, new market entrant **Astro** of Malaysia, which entered the market only in 2006, reported 80,000 subscribers through July 2007 and noted to **NSR** that it had 125,000 subs in December 2007, which grew to 140,000 in March 2008. The Philippines and Vietnam have relatively low DTH subscribers, but the market is open to new market players as well.

Of all the dynamic and highly promising countries in Asia, China still maintains a regulatory environment that is challenging to navigate. In its latest market study on the DTH market, NSR postponed the analysis of the Chinese DTH market as satellite operators and service providers surveyed, viewed China as a relatively closed market where local entities are favored to the detriment of internationally-based market players.

But in the other countries analyzed by NSR, specifically India and Indonesia, growth in the DTH market can be attributed partly to relatively favorable regulations, which are expected to continue over time. And this trend is partly the reason why new market entrants are eyeing the Indian and Indonesian markets. The Philippine and Vietnamese markets hold promise as well, and here, the entrance of new market players will once again be key to dynamic growth.

Nevertheless, the regulatory environment is still not perfectly open, and foreign governments have formally made known their concerns. In December 2007, for instance, the U.S.-based *Satellite Industry Association* (**SIA**) wrote to the *Office of the U.S. Trade Representative* (**USTR**) where the SIA offered "comments in an effort to identify necessary elements that require review in the commitments made by accession countries to the *World Trade Organization* (**WTO**), and to improve existing offers by WTO members that are relevant to the provision of satellite services." The SIA raised concerns in China, India, the Philippines and Vietnam. For India, one of the potentially largest markets for DTH in the globe, the SIA indicated among others, the following:

Restrictions on the use of foreign satellite capacity for direct-to-home ("DTH") services*: the Ministry of Information & Broadcasting ("MIB") has established guidelines that provide a preference for Indian satellites for DTH services, but which allow the use of foreign satellites if the foreign satellite has completed the international frequency coordination process with the domestic INSAT satellite system. However, in practice, DTH licensees are not able to contract directly with foreign*

operators even if the coordination has been completed; the foreign satellite capacity must be procured through the Indian Space Research Organization ("ISRO"), the operator of the INSAT system. ISRO only permits such use if it has not available capacity on its system.

Lack of clarity regarding Department of Space ("DOS") role: *the Department of Telecommunication's New Telecom Policy 1999 stated that users of transponder capacity would be able to access both domestic and foreign satellites, in consultation with the DOS, of which ISRO forms part. While it might be necessary for the DOS to ensure that foreign satellites are completing international coordination agreements with the INSAT system, there are no technical or commercial reasons why foreign satellite capacity should need to be procured through DOS (ISRO), a direct competitor of foreign satellite operators. This lack of clarity results in a competitive advantage for the domestic Indian satellite system.*

NSR would like to note that India as well as the Philippines and Vietnam's regulatory environments appear to have opened up in relative terms. Many will argue that the pace of regulatory openness has not been fast enough and their point is well taken, including the SIA's concerns. However, compared to other markets around the globe, countries like India, in NSR's view at least, have opened up in relatively good pace. The end result (specifically in India) has been the entrance of service providers and at the end of 2007, three companies (over and above the three existing companies plus Doordashan) are looking to seriously provision services in 2008.

Favorable Economic and Household Conditions Complete the Picture

The four Asian countries (India, Indonesia, Philippines, Vietnam) analyzed by NSR are growing DTH markets due to their steady population growth and (more importantly) due to rising GDP per capita levels. NSR estimates that the population of the four countries combined should grow from 1.53 billion at the end of 2008 to close to 1.74 billion by the end of 2015 based on historical population growth levels.

In terms of GDP per capita levels, nominal GDP was recorded at or close to $1,000 at the end of 2007, which NSR expects to grow at steady levels, breaching the $2,000 level in India and the Philippines while growing more dynamically in Vietnam and Indonesia by the end of 2015.

In terms of households, a net gain of close to 51 million households is expected to take place from 2008-2015. With increasing wealth, TV households should improve as well from close to 190 million to over 300 million for a net gain of over 114 million.

The market led and dominated by India is enlarging due to wealth effects that NSR expects to continue over time. In terms of the number of households and TV households, these should grow at highly dynamic levels. The combination of local economic resurgence and programming availability should lead to steady growth in pay-TV consumption for a prolonged period of time.

DTH Subscriber Growth Prospects

Given the favorable economic and regulatory conditions outlined above, growth in DTH services is expected to exhibit double-digit levels until 2015. This trend

assumes better consumer awareness and new entrants to the market, as well as continued economic growth

Paying subscribers to traditional service providers should grow, but new market entrants that are expected to be more aggressive in order to be competitive with the incumbents are expected to drive market growth. One case in point (once again) is Malaysian-based Astro, which garnered subscribers very quickly in the two short years it has been in the Indonesian market.

However, the main market is expected to be India and indeed, NSR expects India to account for over 80 percent of the subscriber base of the four emerging markets by 2015. Apart from high population, TV ownership and rising GDP levels, India has a unique feature that renders pay-TV viewing as a compelling proposition: Bollywood. It has also been widely reported that more than 100 new TV channels are scheduled for launch in India over the next 12 months, with the total number of channels on air set to hit 700 by 2009.

There are also over 110 million television households in India, of which 71 million are reportedly enjoying cable TV. India's population of 1.1 billion with half under the age of 25 represents a viewing audience that is ripe for pay-TV targeting. Moreover, about 15 million new televisions are sold every year in India such that the number of households with a second set translates to demand for more niche channels.

Moreover, low priced service offerings should lead to increased subscription as well. DTH services that cost around $5 per month that may be more expensive than cable TV services at about $3.50 will likely not

become too price prohibitive except for the accompanying equipment. However, the quality of digitized channels over DTH should lead wealthier households to opt for better TV reception. Indeed, the **India Space Research Organization** (**ISRO**) announced in May 2008 that it was launching three additional satellites to address the growing demand from DTH service providers including incumbent **Dish TV** and newcomer **Reliance**. Some 300-350 channels have to be carried by each DTH service provider, which could number more than six by the end of 2015.

In all four countries analyzed by NSR in Asia, household growth and television ownership is one of the fastest in the globe. These countries should continue to become wealthier, and this has been key to market penetration for DTH. But there is one large caveat in all these favorable market metrics, and that is income distribution. Although these countries continue to grow at highly dynamic levels, the poverty rates are still high and relatively unchanged compared to year 2000 levels.

Moreover, DTH is not alone in the pay-TV market. Growth is expected to lead to a large addition of the installed base of pay-TV subscribers by the end of 2015.The good news is that pay-TV services are expected to grow over the forecast period, which favors DTH service uptake. But the bad news is that pay-TV will continue to be led by cable TV in the four countries tracked by NSR, except Indonesia. Should current poverty levels remain over the next several years, market saturation levels are expected to grow relatively quickly. Indeed, NSR in its latest study accounted for poverty incidence and estimated the "true" saturation levels, where household income and financial wherewithal were taken into account. And here, NSR expects the saturation rate or the number of truly addressable households in the four countries to reach over 90 percent by the end of 2015.

Conclusion

Other countries in Asia as well as around the globe are experiencing similar economic and regulatory trends that favor pay-TV services in general and DTH in particular. Some of these countries include Brazil, the Czech Republic, Poland, Russia, Slovakia and Turkey among others. Favorable economic conditions have to go hand-in-hand with favorable regulatory environments to attain high levels of penetration very quickly.

Once again, China is a market that, although economic conditions are ripe for DTH take up, the regulatory environment appears to be not particularly favorable for foreign players. It remains to be seen where DTH services in terms of subscribers will be in China over the next several years and what role the regulatory environment will play.

About the author

Mr. del Rosario covers the Asia Pacific region and is a senior member of the consulting team where he focuses his research on quantitative modeling, data verification, and market forecasting for the wireless industry and satellite communications sector.

Information for this article was extracted from a new Northern Sky Research (NSR) report entitled ***Direct to Home (DTH) Satellite Markets: An Analysis of Ten Emerging DTH Markets*** *Complete information can be found at www.nsr.com*

by Andrea Maléter

Asia is perhaps the most diverse of all regions of the globe from a range of perspectives – social, political, economic, and business. Telecommunications, cutting across all of these areas, reflects this diversity — and satellite services are no exception. Despite this variety, there are some key generalizations that can be made regarding satellite markets in Asia (including the Pacific Rim):

Video is the key growth driver for overall demand in Asia/Asia Pacific, with HD pushing this trend. The capacity required for video services will more than triple over the next 10 years, a fact that has pushed last year's growth, resulting in increasing the number of new operators and satellites that will serve the region. Data services can expect to have steady growth, driven by emerging VSAT applications with government broadband subsidies, as well as expanding government networks, to help support this growth.

