

SatMagazine



THE EUROPEAN MARKET

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SatTV: Will The Future Be Guided By 3D? **by Maxime Baudry and Stephanie Villaret, IDATE**

Satellite holds its own against other broadcasting networks...

Over and above the problems of cost and geographical coverage, which are very specific to each network, the comparative penetration of TV broadcast technologies is a reflection of how the TV market has developed historically within the various countries. While very uniform in North America, Western Europe comprises many nations with very diverse profiles (high penetration of the terrestrial network in southern Europe, predominance of cable in the north). As a general rule, the traditional broadcasting networks, mostly cable and terrestrial, are tending to lose market share as IPTV gains in strength. This new service, now the growth driver in the pay-TV market and particularly in Western Europe where IPTV is developing rapidly, had attracted some 13 percent of subscriber homes by end-2010.

Meanwhile, satellite's share of the market has remained relatively stable. Almost fully digitized now for a number of years (the main exception being Germany where around thirty analog TV channels are still broadcasting, possibly until 2012), satellite has established itself as a major network for broadcasting premium TV. At end-2010, it had around a third of the pay-TV market (29 percent of subscriber TV homes in Western Europe and 34 percent in North America). However, as pressure from competitors continues to mount, the deployment of optical fiber networks, after ADSL, will prove a serious threat for satellite operators.

Satellite still the undisputed market leader for high-quality TV broadcasting (HD and 3D)...

There is no doubt that all broadcasting networks are evolving, preparing for the mass expansion of HD and emergence of 3D over the next few years. DTT networks will migrate en masse to the DVB-T2 standard, cable networks will switch to DOCSIS 3.0 (migration has already been under way for the past two years),

and telecom operators are rolling out optical fiber to make up for the limitations of xDSL.

However, we see no real threat to satellite, at least in the short to medium term. Firstly, even with the impact of the digital dividend, DTT networks will have insufficient capacity to broadcast a substantial number of HD channels. Cable is penalized by its limited geographical coverage (around 50 percent of the population in Europe), and the colossal investment required by operators to deploy DOCSIS 3.0 has forced them to forego extending their infrastructure coverage. Lastly, while picture quality is improving on web networks, with encoding levels of 1.5 Mbps, it is still highly inferior to performances in broadcast mode. The only technology that might pose a threat to satellite is FTTx, combining capacity with interactivity, although no mass deployment is anticipated for at least another 10 years, either in North America or Western Europe. Satellite's positioning in high-quality premium TV (HD and 3D) therefore seems quite solid from 2010-2015.

The factors that differentiate the various networks thus seem to depend on the quality of content received on the TV set and, hence, the choice of encoding. While this is certainly true for HD, the difference will be even more manifest with 3D. The main grievance with poor encoding will be the quality of premium content, particularly live sports events. With 3D relief based on depth, average encoding will only have average rendering (visual) and detail will be harder to make out (e.g., a soccer ball on a large screen). Given the current market-entry phase of 3D, such a strategy could prove disastrous.

As with early developments in HDTV, satellite operators immediately positioned themselves as pioneers in 3DTV broadcasting, mainly by allocating test channels for this new technology. In view of their high broadcasting capacity, they are now best placed to provide the most extensive 3D content solution coupled with the best picture quality. Fiber networks



End-2010 estimates	North America	Western Europe																				
TV reception	Cable is predominant (55 percent of TV homes), but its share compared with other networks is declining, losing ground particularly to satellite (32 percent of TV homes).	Terrestrial reception is still market leader (34 percent of TV homes), although it is declining, while satellite's share remains stable (just over 28 percent of TV homes).																				
	TV reception modes – North America	TV reception modes – Western Europe																				
	<table border="1"> <tr><th>Mode</th><th>Percentage</th></tr> <tr><td>Terrestrial</td><td>8%</td></tr> <tr><td>Satellite</td><td>32%</td></tr> <tr><td>Cable</td><td>54%</td></tr> <tr><td>IPTV</td><td>6%</td></tr> </table>	Mode	Percentage	Terrestrial	8%	Satellite	32%	Cable	54%	IPTV	6%	<table border="1"> <tr><th>Mode</th><th>Percentage</th></tr> <tr><td>Terrestrial</td><td>34%</td></tr> <tr><td>Satellite</td><td>28%</td></tr> <tr><td>Cable</td><td>30%</td></tr> <tr><td>IPTV</td><td>8%</td></tr> </table>	Mode	Percentage	Terrestrial	34%	Satellite	28%	Cable	30%	IPTV	8%
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IPTV	8%																					
Digital TV	Digital TV is making real strides, with 84 percent of TV homes having access to a digital TV solution. Satellite is fully digitized.	Digital TV is making real strides, with 74 percent of TV homes having access to a digital TV solution. Satellite is almost fully digitized (still thirty or so analog channels broadcasting in Germany).																				
	Digital TV reception modes – North America	Digital TV reception modes – Western Europe																				
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Pay-TV	91 percent of TV homes subscribe to a pay-TV solution, a high percentage that shows cable as the main TV reception mode. Satellite accounts for around a third of the market (34 percent of subscriber homes).	57 percent of TV homes subscribe to a pay-TV solution, making the terrestrial network, which is mostly free, the predominant TV reception mode. Satellite has just under a third of the market (29 percent of subscriber homes), while IPTV is growing rapidly (13 percent of subscriber homes).																				
	Pay-TV reception modes – North America	Pay-TV reception modes – Western Europe																				
	<table border="1"> <tr><th>Mode</th><th>Percentage</th></tr> <tr><td>Satellite</td><td>34%</td></tr> <tr><td>Cable</td><td>59%</td></tr> <tr><td>IPTV</td><td>6%</td></tr> </table>	Mode	Percentage	Satellite	34%	Cable	59%	IPTV	6%	<table border="1"> <tr><th>Mode</th><th>Percentage</th></tr> <tr><td>Terrestrial</td><td>5%</td></tr> <tr><td>Satellite</td><td>29%</td></tr> <tr><td>Cable</td><td>53%</td></tr> <tr><td>IPTV</td><td>13%</td></tr> </table>	Mode	Percentage	Terrestrial	5%	Satellite	29%	Cable	53%	IPTV	13%		
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Source: IDATE

(and in the longer term, cable networks) have enough capacity to furnish an equivalent solution, but over a much smaller geographical area for a number of years still to come, giving satellite a head start in capturing market share by winning over the earliest adopters of this new service. The investment needed to acquire a 3D-compatible widescreen leads us to conclude that households will be sensitive to picture quality, especially if 3D content is included in the premium pay-TV package. Satellite operators are also well positioned to capitalize on this growing market driven by 3D, either in supplying the storage systems of movie theaters or in repatriating images and feeding third-party network head-ends.

What positioning should satellite operators adopt, faced with the potential long-term threat of web content migration?

While linear TV viewing is still predominant, it now coexists with the rapid spread of personalized video and VoD practices, which combine broadcast, personal and Web content. This shift follows the long-term trend for the convergence of traditional television and Internet, a trend that has gained momentum and intensified considerably in recent years.

SatBroadcasting™

While DTH is still a flourishing market for satellite operators, who may decide to dig in to their current TV broadcasting foothold by maintaining a broadcasting configuration that responds to the mass consumption of TV programs, they still have to consider what would be the most appropriate positioning for them as content moves increasingly to the Web.

By offering a premium solution, DTH platforms investing substantial amounts to acquire exclusive rights for popular programs that draw sizable audiences (TV series, major sports events, etc.) should, at least over the next few years, be able to hold their own against competition from Web content. Newcomers seeking out a niche in this OTT applications market, looking to distribute their own content themselves (like Google and Apple), should not, in principle, become rivals by purchasing these premium rights, although some are starting to invest in non-premium content (the catalogue collections of major American studios, in particular, should soon be available on web platforms).

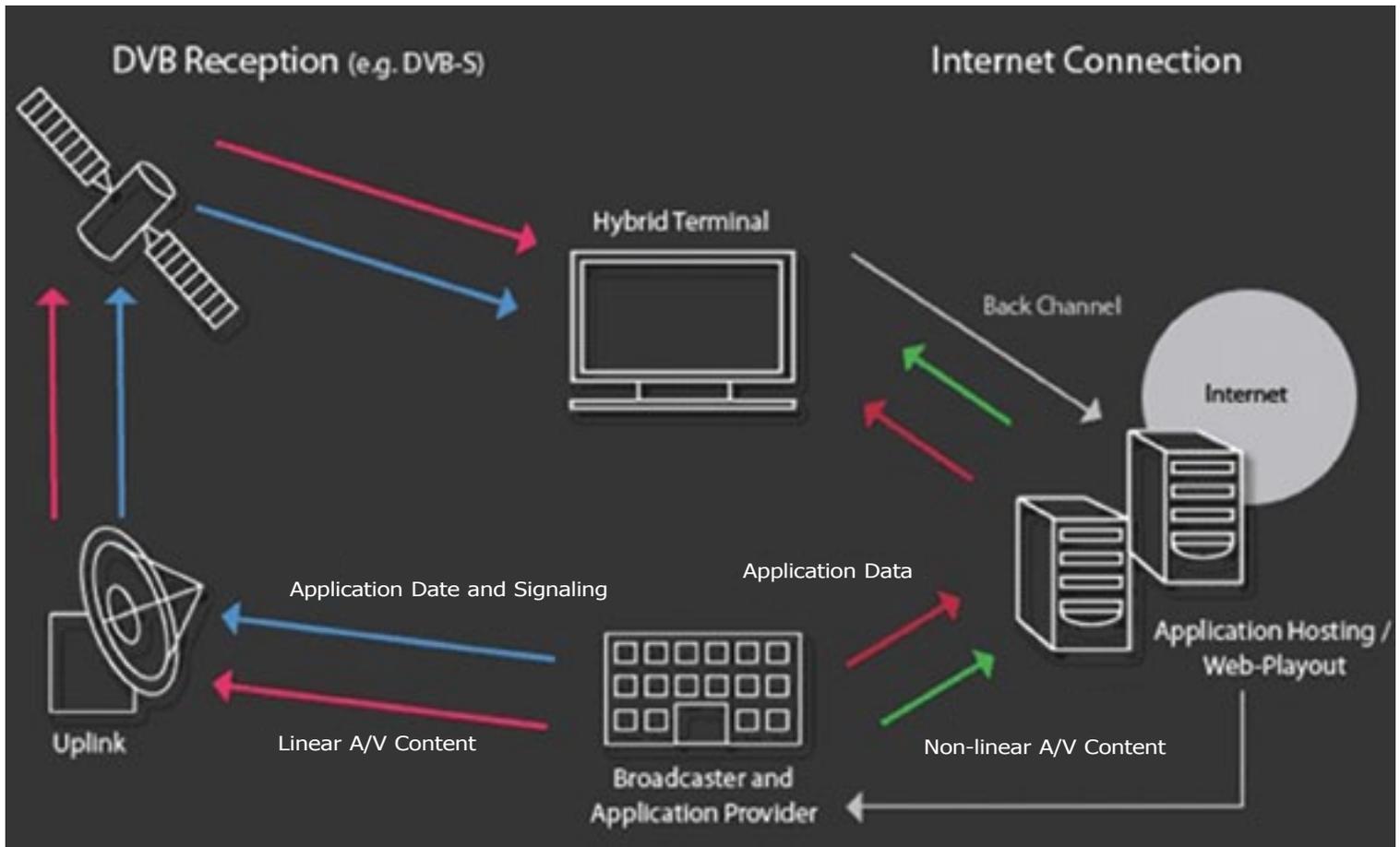
In an effort to set themselves apart from these new competitors, DTH platform operators must focus on the quality of their TV service. To maintain their profit levels, they would be wise to offer premium solutions based mainly on exclusive programming, a wide range of HD channels and high-performance set-top boxes with a built-in hard drive (HD-PVR), encouraging subscribers to consume more services (push VoD in particular, plus optional channels and 3D, etc.), and thus help boost their ARPU.

In this first, long-term outlook for the TV market, DTH platforms would continue to lead the race in the pay-TV market, carving out a niche in ultra-premium content, adding more services and broadcasting more channels with optimum picture quality (HD and 3D), while paid content would focus on premium programs.

However, as more and more content is likely to move to the web, the number of connected TVs capable of accessing OTT applications will rise, bringing all the inherent risks of a destabilized TV market. While interactive services have yet to become a “must have” and a key factor for the success of players in the TV market, the risk of a massive expansion of OTT applications for players in traditional media is very real. With this new configuration, the set-top boxes of pay-TV platform operators will no longer be essential for consumers wishing to access more content. There is the risk that in the longer term, TV viewers will prefer to watch premium content exclusively on demand via the many content providers present on the web, rather than via an exclusive operator.

In the United States, the pay-TV market has already started to lose subscribers: 1.4 percent of customers signed up to a pay-TV service cancelled their subscriptions in the past two years, and seven percent of existing subscribers are considering doing so. Faced with the threat of an explosion in free TV and video solutions that may cause a decline in the pay-TV market, satellite operators have every interest in not abandoning their business of broadcasting free TV channels. A second much longer-term outlook of how the TV market will evolve, compared with the previous scenario, suggests that satellite may confine itself to broadcasting the entire supply of FTA TV in an aim to reach the whole territory, while premium TV will be watched on demand and, therefore, exclusively via the triple play solutions of ISPs, or perhaps more likely directly via the Internet.

If satellite is to fully perform its role in the FTA TV market, it must focus on how it can provide a complement to terrestrial networks and evolve from an approach based on geographical hybridization, which is where it is today, to one based on



technological hybridization, an approach outlined in the **HbbTV** project. The satellite network will thus offer a much more elaborate package of free satellite channels than DTT, with interactive applications based on a hybrid system that will establish it as a serious and competitive alternative for free TV broadcasting.

Will the future of satellite be guided by its complementarity with other TV/video distribution networks?

The main benefits of satellite are its universal service coverage and rapid availability, coupled with its relatively high capacity for broadcasting premium HD content. Recent developments, however, risk eroding the impact of these benefits in the medium term, as satellite has to contend with increasing competition from other broadcasting networks. Optical fiber seems a serious contender and a particular threat to satellite in the long term (2020-2030). While **FTTx** networks still cover less than two percent of the population, most of the recent government stimulus packages introduced in the United States and Western Europe to help kick-start the economy aim to reach 100 percent of the population before 2020. Optical fiber also has an undisputed advantage in terms of interactivity, which is now gaining importance with today's usages, and its approach of offering a quadruple play solution at an unbeatable price is a strong selling point for new subscribers.

Should the above objectives be met, satellite might quickly find itself in a niche position in which it would mainly serve as a complement to **FTTx** networks, distributing TV services in the few rural areas that remain unreachable.

Satellite already provides a complement to DSL networks and is used by some operators to offer triple play solutions to subscribers not eligible for IPTV since they live too far from the distribution frame. Orange in France was the first to take the initiative in July 2008 by sealing a partnership with Eutelsat and SES Astra to extend its triple play solution and cover more than 98 percent of France's population (compatible satellites are **Astra** at 19.2 degrees East, **Eutelsat's Hot Bird** at 13 degrees East and Eutelsat's **Atlantic Bird 3** at 5 degrees West).

Orange's satellite TV solution, therefore, has to be bundled with an ADSL rate plan. In February 2011, SFR followed suit by officially launching its satellite TV service for subscribers not eligible for the ADSL TV service, via a partnership with **Canal+**. Another example, in Germany, was **SES'** announcement in February 2011 that it would team up with **Deutsche Telekom** to combine its extensive FTA TV solution, including **HD+** (a platform for accessing eight FTA TV channels in HD), with the operator's **Entertain** IPTV. The new Entertain Sat package can be accessed by all German homes with a DSL connection of at least 3 Mbps.

From the satellite operator's perspective, "the combination of the broad and high-quality DTH offer from Astra and HD+ with the additional interactive services from Deutsche Telekom creates an attractive media proposition". Lastly, in the United States, operators such as **AT&T** and **Verizon** decided to commercialize their IPTV solutions (called U-Verse and **FiOS TV** respectively) only to subscribers with optical fiber. Their ADSL subscribers are offered, via their intermediaries, a satellite TV package delivered by **DirecTV**, but this is only available to Internet subscribers.

Digital encoding technologies, together with image broadcasting and the super fast progress of Internet access networks, have helped speed up VoIP distribution and bustle in a new wave of equipment, connected TV solutions and associated interactive services, all of which might seriously disrupt the TV industry. Faced with this new challenge of interactivity, and considering their now frequent positioning as a complement to terrestrial networks, satellite operators are turning their attention to IP, embracing the idea of hybridization with terrestrial technologies.

This type of architecture makes best use of each type of network: Satellite for TV broadcasting and the terrestrial link for interactive services and Internet access. One example is the HbbTV project which is probably the most integrated and advanced hybrid satellite/terrestrial solution around today.

The HbbTV consortium's objective is to converge traditional modes of broadcasting (terrestrial and satellite) with broadband Internet to enhance the TV programs on offer. The intention is to give users a more complete entertainment experience, combining the simplicity of broadcast technology with the vast potential offered by an IP network connection. Such a configuration allows satellite to continue its traditional broadcasting role and yet not be fully involved in the IP architecture. **Once the hybrid solutions stage is over, satellite players will then have to consider whether they should continue integrating satellite and IP systems.** ↩

About the authors

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Maxime BAUDRY, Co-Head, Satellite Practice — Maxime joined IDATE as a senior consultant in April 2006. His main area of endeavor is monitoring the satellite industry, the telecommunications services market and operator strategies. Before coming to IDATE, Maxime worked for two years for Aon Explorer, a major strategy consulting firm specialized in the space industry, where his work primarily focused on industrial analysis of satellite telecommunications for space agencies and the sector's equipment providers. Maxime holds a Master's degree in Technology & Management (Ecole Centrale de Paris), and is a graduate of the Ecole Multinationale des Affaires/Bordeaux Business School (E.S.C. Bordeaux & Fachhochschule Münster's ERASMUS program). He may be reached at m.baudry@idate.org



Gottlieb — On Maritime

High Stakes, Huge Risks: The Race Is On... *by Alan Gottlieb, Managing Director, Gottlieb International Group, Inc.*

After years of building their business, Inmarsat's third party Distribution Partners now find themselves in a price war with the giant satellite operator. They are fighting what appears to be a direct-to-end user distribution strategy. Announced in a June 30th press release, Inmarsat's aggressive strategy incorporates extraordinary reductions in the price of VSAT combined with an unlimited Fleet Broadband back up package.