The global proliferation of voice over IP (VoIP) usage continues to drive down overall demand for circuit-switched voice services via satellite. Asia, like all regions, sees a continued steep decline in demand for satellite capacity for telephony services.

Observing in more detail, it is possible to see more specific, niche drivers, and trends of satellite services throughout the region.

Video Overview

Improved economic growth is increasing standards of living. The Chinese and Indian markets push this growth for a number of reasons, including:

- Highest populations
- Regulatory changes allowing foreign operators to enter the market
- Economic growth leading to higher income and discretionary funds

Desire to adhere to the standards of living elsewhere including to match standards of service already found within the region, such as in Japan and Korea 2008 Beijing Olympic Games leading to increased pay-TV subscribers in China, as well as acceptance of HDTV, drives new equipment purchases and interest in expanded content

Within the video market, the most frequently discussed factor driving new satellite demand is the growth of HDTV. This is, unquestionably the most important stimulus of new capacity requirements, and as noted above, the "all HD" Beijing Olympics will be a major focus of this growth. There are, however, other new technologies and applications that are important to the potential direction and size of the satellite video market globally, and in Asia. Since these are not as commonly explored, an overview is provided below.

Internet Protocol Television (IPTV)

IPTV, which enables digital television services to be delivered over a network infrastructure that may include bundling with other Internet services, requires a much more complex infrastructure than cable TV. Additionally, its higher cost requires an educated consumer market to accept this as part of a bundle.

Nevertheless, IPTV enables the evolution of a new type of personalized TV for a fresh audience in the more developed markets of Asia. In addition, Internet-based viewing may penetrate where the DTH market faces regulatory constraints, which is the case in many parts of Asia. The key role for satellites in the IPTV business is providing "head-ends in the sky" enabling IPTV delivery.

IPTV is a key part of triple-play/bundled services offered by telcos seeking to increase revenue opportunities, and to compete in most rapidly expanding markets, including Asia. Some markets such as Japan, Malaysia and, especially India, have already seen the deployment of IPTV, and overall Asian demand will likely double over the next five years.

Satellite Mobile TV

While mobile TV today is a rapidly expanding service worldwide, it is primarily a business for terrestrial wireless operators. Asia provided the first satellite entry into this business, with other regions only now starting service, primarily through vehicle-based terminals. However, even the Korean/Japanese MBSAT-1 has found service take-up to be slower than projected. There are now fewer than two million subscribers, mostly in Korea, well below original projections.

The relatively stronger market in Korea can be credited to the fact that service there has been provided in co-operation with the mobile phone operator, whereas the Japanese model required a separate handheld device.

A range of hurdles face this service including:

- Regulatory disagreements over spectrum allocation and competing standards as well as licensing requirements (China, for example, has at least two different standards – CMMB and TDBM)
- Infrastructure costs, including satellite and terrestrial network build-out plus new user devices
- Content development, as repurposing standard television content for the very small screen has not proven as attractive as specialized programming.

However, as the concept begins to move around the globe, new standards are being implemented. Trials

for DBV-H as an example are now underway not only in Europe, but in Asian countries such as Malaysia, Singapore, Taiwan, New Zealand, and the Philippines.

The broad acceptance of these standards can be expected to produce new terminals with lower price points, driving more consumer acceptance. Unfortunately, the plans to roll out service in China in time for the Beijing Olympics on the CMB Satellites are now somewhat uncertain, and missing this opportunity may seriously slow interest, and delay take up.

Data Services Overview

VSAT services are well established in Asia, although regulatory restrictions have limited growth in many markets. Key areas of growth in VSAT services in Asia are as broad as in other regions, reflecting the diversity of economies in this area.

Enterprise Networks

Retail, financial, utility and extraction industries continue to grow and expand in new markets despite changing some key characteristics. Broader use of credit cards and ATM machines in key Asian markets drives growth in the retail and financial markets, with expanding energy demand pushing the extraction market. The increasing growth of terrestrial infrastructure, and demand for back-up/continuity networks, increase the need for hybrid systems, This may mean fewer satellite sites per system, but greater interconnection required as part of larger networks.

Government networks

While much attention has been paid to the dramatic growth in military use of satellite networks (use that has still not peaked in Asia, outside of the southwest areas such as Afghanistan and Pakistan) satellite networks have been critical for civil government programs throughout Asia. Education and healthcare networks continue to grow, often subsidized by programs such as universal service funds. Other civil government programs, which have long been strong in Asia, such as taxes, customs, and general administrative networks, are growing in importance with e-government initiatives and the demand for electronic access to government services. The market drivers for these networks are similar in many ways to those for education and healthcare, but these are often better funded, making cost less of an issue.

Wireless backhaul

Asia is already a major market for backhaul services for cellular networks. With the growth in broadband wireless networks for both data and media services, there is increasing demand for satellite VSAT capacity to bring those services and networks to remote areas, and across the wide unwired expanses of many Asian countries. As with the enterprise networks for business continuity, this market requires satellite to interoperate with terrestrial wireless, In these hybrid networks terrestrial standards and requirements will be the drivers, with satellite needing to adapt.

Consumer Broadband

IPStar has shown this is a business with potential, but one that requires extensive local relationships to overcome distribution, as well as regulatory complications. In Asia the varying levels of use of home computers, and the evolving deployment of community tele-centers also will be driving factors in local market take-up.

Regulatory Factors Affecting Satellite Services Growth

Satellite services, like all telecommunications, can only grow when market demand, technology and regulation are aligned, like the three legs of a stool. Most of the preceding discussion has been on market and technology developments. The following summary provides an overview of the regulatory leg.

China

Satellite regulation is still very restrictive and lacks transparency. Nevertheless, a number of changes have been planned, driven in large part by the upcoming Olympics. The State Administration of Radio, Film, and Television (SARFT) plans a widespread opening of satellite services for the 2008 Beijing Olympics. Additionally, the 11th Five-year Plan released in March 2007, by China's Ministry of Information Industry (MII), included initiatives such as; promoting satellite communications as an important national security communications back-up infrastructure; and accelerating the number of digital satellite television networks as part of the completion of digital TV transition in major cities. Future growth will depend on how well these changes are received, and whether they are allowed to remain after the Olympics.

India

Since the liberalization of telecommunications' regulations, the country is experiencing a DTH market boom, and now has six licensed providers. The surge in DTH demand led to a scarcity of Ku-band capacity. This resulted in the Indian government permitting the use of foreign satellite capacity, and agreeing to increase the cap on foreign investment in domestic DTH companies from 49 to 74 percent, bringing DTH into alignment with cable companies. Efforts are still ongoing towards adopting an Open Sky policy to allow VSAT operators to work directly with any international satellite.

Other Asian Countries

In addition to these major markets, it is important to keep in mind that there are wide-ranging levels of regulatory transparency and support in Asia, which will impact satellite growth, especially DTH:

- Australia remains an open market and grants open-term DTH licenses.
- Hong Kong retains a supportive regulatory framework that drives competition and investment in its pay-TV and broadband industries. As long as the Chinese authorities allow this to remain an open market, growth in satellite usage will continue.
- Japan continues to have one of the clearest regulatory frameworks in the region, supportive of both investment and competition in its DTH market.
- New Zealand's DTH market is highly competitive, and has been deregulated for years.
- South Korea's goals for digitization and partial regulation of investment norms has increased competition from DTH and forced cable consolidation.
- Taiwan's DTH market remains dependent on deregulation since existing government regulation, and market structures have limited the prospects for digitization and competition.
- A number of Southeast Asian governments support growing pay-TV penetration.
- The launch of DTH service in Indonesia will grow the market for pay-TV in the future but terrestrial TV is likely to remain dominant.
- Digital pay-TV remains robust in Singapore, but the market is inherently small.
- Malaysia continues to be a growing market for multi-channel pay-TV.
- The Vietnamese government's efforts to adhere to international standards for the protection of Intellectual Property Rights (IPR), and to achieve a transparent licensing regime, make it one of the most promising pay-TV markets in Asia. And Vietnam has increased the interest of foreign investors, while, simultaneously, it has launched its own domestic satellite.

About the author

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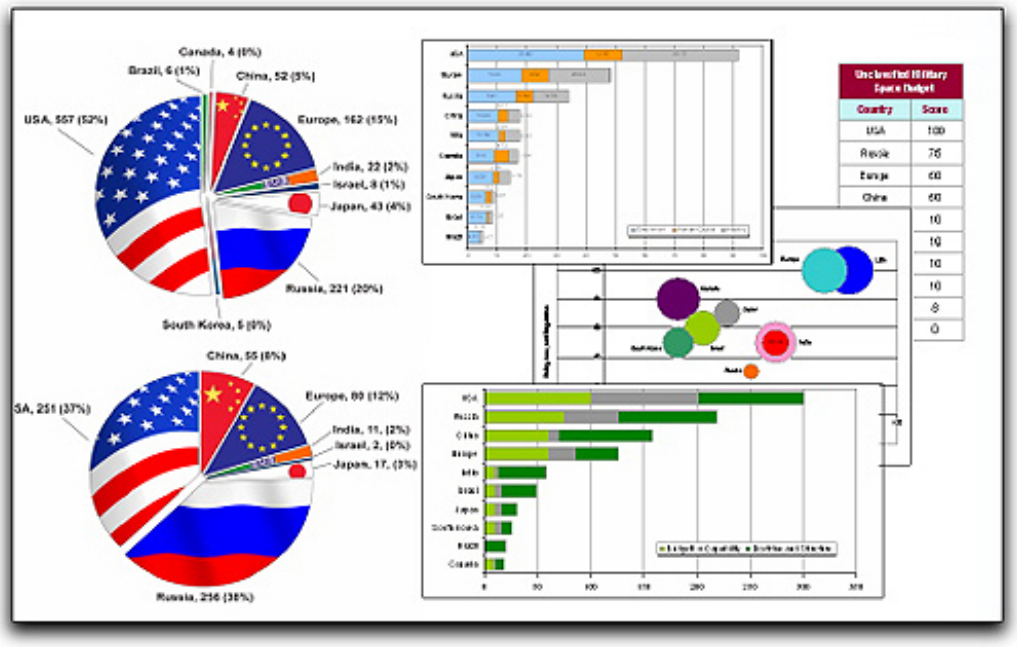
To learn more about the analysis and statistics revealed in the ***Futron Space Competitiveness*** as shown below, head over to this link and learn more about this dynamic report.



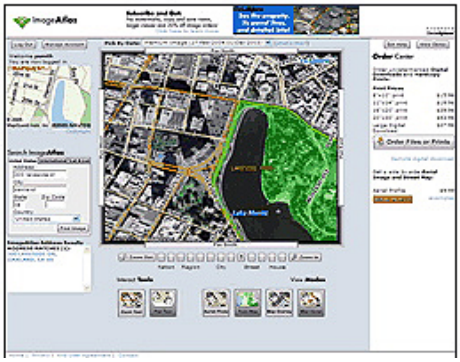
Remote Sensing / Satellite Imagery

by Hartley & Pattie Lesser and a cast of dozens of subject-specific experts

Thanks for returning for Part II of the satellite imagery article. Let's take a look at what, and who, is taking a look... in this edition, and in Part III, we'll present the leading, commercial satellite imagery firms. In Part II, we present *Digital Globe* and *GeoEye.* Please keep in mind that companies arrange the technical specifications for their satellites in various ways. The information contained on each satellite in the "specifications" sections was drawn directly from each company's satellite spec sheets. Some companies took the time to forward to us additional information for the article, and we are most grateful for their support. For more inclusive information, we recommend you visit each firm's website and access additional details in their satellite and product information pages.

Digital Globe

This company operates a constellation of sub-meter, commercial imaging satellites. With a complete library of earth imagery, customers include commercial, defense as well as intelligence and civil government users. Through their programs, more than 1 million km2 of imagery is collected each day, with the results available through online platforms. Their satellite-based products include **Basic**, **Standard**, **Orthorectified**, **CitySphere**, and **Basic Stereo Pair**.



The online access is via the company's *ImageAtlas*. This app is easy to use, as the user does not have to be a sophisticated GIS or mapping specialist to realize benefits from the service. This is afforded users via a subscription service, and the products' tools allow you to pan, zoom, and overlay street names directly onto the image. Other tools include **ImageBuilder** for creating base maps and other image layers for integration and display in various applications and devices. **ImageConnect** is a GIS extension that brings georeferenced photos into your own GIS project from the company's online library. **ImageConnect WMS** (Web Mapping Service) gives users instant online access to updated global imagery without any plug-in requirements. In addition, **PhotoMapper** offers image and mapping solutions using a proprietary data compression format for quick pans, zooms and annotation of imagery markets. Full information on the **DigitalGlobe** product line is available at the company's website.

QuickBird

The **QuickBird** satellite was manufactured by **Ball Aerospace** and launched in October of 2001 from **Vandenberg Air Force Base** in California, aboard a **Boeing Delta II** rocket for DigitalGlobe. QuickBird is still on-orbit performing its mission today at an orbit inclination of 97.2°, SSO, at a distance of 450-km (1,476,378 feet), with a 93.5 minute orbit cycle. QuickBird can revisit target areas in the span of from one to 3.5 days, depending upon the latitude at 70-cm resolution. Its onboard storage can accommodate approximately 57 single area images, and there's enough fuel onboard to last for seven years.

Digital Globe's QuickBird launch and the QuickBird in orbit artist's concept drawing

This satellite is based on the **Ball Aerospace Global Imaging System 2000** (BGIS 2000). QuickBird can collect 61-centimeter class panchromatic, and 2.5-meter multispectral stereoscopic data, over a large field, and is capable of rapid target selection.

The **Camera 60** on board the *QuickBird* can image a strip of the Earth's surface between 14 and 34 kilometers in width. A unique aspect of QuickBird was the ability of DigitalGlobe to alter the satellite's orbit, thereby increasing the panchromatic resolution from one meter to 61 centimeters, and also increasing multispectral from four- to 2.5-meter resolution. This translates to QuickBird being capable of capturing images that are as small as two-feet in size. Each year, QuickBird can acquire more than 75 million square kilometers of imagery.

QuickBird image of the Space Shuttle Discovery at Kennedy Space Center, Launch Pad 39B Image: SIC

Based on 61-cm resolution, at nadir, and 11-bit collected information depth, the QuickBird panchromatic sensor, known as BGIS 200, collects data at the visible and near-infrared wavelengths, and possesses a bandwidth of 7250-nm. Basic imagery products are delivered at the GSD in which the data were collected (ranging from 61-cm at nadir to 1.14-m at 45° off nadir).

WorldView-1

On September 18th of 2007, **WorldView-1** was launched from Vandenberg Air Force Base in California aboard a **Delta II 7290** launch vehicle. **Ball Aerospace** built the bus, as well as the camera, known as the Worldview 60.

WorldView-1 is a commercial satellite offering half-meter resolution. Each day, this satellite is able to collect as much as 200,000 square miles of half-meter imagery. At an orbit of 450 km, WorldView-1 is able to revisit collection areas frequently, enabling customers to obtain updated image acquisitions more often on a daily basis. WorldView-1 also boasts *Control Movement Gyroscopes* (**CMGs**), which enable the craft to capture in-track stereo imagery, and to engage in rapid targeting of sites. WorldView-1 has a mission life of 7.25 years.

With ITT's camera on board, the WorldView-1 satellite captured these sharp pictures of (clockwise from top left): Houston, Texas; Addis Abada, Ethiopia; and Yokohama, Japan.

Aboard WorldView-1 is the half-meter imaging sensor developed by ITT which offers sub-meter resolution images that are used by the National Geospatial-Intelligence Agency (NGA) to fill their geospatial and imagery needs for a variety of ongoing operations. These activities involve the military, intelligence, foreign policy, homeland security as well as for civil use. In October of 2007, the company released the three initial images shown on the previous page, captured by this advanced sensor system.

other plus for WorldView-2 is an instrument vibration isolation system that will reduce the jitter of the spacecraft, critical in the capture of crisper im-

WorldView-2

When launched in mid-2009 aboard a **Delta 7920** launch vehicle with 9-strap-ons from Vandenberg AFB, the new WorldView-2 bird will offer increased flexibility when it comes to target area selection. The resolution will be half meter. WorldView-2 will have 8 bands and the resolution in the multispectal mode is 1.8-meters (panchromatic at half-meter). The bus is the Ball Commercial Platform (BCP) 5000 and offers increased data storage, more power, enhanced stability, and great agility. WorldView-2 will bring into play high spatial resolution and multispectral imagery. This will be of great use for defense, intelligence, disaster response, and exploration for land mapping and for government use.