In addition, small fleet operators are reporting huge reductions in fixed priced Fleet Broadband. Packages have been reported of FB 500 going for prices competitive to VSAT (*i.e.* 15 Gigabytes for \$3,750 per/month) — far below the best Shared Corporate Access Plan pricing.

Already, Vizada has landed a counterpunch. On July 22, Inmarsat's largest DP (which accounts for 40 percent of Inmarsat sales) announced a far more attractive package at lower cost and free from the five-year commitment mandated by Inmarsat. As the two giants battle driving prices lower, smaller VSAT competitors and Distribution Partners with limited cash reserves could be driven from the market or acquired by Inmarsat or Vizada. There are no winners in a price war — only survivors.

Huge Risks for Inmarsat

Given the recent decline in Inmarsat's stock price, it is clear that investors have significant concerns over the huge investment the company is making in Global Xpress as well as the implementation of its new predatory pricing and distribution strategies.

- Will Global Xpress Achieve ROI sufficient to justify the risk? By driving down bandwidth prices to the levels in the June 30 announcement serious questions are apparent as to

whether the return on the Global Xpress investment will be sufficient to justify the enormous technical and market risk associated with the initiative.

- Alienation of Key Distribution Partners: By making what appears to be a move to go direct and by bypassing its distribution partners, Inmarsat risks alienating important marketing partners like Vizada and Globe.
- Further Reductions in Stock Price: By initiating a price war, it risks its own near term profitability further alienating its stockholders who have seen the value of their shares drop nearly 30 percent in the last year. Given the prospects for a further drop in the stock price, stockholders may demand the ouster of current management.
- Hostile Takeover: Should the stock price fall further, Inmarsat could become an attractive takeover target.
- Customer resistance to Global Xpress Upgrade: By selling Ku-band services, high-end customers may become accustomed to Ku's superior resistance to Rain Fade and may resist a transition to Global Xpress.
- Insufficient L-band Capacity: By offering L-band in 10 to 15 Gigabyte per/month packages at prices competitive to VSAT, will sufficient L-band capacity be available to users?

Potential Rewards

What, then, could Inmarsat hope to gain? Initially, the move suggests a grab for market share. However, by driving down revenue and margins of its Distribution Partners, the value of the partners' businesses would be significantly reduced and ultimately Inmarsat or Vizada could buy them for pennies on the dollar. The result would be a significant consolidation of suppliers and a limited choice for shipping consumers and potential for higher prices. Of course, the same consolidation could also occur in military and aviation markets.



Gottlieb — On Maritime

Under such circumstances, how, then, can Distribution Partners and VSAT competitors maintain their independence and profitability? What can they do to effectively compete and survive?

Fighting Back...

There are significant weaknesses in the Inmarsat strategies and in the technical aspects of Global Xpress, and the Distribution Partners can exploit them. Consider the following:

- What Inmarsat has done is to commoditize the delivery of Broadband to Vessels;
- Global Xpress has potentially significant technical and “continuity of service” issues (Rain Fade and no spare satellite) that could make it undesirable for use in critical communications in the high end large fleet segment, Inmarsat’s core market — facts that the satellite engineering community is aware of but have not been effectively communicated to the shipping industry. Switching to Iridium OpenPort is an alternative to Fleet Broadband and to Iridium’s next generation constellation, NEXT, as a Ku-VSAT backup when it becomes available.

Differentiating Product/Service:

Much of the logic behind Inmarsat’s strategic initiative is based upon the Stratos and Ship Equip experiences. It is important to note that significant portions of the revenues of these companies are based upon selling bandwidth and hardware to highly sophisticated end-user communities i.e. the Offshore Service Vessel and Energy markets.

Such end-users have highly sophisticated IT people who are familiar with VSAT and are much more likely to see bandwidth as a commodity vs. Tanker or Containership customers, who demand significantly higher levels of systems integration assistance and service delivery. Consequently, competitors can gain advantage over Inmarsat in these markets through differentiation in value-added services supplemented by training of sales forces in consultative sales technique.

Demystifying Global Xpress

Our extensive research documented in the February 2011 issue of *SatMagazine* (*The Coming Battle for the Maritime Market*) reveals significant potential weaknesses in reliability and “continuity of service” that could make Global Xpress unacceptable to high end users and could relegate its use to more non critical applications such as Crew Welfare (assuming, of course, that the price is low enough). This would support the continuing application of Ku- alone or a Ku-/Ka- hybrid service, but not Global Xpress alone.

Note that the increasing complexity of applications employed across ship to shore satellite will require links of high reliability not compatible with the Rain Fade characteristics of Ka-band. While it may be possible to maintain a link under tropical rain conditions, available bandwidth and bit rate would be severely diminished and variability of bit rate could, according to experts, play havoc with interactive applications. Ironically, while Inmarsat has previously been critical of Ku-VSAT, it now introduces a service even more susceptible to Rain Fade, Global Xpress. In addition, the lack of an in orbit spare satellite brings into question “continuity of service.”

Currently, there is no other global, over water Ka-service planned. Should an I5 satellite fail, users would essentially be out of service for an extended period and would have to rely on Fleet Broadband. With Ku-, this is not a problem, since it is usually possible to provide alternative coverage with another satellite.

Hence, competitors can exploit these Global Xpress weaknesses through customer education via advertising, issuance and distribution of White Papers, PR, conferences and seminars.

Marketing, Marketing, Marketing

Competitors need to coordinate marketing efforts around the common themes of product and service differentiation offering complete solutions and high-end service vs. low priced, commodity bandwidth and hardware. Additionally, they need to educate customers explaining that while Global Xpress may be a worthwhile addition to the overall product mix available to mariners, it is not the revolutionary solution Inmarsat claims it to be.

The Game Has Changed

Like many markets before it, the maritime VSAT market now faces the kind of competitive environment in which only the fittest, cleverest and most agile will survive. Whatever the outcome in the battle for maritime markets, the good old days when satellite gentlemen cooperate and share the bounties of a market now appear to be gone forever. ↩

About the Author:

Mr. Gottlieb is Managing Director of Gottlieb International Group Inc. (www.gottliebinternationalgroup.com) Established in 2001; his firm, located in Washington D.C., is a recognized global authority on the use of VSAT on Commercial Vessels. His firm provides Market research, Business Development and Sales Training in Maritime and Oil and Gas Satellite Communication Markets. Major clients have included Satellite Operators, Equipment Manufacturers, VSAT Vendors and Private Equity firms. His publications include *Buying VSAT*, *The First Independent Guide*, and numerous articles published in *SatMagazine* and *Digital Ship*.



Roundtable: European Satellite Markets



What better way to garner European Satellite Markets expertise than to talk directly with the executives whose companies are involved in numerous business efforts in this region of the world? A number of company leaders were generous enough to discuss their thoughts and plans for their firm's continued activity in the various market segments within the European SatCom environs. Due to the number of executives involved, we present — in alphabetical order — each participating company and their executive spokesperson answering the first question. We hope you find this roundtable to be interesting...

SatMagazine (SM)

Please explain to our readers what your Company's presence is within the European satellite communications and ancillary markets. What sort of experience does your Company possess within the European satellite markets?

Paul Weldon, Senior Vice President of Global Sales, ASC Signal

Our Company designs and manufactures satellite Earth station antennas from 3.5m to 9.4m apertures operating at the full commercial satellite frequency spectrum from C- to Ka-band, deployed within networks for broadcast and enterprise applications. The company has provided hubs through the major VSAT OEMs such as **Gilat**, and **iDirect**, broadcasters (**BBC**, **ITN**, and **RAI**), and for DVB applications. These antennas have also been deployed for other applications, such as government surveillance and monitoring systems. ASC Signal's experience extends beyond the antenna system itself to the complete Earth station configuration and integration, including RF amplifiers, up/down converters, redundancy threads, receive chain electronics and network management software.



Joerg Schmidt, Managing Director + CEO, DEV Systemtechnik

DEV Systemtechnik is a leading technology supplier for the transmission and distribution of radio frequency signals within satellite Earth stations and head ends. We develop and produce leading-edge products and systems for the entire signal transmission path, from antenna/LNB to receiver. Our products are deployed in major cable



and satellite installations throughout Europe — including companies such as **Astra**, **Eutelsat**, **GlobeCast**, the **European Broadcasting Union**, **ZDF**, **Kabel Deutschland**, **Canal Digital** **Kabel TV** and others — as they meet the highest demands on system availability, reliability, and controllability.

Jani Lyrintzis, Vice President + G.M., Wireless Solutions, EB

EB develops advanced technology product that enriches end user experiences. The company specializes in embedded software and hardware solutions for the automotive industry and wireless technologies. Our technical core competencies are in automotive-grade software, wireless technologies, solutions and system and software architecture. The **EB Wireless Business Segment** turns the next generation wireless technologies into state-of-the-art products, services and solutions that include wireless device development and infrastructure solutions; device offering and platform development, reference designs and technology demos and products; infrastructure offerings; Mobile WiMAX base station framework and RF variants; R&D service and test tools for measuring, modeling, and emulating the radio channel environments.



Dimitrios Papaharalabos, Head of Sales + Marketing, Europe Media Port

EMP (Europe Media Port) is a global service provider for distribution of Video, Internet and Data connectivity solutions to the Media, ISPs and Governmental markets, via the **Nemea** teleport located in Greece. EMP delivers the highest quality transmissions of data, IP, video and audio



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to broadcasters, teleports, satellite operators, enterprises, ISP providers, PTP data carriers and governments. From our strategic geographical position, EMP offers high quality access to all satellites in the **45 degrees West to 90 degrees East** range, covering Europe, the Middle East, Africa, the Americas and Asia. EMP is a leading global service provider in the new and fast growing Ka-band satellite high speed data market.

Catherine De Peuter, **Senior Program Manager, Futron**

Futron celebrated its 25th anniversary last month (August 2011). While the main focus of the company in the past quarter century has been on commercial and government space (in particular serving government agencies such as NASA), our *Space and Telecommunications* (S&T) division has concentrated its research on satellite communications. Futron has a large number of European clients who use our standardized research and strategic consulting services. Futron's expertise encompasses all aspects of satellite communications in that its clients are active in the launch industry, satellite operations, satellite manufacturing and ground segment sectors alike. We have also support a number of financial transactions ranging for private financial due diligence to export credit analysis.



Doron Elinav, V. P., Marketing and Business Development, **Gilat Satellite Networks**

Gilat Satellite Networks Ltd. (Nasdaq: GILT) is a leading provider of products, solutions and services for high performance satellite-based networks, and enables communications across the globe. Founded in 1987, we introduced our first VSAT product for the satellite communications industry and we have not stopped since then. Recently, we have expanded our capabilities with two acquisitions;

Raysat Antenna Systems and Wavestream.

Raysat Antenna Systems provides low-profile *Satellite-on-the-Move (SOTM)* antennas, mostly to government customers. They are the market leader in the low-profile antenna segment. **Wavestream** is a leading provider of **SSPA (Solid State Power Amplifier)** technology. Their products are used mostly by the U.S. **Department of Defense (DoD)** today and they are now expanding to International markets as well as to commercial customers.

Gilat has been active in Europe for many years, focused up until now mostly on the enterprise and government sectors. These include a range of users such as retail Point-of-Sale, lottery, SCADA and secure connectivity between sites. Our sales today are to service providers who provide technology and satellite capacity to the users. Some of these service providers also provide coverage to other regions, such as Africa and the Middle East. Recently, Gilat entered the consumer market in Europe, having been selected by **SES** to bring Ka-band terminals to its European service — **Astra2Connect**. Gilat's Ka-band platform will allow SES to deliver significantly faster Internet and Voice-over-IP services to private households and small businesses across Europe. SES is currently serving more than 80,000 ASTRA2Connect end users and operates the largest satellite-based broadband network in Europe.



Phillippe Manzano, Head of Satellite Product Management, Globecast

GlobeCast is a leading service provider for audiovisual content management and delivery. Broadcast via satellite is our core business, but our market presence today is much broader, to help broadcasters manage their content and deliver it seamlessly to viewers on five continents via satellite and fiber. In Europe, we offer services on the leading contribution, cable distribution, and *direct-to-home (DTH)* birds, with several offices and teleports in the region.



Roberto López, CEO, Hisdesat

Hisdesat has a long experience in the global satellite market as an operator of secure communications services, both in X- and Ka- military bands. Our system of government communications is based on two satellites covering two-thirds of the globe — a third satellite is in development in cooperation with the **Norwegian Ministry of Defense**, which will expand the coverage of our system and increase the supply of services. Additionally, we are developing other constellations of satellites in the field of Earth Observation and AIS to improve safety in maritime traffic.

On the communications side, we currently have two satellites in operation. The **Spain Sat** is positioned at **30 degrees West**, and offers coverage that includes virtually all the Americas, Africa, Europe, as well as reaching the Middle East. The second satellite, **Xtar-Eur**, is positioned at **29 degrees East**, and provides coverage from Brazil to Indonesia, including Europe, Africa, the Middle East and much of Asia. The third communications satellite in development is **Hisnorsat** and will be managed through a cooperation program between Hisdesat and the Norwegian Armed Forces. Hisnorsat will feature active transponders in X- and Ka- military bands.

In Earth Observation, we have a system comprised of two satellites which use spatial observation technologies, optical and radar (SAR) for civilian and military use. The radar satellite (**Paz**) will be in orbit in late 2012 and the optical satellite (**Ingenio**) will be launched in late 2014. Our maritime satellite information system (AIS) is managed through the Canadian society, **Exact Earth**, a joint venture between **COMDEV** and **Hisdesat**. There are currently three microsattellites in orbit and three more will be added by the close of 2011. The complete constellation, consisting of 10 microsattellites, will be completed in 2014 and will provide updated information of world maritime traffic every 60 minutes.



Mary Cotton, CEO, iDirect

Our experience within these markets is extensive, and increasingly so. As time has gone by, we've increased our footprint significantly. I think one of the main drivers for this is the level of trust we have with our customers. As we don't compete directly with our customers, we've positioned ourselves as trusted advisors. This has given us considerable credibility in the market, which has allowed us to penetrate across the region and become more focused on vertical markets.

We define the European market to include West Europe, East Europe, the Nordics, Russia and the CIS, which geographically is quite broad. Our metrics illustrate considerable success in Europe over the years: Just looking at Russia and the CIS alone, we have approximately 58 hubs deployed. In Europe, we are leading our competition.



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Bruno Dupas, President, Integral Systems Europe

Integral Systems Europe (ISE), a wholly-owned subsidiary of Integral Systems, has been committed to offering industry-leading, commercial-based ground segment products, solutions and services for more than 10 years. We currently operate out of two sites, our headquarters in Toulouse, France and Newcastle in the United Kingdom. From these two locations, we provide European-based satellite operators, satellite manufacturers, space agencies, broadcasters, service providers, government agencies and the military the following services;



— **Satellite Command & Control/Fleet Management** via our **EPOCH Integrated Product Suite (EPOCH IPS)** which has long dominated the market for satellite C2 and fleet management. As the leading commercial-based satellite C2 solution, it supports satellite designs from every major commercial geostationary satellite manufacturer.

— **Earth Station Integration Services (ESIS)**, which includes turnkey antenna/RF system design and integrated Earth stations for satellite service providers, broadcasters, and critical VSAT network operators.

— **Network Management** using our award-winning **COMPASS™ Network Management System (NMS)** which provides complete network management and monitoring control, as well as remote site management.

— **RF Mitigation**, where ISE combines industry-leading products from **Integral Systems' Monics®**, **SAT-DSA®** and **satID®** to offer the market's only integrated carrier monitoring, RF interference analysis, detection and geolocation system. Satellite operators are able to identify costly RF interference in a matter of seconds and locate the source within 10 kilometers.

— **Integrated Ground System Solutions**, comprised of turnkey, end-to-end ground system solution for all types of satellites, providing antenna and RF facilities, network equipment, **C2/TT&C** control system, Network Management and Monitoring, Carrier Monitoring and RF Interference Detection and Geolocation.

Svend Lykke Larsen, Managing Director, KVH Europe A/S

The European satellite markets are a major focus for KVH. We offer satellite communications systems and service, as well as satellite TV systems, for commercial and leisure mariners throughout Europe. This area is such a focus for KVH that we have subsidiaries in Denmark and Norway, along with distributors and dealers in virtually every country in Europe. KVH has been involved in the European maritime market for more than 20 years, and we continue to expand our product offerings and support network on a regular basis. Most recently, we acquired **Virtek Communications** (now **KVH Norway**) with the aim of fully integrating its



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powerful *CommBox™ Ship/Shore Network Manager* within our comprehensive SATCOM solution as well as establishing a new office in Norway.

Howard Hausman, President + CEO, MITEQ

MITEQ is a diversified microwave engineering company with a major presence in satellite Earth station equipment and microwave components for military and space applications. In satellite Earth stations, MITEQ designs and produces all of the microwave equipment from the output of the modem to the input of the antenna. We have equipment in more than a hundred countries on seven continents, with Europe being our largest market outside of the United States. As a qualified aerospace manufacturer, certified to the applicable ISO standards and AS9100 (a quality standard above ISO standards), we have produced space equipment for major satellite space systems including the European *Herschel Space Telescope*. These high quality, high reliability and state-of-the-art technology techniques are used in the manufacture of all of our equipment and make our satellite Earth station subsystems known for these attributes around the world.



Ahsun Murad, President + CEO, Optimal SATCOM

Optimal SATCOM is the only provider of COTS-based enterprise-level satellite capacity management systems in the world, catering to commercial satellite operators, satellite service providers, and MILSATCOM users. The European market is of great interest to us at this time. Commercial satellite operators are launching major new satellite systems such as O3b, and are using larger and more complex satellites. There is increasing use of the Ka-band with both partial Ka-band payloads and dedicated Ka-band satellites launched or being planned. Satellite service providers are increasingly moving towards bandwidth-efficient technologies such as carrier-in-carrier and adaptive/variable coding and modulation features of DVB-S2, and more importantly, structuring product offerings that take advantage of their unique features. On the MILSATCOM front, new military satellite systems are now in the planning stages. At the same time, corporations are pushing towards higher operational efficiency and greater profitability, and there is significant M&A activity amongst the satellite operators. All of these present potential new challenges in capacity management, and new opportunities for us. In addition, the European players are technology trendsetters for their corresponding market segments in other high-growth areas of the world, such as Africa, the Middle East, and Asia. Emerging players in those markets often look to their European counterparts for cues regarding best practices, and our maturity in the European market positions us well for pursuing opportunities elsewhere.



Gabriel Racah, Director of Marketing, ORBIT

ORBIT is a leading provider of mobile satellite communications systems for GEO satellites as well as tracking and telemetry solutions for LEO satellites. We entered the market of mobile satellite communication systems with TVRO and L-band SATCOM systems for aircraft, mainly business jets. Then, in 1999, we entered the maritime satellite communications market with a stabilized TVRO system which served the global TV reception needs of cruise liners. A year later we added stabilized VSAT solutions and, since then, we



have installed more than 3,500 maritime systems worldwide in virtually every maritime segment: Commercial shipping, cruise liners, oil & gas rigs and support vessels, and navy fleets. Our portfolio of TVRO and VSAT solutions, spanning from 80cm to 3.1m systems, are in use by over 20 navies worldwide, 10 of which are European. We also specialize in low profile SATCOM terminals for high speed trains. ORBIT's train system is being used by the TGV high speed train in France, through a joint project with Europe's largest satellite provider, **Eutelsat**. In addition, we provide TT&C (*Telemetry, Tracking and Command*) and remote sensing solutions for LEO satellites navigation and Earth observation customers. These systems range from three to 10 meters in dish size and support in L-, S-, and X-bands.

John Restivo, Vice President + G.M., Teledyne Paradise Datacom

Teledyne Paradise Datacom is unique among satellite communications equipment manufacturers in that it retains engineering, manufacturing, customer support and sales capabilities, in Europe, and the U.S. The business was founded in the U.K. in 1988 with the design and manufacture of highly functional, software based, SCPC modems which have been used in strategic defence, intelligence, GSM backhaul and broadcast systems across Europe. SSPA, LNA and VSAT BUC products were added to the modem portfolio in the late 90's and have been adopted widely by European system integrators, telcos, military and broadcasters throughout the EMEA region for vital communication and broadcast applications



Dr. Harald Stange, CEO + Managing Director, Romantis GmbH

ROMANTIS Group is an international alliance of specialists and companies professionally engaged in satellite communications. The group consists of our German Headquarters and subsidiaries in Canada and Russia, plus minority interest in different telecommunication companies worldwide. We specialize in reselling satellite capacities, systems integration, research and development, ground segment equipment manufacturing. To succeed in satellite business these days, a company or organization needs to offer cutting-edge technology but also to have a thorough understanding of the whole value chain of the industry. We at Romantis have both: Advanced technology for multimedia and data networking over satellite and many years of successful experience in reselling satellite bandwidth and operating satellite networks.



Peter Guggenbach, CEO, RUAG Space

RUAG Space is the largest European space product supplier to the industry. We offer a broad portfolio of subsystems and equipment for satellites and launchers that comprise of launcher structures and separation systems, satellite structures and mechanisms, digital electronics, satellite communications equipment and satellite instruments. For commercial telecom customers we offer a wide range of space-proven subsystems, for example, antennas, receivers and converters, structures and mechanisms, multi-layer insulation and mechanical ground support equipment. We offer these products to customers all over the world and, from our point of view as an equipment supplier, it does not make much sense to talk about a European commercial market. Telecom operators procure their satellites and equipment globally. European providers use U.S. built satellites and vice versa.



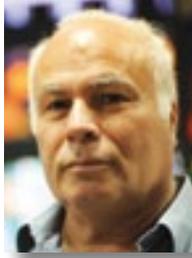
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David Hochner, CEO, SatLink

SatLink Communications delivers your content to every corner of the world. As a leading provider of global satellite transmission services, we emphasize global content distribution for television, radio and data channels over satellite, fiber and IP. In Europe, we supply an array of advanced solutions to broadcasters, payTV operators, satellite operators, ISP providers, large communication enterprises and maritime as well as to other teleports. Our strategic location, global satellite and fiber network make us the perfect gateway to Europe.

SatLink provides *Direct to Home (DTH)* distribution over *Hot Bird* and *Eurobird 9* satellites to international broadcasters for European viewers. Moreover, broadcasters wishing to reach European payTV and IPTV operators, or those looking to deliver them a chunk of TV channels downlinked and aggregated from all over the world, SatLink offers reliable and cost effective fiber / satellite contribution, or via our iStream delivery solutions. For Occasional Use delivery of sports, news, and special events, a substantial part of the East to West (and vice versa) traffic is delivered via our teleport.

Our expertise is in high quality service as well as in the HD, 3D, and SD solutions our team of experts provides. As a believer in advanced technologies, I am always pushing our team to be creative and smart in supplying solutions based on these technologies. We are already transmitting 3D sports around the world and are moving forward with more HD channels and *Over The Top (OTT)* solutions. We also have a growing global data and government communications division handling requests and operations for a slew of agencies, organizations and corporate clients. These clients receive reliability, versatility and creativity in keeping their international communications traffic sound.



John Suranyi, President + CEO, Sencore

Sencore has a strong following in the European satellite community as a leading provider of high-quality signal transmission solutions. Our company draws on more than 60 years of investment and success in engineering design and technology to offer a complete line of products to the European satellite community that supports reliable, consistent, and high-quality satellite signal delivery and monitoring. Our world-class portfolio includes video delivery products, system monitoring and analysis solutions, and test and measurement equipment, all designed to support system interoperability and backed by best-in-class customer support.



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Throughout Europe and the Middle East, our solutions are represented by leading distributors including AsyaSat, CVE, Satlan, Consult Services, Bluebird TV, and Olvitech.

Romain Bausch, President + CEO, SES

SES is the preeminent satellite operator in the world and the clear DTH leader in Europe. We pioneered European DTH in 1989 when the company was founded to provide satellite-delivered television to homes across Europe without access to a wide choice of programming. At the time, the vast majority of households did not have access to cable networks, so most were limited to very small terrestrial offerings of three to five channels. Satellite just came naturally.

We launched **SES ASTRA** as a DTH satellite system to provide new programming and more channel choices to households throughout Europe. In the end, SES really opened the door to a whole new world of content and connectivity for the region. We continue to sign on new DTH subscribers and deliver new services, such as HD and 3D TV. The number of ASTRA DTH households, together with the cable platforms we are serving, now stands at more than 135 million TV viewers today.

By the way, **IBC** is always an important show for SES. More so this year than ever before, as SES brings **SES ASTRA** and **SES WORLD SKIES** together under the new SES brand that's become synonymous with innovation and financial stability. The launch of the **One SES** is aimed at further elevating the satellite operator's customer-centric approach — a strategy that has enabled SES to serve the European market very well over the years.

Steve Beaumont, Senior Vice President, Skyware Global

Skyware Global has a global presence in the satellite communications arena and, as such, is proud to be a major force in every region throughout the world — but in particular, Europe. With a manufacturing plant based in the U.K. and a strong network of distributors representing Skyware Global in all major markets, our unrivalled ability to supply the needs of the European market 'locally' makes us the natural choice when it comes to satellite systems.

Of course, presence is not the only requirement needed to be a competitive force in Europe or elsewhere. Skyware Global firmly believes in investing in its product range and is arguably the only supplier in this field with extensive research and development capability in both the antenna and the electronics sectors. Our research centres located in Scotland, Stockport, and Krefeld, Germany, are all outstanding facilities and home to some of the best engineers in the business. We have also been pleased to recently announce the opening of a new engineering facility in Washington DC to augment our existing facilities. This unrivalled talent pool is charged with developing both customer specific solutions as well as the more generic products needed to service this market place.

Gil Ilany, Vice President, Marketing, Spacecom

Spacecom is the multi-regional satellite operator of the **AMOS** satellite fleet currently consisting of the **AMOS-2** and **AMOS-3** satellites co-located at the **4 degrees West** orbital location. Together, these satellites create a "Hot-Spot" in the Middle East and in Central-Eastern Europe where their transmissions are received by most cable head-ends. The AMOS satellites offer a wide range of



communications and broadcast services throughout Europe and the Middle East, with cross-Atlantic connectivity to the U.S. East Coast. Among Spacecom's customers are DTH platforms such as T-Home SatTV in Hungary, Magio TV in Slovakia, and Yes in Israel.

With one of the strongest satellite presences in Central and Eastern Europe, AMOS works with leaders like HBO for its European cable distribution, Ukraine's Inter Media Group, and MTV channels, among others.

Arnold Friedman, Senior Vice President, Marketing & Sales, SS/L

Space Systems/Loral is the world's leading manufacturer of GEO commercial satellites. We design and build satellites for all of the major operators and in the last few years, about one third of our satellite contract awards have been with European companies. We have a long history of involvement with European customers. Most recently, we announced that we are building a satellite for **Telenor Satellite Broadcasting** in Norway. The satellite, **THOR 7**, will provide maritime broadband services for ships in the North Sea, Norwegian Sea, Red Sea, Baltic Sea, the Persian Gulf, and the Mediterranean. It will also provide broadcast capacity in Central and Eastern Europe.



Dr. Matt Perkins, CEO, Surrey Satellite Technology, Ltd.

SSTL perceives a market need for cost-effective small geostationary communication satellites with less than 4.5kW power. To address this market, SSTL is developing a *Geostationary Minisatellite Platform (GMP-T)*. The GMP-T development is being progressed in partnership with the **European Space Agency** through their **ARTES** program for telecommunications. The development builds on SSTL's heritage in the low and medium Earth orbits and is now quite advanced. SSTL is ready to take the GMP-T product to market over the coming year. Through our work on the **Galileo** program — where we primed the first satellite **GIOVE-A** and are currently designing the payload for the first 14 EC-funded operational satellites — we have developed the expertise to design and build communication satellite payloads.



Mark Dankberg, Chairman + CEO, ViaSat

ViaSat has been serving the European marketplace since the mid '90s with many products and services for both government and commercial customers and partners. We cover the whole European continent directly from offices located in the U.K., Italy, Switzerland and the Czech Republic and through representatives, distributors, and partnerships in most European countries. This physical presence in the old continent has been the key to our success, both in our satellite and in our non-satellite based business. We started our satellite business in Europe about 15 years ago, when we introduced the Skylinx product for a first responder telephone and data network in Spain, and the first LinkWay full-meshed network in Italy for monitoring and control of highway traffic. In 2001 we introduced the LinkStar star-based topology VSAT system which included terminals that sold for a disruptive price of less than US \$1,000 for the first time in the history of VSAT networks. LinkStar has been extremely successful in Europe, and to-date we count more than 25 operational networks



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and an installed terminal base of more than 20,000 user terminals. Our experience in Europe also includes mobility networks. These are satellite-based turn-key services for commercial and government maritime, aviation, and ground mobile applications. We also provide high-tech antennas for remote sensing, teleport, and mobile applications. And now we are entering the largest and most exciting phase of European growth, with the launch of Eutelsat KA-SAT. We are proud to be their ground networking partner for many years now.

Jesse van Straaten, COO, Vizada

Vizada is the leading independent provider of global satellite-based mobility services. Within Europe, we are largest independent provider of satellite communications. Through our indirect network of over 400 service providers, we are able to commercialize our portfolio and are present in all segments that use commercial mobile satellite communications. Our more than 200,000 end users include merchant shipping vessels, emergency response organizations, government and military units, global media companies, telecoms and Internet service providers, and business, military and civil aviation.

Steffano Vittor, CEO, Vizada Networks

Our Company provides 'last mile' connectivity to major European organizations when expanding their WAN architecture to include their emerging markets office locations. Services are provided as



a seamless extension to their MPLS backbone and integrated with their terrestrial network supplier. The services comprise a wide variety of VAS and differentiated SLA options. From being in the European satellite industry for nearly 40 years, we have gained significant experience in the developing needs for business critical communication within our customer base. Accordingly we secure our customers ability to leverage on their ITC strategies and investments at all their locations.

Kai Koppenburg, Director of Sales + Marketing, WORK Microwave

WORK Microwave, established in 1986, has 25 years of experience in RF design and manufacturing, and is an expert in microwave and digital signal processing know-how. Headquartered in Holzkirchen, (near Munich), Germany, there are four product divisions producing advanced products in the areas of SATCOM Technologies, Navigation Simulators, Sensors & Measurement and Defence Electronics. The Company works closely with system integrators, broadcasters, telecom operators, satellite operators, teleports, DSNG operators, developers of navigation systems and applications, as well as with government organizations and defence technologies companies to provide analog and digital RF-solutions. **WORK Microwave** also serves industrial production lines with high-precision microwave sensors for measurement applications, and has a long-standing reputation for product reliability and quality. As a result many high-profile customers in these industry sectors have chosen them as their trusted



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partner including; SES Astra, Eutelsat, ND SATCOM, Vertex Antennentechnik GmbH, EADS, Telenor, Telefonica, Thales, Rheinmetall Defence, and Siemens.

SM

Why did your Company enter this market? How long has your Company been involved in this segment?

Dr. Matt Perkins, SSTL

SSTL operates in a variety of market segments but finds that its approach is most relevant for commercial activities where the customer is highly focused on value for money. Consequently, SSTL is determined to carve out a significant role in satellite communications as this is the most commercial area of space activities.

Romain Bausch, President + CEO, SES

Simply the fact that close to 80 percent of Europeans didn't have access to multichannel TV... Cable was far less developed at the time than in the U.S., for example. Satellite provided a tremendous alternative to cable. Satellite systems were much easier and faster to roll out. We didn't have to dig up roads. We provided a compelling channel lineup in the respective European languages and made it simple for consumers to install satellite dishes for direct-to-home (DTH) reception of new programming choices.

We also introduced the concept of co-positioning of spacecraft, which allowed us to provide satellite backup and ultimately a much larger channel count. Every time we added a new satellite in the 19.2 degrees East orbital slot, for example, we increased the number of channels we could deliver. Our first satellite in 1989 distributed 16 analog channels. We doubled the channel capacity with each new satellite we parked in the slot. Today, with the advent of digital transmissions, we deliver more than 1,300 channels over different orbital positions. SES introduced digital satellite transmissions over Europe in 1996, which dramatically increased the number of channels we could deliver to subscribers. Today, as part of our global SES strategy, we're leveraging our DTH and video distribution leadership to launch new DTH neighborhoods in emerging markets around the world. We're co-locating satellites in orbital slots serving Asia, for example.

Dimitrios Papaharalabos, Europe Media Port

EMP was established in 2007, with a registered office in Cyprus. Since then, and with a long term partnership with OTE S.A., the Hellenic Telecommunications Organization, we are working together to develop EMP as a leading service provider of satellite uplink services globally. EMP's strategy, professional attitude and unique partnerships with other teleports and satellite operators were the main reasons of success for the past two years (2009 and 2010) to rank as the world's fastest growing teleport according to the World Teleport Association (WTA).

Gil Ilany, Spacecom

In creating Spacecom, management conducted market research, and on the basis of insights gained, targeted the fast growing Central-Eastern Europe markets. Since 1994, the company has been active in the satellite services landscape. In 2003, Spacecom launched the AMOS-2 satellite to the 4 degrees W orbital position co-located with AMOS-1. In 2008, we launched AMOS-3 to the same position expanding our service portfolio with additional capacity and enlarged coverage areas. The CEE markets are still providing great opportunities for the company and we are planning a new satellite, AMOS 6 for launch in 2014 to enhance our services to the region.

Dr. Harald Stange, Romantis

Our company and our key team have a rich experience and long-track history in satellite communications industry, which began in the early 90s. In 2005 the company adopted a new strategy, which significantly expanded our vertical integration, by launching our own R&D and production; we also began an active expansion outside Europe. We're creating a business with new and up-to-date paradigm — vertically integrated satellite company.

Jesse van Straaten, Vizada

Vizada was formed in 2007 as a merger of Telenor Satellite Services and France Telecom Satellite Communications, two of the major players in the European and world satellite communications field. Today we are the largest independent satellite communications provider. More than three decades of service in this market has given us extensive experience and allowed us to build long term relationships with our indirect network of providers. Vizada was very recently acquired by EADS's **Astrium Services**, a global division and leader in commercial and secure SATCOM services. We are pleased to become a partner of a global leader in the aerospace industry, and positive that this change will help us to continuously pursue our global satellite-based mobility services strategy.

Peter Guggenbach, RUAG Space

RUAG Space has been a major player in European space programs from their very beginnings in the 1960s. The company was involved in the development, manufacturing and testing of the very first European satellite ESRO-1 and has been an important partner in the Ariane launcher program since it was founded in the 1970s.

Karl Koppenburg, WORK Microwave

WORK Microwave was established in 1986 and the first products developed were signal sources, and the first- and second-generation frequency converters (analog RF solutions). These products, developed and marketed between the years of 1986 and 2001, were representative of our core competency: The ability to build highly stable and clean RF sources. It was also during this period of time that the RF know-how became the basis for successfully approaching the microwave sensor market.