As is the case with WorldView-1, this new satellite will also offer CMGs. An-

ages. Additionally, global customers will find they will be able to task the spacecraft to deliver data directly to their ground stations, simply by uploading their individual imaging profiles to the satellite. The mission life of WorldView-2 is 7.25 years.

The satellite will have on-board a world-class telescope with high contrast (MTF) and signal-to-noise ratio. Both panchromatic and multispectral bands will offer selectable TDI with 11-bit range. The imaging payload will be the second system of this type engineered and manufactured by ITT Space Systems Division for DigitalGlobe. ITT is responsible for the electro-optical assembly of the camera and telescope, the detectors and focal plane assembly, as well as high-speed digital processing electronics.

Washington, D.C.

Rob Mitrevski, vice president and director, commercial and space sciences, **ITT Space Systems Division**, adds, "The WorldView-2 imaging payload is the most advanced to date and will supply unprecedented detail and geospatial accuracy, further expanding the applications for satellite imagery in both commercial and government markets."

GeoEye

Possessing a wide variety of owned satellites, as well as access to satellites belonging to their customers, **GeoEye** brings into the market advanced image processing and photogrammetry. Any geospatial application could find GeoEye imagery suited to their needs, from digital elevation models to fused images to land-use classification maps and more. Their imagery is used in such environments as mapping, national security, environmental monitoring, urban planning, resource management, homeland defense, commercial fishing, and emergency preparedness.

IKONOS

This satellite was launched in 1999 and collects 1-m panchromatic and 4-m multispectral data, at a rate of more than 2,000 square kilometers per minute, orbiting the earth every 98 minutes at an altitude of about 680 km (423 miles). This was the world's first one-meter commercial satellite. To date, IKONOS has gathered more than 275 million square kilometers of imager, all available in the company's digital archive. There are more than a dozen ground stations situated around the globe for this satellite's downlinks.

OrbView-2

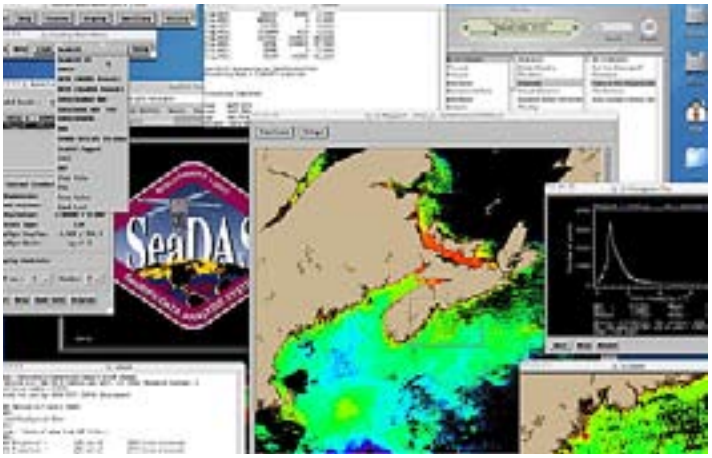
This satellite is used in studies of the world's carbon balance and global warming, providing 2,800 km wide swaths for broad area coverage. The satellite collects color imagery of all of the Earth's land and ocean surface. Under a program called SeaStar, commercial fishing vessels use maps that include imagery from OrbView-2 for detecting oceanographic conditions favorable for fishing. There are eight channels of data that provide color information from the visible to near-IR spectrum, and accessibility is via direct downlink or

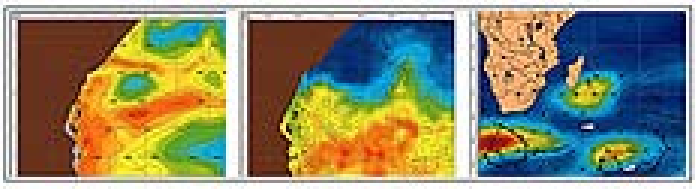
the web. This satellite has a life expectancy of around 12 years. MJ Harden, a well-known firm providing aerial imagery for the Oil & Gas industry, was acquired by GeoEye in March of 2007 and added their aerial imagery expertise to the GeoEye mix.

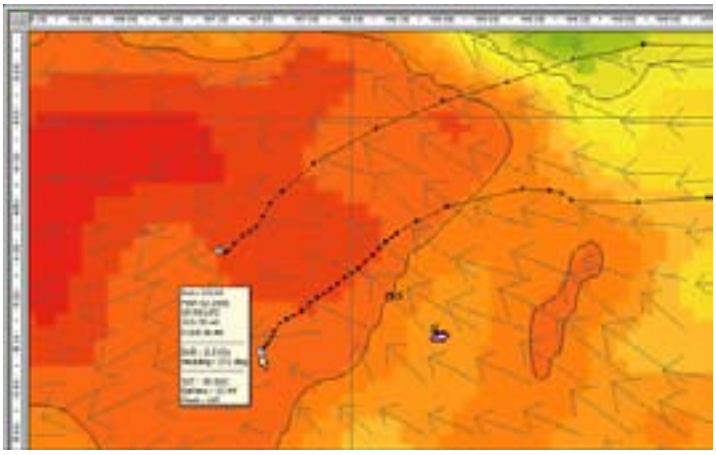
One of GeoEye's services is the Ocean Monitoring Service. For use by technicians or scientists, this program provides science quality imagery, or model-based data sets of various geophysical parameters. Another often requested product from OrbView-2 is the **Chlorophyll-a**. This is the green pigment found in plants and marine phytoplankton, indicators of total plant biomass. Spatial patterns in Chlorophyll-a reveal more detailed definition of the dynamic ocean's surface structure than is observed from spatial patterns in Sea Surface Temperature (SST). Often used is the SeaWIFS Data Analysis Systems (SeaDAS) image analysis package, which processes, displays, analyzes, and ensures quality control of ocean color data. See the next page for illustrations.

Another product is SeaStar for commercial and sport fishing use as well as for tracking **OrbBuoys** and vessels. GeoEye creates SeaStar oceanographic maps by integrating oceanographic information that's collected in near real-time from satellites and other sources. For commercial fishermen, maps are delivered electronically to vessels showing areas of high fish-finding probabilities. Using GeoEye's OrbMap software, vessel captains combine their own, personal knowledge of an area with the SeaStar map to create customized images where fish are likely to gather. For example, in the map grouping shown on the next page, from left to right the maps show sub-surface temperature (50-m) with contour lines, a SST base map with surface currents overlay, and a regional weather chart showing

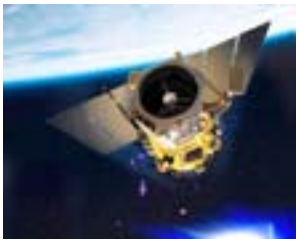
barometric pressure and wave height. The next map presents **OrbBuoy** tracking on a sea surface temperature base map with a surface current overlay using the OrbMap software. For information on GeoEye's OrbBuoy products, check out the asset tracking site here.







GeoEye-1



The company's nexgen satellite, GeoEye-1, is planned for a launch from Vandenberg Air Force Base soon. The launch vehicle will be a Boeing Delta II rocket. General Dynamics is designing and manufacturing the satellite, while ITT is providing the electro-mechanical camera, optical telescope assembly, the detectors, as well as the focal plane assembly and high-speed digital processing electronics. MacDonald, Dettwiler and Associates and Orbit Logic are involved in upgrading GeoEye's ground segment to support GeoEye-1's advanced technologies.

Images will be collected at 0.41-m panchromatic and 1.65-m multispectral resolution and will have the capability of precisely locating an object to within 3-m of its true location anywhere on the surface of the Earth. GeoEye-1 will be able to collect 700,000 square kilometers of panchromatic imagery, and up to 350,000 square kilometers of pan-sharpened multispectral imagery, in one day, storing the data to its 1 terabyte capacity solid-state recorders.