After 2001, WORK Microwave responded to market demands by tracing the digital pathway and by broadening the company's product offerings to include digital RF solutions by developing a comprehensive range of video and network devices. The company initially started with the introduction of modulators and gradually added demodulators and modems to its offerings. Also, post-2001, the defence electronics market became a further stronghold for the company with the design and production of fast-hopping synthesizers for military radar applications. Between 2001 and 2006 the third- and fourth-generation frequency converters were also developed. In 2006, as a spinoff from the digital efforts, the expertise gained through the development of modulators was used to design the Multi-GNSS Laboratory RF Navigation Constellation Simulator (NCS). Most recently, in 2010, the range of IP-based SATCOM equipment was introduced.

Howard Hausman, MITEQ

MITEQ has been in the satellite communications market since the beginning of satellite communications. We worked with Intelsat and NASA when the industry was in its infancy developing the hardware and techniques that are the basis for current industry techniques. Europe is a significant market sector for us, with satellite systems that are innovative and demanding — it's the kind of market that uses our highly reliable, high technology equipment.

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Gabriel Racah, ORBIT

ORBIT has been an active player in the supply of advanced tracking antennas to commercial and defense establishments for decades, with thousands of systems currently deployed on vessels and aircraft. In recent years, we decided to focus our efforts on several satellite applications, mainly in the areas of mobile satellite communications for the maritime industry and tracking antennas for LEO satellites.

Joerg Schmidt, DEV Systemtechnik

DEV has been a player in this market since 1995. As I saw the satellite communication market growing, I decided to become part of it and pursued the aim to design, develop, and manufacture innovative high performance products that meet customer challenges, and also contribute the “Made in Germany” quality.

Jesse van Straaten, Vizada

Vizada was formed in 2007 as a merger of Telenor Satellite Services and France Telecom Satellite Communications, two of the major players in the European and world satellite communications field. Today we are the largest independent satellite communications provider. More than three decades of service in this market has given us extensive experience and allowed us to build long term relationships with our indirect network of providers.

Roberto López, Hisdesat

Hisdesat was born in 2001 as an operator of satellite government services to act, primarily, in the areas of defense, security, intelligence and foreign affairs. Since 2005, we have provided secure satellite communications services to government agencies of different countries and we are currently developing new constellations of satellites to observe the Earth and maritime traffic information by satellite (AIS). Hisdesat is the world’s first provider of satellite communications services in Ka- and X- military bands, but also serves civilian needs. We are offering those aforementioned last generation services and dual character in a very specialized market that has great development potential especially in supplying governments with these services.

Doron Elinav, Gilat

We entered the European market early in our history. Our European strategy is to work closely with service providers, who cater to consumers, SMEs, corporate and government agencies. For organizations requiring either very reliable communications or complementing terrestrial networks, Gilat’s VSAT solutions are the prime candidates.

Catherine De Peuter, Futron

Space is global — and Europeans are recognized leaders in the aerospace industry. In order to fully support this global community, Futron worked with its European clients for over a decade. While the company does not have a European office, Futron has been heavily involved in the European satellite communications markets since 2000, and have subsequently expanded our original customer segment to include the manufacturing, launch and financial community. Our European clients continue to value our services, and we look forward to continuously support their activities.

Ahsun Murad, Optimal SATCOM

We first got involved with the European market back in 1998 with the spin-off of New Skies Satellites (now part of SES World Skies) from Intelsat. At that time, we were part of COMSAT Laboratories, and we worked with Intelsat and New Skies to transition all the data for the six satellites being transitioned to New Skies, and set up their own enterprise capacity management systems and databases at The Hague in The Netherlands. We have since expanded to provide enterprise capacity management

systems to other European satellite operators, the larger satellite service providers, and key MILSATCOM programs.

Steffano Vittor, Vizada Networks

Vizada Networks has, through its Telenor heritage, roots back to the early seventies where commercial VSAT solutions were deployed to the oil installations in the North Sea. Later on, our company was among the major service providers during the early stages of rebuilding the infrastructure for the emerging market countries in Central and Eastern Europe; operating hundreds of VSAT stations for Government organizations and private companies.

Svend Lykke Larsen, KVH

We entered the SATCOM market in the early 1990s when we began manufacturing satellite antennas for American Mobile Satellite Corporation (AMSC) and other SATCOM pioneers. Over the next few years, KVH began designing its own satellite antennas and also added Inmarsat service to our offerings. The results of these early endeavors are clearly visible in today’s highly successful line of TracPhone® and TracVision® systems. We expanded our reach significantly with the introduction of the TracPhone V7 and our exclusive mini-VSAT Broadband satellite communications network in 2007. The mini-VSAT Broadband product line continues to grow, most recently with the additions of the ultra-compact TracPhone V3 and the CommBox Ship/Shore Network Manager in 2011.

Phillippe Manzano, Globecast

Our roots are in Europe, being a France Telecom-Orange company. As such, the European satellite video market is GlobeCast’s traditional market, in which we have been a leader for more than a decade.

Bruno Dupas, Integral Systems Europe

Originally, we entered the market to provide European satellite operators our EPOCH IPS Fleet Management solution. European operators like SES, Hellas Sat, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) and others currently rely on EPOCH IPS to manage their diverse fleet of satellites. As the demand for bandwidth has increased throughout the region, we have expanded our offerings to ensure that our customers meet ever-increasing Quality of Service (QoS) contracts and Service Level Agreements (SLA). Our complete ground segment solutions lower costs, increase efficiencies, provide higher-levels of control and enhance security.

Steve Beaumont, Skyware Global

Skyware Global was formed in 2009 through the amalgamation of several long-term companies from within the satellite communications field. In particular, Raven in the UK which has a long heritage and strong in-market reputation. The markets throughout Europe, whilst all different, share many similar solution needs. Europe therefore represents a significant customer base with a multitude of consumer needs from DTH (Direct To Home) for TV and Broadband through to enterprise needs for in-market lottery providers, banks, garages and many other sectors using VSAT solutions.

Building on one of our core competencies Skyware Global is able to offer cost effective solutions to every market demand harnessing our high volume manufacturing capability to deliver competitive solutions across the satellite spectrum.

Mary Cotton, iDirect

iDirect initially expanded into Europe in a technical capacity in 2002-03. It effectively started with just one person, soon became a few people, and eventually formed into a regional headquarters office in EMEA in 2003-04. In 2006-07, we opened an office in Dubai to cover the Middle East and Africa region.

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We experienced very rapid growth in the European market due to the popularity of our Intelligent Platform and the innovative opportunity it brought to service providers and operators. iDirect pioneered an IP-based system that mirrored the quality and reliability of terrestrial communications. This changed the very nature of what satellite was capable of achieving and gave service providers a significant new market to capture, which was quite healthy in Europe.

We delivered our solution through a hub-and-line card system that made it affordable for operators to enter the market and grow in a measured way. This was the cornerstone of our Intelligent Platform, which also includes our versatile series of remotes and our fully-integrated operating and management software. Everything works in parallel to form a single, unified IP-based satellite communications architecture, giving service providers the functionality they need to efficiently establish a reliable, shared satellite service able to deploy the widest range of applications.

We quickly built a solid partner base and local sales and support presence throughout the region. In February 2010, we moved to our new office in Eton, UK. The new location replaced our Slough, UK office and offers better facilities for training, sales and engineering. The Eton office hosts a variety of support-related courses designed to offer service providers with the highest possible return from their investment in iDirect hardware and software. Currently, we run our European operations out of this office, but maintain customer service personnel.

Furthermore, through the acquisition of Parallel at the end of 2009, we have a software engineering office in Milton Keynes for our SatManage product that is an extension of our Engineering and development group in Herndon, Virginia.

David Hochner, SatLink

SatLink is based at the eastern end of the Mediterranean Basin, in perfect position to be the gateway to and from Europe for all your communications needs. The European market is strategic for us and has been so from day one. With a ground station literally at the connection of three continents — Europe, Asia and Africa, we parlay the advantages of our location into an excellent business solution for the communications industry wishing to reach Europe, Asia, Africa or the Middle East. With our global satellite and fiber network and agreements with leading satellite operators we are able to bring your content anywhere and at anytime you request. SatLink has close to 20 years of experience meeting the needs of the European and international satellite markets.

Paul Weldon, ASC Signal

Originally as Andrew Corporation and since 2008 as ASC Signal, we have been in the Earth station antenna market for more than 40 years. The company entered the market because we saw our developing technology capability fitting well in the satellite sector. We predicted that this would become a significant and dynamic market, and wanted to be in from the start. As the satellite communications

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market developed, Andrew Corporation was able to grow its activities within the sector and quickly became a “household name” for customers looking for reliable ground equipment from a proven manufacturer. The company’s key advantage has been technical know-how, which has enabled us to adapt and develop our designs (feeds, mounts, control systems) as the market has changed and different frequency bands have come on stream.

Arnold Friedman, SS/L

We have been building satellites for more than 50 years and some of our earliest projects in the 1970s were for the United Kingdom’s Ministry of Defence.

John Restivo, Teledyne Paradise Datacom

More than 60 percent of U.K. exports are into the EU, so as the company grew in the early 90’s, it was a natural progression to address the markets of the EU, that were open and addressable by a U.K. business. Teledyne Paradise Datacom has been involved in this segment for more than 15 years

Mark Dankberg, ViaSat

We identified a good potential for business in Europe due to the deregulation of VSAT networks and services in the mid 90s. Many private teleports started their operations and ViaSat technology was many times their choice in a marketplace that became extremely competitive. From a government sector perspective, the many European NATO nations are a natural geographical extension of our U.S.-based government technology business. But one of the phenomena we have noted is that the opportunities for satellite broadband services tend to be greatest in those markets that have the highest penetration of terrestrial broadband services. We believe that Europe’s high adoption of broadband services in general creates a favorable environment for growth in that market.

SM

Are you focused on any particular segments, due to their growth potential? (i.e., launch, manufacturing, teleport, security, MILSATCOM, imagery, satellite broadcast, and others.) What market segments in Europe do you believe are the most promising for your Company?

Dimitrios Papaharalabos, Europe Media Port

EMP is focused on providing global distribution of Video, Internet & Data connectivity solutions to the Media, ISP & Governmental markets. We are active in supporting the business operations of our clients — whether in the telecommunications, secure communications, broadcasting or enterprise markets. EMP’s value proposition is based upon competitive pricing, high service flexibility and passion of our people to deliver solutions to the most demanding markets. We are excited by the recent development of Ka-band high speed data communications market and its vast growth potential in the years to come. In addition, we are already providing iDirect VNO services from Nemea teleport for large enterprises and satellite operators.

Bruno Dupas, Integral Systems Europe

As mentioned previously, we work with European-based satellite operators, satellite manufacturers, space agencies, broadcasters, service providers, government agencies and the military. While all of our offerings provide significant value and we project increases across the board, the area we are seeing the most interest in is RF mitigation.

The growing problem of satellite and signal interference will continue to plague the industry on a global scale. The number of satellites and ground transmitters are growing rapidly increasing the number of interference events and the effects of interference. Euroconsult recently reported that roughly 1,185

satellites will be built and launched from 2009 to 2018, a roughly 50 percent increase from the previous decade. Another leading industry group estimates that satellite operators with small-to-large fleets of geostationary satellites positioned in the Atlantic, Pacific and Indian Ocean regions incur costs from hundreds of thousands to millions of dollars per year due to satellite interference. These losses are two-fold. First is the revenue impact from the actual outage time. Second, is the man-hour costs spent locating the source of the interference and mitigating the issue.

To combat interference issues, vendors are providing products that automatically detect interference and geolocate the source. Integral Systems has been at the forefront of developing and offering innovative signal interference detection and Geolocation products. In fact, our Monics RF Signal Monitoring and satID Signal Geolocation Systems are the most widely used products in the industry, providing accurate detection within minutes and the ability to locate the source of interference within a few kilometers.

Mark Dankberg, ViaSat

We focus on markets with large growth potential and with opportunities to create meaningful competitive advantage through technology innovation. Satellite broadband is probably the single largest example of such a market. In Europe, we believe Eutelsat KA-SAT coupled with our SurfBeam® 2 creates a strong foundation for consumer, enterprise, defense, and mobility applications. We believe mobility is a growing market that we will continue to support both directly and through partners such as Eutelsat, and with KVH Industries for maritime. ViaSat is recognized as a leader in the MILSATCOM marketplace in the U.S., so we are leveraging that extensive experience in Europe within specific opportunities, both as an equipment supplier and as a service provider — also with emphasis on broadband and mobility.

Ahsun Murad, Optimal SATCOM

Satellite capacity management for enterprise communications networks and off-shore connectivity services (and their MILSATCOM counterparts) are the most complex to plan, deploy, and operate efficiently, and they continue to be the most important market for us. In addition, our broadcast and wide-area planning capabilities, along with the unique ability to analyze complex adjacent-satellite interference scenarios are directly applicable to the design and operation of DTH satellite TV and other such services.

Arnold Friedman, SS/L

We are very excited about the broadband market and believe there will be significant demand for broadband by satellite expansion in Europe. SS/L has built two of the world’s highest capacity satellites for broadband, which will provide more than 100 GB/sec capacity and we are also building many multi-mission satellites that include broadband payloads. THOR 7 is one example of that and we have put broadband payloads on satellites for Hispasat in Spain and for SES in Luxembourg among others.

Svend Lykke Larsen, KVH

We are seeing great success with the TracPhone V7 in the commercial maritime market in Europe and around the world, and we are very excited about the potential for leisure boaters and yacht owners to adopt the compact TracPhone V3. At just 14.5” in diameter, it is the world’s smallest maritime VSAT antenna, and will fit on just about any vessel. Both systems are successful because of KVH’s proven manufacturing process — our antennas are tested to military specifications, ensuring that they are nearly bulletproof — and because of the reliability, affordability, and global reach of our mini-VSAT Broadband network. No other solution offers best-of-breed hardware and

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service from the same provider, and busy mariners tell us time and again that having just one point of contact for their satellite communications is an important benefit. They've all experienced challenges with other solutions where they had different providers for the antenna, the modem, the airtime service, etc., but KVH has done away with that problem completely. When you combine all that with a variety of airtime packages and rates one-tenth the cost of Inmarsat, the choice becomes easy.

Jani Lyrintzis, EB

Worldwide, satellite usage has become more accessible and mainstream within enterprise and consumer markets. The availability of mobile satellite services (MSS) coupled with new devices, integrated with both satellite and cellular capabilities, at a reasonable price — have led to a paradigm shift within these two markets — giving rise to a new form of mobile communications options. But how does the MSS opportunity compare globally, especially when spectrum layouts in Europe are denser than those in North America? Is there an opportunity for MSS in Europe, where the infamous 'cellular dead zone' is not as prevalent, as compared to other regions? The answer is yes, but the value proposition is different. The MSS opportunity in Europe is less for about providing emergency back-up capabilities and more for business and entertainment purposes.

Specific to the enterprise, newer MSS technologies including a connectivity module, a device EB, Elektrobit, defines as a mobile satellite-terrestrial connectivity concept, allows satellite and traditional cellular coverage to converge to spawn increased communication for machine-to-machine (M2M) operations. Examples include; allowing more accurate weather data checks, remote monitoring, medical monitoring, home security, safety and several other capabilities. With the increased reliability of satellite communication, M2M achieved via MSS can, and should, work more closely together as seen in the following examples:

Asset Tracking — The majority of European businesses rely on satellites for asset tracking through M2M communications and for tracking across large bodies of water. By attaching an MSS-based connectivity module onto boats, trains, cars and other mobile vehicles,

corporations can more accurately track location, timing and shipments and have immediate access to this information via their mobile phones, creating a confluence of satellite and terrestrial mobile communications.

Maritime Applications — Businesses that primarily operate in maritime environments, whether fishing companies, trading or otherwise, have increased productivity and decreased costs thanks to reliable satellite communication in the field, yet they lack the basic cellular communications options such as Internet access, phone reception and texting capabilities. With integrated MSS capabilities, off-shore men/women can gain immediate access to effectively communicate via mobile-satellite technologies, regardless of maritime location.

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Military — The European military is a major user of satellite services as it offers Continuity of Operations and Continuity of Government (COOP/COG) solutions to keep deployed troops and military personnel connected and reachable. However if ground based infrastructures fail, the value presented by the redundant connectivity and on-demand communications services of MSS technologies, especially during peak-usage, ensures information assurance, situational awareness and back-up communications through the highly resilient, uninterrupted, and interoperable communications of new MSS technologies.

Opportunities outside enterprise markets also exist. In fact, from a business-to-consumer viewpoint, the desire to deploy MSS technologies to keep consumers connected and accessible is tremendous. For example:

Entertainment — One of the most significant growth areas within the European MSS market exists in the vehicular-entertainment space. European auto manufacturers are seeking inclusion of MSS-based radio and television broadcasts within backseats of future vehicles, and are coupling this technology with other advanced broadcast services. Incorporating MSS and broadcast services into European vehicles, provides the ubiquitous broadband connectivity to offer exciting new front- and rear-seat infotainment applications and services.

Gabriel Racah, ORBIT

Within the satellite and space industry ORBIT focuses on ground, maritime and airborne tracking terminals for satellite communications and telemetry. In recent years the shipping industry has begun to adopt broadband satellite communications for operational needs as well as crew welfare. This is creating a strong demand for robust SATCOM solutions which we believe will continue to accelerate in the coming years. Another important satellite market experiencing growth is Earth observation, with more and more companies tapping directly into LEO satellites' data streams for commercial applications. When we decided to enter the maritime satellite communications domain, Europe was the natural choice as our initial target market as it is the home of some of the largest and most advanced shipping companies in the world. European companies were also among the first to understand the advantages of broadband at sea and adopt VSAT solutions.

John Suranyi, Sencore

Sencore is focused on developing and marketing a range of innovative products for the delivery of compressed video services via satellite for contribution, mobile news gathering, and distribution applications. Our target markets cover the gamut of the professional video broadcast industry worldwide and include the direct broadcast satellite, terrestrial broadcast, IPTV, and cable TV segments.

Dr. Harald Stange, Romantis

We are strong in development and production of satellite communications equipment. Romantis is the only European company that may help its customers with complete solution comprising appropriate packages for ground and space segments including satellite capacity for "occasional use" via our automated booking system and able to resolve telecommunication tasks of any complexity. We have specialized solutions for different categories of our customers: Broadcasting, News Gathering, Managed Networks, Broadband access, Cellular Backhaul, etc.

Gil Ilany, Spacecom

An industry leader in high quality broadcasting and communications services in Europe and the Middle East, Spacecom is focused on DTH (Direct-to-Home) platforms, TV broadcasters and programmers, corporate and government organizations, ISPs, network integrators, VSAT service providers and telephony operators. We believe that growth in these sectors remains strong both from a geographic and a services point of view. Our co-located satellites — AMOS-2 and AMOS-3 — provide us with an advantage in these markets and enable us to provide excellent and strong broadcast neighborhoods. We intend to continue pursuing broadcast and emerging broadband opportunities in the region and see the Ukraine as a strong growth market as well as the Balkan region. Spacecom is also planning to expand Western Europe with AMOS-6.

Catherine De Peuter, Futron

Futron views space broadly, starting through the manufacturing supply chain through satellites and launch, in-orbit operators, and back down to ground. While Europe has emerged as the location of choice for major operators, there are also promising developments led by pan-European institutions and specific national space agencies. We see increased and significant initiatives by individual European countries and agencies (outside of the long standing cooperation under the ESA or European Union umbrellas). France and Italy cooperate on several joint satellites programs focusing on military and consumer applications. In the U.K., Avanti communications plans to launch the continent's first all Ka-band satellites for consumer broadband in 2012, and country has set up a new space agency. As more Central and Eastern European countries ramp up space activity, e.g., Poland, Lithuania, et al, the size and scope of opportunities will continue to grow. We particularly see interest in satellite navigations applications tied to GMES and Galileo, supported in part by ESA and the European Satellite Navigation Competition. Applications is the driver of growth in the space industry, and Europe is positioned to capture many of these new innovations.

We see Europe particularly strong in terms of Human Capital. Based on our research on space competitiveness, Europe now comfortably leads the world in terms of space-oriented university programs, well ahead of the United States and other space-faring nations. This bodes well for the quality of the workforce in the next decades and for European space competitiveness as a whole.

Peter Guggenbach, RUAG Space

RUAG Space is active within the institutional and commercial space markets. We believe the commercial market will be the main driver of growth in the years to come. Thus, our strategy focuses on products and technologies that are attractive for commercial (telecom) customers. However, the institutional business will not lose any of its importance in the future. The programs of the ESA will remain the base of our business. Through our participation in those programs we acquire technologies, which we can commercialize on telecom and/or export markets outside Europe.

Kai Koppenburg, WORK Microwave

WORK Microwave is specifically interested in continuing to expand its business in the teleport market as well as in providing high-quality products for satellite broadcasters. The company has a solid background in serving the teleport, broadcasting, and MILSATCOM markets. We are also extremely customer focused and committed to learn from the feedback provided by the end-users of our technology within these markets. We continually invest in expanding the feature sets of our devices in line with the feedback received, and we have even introduced new product lines that we identified together with the end users. Our ultimate goal is to provide technology solutions that

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increase service quality and reduce operating costs. Keeping in mind our close relationship with our customers and our deep understanding of the market needs, we see teleport and satellite broadcast as the most promising markets for us.

Dr. Matt Perkins, SSTL

SSTL is primarily a satellite manufacturer. In the telecom sector SSTL's GMP-T is a generic platform capable of carrying a variety of payloads such as those targeted at direct broadcast TV, fixed communications links and broadband services. SSTL's other major business line is in Earth observation, particularly imaging systems at a variety of resolutions including very high resolution (pixel size of 1 metre or less). The technology that SSTL can deploy in this field is advancing at a phenomenal rate and allows the company to offer extremely high performance systems at costs that would have been absolutely impossible a few years ago.

Paul Weldon, ASC Signal

We are focused to varying degrees on all market segments that require satellite uplinks and downlinks. Our key focus in Europe is to support building out the emerging Ka-band systems, a market segment where we have an outstanding track record (mainly in other regions) based on our unique patented sub-reflector tracking (SRT) technology. Our SRT technology has been proven to give superior performance in challenging climatic conditions, for example, from the IP Star network in the humid heat and typhoon conditions of South East Asia, to the Wildblue network with its extremes of hot and cold temperature in continental North America. ASC Signal has worked closely with the world's four largest Ka-band providers to date to build them solid gateway hub Earth stations based on our Ka-band technology.

Howard Hausman, MITEQ

MITEQ is a microwave equipment manufacturer, we focus on Earth station ground equipment between (not including) the modem and the antenna. At first glance the user applications are transparent to the microwave subsystem, but in reality they have a profound effect. We support launch services with low phase noise converters used in Telemetry, Tracking and

Control Earth stations. We support military SATCOM systems with ruggedized equipment that operates over a wide temperature range, and other applications, such as multiple or very wideband carriers that required superior performance and very low Bit Error Rates (BER). Europe is a high technology market demanding this superior performance on their commercial and military applications.

Joerg Schmidt, DEV Systemtechnik

Our focus is to transmit and distribute RF signals. The requirements within the market segments you mention are very similar which means that we will participate in the growth of any of these market segments. We also believe that reasonably priced customized solutions will be required more and more. Customers

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increasingly want a “one-stop source” for RF transmission. I am convinced that the market for RF over fiber is a promising segment for DEV, as well.

Doron Elinav, Gilat

Gilat is focused on the SATCOM market, for the Commercial and, more recently, the Military and Defense markets. We believe that two of the most promising segments in the European market are Internet services to be provided by the new Ka- satellites and the MILSATCOM markets. Ka-band satellites, especially those with spot-beam technology, reuse the frequency band across the coverage area, and when combined with advanced VSAT transmission technology results in 10-100 times the capacity than available on traditional Ku-band satellites. This will enable satellite operators to provide more throughput to more customers, and at more competitive prices. The main target market is the consumer segment, where some analysts estimate that there are millions of under-served homes in Europe alone. This is probably the highest growing segment in the SATCOM market today. We believe that these advances will also drive market growth to the SATCOM industry in general for enterprise and government applications, as well.

For reference, according to the latest NSR market research, Broadband Satellite Service Revenues is forecast to rise from \$3.7 billion in 2010 to \$8.1 billion by 2020. Of this, Ka-band represents the biggest growth engine — from \$1.1 billion in 2010 to \$4.6 billion in 2020. Western Europe is expected to show the biggest growth of all regions, growing from \$100 million today to \$3 billion in 2020. The second promising market is the Defense sector, which includes military, homeland security and emergency response applications. We think that the need for broadband communications for forces, regardless of their location, will be a big opportunity for the satellite industry. This will be, in many cases, SOTM applications or quick deploy-solutions. We think that our solutions for SOTM, which include antenna, power amplifier and modem are very attractive for this segment.

Jesse van Straaten, Vizada

We are excited to be a driving force in the maritime satellite communications field. The maritime segment is expected to double in size over the next decade and we definitely make it a priority in our European development and sales. Within the maritime segment, we cater to a wide variety of specialized niches such as cruise, ferries, offshore and merchant vessels.

We are currently working with our partners to develop business in the aeronautical markets — for business, passenger and government, large growth is expected in terms of satellite communications usage over the next few years. For land-based communications, the government segment has proved to have great potential as well. We have established a specialized European sales force to tend to the specific requirements of these government, military and NGO segments.

Steve Beaumont, Skyware Global

Whether the need is for steel antenna, composite solutions, electronic products, unique or multi location solutions, Skyware has the answer. The significant level of investment made by Skyware in its engineering base has enabled us to develop products that are at the ‘cutting edge’ and yet are truly affordable. Quality, high volume production, exquisite customer service and outstanding products across a broad church enables Skyware Global to be a true partner to our extended customer family. The digital broadcast arena has and continues to explode across Europe and requires easy to install, robust and efficient products at cost effective prices — Skyware Global is well positioned and experienced to be able to answer this requirement.

Steffano Vittor, Vizada Networks

Vizada Networks focuses on all segments that have remote communication needs including military applications. We are today present in all major NATO theaters as well as in Africa. We also have strong business in the government, humanitarian and business sectors.

David Hochner, SatLink

Europe is a key region for SatLink. This includes Eastern Europe for which we are building dedicated solutions for its growing markets. We provide DTH and contribution solutions for international broadcasters to reach the continent. A prime example is our collaboration with Viacom in bringing their channels to Europe as well as taking them to Africa. Also, we are the sole satellite distributors of UK-based Thomson Reuters’ video feed from Europe to five continents.

SatLink also provides contribution for European networks and groups around the world such as the EBU and the club de brougue bouquet of European government channels to Asia. We are also proud of our technologies and advanced equipment enabling us to deliver HD, 3D and SD sports, news and special events from Europe to every corner of the globe and vice versa. Our strategically located infrastructure and more than 100 earth stations enable mass downlink and aggregation of channels for IPTV and PayTV operators. Finally, another segment in which we hold expertise are technical solutions, including TT&C and EIRP, for European satellite operators.

Mary Cotton, iDirect

The initial approach to the European market was very enterprise-oriented, which was consistent with the market trend for SATCOM at that time. That’s where we got our start in Europe with the likes of BT and France Telecom with our equipment being used by major global operators for traditional network-extension business as well as IP access. Since its inception, it has become significantly focused on industry verticals as our market has matured. This is happening primarily around a number of key verticals including maritime, defense and government, oil and gas, and more recently, utilities and SCADA. Around 50 percent of the global maritime market is driven out of Europe. Over time, we’ve developed our position in that market so that we have about 48 percent of that market share.

From a defense vertical perspective, of the 27 countries within the European market, 18 are using iDirect in some formal military capacity. Out of the 28 NATO members, 16 are similarly using iDirect in some capacity, be it for tactical COTM applications or morale and welfare.

We also have key players in the broadcast community and within IP-SNG (IP Satellite News Gathering) that use our technology for IP access and also for video contribution. These include SIS, Arqiva, and Mediaset in Italy.

The most promising segments would certainly include cellular, particularly the Russian and the CIS region. iDirect has a proven technological advantage in providing the most efficient transport architecture for the backhaul of voice and data traffic for cellular networks. In terms of emerging verticals, we’ve had some significant wins in the SCADA and utilities markets. These include the network digital switchover with Arqiva, Wales and West Utility (WWU), and Eon, a large utility in Sweden. Our products are aligning well with market demands and also with future products coming downstream like the Evolution X1.

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Romain Bausch, SES

SES has long enabled a broad range of markets — from enterprise and maritime to telecom and government services. But about 70 percent of our business is video centric. We have been a leader in video distribution for decades. Our video customers stick with us and sign long-term contracts with us. Since the introduction of digital transmissions, the ramp up of niche programming, and new, exciting developments in HD and 3D TV, offers tremendous opportunities for SES and for our customers. We're ahead of schedule, delivering 220 HD channels over Europe alone. And we anticipate virtually everything will be HD sooner than later. We already have regular 3D TV offerings in the UK, Spain, France and Germany.

We continue to innovate and advance in other segments, such as mobile connectivity in places like Africa, but there's an insatiable appetite out there for great video content and we will continue to lead the way to quenching the demand. Our three-year satellite launch plan is the most ambitious ever — with a dozen satellites headed for orbit between now and 2014.

Roberto López, Hisdesat

MILSATCOM and images segments have experienced significant growth in recent years and despite the unfavourable economic situation, the demand of this type of services will be maintained and enhanced in the future. In the field of AIS by satellite information, we are working on a new generation of satellites that will allow us to deliver for the first time, worldwide real-time information about the global maritime traffic situation, regardless of the ship's position. This new system will result in the development of new applications for a larger number of users that will improve the safety conditions and the environmental control of our seas. It is in this field with a new system like this where we see a significant demand.

Phillippe Manzano, Globecast

Our company is basically a service provider for broadcasters, so we are focused on this particular market segment and to offer the best-in-class services to our present and future broadcast customers. The market in Europe is a mature yet vibrant one — with growth areas in Eastern Europe especially, where many of our clients are looking to expand coverage.

SM

What have been among your most successful projects for this market? Why?

Romain Bausch, SES

One of SES' biggest achievements in Europe is the successful introduction and full transition to digital transmissions. We launched the first digital deliveries across France and the UK in 1996 with Canal Plus and BSkyB. In April of next year, analog transmissions will come to an end across Europe when Germany goes fully digital. It is certainly a major accomplishment that opens the door to big, exciting channel lineups and new developments in HD and 3D TV. Special interest and dedicated niche channels simply wouldn't be possible without digital. Think of all the multicultural programming that is so important in emerging markets, places like India where it's critical to offer content tailored to hundreds of different groups. One doesn't have to look any further than Eastern Europe to see the true power of digitization. We're convinced digital satellite television has contributed significantly toward opening these countries up to the global community.

Bruno Dupas, Integral Systems Europe

We have many successes we can point to. For Cyta, the dominant telecommunications operator in Cyprus, we installed our SAT-DSA Digital Spectrum Analyzer product with customized RF elements in the main Cyta teleport facility. The system monitors carrier signals from more than 30 antennas in C- and Ku-bands and provides interference detection and analysis capabilities. In cooperation with Mediacom Digital Evolution s.r.l., we provided a SAT-DSA Digital Spectrum Analyzer system for Elettronica Industriale (Mediaset Group) (E.I.), one of the largest network operators in Italy, at its main teleport in Milan, Italy. The system provides automated Digital Television (DTV) monitoring and problem reporting. Due to the systems' unique signal characterization capabilities, E.I. is able to better maintain traffic quality and identify RF interference that can disrupt broadcast quality. In the Ukraine, we work closely with their national spectrum regulator. Using our GeoMon solution to monitor and geolocate RF interference, the government is able to effectively police the satellite spectrum.

Phillippe Manzano, Globecast

A long term project for GlobeCast has been helping Orange launch their TV offer in France on every possible platform: first on DSL (IPTV) and Mobile, and then over satellite as a complement, with VOD and other innovative services included as well. This made Orange a real pioneer within the telco market segment over Europe. We've also been involved in DTT contribution over satellite in France and Italy, which we're really proud of. Currently, we're involved in end-to-end projects including satellite distribution but also terrestrial backhaul and additional services, such as play-out for major broadcasters. All of these have been key successes for the company; such turnkey offers are a great value for our customers.

Kai Koppenburg, WORK Microwave

WORK Microwave has experienced continued success as a preferred supplier to several global players. Our technology provides extensive time and cost benefits to our users, as apparent in the many installations by teleport operators. Our high-quality and reliable equipment reduce their need for investment and resource allocation on maintenance, cutting down overall operational costs.

Jesse van Straaten, Vizada

In the maritime segment, along with our service provider partner, Marlink, we had a very important opportunity to provide a comprehensive maritime broadband package for the major shipping company, AP Moller-Maersk. We were able to establish high speed Internet connections onboard to provide crew communications for personal and business uses.

Additionally in the maritime market, we have recently launched Vizada XChange, the new all-in-one platform that helps turn vessels into virtual mobile offices at sea. Though the service is still new, it has generated great interest and we expect it will be one of the major highlights of the year for us. One of our signature solutions is SkyFile® Mail, the most widely used messaging system in the maritime world. It is part of our in-house developed value added solutions portfolio and is a free messaging and compression tool for onboard users of email, fax and SMS messaging. We are also happy to see the success that our all-in-one prepaid communications card, Universal Card™, has had with maritime crews.

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Mary Cotton, iDirect

Through our partner Orange business services, we have won a significant number of MoFA (Ministry of Foreign Affairs) networks. Another recent success has been the significant operating software upgrade of NewWave and ShipEquip — one of the largest upgrades in our history, and one that was managed seamlessly around the world. Recently, there has also been an enablement in Paradigm Services satellite gateways (SGS) to support military SATCOM operations.

When a historic flood struck Hungary in 2010, the nation's new emergency response strategy was put to the test, and iDirect's platform supported the satellite network in revolutionary ways. With communications networks unavailable in damaged areas, Hungarian telecom provider Pro-M leveraged satellite-based connectivity to help more than 23,000 first responders coordinate rescue efforts. The satellite network, managed by Hungaro DigiTel and built on the iDirect platform, provided a critical lifeline during this crisis.

Steffano Vittor, Vizada Networks

In regard to military applications, there are several projects worth mentioning, but I believe our key success has been in developing in-theater or in-field operation and support, resuming full responsibility for the operation of remote end installations as an integrated arm of our customers own ITC infrastructure. In other areas we support the major NGOs and well-known global businesses for their communication needs in Africa, Europe and internationally.

John Restivo, Teledyne Paradise Datacom

Teledyne Paradise Datacom satellite modems are key to the operation of a variety of European defence communications networks such as Skynet 5, Syracuse, SATCOM BW and Secomsat to name but a few. The rich feature set, versatility and ease of use of our products has made Teledyne Paradise Datacom an easy choice as a supplier to Armed Forces across Europe. Through our European operation we provide products and support for leading GSM operators such as Vodacom and MTN. We are also a key provider of modems and RF for the data dissemination network of the pan European Galileo satellite system.

There are significant technical, legal and cultural differences that leading satellite ground segment manufacturers, such as Teledyne Paradise Datacom, must overcome to succeed in Europe. These differences need to be understood and exploited, for example, providing satellite products with multi-lingual user interfaces. We also require capable local staff and a comprehensive distribution network capable of addressing the disparate European markets. This represents a significant financial resources and commitment to the market which only companies the size of Teledyne are able to provide. The current, well documented financial difficulties within the euro zone are a significant challenge, particularly as their impact is far reaching across the continent. However, we feel the European market is strategically important to our company with the potential to yield further significant returns for our investors over time.