This satellite will complete 12 to 13 orbits per day at an altitude of 684 km (425 miles), with an orbital velocity of about y.5 km/sec (16,800 mph). Due to its SSO, GeoEye-1 will pass over a given area at about 10:30 a.m. local time each day. Additionally, the satellite will possess greater agility, being able to turn and swivel in orbit to point the camera at target locations below it, as well as from side to side and front to back.

An interesting simulation of GeoEye-1's imaging capabilities may be viewed at this link. A Flash presentation reveals how various target locations would be captured at the various imaging resolutions of the satellite. GeoEye offers various image processing services from a broad range of data sources. These include their satellites as well as QuickBird, Landsat, SPOT and IRS satellite imagery. In example, regional and local governments would use this imagery for public facilities planning.

GeoEye-2

Coming online after **GeoEye-1** will be **GeoEye-2**, with the camera work having already been contracted to ITT. Plans are for this satellite to launch three years after a builder has been contracted for the project. GeoEye-2 will be a 3G remote sensing satellite and should launch in either 2011 or 2012. According to the company, objects as small as 25 centimeters will be discerned on the earth's surface by GeoEye-2. This satellite will be of the same general class as GeoEye-1. However, there will be significant improvements in the satellite's capabilities. These will include enhanced direct tasking, and retrieving Earth's surface imagery at 0.25-m or 9.75-inch ground resolution.

GeoEye also operated **OrbView-3** which was decommissioned on April 23, 2007. Images from OrbView-3 are available now only through the company's archive sales process.

To Be Continued...

In the next issue of *SatMagazine*, we delve into ImageSat International & Spot Image and close the series with a look at **Surrey Satellite Technology** and **RapidEye.**

	QUICKBIRD CHARACTERISTICS
Orbit	**450-km, SSO, 98°**
Period	**93.4 minutes**
Sensor bands	**Panchromatic (60-cm BSD at nadir Black & white 445-900 nanometers Multispectral 2.4-m GSD at nadir**
Sensor resolution	**0.50-m GSD at nadir**
Dynamic range	**11-bits per pixel**
Swath width	**16.5-km at nadir; accessible ground swatch is 544-km centered on satellite ground track (to ∞30° off nadir**
Pointing accuracy	**less than 0.5-millradians absolute per axis**
Knowledge	**Less than 15 microradians per axis**
Retargeting agility	**Rate — 3.7 days, depending on 60-cm resolution latitude**
Revisit frequency	**1.7 days at 1-m GSD, 4.6 days @ 25° off-nadir**
Onboard storage	**128 gigabits**
Viewing angle	**In-track and cross-track porting**
Per orbit collection	**∞128 gigabits (approx. 57 single area images)**
Max contiguous area	**60x110-km mono, 30x110-km stereo, collected in single pass**
Communications	**Payload data: 320 Mbps X-band housekeeping 4-, 16- or 32-kbps real-time, 256-kbps, 2 Kbps S-band uplink**

	WorldView-1 Characteristics
Orbit	496-km, SSO, 10:30 a.m. descending node
Period	94.6 minutes
Sensor bands	Panchromatic
Sensor resolution	0.50-m GSD at nadir; 0.59-m at 25° off nadir
Dynamic range	11-bits per pixel
Swath width	17.6-km at nadir
Pointing accuracy	<500 meters at image start and stop
Knowledge	supports geolocation accuracy with specs of 6.5-m CE 90% at nadir, with actual accuracy in the range of 4.0 to 5.5-m CE90%, excluding terrain and off-nadir effects
Retargeting agility	acceleration — 2.5 deg/s/s rate — 4.5 deg/s time to slew 300-km — 10.5 seconds
Revisit frequency	1.7 days at 1-m GSD, 4.6 days @ 25° off-nadir
Onboard storage	2199 gigabits with EDAC
Max. viewing angle	nominally +/-45° off-nadir=1036-km wide swath higher angles are selectively available
Per orbit collection	331 gigabits
Max contiguous area	60x110-km mono, 30x110-km stereo, collected in single pass
Communications	image & ancillary data: 800 Mbps X-band housekeeping 4-, 16- or 32-kbps real-time, 524-kbps stored, x-band command: 2 or 64-kbps S-band

	WorldView-2 Characteristics
Orbit	770-km, SSO, 10:30 a.m. descending node
Period	100 minutes
Sensor bands	panchromatic + 8 multispectral with standard colors—red, blue, green, near-IR; + 4 new colors—red edge, coastal, yellow, near-IR2
Sensor resolution	panchromatic 0.46-m GSD at nadir 0.52-m GSD at 20° off-nadir multispectral 1.8-m GSD at nadir, 2.4-m GSD at 20° off-nadir (if non-US Government customer, images must be resampled to 0.5-m)
Dynamic range	11-bits per pixel
Swath width	16.4-km at nadir
Pointing accuracy	<500 meters at image start and stop
Knowledge	supports geolocation accuracy with specs of 4.6- to 10.7 meters CE90, excluding terrain and off-nadir effects — with registration to GCPs in image, 2.0-m
Retargeting agility	acceleration — 1.5 deg/s/s rate — 3.5 deg/s time to slew 300-km — 9 seconds
Revisit frequency	1.1 days at 1-m GSD or less, 3.7 days @ 20° off-nadir or less (0-.52-m GSD)
Onboard storage	2199 gigabits with EDAC
Max. viewing angle	nominally +/-45° off-nadir=1036-km wide swath higher angles are selectively available
Per orbit collection	524 gigabits
Max contiguous area	96x110-km mono, 48x110-km stereo collected per orbit

IKONOS CHARACTERISTICS

Orbit	680 km, SSO, 98.1° inclination, 14-15 daily orbital passes, 98 minute period
Sensor bands	Panchromatic, blue, green, red, near-IR—Spectral range: 526 to 929-nm
Sensor resolution	Pan: 82-cm at nadir, 1-m @ 26° obliquity— MSI: 3.2-m @ nadir, 4-m @ 26°obliquity
Swath width	11.3 km (7 miles) at nadir 13.8 km (8.6 miles) @ 26° off-nadir
Dynamic range	11-bits per pixel; pixel intensity range 0 to 2047 DN
Pointing accuracy	Up to 2-m CE90, 3-m LE90
Retargeting agility	In-track stereo w/ 2 images taken a minute apart on the same orbital pass
Revisit frequency	2.9 days @ 1-m resolution — 1.5 days @ 1.5-m resolution — These values are for targets at 40° latitude — The revisit times are more frequent for higher latitudes and less frequent for latitudes closer to the equator.
Onboard storage	80 GB
Per orbit collection	Collects pan and MSI over 2,000 square kilometers per minute
Max contig. Area	1,000 km long x 11 km wide
Swath width	7000 km @ 510 km
Swath inclination	97.2°
Dynamic range	10 bits
Datalink rate	280 Mbit/sec
Knowledge	CE90 = 35-m
Retargeting accuracy	Rate =1.5°/sec
Revisit frequency	3 days @ 90-cm
Onboard storage	32 Gbit
Max viewing angle	45°
Per orbit collection	4500 km ground track (1500 km^2 – 7700 km^2, depending upon image scenario)
Max contiguous area	> 450 km
Communications	Imagery download: 280 Mbps—Command Upload: 5 Kbps—Telemetry download: 2.5/15 Kbps

	ORBVIEW-2 CHARACTERISTICS
Orbit	705 km
Sensor bands	6 visible; 2 near-IR Spectral range: 400 to 875-nm
Sensor resolution	1 to 4 km
Scene width	2,800 km
Revisit frequency	1 day
Onboard storage	128 MB

	GEOEYE-1 CHARACTERISTICS
Orbit	684 km, SSO, 98° inclination with 12-13 daily orbital passes
Period	98 minutes
Sensor bands	Panchromatic, blue, green, red, near-IR
Sensor resolution	(simultaneous) Pan: 41-cm (1.34 ft) MSI: 1.65-m (5.41 ft)
Dynamic range	11-bits per pixel
Swatch width	15.2-kim; swath area 225 sq km
Pointing accuracy	CE stereo: 2-m (6.6 ft)—LE stereo: 3-m (9.84 ft)—CE mono: 2.5-m (8.20 ft) — These are specified as 90% CE for the horizontal and 90% LE# for the vertical with no ground control
Retargeting ability	In-track stereo with two images taken on the same orbital pass; provides for digital elevation data
Revisit frequency	3 days
Onboard storage	1 Terabyte; x-band downlink @ 740 Mb/sec or 150 Mb/sec
Max viewing angle	Up to 60°; capable of imaging at any angle
Per orbit collection	Pan: up to 700,000 sq km — MSI: up to 350,000 sq km
Max contiguous area	Large area: 15,000 sq km (300x50 km) 1° cell size: 10,000 sq km (100x100 km) stereo area: 6,270 sq km (224x28 km)

by Bob Potter

Interference costs satellite operators millions of dollars each year. Solutions such as sophisticated, cost effective tools are now available that allow operators to plug leaks that cost the loss of revenue as a result of interference. The good news is that the expense of interference mitigation tools can be recovered in less than a year by increasing revenue and lowering costs.