Roundtable: European Satellite Markets

David Hochner, SatLink

SatLink has been serving the market with high quality, creative and technologically superior solutions for over 20 years so our successes have been many. Some of our projects include: being the sole international satellite distributor of Thomson Reuters' core video product, Reuters World News Service around the world; working with Viacom's Nickelodeon Polska; supplying occasional use broadcast of HD sports, news and entertainment around the world including HD transmission of the UEFA football from Europe to Asia; and handling TT&C solutions for the SES group including SES WorldSkies and SES Astra including being SES WorldSkies Middle East POP. Our business method is to work closely with a client to become their partners — for the long term.

Roberto López, Hisdesat

We have a long list of successes in our company. Since 2005, we are providing satellite communications with the Xtar-Eur, covering from Brazil to Indonesia, including Europe, Africa, Middle East and much part of Asia. In 2006, we began to operate SpainSat, a satellite covering almost all the Americas, Africa, Europe, reaching de Middle East. This is a relevant milestone in the Spanish space industry. Moreover, the recent agreement with the Norwegian government, as well as the previous ones with the Belgian and Danish Ministries of Defense has placed Spain in the third position in Europe for provisioning government communications services through satellite.

Despite how young our company is we have an impressive list of successes. Since 2005, we offer secure communications services through the Spain-Sat and Xtar-Eur satellites and there is no better way to describe the quality of our services but through the relationship with our customers. In Spain, we serve the Ministry of Defence, the Ministry of Foreign Affairs and various agencies in the field of Security and Intelligence. In Europe, the Ministries of Defence in Belgium, Denmark and Norway trust us. In the USA, through our owned company, Xtar LLC, we are serving the DoS, the DoD and several other government agencies too.

The last international competition we won was with the Norwegian government to develop a joint communications satellite. We are now in the RFP stage while the launch of the satellite is forecasted for late 2014. There is no doubt that this project is a landmark in the young history of our company. All these projects encourage us to keep on working in order to consolidate the company in a leading international position as provider of government services via satellite.

Joerg Schmidt, DEV Systemtechnik

As we celebrate more than a decade of business, we have enjoyed successes with many challenging projects. Some examples include exciting projects with Astra, Eutelsat, Skylogic in Europe, and KDG in Germany. Our existing customers are well aware that by working with RF experts like DEV, they can avoid running into problematic RF signal delivery or complete service loss. I personally always like to help customers build systems that meet all their needs for high availability and reliability.

Paul Weldon, ASC Signal

Our Next Generation Controller (NGC) antenna controller, which was launched in Europe at IBC 2009, has revolutionized the way customers are able to manage their antenna tracking operations. With hundreds of customers now deploying NGC controllers in the European region, operators appreciate its operational

efficiency and versatility, and their ability to opt for a level of functionality that is appropriate to their needs. So if their initial investment is constrained by tight budgets, customers can start with a basic tracking configuration, and then add other options later, including a wide range of possibilities such as spectrum analyzer or carrier monitoring to give increasing functionality and sophistication, when these are required.

Steve Beaumont, Skyware Global

Building long-term customer relationships requires a combination of elements all coming together in a consistent fashion — product, price, people, quality and innovation. Our reputation for supplying outstanding products to the domestic broadcast markets in the UK has taken many years to develop but our willingness to understand our customers' needs whether they be aesthetic, installation as well as technical capability is critical to building out successful projects. Within the UK we are particularly proud to be a significant part of the 'great digital switchover' as the foremost supply of antenna to domestic dwellings across the country.

Dr. Matt Perkins, SSTL

The ESA/EC Satellite Navigation program has been extremely important in demonstrating SSTL's capability to build satellites capable of flying in high orbits (MEO and GEO) with complex RF payloads. GIOVE-A, for which SSTL primed the satellite including both platform and payload, was declared a "full mission success" by ESA in 2008. This led the way to SSTL's participation in the full constellation through the contract signed in 2010 to supply the payloads for 14 "full operational capability" satellites.

Outside of the telecom area the other three landmark programs of the last decade have been constellations of small satellites. It's through constellations that the real benefit of low-cost small-satellites can be truly exploited — the much lower unit cost making systems financially viable. The first of these systems was the Disaster Monitoring Constellation (DMC). DMC enables imaging of anywhere on the globe within 24 hours allowing for rapid response provision of data when it is needed. DMC was replenished in 2009 with the launch of two additional satellites. With the upcoming launch of further satellites this year the longevity of the system is assured for many years. DMC is partly institutional and partly commercial.

The RapidEye constellation, in which SSTL provided the satellite platforms and satellite level assembly integration & test, is almost totally commercially funded — illustrating the trend that EO is becoming far more commercial and will continue to do so. The system was launched in 2008 and is performing superbly with around 4,000,000 sq.km imaged per day by the constellation of 5 satellites. Most recently SSTL signed the agreements for the "DMC3" system, a constellation of three satellites with very high resolution imaging capability — 1m per pixel. DMC3 is a novel business model — akin to that of communications. The satellites are owned by SSTL's subsidiary company DMCii and the capacity on the satellites is leased to commercial companies who have a business exploiting the data they generate.

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Dimitrios Papaharalabos, Europe Media Port

EMP was the first announced provider of Gateway Teleport services for O3b's global network. O3b, a subsidiary of SES, is building a new satellite-based, fibre-quality Internet backbone for telecommunications and Internet service providers that will link its reliable Gigabit IP network connectivity and bandwidth services to clients located in Asia, Africa, Europe, and the Middle East. This long-term agreement allows for the provision of a range of services through EMP via the Nemea, Greece teleport. The EMP team is an instrumental partner to O3b's plans for establishing a seamless data service network for their clients. We will assist O3b in rolling out the new, ground-breaking solution to provide fast Internet connectivity to billions of citizens, businesses and organizations in previously poorly connected regions around the world.

EMP also provides solutions to the broadcasting industry including playout services, uplink, turnaround, space segment leasing and occasional use services. EMP is partnering directly with satellite operators and teleport facilities around the world to provide diverse global end-to-end solutions in accordance with broadcasters' needs. For example, we are offering a customized DTH solution to the new channel Kahkeshan TV, broadcasting on Hotbird directly throughout Europe & Middle East to reach a wide audience.

Dr. Harald Stange, Romantis

We have successfully implemented numerous projects in various parts of the world. But perhaps the most complex and interesting project was the creation of a national satellite operator in Kyrgyzstan. This project demonstrates the possibilities of Romantis' strategy. The entire infrastructure of this operator is based on the resources and technologies of Romantis. Regardless of poor economy and difficult political situation this company has become the dominant provider of TV/Radio broadcasting, VSAT networking, has helped cellular operators to penetrate the inaccessible corners of this mountainous country. This project is a very good illustration of how the commercial European companies can help emerging markets on a mutually-profitable basis.

John Suranyi, Sencore

With the introduction of our IRD3387 back in 2004 — known today as the MRD 3187B receiver decoder — Sencore set the standard for receiver/decoder performance, scalable functionality, and low cost of ownership. The MRD 3187B has been well-received by the satellite industry because of its ability to adapt to almost any contribution, distribution, or backhaul environment. Following the MRD3187B, we introduced the ASM988A advanced satellite modulator, which addresses operators' requirement to increase bitrate efficiency by providing more bits per Hz. The ASM988A offers efficient 8PSK modulation as well as 16-QAM and QPSK, making it perfect for the DBS environment, contribution, or SNG. Finally, our SMD 989 DVB-S/S2 modulator offers unprecedented efficiency, flexibility, and reliability for all types of satellite digital video

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delivery applications — with intuitive user and remote interfaces that ensure fast setup and effortless system integration, and standard ASI and IP inputs.

Arnold Friedman, SS/L

We are currently completing three satellites for SES and have developed a close working relationship with that company over the past few years. We have an open door policy with all of our customers, and the two to three year process of bringing a satellite into existence from designs on the computer screen to launch is a very collaborative process. Our European customers have offices on site with us here in California and I think they really like our openness about issues that might come up along the way. When they are right here with us on site, important decisions can be made and approved quickly and there are no surprises. That is very important in this business.

Mark Dankberg, ViaSat

Our single largest project has been to provide the ground networking equipment for KA-SAT. That involved an extensive network of teleport gateway terminals and network infrastructure, and will ultimately support in the neighborhood of one million direct to home broadband Internet subscribers. Last decade, as previously mentioned, we were the first company to introduce a VSAT terminal for less than US \$1,000. In those days, we developed a partnership with Eutelsat and its wholly owned subsidiary, Skylogic, for the launch of LinkStar-based services (called D-Star) to professional users across Europe. At the time it was one of the largest Satellite IP-based shared networks in Europe, including 14 LinkStar hubs feeding eight different Eutelsat satellites and more than 10,000 terminals deployed.

SCADA is a specific vertical segment where our LinkStar product has been extremely successful over time and is mainly represented in Europe by two mission-critical projects: Gas Natural-Fenosa of Spain, a leader in the provision of monitoring and control services in the utilities European marketplace, serving thousands of kilometers of pipelines, river basins and electric lines; and ISKI of Turkey, the Istanbul department of Water and Waste management serving more than ten million people in the Turkish Capital city.

Another commercial project where we have been very successful worldwide, and especially in Europe, is a variety of mobile applications such as maritime though our agreement with KVH, airborne though our own Yonder®-branded service, and a specific service to the French National Railways (SNCF) TGV trains. In the government sector, we have been extremely successful in the deployment of UHF equipment in Italy and MIDS equipment in Turkey.

Gil Ilany, Spacecom

AMOS' biggest and most successful mission has been turning its name, services, and capabilities into a reliable brand known world-wide. Among our most important successes are our work launching and supporting important DTH providers such as T-Home SatTV in Hungary and MagioTV in Slovakia, both part of the Deutsche Telekom Group. In each instance we provide them with high quality solutions that expand their market offerings and the regions they reach. These important DTH services, along with Israel's Yes DTH, anchor the AMOS satellites. Our personal relationships, expert technical offerings, and our satellites' powerful beams all add up to an excellence of service and quality making the AMOS fleet the preferred choice for these important broadcasters. In CEE, the DTH is market growing and as more HDTV and 3D channels enter the market, we expect demand for our services to continue growing steadily. The prospects for continued growth in this market remain positive as communications and entertainment are popular.

Howard Hausman, MITEQ

MITEQ is a high end provider of satellite equipment. Our most successful projects have been with high end service providers entering new markets and using new frequency spectrum. Our excellence in engineering gives us the flexibility and adaptability required to keep our customers leaders in their respective markets. They count on MITEQ to push the technology and we do it with quality and reliable products.

Svend Lykke Larsen, KVH

Without a doubt, the mini-VSAT Broadband network has been our biggest success in the maritime market. It is now the world's fastest growing maritime VSAT service, and it's at the heart of two of the industry's most innovative and reliable products, the TracPhone V7 and TracPhone V3. We are always working to bring value-added options to this suite of products, including the CommBox Ship/Shore Network Manager, our Crew Calling Gateway, and options for GSM picocell service, but the network remains at the heart of it all. The most important things to any vessel manager choosing a SATCOM solution are coverage and reliability — will my crew be able to use the solution throughout their route? Can we depend on the system to work seamlessly whenever we need it? The answer, for mini-VSAT Broadband subscribers, is a resounding yes. And of course, with some of the most competitive airtime rates in the industry, mini-VSAT Broadband is a great fit for budgetary priorities, as well.

KVH is not strictly a SATCOM company, though — we also offer an innovative suite of TracVision® satellite TV systems, which are available in linear configurations specifically to serve the European maritime market. These solutions are trusted by a wide range of European mariners, from owners of small pleasure boats who enjoy the compact TracVision M3 to yacht owners taking advantage of the TracVision M9's WorldWide TV satellite library or the TracVision M7SK's automatic skew feature, to a Russian shipping fleet bringing affordable entertainment to its crew by deploying the TracVision M9 on 60 vessels.

Doron Elinav, Gilat

The recent award by SES is very important to us because it begins to fulfill part of our strategy to expand to Ka Band markets where we think most of the future growth will come from. Gilat has also been awarded a Ku-band consumer network contract by Hispasat, for broadband Internet services to Spain's growing consumer market.

We have many enterprise and corporate customers in Europe, such as Orange Business Services, the enterprise communications arm of France Telecom, with a SkyEdge II hub at their Bercenay site in France. GE SATCOM with hubs in Backnang Germany and AT&T serving InterMarche in France. One interesting project is in the UK, where we provide hybrid connectivity solution to Regis. This solution, based on Gilat's PrysmPro, enables seamless switchover between communication technologies to enable the best mix of price and availability.

Some European service providers also serve customers in Africa and the Middle East. Examples of these include Orange Business Services, Gateway Communications and GlobalTT. One such application, by Orange, facilitates a cellular backhaul network in Niger. This network is part of a multi-star topology allowing the expansion of the GSM network coverage to remote locations. An advantage of this multi-star topology is that Orange Business Services can manage the network from their teleport in France while maintaining direct, single-hop connectivity between Gilat's SkyEdge II terminals installed within the GSM network in Niger.

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Ahsun Murad, Optimal SATCOM

A good example would be our project with Telenor, Vizada, and Marlink in Norway and The Netherlands. Telenor has a corporate culture that encourages efficiency and automation, and at the same time, its management is very receptive to innovative ideas. With Telenor's segregation of some of its service provider business into separate companies — Marlink and Vizada — and separation from its satellite operator business (now under Telenor Satellite Broadcast Services), Telenor has experienced unique challenges in supporting its separate but related satellite capacity management requirements across all of its operations. We are fortunate to have been able to work closely with all three companies for the past several years to help facilitate their operations — it has been a very rewarding project for us.

Peter Guggenbach, RUAG Space

On the commercial telecom market we have been very successful with our receivers and converters for more than 30 years now. We have supplied hundreds of microwave units, ranging from UHF to Ka-band frequencies, have been delivered to demanding customers. Our high-performance Converters/Receivers are used by a diversity of service providers: Eutelsat, Intelsat, SES Astra, Telesat, Hispasat, Thuraya, DirecTV and others. RUAG Space Converters/Receivers are characterized by small size, low noise, high linearity, excellent frequency stability and low spurious levels.

Gabriel Racah, ORBIT

ORBIT has participated in a diverse range of successful projects for both commercial and defense customers. Just recently Orbit was awarded a contract for the installation of VSAT solutions for a leading Asian Navy. As part of this project hundreds of VSAT terminals in Ku- and C-bands are being deployed across the entire fleet. During a lengthy and highly demanding selection process, the customer tested several vendor systems at sea. ORBIT's systems were the only ones that were able to meet the extremely high performance standards set by this customer.

Catherine De Peuter, Futron

Many of Futron's project's clients in the satellite market prefer to remain confidential, and it is therefore difficult for us to answer this question in as much detail as we would like. We are often asked to perform independent due diligence evaluations (both technical and financial) focused on planned satellites systems that focus on the European market. We would however like to highlight our in-depth yearly study of the satellite and space market (as part of the Space Competitiveness index), and our annual satellite communications forecast. Both products have a heavy focus on Europe and are available on our website.

SM

The challenges are numerous for entry into, and for business sustainment within, this area of the world. What do you see as among the most formidable challenges to surmount?

Jesse van Straaten, Vizada

All the new technological developments that the industry churns out at an incredible rate can make it difficult for the customer to make an appropriate choice for their specific needs. Vizada maintains a technology agnostic approach, meaning that we can always supply the right solution for our customers' needs, regardless of what kind of connectivity they have or will have in the future.

Our technology agnostic strategy also applies to the different connectivity solutions available today, as seen with our L-band (Inmarsat, Iridium, Thuraya) or Ku-band VSAT products and solutions. We are currently working to get ready for the upcoming Ka-band service so that it seamlessly fits into our offering and provides an upgrade path for our customers. We

always strive to provide the most flexible and enhanced solutions, preparing for the industry's rapid advancement.

Steffano Vittor, Vizada Networks

From an operational aspect, access to skilled workforce at remote locations is a serious challenge. Therefore Vizada Networks focuses on making our solutions transparent and remotely operable, taking advantage of a highly integrated M&C system. Other challenges to emerging markets operation are local bureaucracy related to licensing and customs clearance of goods that often adds significant delays to implementation and fault restoration.

Howard Hausman, MITEQ

In the business of building satellite Earth station equipment the challenges are mainly in engineering, production and marketing, which covers most of the business universe. In engineering the challenge is designing the product that meets the customer's needs within the budget the customer is willing to pay. In production the problem is building the usually limited quantities of the product in a cost effective manner, i.e. within the customer's budget. In marketing the challenge is educating the customer on the value of MITEQ's high end engineering and product reliability, which are long term considerations that reduce recurring operating expenses.

Dimitrios Papaharalabos, Europe Media Port

Challenges in building a business are numerous. We have found that sound investments in both human and technical infrastructure enable our business to grow and create new products and services across our entire range of services to enhance customer experience. For example, we recently finished installation of three new large dishes ranging from 7.2 – 11 meters and already placed an order of more to be delivered for later this year. On

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the fiber side, recent upgrades now support STM-64 & Gigabit Ethernet high speed data rates. We are in a constant market search and we are actively looking for new technologies, new practices and business models that will help us to deliver the best service to our client needs.

Catherine De Peuter, Futron

For government satellite projects, the biggest hurdle is that cross fertilization between the military and non-military space. Given the breadth of stakeholders, this is ever more difficult (though not impossible) in Europe than in other parts of the world since European countries manage and finance their own defense (or as part of NATO), whereas scientific payloads are most often managed under the ESA umbrella. This makes it harder to achieve economies of scale by, for instance, combining several missions or applications on the same bus. Challenges in the commercial area are of a different nature. European Commercial satellite projects, in particular those focused on the consumer market (such as DTH or Direct Internet Access), are forced to compete with the most advanced terrestrial network build out in the world, and must be based on very realistic and conservative assumptions regarding the target market.

Phillippe Manzano, Globecast

Western Europe is quite a mature market, whose main challenges in the satellite domain are alternative delivery solutions, such as multiple devices, TVoIP, FTTH and OTT TV. We think that satellite is likely to remain a key service for video applications, however, the market will be shared differently than it is today, and the value of satellite delivery could decrease. Regarding Eastern Europe, which is less mature, the consolidation of the DTH players is the next challenge that will impact the industry.

Joerg Schmidt, DEV Systemtechnik

The most formidable challenge I see is the continued care and development of outstanding customer relationships. Digital technology advances are in the spotlight, but it is really important to understand that ultimately the world is analog. The digital communications advances that bring more services and bandwidth also require and depend on the delivery of new levels of higher performance analog circuitry and technology, for example, better RF solutions. So users of RF products need confidence that their technology partner has a deep knowledge of the technologies and customers' applications. The challenge of earning that confidence from a much larger slice of the global market pie is our biggest one at the moment, but we are enjoying successes.

The second challenge is how to meet the driving demand. I think there will be more demand for HD and later for HD-3D. With these applications more bandwidth is required, and also the quality of transmission equipment needs to be much better than that what is used since the old analog times.

Paul Weldon, ASC Signal

Antenna manufacturers have noticed a major challenge in the increasingly diverse frequency ranges requested by customers. Customers, including operators and resellers, see satellite operators launch new transponders with special frequencies and then turn toward operations in these frequencies. Two examples are Insat's C-band, and Arabsat's Ku-band. ASC Signal has more experience than anyone in understanding how changing frequencies affect feed design and antenna optics design and has been able to adapt and develop special products for specific customer needs.

John Suranyi, Sencore

Europe offers significant challenges to satellite technology providers, not the least of which is the great number of isolated, fragmented, and segmented markets that are in varying stages of technology adoption, and the influence of multiple languages and cultures. We're also dealing with multiple and sometimes competing broadcast standards such as DVB, ISDB, and CMB, and the varying certifications, regulations, and requirements of doing business across multiple countries.

Mark Dankberg, ViaSat

Probably the single biggest challenge we face for satellite broadband services is overcoming the poor reputation that satellite has acquired for high speed Internet access. This challenge is not unique to Europe — we encounter it everywhere. The latest generation of broadband satellites, such as KA-SAT in Europe and ViaSat-1 in North America can deliver subscriber speeds of 20 Mbps, with bandwidth provisioning sufficient for virtually all applications including high definition video teleconference and streaming video. In many cases, we believe satellite broadband can offer superior performance and value relative to lower end terrestrial alternatives, including long-loop DSL and mobile wireless services used for fixed home Internet access. Yet, many government organizations simply assume that satellite is a last resort only — that satellite services are worse and more expensive than all terrestrial services.

We are working hard to show people that the fundamental issue with satellite is having sufficient bandwidth — and that it is an economics issue, not a technology problem. The economic advantages of high-capacity Ka- satellites are compelling and overturn many old assumptions about capital and operating costs for broadband deployment. Each new market is a challenge, yet we have made substantial progress in a number of countries around the world, and now with Eutelsat and KA-SAT we're seeing progress in Europe, too.

Gil Ilany, Spacecom

As a multi-regional satellite operator, Spacecom is familiar with the challenges and issues inherent in operating a business in this market. We have been successful because we listen to our customers and provide them with the solutions they need. It is not good enough to respond to a request for services, rather we must work hard to develop and implement the right solution to meet a client's needs. We have taken the time to establish beneficial relationships with distributors and business partners in the region to generate success for all. With the proper business conduct and practices in our markets, we are able to work with our partners and weather economic challenges, such as the ongoing world economic turmoil. We are always ready to take the necessary steps to keep our businesses moving forward. Internally, we have invested smartly to create a business team that works well together. Likewise, we have conducted research enabling us to better understand markets so that we can clearly see our potential moves and go in the right direction. Lastly, we are in business for the long run and take a long term view of what we need to do and when to do it. In this way, we are able to structure risks and manage them.

Mary Cotton, iDirect

It's a highly segmented marketplace, and there are numerous network operators. Several operators from areas such as Africa and the Middle East have uplinked their services out of Europe, but that dynamic is changing. And while it's quite segmented, it's also quite concentrated. There's a fair amount of competition for our customers, and there are a lot of customers going after the same projects.

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Another challenge is in competing technologies, particularly in the arena of SCADA and utilities, where our customers often compete not against other SATCOM solutions, but against competing technologies like GPRS. The localization of connectivity creates challenges as well. Regions like Africa are seeing the emergence of more and more fiber every day. Subsea fiber delivers high speed Internet access to cable heads — the actual landing stations — in each country, such as SEACOM, which from a SATCOM perspective, effectively regionalizes connectivity to a localized area. Hubs have to be deployed in a country to deliver in-country services competing in turn with emerging local terrestrial network providers. This has had an impact on Middle East and African network operators that have historically based themselves in Europe to gain access to Tier 1 Internet Points of Presence (POPs).

Svend Lykke Larsen, KVH

Entering this market with a new product is a challenge in itself, but in just a few short years, mini-VSAT Broadband has become the world's most popular and fastest growing maritime VSAT network. We accomplished this by delivering on our promises — our hardware works as we say it does, we've expanded network coverage regularly to create the truly global coverage that our subscribers now enjoy, and we continue to innovate, offering new products and value-added services that make our customers' lives easier regardless of where or why they travel. Since KVH manages the mini-VSAT Broadband network along with our partner, ViaSat, we have the ongoing responsibility of ensuring that service remains constantly available and optimized throughout the global network. That's why we operate a dedicated Network Management and Global Support Center where network traffic and conditions are monitored and adjusted continuously to ensure the performance that our customers expect.

Gabriel Racah, ORBIT

Based on decades of experience, ORBIT has mastered the technical challenges of satellite communications and tracking, which allows us to provide industry-leading solutions in these fields. Our greatest challenge today is to put our accumulated technical know-how to good use by developing innovative solutions that address our customers' needs and provide revolutionary value. For example, when we started to define a new generation of C-Band maritime terminals we identified that our customers' main challenge was dealing with the large size and weight of their current solutions. This analysis led us to the design and development of a revolutionary compact system (2.7m footprint instead of an industry-standard 3.8m) that delivers equivalent RF performance and fully complies with all major satellite regulations. The system can fit into much smaller vessels and can be deployed in a fraction of the time and cost of traditional solutions.

Steve Beaumont, Skyware Global

Assuming the technical capability one has always to consider the 'local' culture within a market to ensure that your logistics, customer approach and products reflect the needs of the country in which you are operating. For this reason Skyware Global always appoints a local partner in market, with strong connections to help promote and respond to local demands. With a global organization and a strong local presence Skyware Global can offer the best of all worlds — true global expertise harnessed and focused on delivering the most appropriate product solution at highly competitive price points. This key attribute linked to a flexible and agile customer response makes Skyware the obvious solutions provider throughout Europe.

Doron Elinav, Gilat

One of the main challenges the SATCOM industry faces is competition with terrestrial networks. Overcoming this challenge is taken through several paths: **Provide more capacity, at lower price per Mbps.** — Ka-band satellites, with their high capacities, will bring higher throughput to regions that are underserved by terrestrial networks. As demand for high speed broadband grows, the number of underserved regions will grow, because DSL and fiber cannot cover well less dense areas. **Complement terrestrial networks** — Hybrid networks are an excellent solution for systems that require high availability connectivity, yet lack terrestrial alternatives at a competitive price, such as MPLS. Led by US enterprises, many have implemented hybrid solutions, such as DSL or 3G together with satellite. **Areas where terrestrial networks are not applicable** — Military and Defense applications, by their nature, often cannot depend on terrestrial networks. They therefore require a satellite component to augment the terrestrial component. Other examples include on-the-move applications, such as for ships, planes and trains.

Kai Koppenburg, WORK Microwave

The biggest challenge that we have encountered is dependence on, and compatibility with, legacy equipment. We have found time and again that users of legacy equipment are slow to migrate to newer technologies and standards, and newer equipment is not always compatible with old or existing equipment. However, the steadily growing demand for larger bandwidth raises the need for equipment compatible with higher frequency bands. An example is the Ka-band. With its larger amount of available bandwidth, it's becoming more and more attractive to satellite service providers as lower and more traditional frequency bands become increasingly congested. But the rate of migration is slow and fraught with challenges.

Ahsun Murad, Optimal SATCOM

Enterprises around the world, not just in Europe, see challenges in efficiently managing their satellite capacity and all of the business processes related to this. The increasing emphasis on operational efficiency and profitability strongly favor a push towards integrated systems such as Optimal SATCOM's ECM. Adopting an enterprise system like ECM usually involves major changes throughout a company. This transition from legacy systems (which usually consist of a combination of stand-alone tools and manual processes) to a fully integrated system like ECM affects almost every business process in some way or the other. With the expertise we have acquired working with our large customer base, we have learned that it is important to involve people at all levels of the company from the earliest stages of the project, to thoroughly understand the functionality of the legacy system, and to efficiently transition from legacy processes to the new system.

David Hochner, SatLink

Building a business is based upon proving capabilities and showing results in budget that turn clients into long term business partners. Through our people, creativity and efficiency we maximize our global infrastructure, products and relationships to deliver superior service. In Europe, we are focusing efforts to add more news and sports segments that maximize our more than 100 earth stations. We are also furthering our capabilities to deliver DTH over our platforms on Hot Bird and EB9. In Eastern Europe, we are building specific solutions to reach those markets. We have generated successful case studies from scores of clients including Viacom's MTV International, euronews, the European Broadcast Union (EBU), Thompson Reuters, and recently added NTV MIR distribution to Russia together with Globecast. The most formidable challenges are proving capabilities. We have found that expertise is not enough — creativity

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and the ability to think ‘solution’ in any and every case is really what keeps customers working with SatLink. When we translate a concept into reality, and make it work, we prove to our clients that building a relationship is for the long run.

Dr. Matt Perkins, SSTL

Space is a hostile environment and space projects are inherently risky — it’s not easy to repair satellites once they are in orbit! This means that customers can be quite conservative in terms of the technology they are prepared to allow onto their missions. This leads to a major problem for satellite builders — how do you qualify new technology? In the UK the Government’s Technology Strategy Board has recognised this fact and is funding the provision of a technology demonstration satellite, TDS-1, which will allow SSTL and other UK organisations to qualify new developments. To a large extent SSTL relies on its excellent and substantial heritage but initiatives like TDS-1 really do help.

Dr. Harald Stange, Romantis

There are challenges all of the time, but those who do not accept the challenge will not be successful in the future. Furthermore, we see the demand for a very flexible and efficient VSAT system, one that can be changed and adapted to changing network requirements by the selection of software modules only. This can be also grown into HTS market needs and we see the enormous potential of IP SNG, IP broadcast and Telepresence via satellite.

John Restivo, Teledyne Paradise Datacom

This year has been a very difficult year for many European countries, with little or no growth in their economies. (e.g. The U.K. economy grew only 0.2 percent in the three months to June 30th, as compared to 0.5 percent for the previous quarter). However, a number of European governments have been taking aggressive measures to reduce their countries budget deficits, and there is now a willingness among the major financial players in the EU zone to address the financial crisis facing the euro zone. We, therefore, expect our income generation and growth in the region to be flat during 2011, with the prospects for significant growth occurring in 2012. The opportunities for growth for Teledyne Paradise Datacom will be through a number of intra-government organization communication programs, providing strategic military communications, and also through technology refresh on essential non military government networks.

SM

What applications are driving the demand for satellite-delivered communications in Europe? What do you see as the major focuses for driving existing and new business in this arena?

John Suranyi, Sencore

Applications that are currently fueling the market for satellite technology solutions include digital satellite news gathering, distribution of video services to IPTV and cable TV head ends, distribution of video services for terrestrial SFN and gap-filling re-transmission applications, the addition of new channels to multi-channel distribution infrastructures, and the addition of HD channels to existing service offerings.

Mary Cotton, iDirect

In the maritime vertical, there’s a changing regulatory environment that requires certain types of data to be delivered to vessels, such as ECDIS (Electronic Chart Display and Information System) maps, as well as integrating vessels within the corporate network infrastructure of a shipping company.

Within the military vertical, despite the changing nature of the battlefield in Iraq and Afghanistan, there’s a requirement to continue to support rapid reaction deployments, the recent example being Libya, as well as increased sensory requirements that drive up IP utilization, such as UAV and remotes sensors. Within SCADA, again we see an increased data requirement with an increase in data demand and utilization in areas such as video surveillance. The upcoming Olympics in London has also increased the demand for civil infrastructure (civil contingency networks) and backup networks to support increased traffic in this area.

Joerg Schmidt, DEV Systemtechnik

There are three, main, required elements for driving our business. They include more bandwidth, more transmission system uptime (with redundancies built in that can be used automatically, and the transmission system must be of higher quality, as the digitally modulated signals do not accept signal degradation to the same extent as analog modulated signals. To address all these requirements, DEV launched its Optribution product line in 2010. Optribution is our term for the optical transmission and distribution of your RF signals. The added value is more functionality in fewer devices at lower costs.

John Restivo, Teledyne Paradise Datacom

The worldwide migration to IP traffic is affecting virtually all applications. Teledyne Paradise Datacom is positioned to address this through satellite bandwidth saving and sophisticated traffic management techniques. The deployment of European forces overseas in areas of conflict is also a primary driving force for the provision of communications for strategic and welfare purposes.

Paul Weldon, ASC Signal

The satellite communications market in Europe is quite mature, but there are still new opportunities. One example is delivering broadband Internet to more remote, rural regions. Again, ASC Signal has seen the emergence of Ka-band with operators such as Eutelsat and Avanti as they target such markets. Both have built business plans based on rolling out networks to a high-volume subscriber base throughout Europe. In addition, more traditional applications continue to create demand, as problems of theft or sabotage, for example, keep reminding operators that satellite uplinks are far less vulnerable to these issues.

Mark Dankberg, ViaSat

We see the single most significant theme being the dramatic growth in bandwidth consumption. While terrestrial networks have made big improvements to their unit bandwidth costs — that has not been the case for satellite because broadcast has been the dominant source of profits. As a result, in general we have seen satellite networks increasingly relegated only to those applications that are NOT bandwidth intensive. And, those applications are increasingly rare. The bandwidth economics of Ka-band — and especially KA-SAT in Europe, creates a big advantage

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compared to conventional FSS satellites for data driven applications. That covers a broad spectrum of uses including home Internet, enterprise, defense, and mobility.

Romain Bausch, SES

HD is certainly a driver, as more programming is offered in high-def and more HDTV sets are sold throughout Europe. Then there are the developments in Eastern Europe where new satellite platforms are being launched in a number of markets. We have recently launched services in the Ukraine, a new market to SES. Europe also has a niche market for satellite Internet services. Even in well developed, wired European countries, we're seeing a niche group of households that may never be connected to high-speed terrestrial broadband. In those cases, satellite is the only alternative for people who want to benefit from high-speed connectivity.

Svend Lykke Larsen, KVH

There are a number of reasons for vessels to bring satellite communications onboard, and each company or yacht owner has their own unique requirements. However, some of the applications we hear about repeatedly are regulatory compliance (electronic filing of paperwork for programs like ECDIS), remote monitoring of engines and other systems, as well as IT systems, and affordable, always-on connectivity to support business efficiency, including sending large files. The connection is often used for remote monitoring and management of IT systems — mini-VSAT Broadband can be easily integrated with a ship operator's corporate IT structure to support these functions. Many of our customers also utilize the mini-VSAT Broadband connection to support recruiting and crew retention efforts, because a connection to home is an important benefit to many mariners. Since this kind of connection can be provided easily and at a very low cost with a TracPhone V7 or V3, our customers are able to offer their crews this essential benefit.

Dimitrios Papaharalabos, Europe Media Port

One existing hot topic is the high-speed, bandwidth rich applications that are prepared to be in place in the next couple of years, via the new allocations of vast amounts of bandwidths in the Ka-band frequency. Europe is playing a major role in hosting operators that already invest heavily into these next generation systems and alongside European teleports are partnering for providing the gateway and fiber connectivity with multiple Gbit connections. This is really a big case for growth and European market development.

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David Hochner, SatLink

The demand for satellite communications in Europe is being driven not only by the opportunities the modernization of infrastructure in new areas but also by the uptake of new technologies such as 3D and HD in the more mature markets. SatLink understands that each region or country has different needs and thus we can provide dedicated solutions to satellite operators, channels, networks and IPTV operators. We continue to be excited by the myriad opportunities that each region in Europe offers and via our people, creativity and efficiency we examine various technologies and solutions so that we can deliver superior service to match each and every market's requirements.

Dr. Matt Perkins, SSTL

The world's appetite for bandwidth for direct broadcast TV seems to be continually growing at quite a rate. Developments such as HD TV and 3D TV are driving the bandwidth requirements. The other growth area is broadband and we believe this market will exhibit the highest growth rates in the next decades — there's a large proportion of the both Europe's and the world's population whose only viable option for broadband is via satellite.

Kal Koppenburg, WORK Microwave

Several applications are driving the demand for SATCOM technologies in Europe, but the biggest trigger factor is possibly the growth of IP-based services worldwide. IP technology is growing and will certainly play an evolutionary role in providing development opportunities for the satellite industry. Also, high throughput platforms using spot beam technology and efficient use of bandwidth have the potential to become engines of growth for the satellite industry. Finally, the increasing bandwidth demand in the Middle East is another influential factor for driving the business in Europe.