Conservative estimates for a fleet of three satellites lists the cost of interference at $2M per year. This total consists of lost, or reduced, revenue due to; delay of the start of services; transponders directed to operate in backed off mode that results in less power and/or bandwidth available for sale; and spectrum that is used for interference mitigation. Then there are the increased labor expenses that include overtime and purchases of other external services.

To understand how modern tools help to reverse this issue from an expense into profit we first have to understand the causes and reasons for the interference.

The *Satellite Users Interference Reduction Group* (**SUIRG**) categorizes satellite communication interference into five main groups, these are:

1. User Error
   a. Human Error
   b. Equipment Failure
2. Crosspol Leakage
3. Adjacent Satellites
4. Terrestrial Services
5. Deliberate Interference

User Interference

This is usually accidental as a result of operator error, equipment malfunction, or due to poor cable shielding. These interference types are, in most instances, relatively easy to find, however, it usually takes a disproportionate amount of the satellite operator's manpower and time to locate.

Crosspol Interference

This is usually caused by; incompatible modulation types (such as FM TV) transmitted in the opposite polarization field to digital services on the cross-opol; poorly aligned antennas in bursting networks; and lack of training/experience of the uplink operators. The first example involves unusable capacity in which the company of the interfering service compensates the other party. The second and third types are extremely time consuming and labor intensive in both equipment and training.

Adjacent Satellite Interference

This type of interference is generally accidental, due to operator error, or poor inter-system coordination. Frequently, this can be resolved between the satellite operators. Unfortunately, this type of interference is becoming more prevalent as two degree spacing between satellites in the geostationary arc becomes more common.

Both of the affected satellite operators want full use of the spectrum on a non-interference basis. However, this again consumes a disproportionate amount of manpower and time to resolve, resulting in loss of useful spectrum and ultimately, of revenue.

Terrestrial interference

This is the result of; existing terrestrial microwave systems; new microwave systems that have commenced service following deployment of the satellite; or civil or military radar systems. This situation is usually time consuming and difficult to resolve, especially in the military arena. In general, as the terrestrial systems usually have priority, this becomes dead capacity on the satellite.

Experience reveals that with military interference, if proof of source can be indicated, the military is cooperative in removing the cause, if at all possible.

Deliberate interference

This type of interference is usually geopolitically motivated. It is, generally, relatively easy to locate, but almost impossible to remove without political intervention, which can prove difficult.

Recent (SUIRG) reports of cost of interference to a satellite operator reveal that $2M per year is a conservative amount. In order to reduce the loss of revenue, satellite operators need to take a holistic approach to their interference mitigation processes. Geolocation systems are not the panacea for interference that one may think. They are simply one of the tools of the trade to assist and help with interference mitigation.

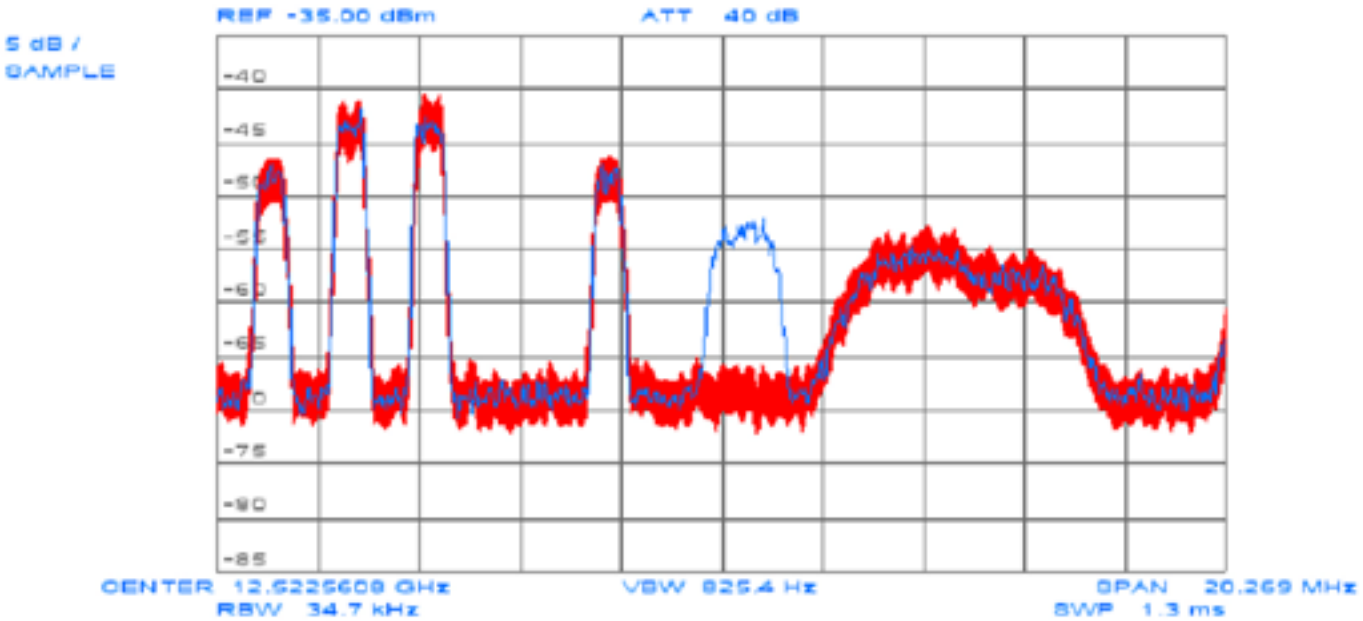
When interference occurs, payload operators first have to ensure that the user is still active, and that their service is operational. Following that, the operator needs to address the removal of the interference by first determining the source, and then shutting down the transmission.

In the ideal world, interference would be detected and resolved before it affected the existing client of the satellite.

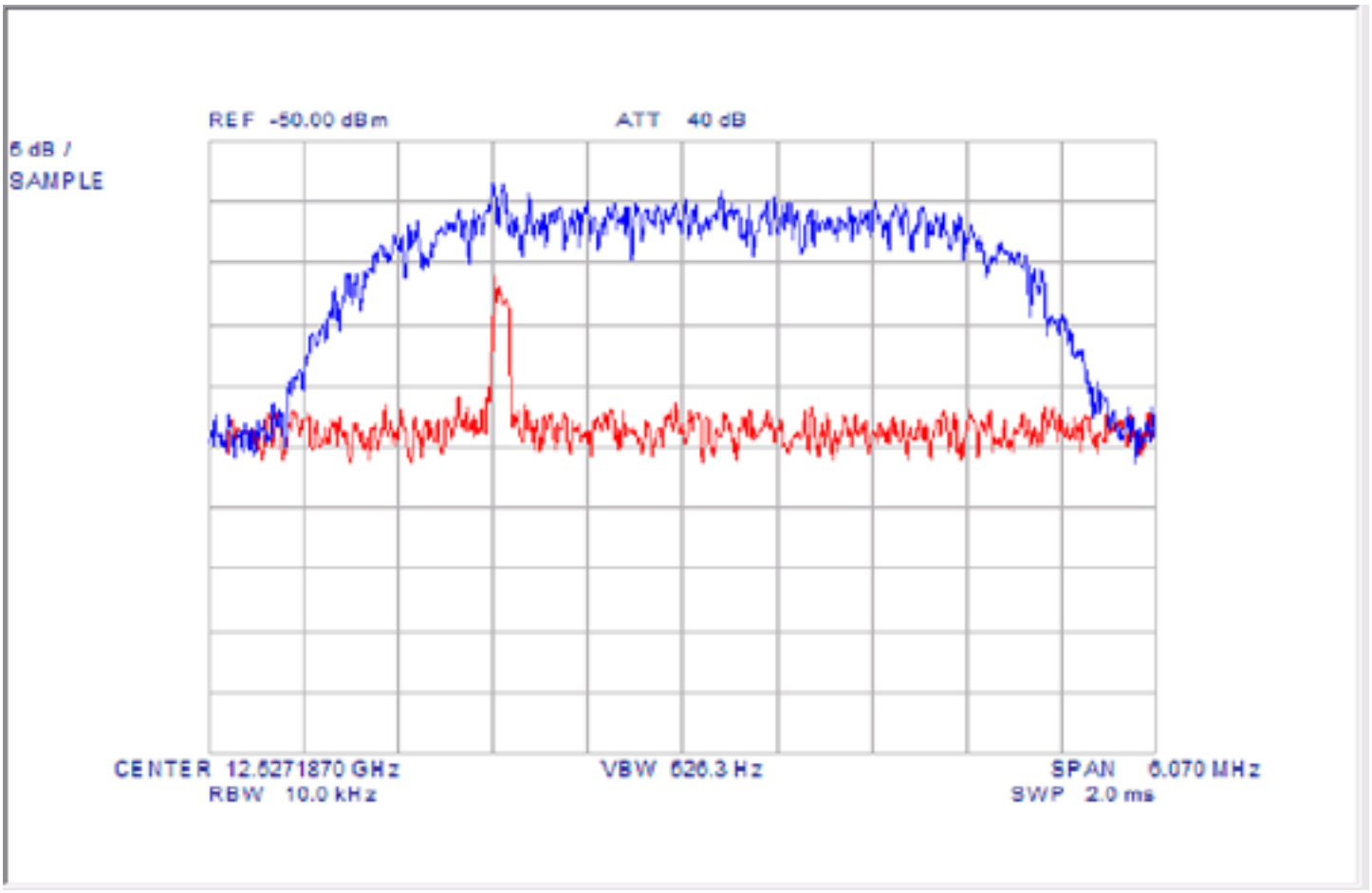
For this to become a reality there first needs to be coordination among planning and live operations, with an open, automated interface between the tools that planners and payload operators use.

With this open interface planners can see what is occurring on the satellite, and operators can observe what should be on the satellite. The result is that the CSM system can locate unauthorized carriers, which potentially can become interferers by occupying the frequency space that is needed for a new customer.

An unauthorized carrier is easily detected when live traffic is overlaid with a planned mask. Frequency planners can readjust the uplink schedule, or frequency plan, and payload operations can locate the source of interference and have it removed. All this



Selected - Transponder: 'L Band' - Customer: 'GCC'



is achieved before there is an impact to the new uplink service, and there is no loss of revenue due to delays in the new service.

Digital Spectrum Analyzers (DSA) can find interference occurrences within live carriers before the interference becomes a real issue, resulting in loss of revenue. For this to be affective a feature of the DSA needs to locate interference under the entire live carrier bandwidth, and then be able to analyze it.

With knowledge that interference is occurring, and having access to the analysis of the interference, the payload operator can work to remove the obstruction. This can yield fast results, without affecting the existing service. In fact, it may not ever be known that a small interference signal was present.

The positive result is not having to move the existing service to another frequency slot. This enables the planners to reserve less spectrum for interference mitigation, and make it available for revenue generation.

When the live service is affected by interference, and the operator needs to move the service to a new slot, the operator needs to view the satellite frequency plan and test scenarios. These determine what would happen to a transponder operating point if the serviced was moved to a new frequency.

Graphical analysis tools within the planning system are used to test the new transponder, and observe the frequency plan, transponder noise floor, and operating point if the operator were to move the service to the new slot.

This ensures that correct operation of the transponder is maintained, and the temporary movement of a service that is suffering interference does not affect existing services.

Once the operator has quickly resolved the issues of the existing customer, their attention can turn to the removal of the interference.

One of the DSA carrier's features also allows for fast resolution of crosspol issues enabling the operators to determine if the interference is coming from the other pol. By using the feature to remove

the digital carrier on the crosspol, the performance of the copol antenna is easily observed.

With access to the Earth station database within the planning system the operator resolves the issue quickly and easily with no interruption to services to complete an antenna check.

The interference analysis provided by DSAs acts as a fingerprint. The payload operator uses this information to search the CSM and the planning databases to research the past, present and future services for a "match". SUIRG reports regarding causes of interference indicates that 98 percent of known interferers are past, present or future customers of the satellite operators.

As a result, most of the interference occurrences can be found and dealt with by inexpensive searches of carrier lifetime databases.

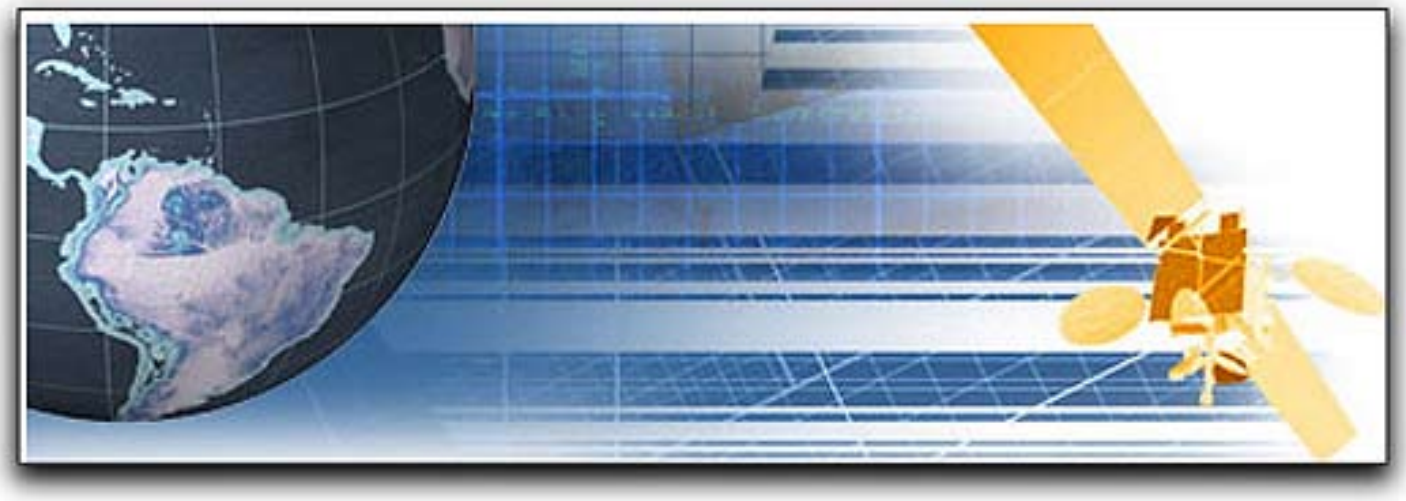
New initiatives such as the SUIRG sponsored *Unique Carrier Identifier,* or *CarrierID* provide for use of overhead bits to uniquely identify a modem. Operators can use DSAs to extract the CarrierID and pinpoint the location of the modem quickly resolving interference issues. With the decreasing costs of planning systems and DSAs, a modest investment for an integrated system can save a small operator as much as 50 percent of the cost of interference. This can translate to as much as $1M per year.

Satellite interference is generated from multiple sources; typically most are from operator error or equipment malfunction. When there is an interference incident, it can take anywhere from minutes, to months, and even up to a year of investigation to resolve the problem. This results in lost revenue and increased costs.

The smart investment of an integrated payload planning and operations system can yield huge savings amounting to payback of the cost of the system in less than a year.

About the author

Bob Potter is the President of SAT Corporation and is an expert in interference technologies and solutions.



by Adrian Ballintine

The talking heads continue to prattle on about FttN (Fiber-to-the-Neighborhood) or FttH (Fiber-to-the-Home) and how WiMAX might extend broadband delivery in Australia. However, the element not addressed concerns the most remote Australians, those whose isolated locations make the delivery of fair and equitable broadband connectivity most difficult to deliver. These would-be users continue to be overlooked, and are, only slowly, crossing into the digital divide.

There have been, and still remain, a range of government initiatives to supply a fix for these Australians who do not possess broadband connectivity. To date, at last count, they number around 300,000, but there may be considerably more. Australian Bureau of Statistics research published this year indicates farmers are generally relying on dial-up services for the Internet—often at STD rates!

Between 2001 and 2006 the number of Australian households acquiring Internet access nearly doubled. In major cities today, nearly two-thirds of all homes have Internet access.

The downside for remote Australia is that less than half, in fact only 42 percent of remote Australian households, have any Internet connection at all. The picture worsens when it comes to those families and homes connected to broadband that are able to access the digital world of eCommerce as well as the triple play of voice, data, and video. Less than half the homes in major cities have broadband and less than a quarter of remote Australian households have broadband.

Additionally, indigenous households are about half as likely to have broadband when compared to non-indigenous households. The government broadband initiatives started in earnest with the *Higher Bandwidth Incentive Scheme* (**HiBIS**), morphed through various iterations of ABG—at the state level, numerous policies remain in place. The latest policy involves the Western Australian (WA) Government, in Kimberley, and how to bring broadband, and its benefits, to 16 regional and remote locations. The areas range from Broome to Turkey Creek, three national parks, and other services and locations that are spread throughout the vast northwestern region.

Billions of dollars are involved in order to connect the relatively easy locations of Australia. Yet there is no current national satellite policy, and no explicit, over-arching policy solution, yet, for the remotest of Australians. The same holds true for the 80 percent of the Australian landmass devoid of fiber and other similar technologies.

Therefore, while we are prepared, as a nation, to spend more than $4.7 billion of taxpayers' money on new fiber for regional and rural Australia (in addition to the billions already committed), we haven't focused on those most in need, the hardest to connect— those in remote Australia. This includes those travelling in these out-of-the-way areas, fighting bushfires, mopping up after cyclones, those who are living and working in the bulk of the Australian land mass. These folk are not, and never will be, served by fiber, WiMAX or anything else—only satellite can fulfil their communication needs.

Happily, for those people in the bush, it is in satellite technology that a paradigm shift is now apparent. Satellite is appearing where it is most needed, with increasing cost efficiency and performance. And because of this startling change, the cost structure of satellite performance is being re-written. The end-user, that farmer in the bush, or that fire fighter at the fire front, will now enjoy better data and voice transmission (even video streaming, if he or she has time!) at a new, low price.

Why isn't this new satellite technology available in urban Australia and the region today? Why are the satellite operators not talking this up with government or the technical community? Could the answer be found in the fact that there is still capacity for sale on the "old" technology satellite fleets over this area?

The new paradigm and its benefits are based in **ViaSat**'s **Surfbeam** hub technology, spot beams and gateways, and a satellite loaded with Ka-band. None of these technologies are available from the Thai or Singaporean owned satellite operators in Australia. The only Ka-band sold in Australia is via Optus and that's for military use only.

The Change Is En Route…

The North American market is the proving ground for Ka-band technology, and through WildBlue, it has proven to be to the fastest growing consumer satellite broadband, ever. The Canadian Ka-band satellite, with this same technology, closed its sales book just 18 months after its launch. The WildBlue satellite for the U.S., launched two years later in early 2007, is estimated to reach full capacity in only 15 months.

Driving the demand that stimulates these results are the following statistics: The world consumer Internet traffic is estimated to use approximately 3 terabytes (that's 1,000 gigabytes) per month in 2008—this will double to 6 TB in just two years.

The demand for broadband connection is alive and well in Australia and the new Ka-band and Surfbeam technology, together with newly developed proprietary technology from NewSat partners, ViaSat, offers superb performance at a fraction of the cost of the current world's best practice.

Yet, in Australia, we have not even migrated to Ka-band for consumers, business, and general government, nor have we embraced even the SurfBeam technology. Regardless, NewSat is installing the first hub in the region, making us, as a nation, not one, but two steps behind the forefront of satellite technology. Plus, NewSat has announced to the industry that it is completing the service offering to the market with its intention to additionally launch its own satellite over Australia and the region by 2011.

In Europe, **Eutelsat**, the largest EU satellite company (with a fleet of 24 satellites), and the third largest satellite owner and operator in the world, has been the

first mover to adopt this paradigm shift on that continent. Eutelsat announced that Europe would have its first Ka/ViaSat satellite in 2010. Eutelsat claims their new satellite will deliver more consumer connectivity than all of the rest of their fleet (24 satellites) combined. ViaSat has also announced that it will launch its own satellite, built by Space Systems/Loral (SS/L), over North America.

And Now…

NewSat's Perth Teleport

The company is well placed to extend its on-the-ground services from its two teleports in Adelaide and Perth, where it has 23 antennas, some up to 13 meters in diameter. These connect to 12 satellites operated by the world's biggest space players, including Intelsat, SES NewSkies, and others, which are global in coverage. The next step is quite obvious... the company has already announced it will offer Australia's first non-military Ka-band satellite, and has already invested in the SurfBeam hub. This combination takes the nation one step closer to the cutting edge of satellite performance and price.

What magnitude of price slashing are we discussing? In August 2007, NewSat offered to sell ABG entry-level Ku-based broadband connectivity to remote Australians at 30 percent less than the best of the rest in the market. Under Ka-band, the pricing is expected to drop even further. As some pricing considerations remain commercially sensitive at this time, where prices may go is anyone's guess as 60 percent off is already a huge slice, given an ABG licence. The picture is clear for remote Australians under a Ka-band supply. They won't be paying monthly bandwidth fees such as they are today and their fees could be guaranteed against the ravages of inflation and interest rates because of the adoption of NewSat's proposed satellite with Ka-band and its associated technology.

As of this writing, the company is in negotiations to establish itself at the forefront of this global technology breakthrough. There are some critics stating this breakthrough in satellite technology has yet to be proven in the field. Other experts claim the technology has been tested by some of the biggest space companies in the world for three years and is simply a progression of today's expertise. The technology is, indeed, the fastest growing, most highly tested and proven broadband connection in the history of satellite telecommunications.

The former view of satellite communication, that it suffers from jitter and latency hurdles, is diminishing. The jitter is being eradicated by improved technology— latency will never be extinguished. Rather, latency is diminished as evidenced by the commercial quality VoIP service over satellite offered by companies such as NewSat, streaming of video over satellite, and a number of commercial uses such as developed by the Victoria State Government's Spatial Information Unit—they can now transmit data packages for controlled farming purposes at world-record and award winning new levels.

We are currently witnessing rapid changes in technological solutions in metropolitan and regional Australia, with the industry now talking up FttH. The future of major roll-outs to regional Australia appear uncertain.

What NewSat is proposing is a holistic solution to the many disadvantaged people, businesses, government projects, curriculum, and medical services. NewSat will provide delivery as well as defence and emergency communications across the entire continent, wherever it is needed, including seaward. Wherever FttN, FttN + WiMAX, FttH, or any other solution that is decided upon or emerges from the industry, falls short, the NewSat Ka-band satellite coverage can solve the problems.

The myriad of broadband shortcomings now documented by the government can best be resolved by a big picture solution. The answer could resemble what NewSat presents, rather than bandages and add-ons. Those would be relatively expensive to implement and operate as temporary fixes, as well as being short lived in the face of rapidly changing technology.

NewSat will work closely (as it does already) with the States, NGO's, and other groups who will benefit from the satellite platform at a high level of performance, and at a price point never previously considered. The company judges these elements fundamental to the social equity equation. They are also proud to be leading the nation in delivering this infrastructure, and making it available to consumers, to government and as a wholesaler to other down-stream retail telecommunication providers.

The first NewSat and only indigenous satellite for Australia will be **Jabiru**. The payload is expected to be a mixture of transponders and that is being defined by preliminary discussions with targeted clients. Jabiru will be a comparatively large satellite weighing more than an estimated 5 tons, with a life expectancy of 15 years. NewSat is in negotiations with a number of parties for allocation of a necessary geostationary slot.

NewSat's world-class teleports have provided the company's springboard for the Jabiru satellite project. The paradigm shift in technology around the world illustrates the powerful reason why NewSat is extending its business to become a complete satellite/space model. As explained in this article, NewSat believes Australia should have its own satellite/s to fix the country's own problems and maximize the productivity and emergency communication opportunities for the nation as a whole while satisfying the needs of those in remote areas. For information on NewSat's satellite coverage, use this link. For more information on the company, head over to their website.

About the author...

Adrian Ballintine is the Chief Executive Officer for NewSat Limited. Adrian is experienced in building successful technology companies, such as Gupta and Asymetrix. He has developed NewSat from its launch into an eminent position today as an independent satellite services leader in the Asia-Pacific region.

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