Dr. Harald Stange, Romantis

The change from analog to digital broadcast with new HD and 3D requirements, IP SNG, and more and more requested flexible Tele-presence / back-up or disaster recovery solutions.

Jesse van Straaten, Vizada

Nowadays people want to be connected via networks such as e-mail, social media, etc., no matter where they are in the world. This trend is boosting the need to provide communications capabilities in remote locations where no GSM or terrestrial infrastructure are available, whether it be on land, at sea or in the air. This is where the satellite communications industry comes in.

In the maritime segment, the increasing requirement for data connections via satellite communication is coming from both crew as well as operational requirements to turn the vessel into a digital office at sea, with increasing demand for IP connectivity and bandwidth similar to offices on land. For both of these developments, the customer must be provided with a reliable and cost-efficient communications system that is able to handle heavy data usage. We are focused on providing these customers a wide variety of connectivity services, enriched with various business and crew applications that are optimized for usage over satellite.

Phillippe Manzano, Globecast

In the video domain, satellite-delivered communications are used for a variety of applications; from occasional contribution to cable/IPTV/DTT distribution and direct-to-home broadcasting. Both existing broadcasters and start-up channels have either a short-term or a long-term goal of being present on as many of these distribution platforms as possible.

Roberto López, Hisdesat

Satellite services represent a unique opportunity for all those government organizations that require fast, secure and flexible communications systems. The HISDESAT systems have been developed specifically to provide next-generation high reliability and quality communications services for both civil and military applications. In order to keep on achieving success in this competitive environment, we will continue with our strategy based on innovation that will allow us the permanent improvement and diversity of our services as well as the amelioration of our international position to increase the number of users of our systems.

Steffano Vittor, Vizada Networks

As mentioned above the strong economic growth in emerging markets are the major driver for European industrial activities in these regions. The untapped potential in the rapidly increasing middle class within the emerging market economies means that people are acquiring the same level of goods and services that we see in the industrialized world.

Catherine De Peuter, Futron

The migration to Ka-band for consumer applications will continue. The introduction of large amounts of Ka-band capacity to the European market will continue and might be a "game changer" for the price points between satellite versus terrestrial delivery of Internet broadband and television services.

Steve Beaumont, Skyware Global

New satellites are driving usage across a variety of needs as well as consumer driven demand for improved communication solutions e.g. broadband in more remote regions. As the sky becomes more crowded with 'birds' the need to adopt a Ka Band solution with its increased accuracy is a critical transfer for all but especially the early adopters who look to maintain a market leadership position. With Skyware being the foremost supplier of Ka solutions both antenna and electronic Ka products are experiencing increased demand. Skyware Global have recently successfully launched a range of Ka antennas and transceivers to answer the increased demand.

Ahsun Murad, Optimal SATCOM

HD TV has definitely been the biggest driver of demand for satellite capacity from a bandwidth perspective. New and innovative technologies including highly efficient modulation and coding schemes have greatly facilitated this demand. Service providers are using these same innovations to deliver enterprise satellite services to end-users (especially to emerging markets) at lower price points, driving a robust broad-based demand for satellite capacity across the world. Connectivity to the Internet and social media is increasingly becoming a necessity even in the developing world, creating another huge driver of sustained, long-term demand.

Bruno Dupas, Integral Systems Europe

Over the past decade, satellite operators in Europe have consolidated their Telemetry Tracking and Control (TT&C) sites for their satellites by centralizing the management and control of these assets into a single system. They have also acquired effective RF mitigation solutions, such as Monics® from SAT Corporation for carrier monitoring and RF signal interference analysis and detection. Thus, the market from this perspective is rather mature. Where we do see major growth opportunities are in new, green field projects where we are able to offer a complete line of ground segment products, solutions and services — from fully integrated Earth Stations to software installations. Because we provide commercial-based products, customers are able to cost-effectively implement solutions that will sustain their operations for the long-term, regardless of the satellite bus they are using.

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Service providers have a different problem. Signal modulation techniques evolve constantly to make better use of the bandwidth. Again, because we offer commercial-based technology solutions, we are able to up with the constant evolution, which help satellite services providers streamline their operations, cut costs and increase efficiencies. Finally, on the government and military side, debt concerns have put a strain on budgets. While this trend will continue into the foreseeable future, there is still opportunity as government agencies and the military need to modernize their networks and operations to meet the growing demands of end users. In this environment, these customers should look to offerings that are not only cost-effective, but are flexible enough to provide support beyond the scope of the original project.

Howard Hausman, MITEQ

Television and the Internet are driving the demand for increased in communications connectivity. Satellite communication is one leg of the communication structure that proportionately will grow as demand increases. In the recent past HDTV drove an increase in broadcast bandwidth, in the near future 3D TV will also increase the broadcast bandwidth demand. On the Internet side of the equation, smart phones, mobile emails, and texting is driving the demand for more bandwidth.

Gil Ilany, Spacecom

Technology is a primary market driver for communications in Europe. In the broadcast sector, HD and 3D are generating new TV channels and as we have already seen, adding supplementary versions of pre-existing channels. We are confident that entertainment, sports and communications applications will keep the needs for satellite capacity moving ahead into the future.

Opportunities also exist for new DTH platforms and new TV channels throughout the region. New DTH players are coming into the market such as Magio TV in Slovakia. The AMOS fleet is well positioned to take advantage of broadcast trends as economic growth engages the local economies in our target CEE markets, and we will see more channels as well as new payTV platforms creating opportunities for AMOS.

SM

Have you offered any guidance to your business teams and/or shareholders as to how you project your Company's quarterly earnings for this market and for the global market overall?

Joerg Schmidt, DEV Systemtechnik

We see big opportunities outside of Europe as well. For example, we recently formed DEV America (www.dev-america.com), based in California, so DEV will be even better positioned to meet growing demand for our advanced technologies from satellite teleports, uplinks, direct-to-home (DTH) and IPTV head ends, as well as cable TV systems and playout facilities. We also see growing demand from Asia and the Mideast, for example, with recent projects in India and the Mideast, with installations for major operators such as Etisalat.

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Dimitrios Papaharalabos, Europe Media Port

EMP is a private company with private investors that like everyone else is operating with regular forecasts and internal updates for growth plans and especially for maintaining healthy profitability.

Paul Weldon, ASC Signal

Europe should certainly not be seen as a declining market. I think “steady as she goes” sums up Europe’s revenue generation for the immediate future.

Roberto López, Hisdesat

It is critical to perform a long-term planning, be visionary and leave nothing to chance. In an industry as complex as this, that requires large investments, the comprehensive planning of innovative, sophisticated and complex projects is essential to achieve their successful completion. This is what creates trust, investments and opportunities for further growth.

Doron Elinav, Gilat

In general, we do not publish guidance or projections for our earnings. We think the market is getting better in 2011, compared to the past two to three years. We can see a sign of this in our backlog. At the end of 2009, our backlog was \$180 million, and at the end of 2010, it was \$232 million. Our management objectives for 2011 are to increase our revenues to more than \$330 million and achieve an EBITDA margin of 10 percent.

Mark Dankberg, ViaSat

Economic environments are difficult and challenging. However, there are always opportunities when you can deliver higher performance AND lower costs to your customers. The bandwidth economics of high-capacity Ka-band satellites make that possible and that is the area we are most focused on for growth. In general, given that we see bandwidth as a core value proposition — especially the unit cost of bandwidth (such as cost per MByte, or Mbps stream) — we have seen our markets constrained until the launch of these next generation satellites. Now that KA-SAT is in service, with ViaSat-1 scheduled for launch in September, we believe that creates more opportunities for us to grow our equipment and services revenues. In the meantime, we have seen the greatest growth from migrating broadband users away from conventional L-band MSS services and onto spread spectrum Ku-band and/or C-band services because that also supports the higher performance at lower cost theme that is so attractive for Ka-band.

John Restivo, Teledyne Paradise Datacom

We are making stringent efforts to control costs within the region, ensuring that every dollar invested in product development and marketing is targeted at those segments of the market that are strategically important to our business.

Mary Cotton, iDirect

On a sales level, our guidance has to do with how we manage our regional teams. We look at our territories within the European region as separate portfolios, and we try to manage each territory on that basis, reflecting the unique characteristics of each market we operate in to be as locally responsive as possible. That’s rolled up from a global perspective, looking at iDirect’s regions as separate businesses and again managing on a portfolio basis. By this approach, we ensure that we are commercially flexible and agile by market and vertical whilst managing the challenges and risks faced by any global commercial operation.

Jesse van Straaten, Vizada

On the land mobile market this year, major events, natural disasters, and missions in different regions of the world have led to an increase in the need for mobile satellite communications. This has definitely had a positive effect on the global market for satellite communication, mainly in the aid, NGO, media and government market. In the maritime segment, the new Vizada XChange platform in combination with the just launched broadband packages is expected to lead to very positive results over the next few months.

Svend Lykke Larsen, KVH

We are cautiously optimistic about our near-term financial goals as the general worldwide economic weakness has put a lid on consumer spending, especially in the leisure marine and land markets. On the other hand, we are very pleased with the development of our strategic initiatives like our VSAT business, where hardware shipments more than doubled in the second quarter and we activated a record number of airtime subscriptions. As a result, we’re confident in our longer term growth strategy and financial objectives.

The mini-VSAT Broadband network is a major part of our long-term goals, as the ongoing revenue stream from the sale of airtime service will continue to grow as more customers activate mini-VSAT Broadband accounts. New coverage along the western coast of South America gives mini-VSAT Broadband the broadest global coverage and the widest global regulatory approval of any maritime VSAT service. The mini-VSAT Broadband network has never been more popular, and with a track record of more than three years of operation, it’s a proven resource for mariners. We’re now delivering more than 100 terabytes of data per year with a network reliability rate of better than 99.5 percent. Our goal is to continue to expand and enhance the mini-VSAT network and the hardware and services available to our customers while aggressively pursuing a wide range of business opportunities.

Ahsun Murad, Optimal SATCOM

Based on the business growth we currently see with our customers, we expect continued strong growth throughout the rest of 2011.

Catherine De Peuter, Futron

Yes we have, this year as in the past years. However, this information remains confidential.

Steve Beaumont, Skyware Global

Presenting a realistic strategy to deal with any global region is essential. The final strategy has to reflect the market conditions as well as a more detailed action plan for implementation recognizing the need to fully resource each plan. Realism and setting expectations at an achievable level helps to relieve the pressures associated with this drive for short-term and immediate results. Naturally we all want to be successful and care has to be taken not to dilute plans to the point of meritocracy. The most successful approach to the growing problem of short-termism is the one that our industry is built upon, namely communication.

Steffano Vittor, Vizada Networks

Yes, we have incorporated our guidance in our long range planning provided to our shareholders.

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Gabriel Racah, ORBIT

ORBIT is active in several domains: mobile satellite communications, C4ISR (communications, computers, command, control, Intelligence, surveillance and reconnaissance) for defense customers and earth observation ground systems. As a public company we provide an overall guidance to investors that is available here: <http://www.orbit-cs.com/investor-kit>.

Peter Guggenbach, RUAG Space

Direct to home (DTH) television will remain the major driver for satellite communications in the near future. Technologies such as HDTV and, to a much smaller extent, 3D, increases the demand for additional satellite capacity. The growing number of DTH customers in Eastern Europe will also produce additional demand for services.

SM

How do you believe the European satellite market will impact global, as well as your Company's, business opportunities?

Romain Bausch, SES

The satellite business is very resilient to the economic downturn. We have long-term contracts with our customers for starters. And while people may tend to spend less on restaurants, movies and vacations in times of economic difficulties, they still want entertainment at home. Many attractive payTV packages may grow even faster during economic struggles, since they provide a good value when value is king. For the price of a few theater tickets, for example, monthly subscribers can get the latest sporting events and movies delivered to their home. HD and 3D are making it an even more compelling business model.

Just look at BSkyB, which announced this summer that its HD subscriptions grew by 40 percent.

The new SES, which we're launching at IBC, is building on our deep experience in DTH and video distribution in Europe and North America. We're very well positioned both strategically and financially to capitalize on our European and U.S. successes by enabling the development of attractive DTH and orbital neighborhoods in a growing number of emerging markets. As part of our global launch, SES is doubling the size of our teams on the ground serving emerging markets across Africa, Latin America, Asia and elsewhere. Our overall goal is to become even closer to our customers and positioned like no one else in the industry to understand and meet the needs of our diverse clientele.

Regardless of the market segment and the region of the world, as a global provider unmatched in customer centricity we will enable everyone from broadcasters to broadband providers to unleash new opportunities with SES.

Paul Weldon, ASC Signal

The European satellite communications market seems to have recovered quite quickly from the recent recession. Although traditional transponder frequencies (C-, Ku-) are saturated, this has probably helped drive the onset of Ka-band space segment. We see this as a significant opportunity for ASC Signal, given our proven mastery of Ka-band technology. Ka-band is a complex technology to work with as far as ground equipment is concerned, being subject to much more stringent criteria than the traditional C-, Ku- and even DBS frequencies. We do not believe the low-cost, less-sophisticated manufacturers will have proven solutions in the short term. This is not meant to sound

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like complacency as no doubt they will develop it in the medium to longer term. The onus will be on ASC to stay one step ahead, always looking to provide cutting edge technology.

Europe will always figure as a heavyweight, with operators such as Eutelsat and SES-Astra continuing to invest heavily in the sector, build for longer term growth and increase satellite transponder capacity. These are organizations of the highest professional calibre that would not be investing in such technology if they were not convinced of the market potential and the business case. On top of that, Europe is also very much a stepping stone for activities in adjacent regions such as the Middle East and Africa. There are clusters of European specialists and integrators with substantial experience in satellite technology who are also becoming adept at positioning themselves for markets outside the immediate European theatre. ASC Signal is tracking all of these movements in the European and worldwide markets and sees them as potential opportunities for growth.

Gil Ilany, Spacecom

Spacecom's research and market analysis show that the economic realities in Europe will continue to grow — with more growth in Central and Eastern Europe, alongside further growth in Western Europe. The company is ready for the future and currently is scheduling a new satellite, AMOS-6 to be launched in 2014 and co-located with AMOS-2 and AMOS-3 at 4 degrees W. AMOS-6 will include pan-European coverage, as well as coverage over CEE and the Middle East.

Spacecom continues to be bullish on the marketplace. In a more connected world, satellite operators will continue to be the choice for wide area broadcast, video contribution, data services, and backhaul. This will persist in Europe for the next decades and we believe that capacity requirements will advance and increase especially as broadcast and broadband Internet grow. More of the same market forces will affect Africa, Asia, and Eastern Europe — our key markets for the future. We are positioning ourselves to continue our growth as a multi-regional satellite operator with the launch of three new satellites AMOS-5, AMOS-4 and AMOS-6 planned for the next three years.

Ahsun Murad, Optimal SATCOM

Cost is always a consideration for companies looking to make capital investments in enterprise systems such as our satellite capacity management systems. One would think that we would see slower revenue growth; however, it has been quite the opposite. Satellite operators and services providers looking to increase operational efficiency and maximize profitability are highly motivated to implement integrated systems like the ECM. We expect to see continued strong growth in the European market for this reason, and due to the continued weakness of the U.S. Dollar against the Euro, since all our products are priced in that currency.

As I mentioned earlier, Europe is of strategic importance as it is a trendsetter for corresponding sectors in higher-growth, emerging markets. We feel that our established success in Europe will have a significant multiplier effect in other regions worldwide. Systems such as O3b, if successful, could significantly shift the world-wide equation for the satellite market and Optimal SATCOM is evolving to address this potentially game-changing environment.

Mark Dankberg, ViaSat

We think the bandwidth economics of high-capacity Ka-band will have a very influential effect on the global satellite data market. Obviously for that to happen on a global basis there will need to be high-capacity satellites in orbit also on a global basis. We also stress that it's not merely Ka-band that is the game changer — it's the bandwidth economics that come from Ka-band satellites delivering tens or hundreds of Gbps each — into markets that are open and competitive for satellite

services. The first place that happened was in the U.S. — where our WildBlue subsidiary pioneered the market for Ka-band, high volume, low cost services for home and business.

Eutelsat is showing that the business model can be applied in other parts of the world. While the U.S. is a relatively homogeneous market, the coverage footprint of KA-SAT encompasses literally dozens of countries with a wide range of economic situations and terrestrial networking infrastructure. We believe that the success of Eutelsat in such a diverse environment will help catalyze the global spread of this exciting new approach to satellite broadband services. And we believe ViaSat will be at the forefront in helping develop the ground and space technologies, and service business models, for innovative new telecom partners the world over.

Dr. Harald Stange, Romantis

Clearly, we have a marketing and sales target, which was discussed with our business teams as well as with shareholders and, as of this writing, we are slightly ahead of our target. We are also continuing to develop our global presence. Mid-year 2011 finds us having started our operations in Canada, which now allows us to approach North and South American markets with solutions

Steve Beaumont, Skyware Global

The march towards progressive digital solutions is unstoppable. The demand for faster and more secure communication vehicles is as rampant as ever. These two aspects work in the favor of a satellite solutions company like Skyware Global. Yes, the market is increasingly competitive, however, by offering a broad array of product solutions, a willingness to work in tandem with the customer all underpinned with a long and strong market presence Skyware Global are confident of our ability to continue to grow within what is effectively one of the more mature market places in the world. VSAT solutions are key here and the broad product range offered by Skyware Global enable us to penetrate the market where others become more restricted. Our expertise in high volume cost competitive manufacturing enables us to not only compete on a product benefit point of view but also ensure that our customers receive a highly competitive price. Value added products and service are also a key contributor to our on-going success. Working with our network of distributors and systems integrators across Europe significantly helps enter the newer markets and grow those where satellite solutions have been present for longer.

A company cannot be truly global nor wholly successful without penetrating the critical European market place. With a strong and growing market presence throughout Europe, Skyware Global continues to be well placed within both the Europe and the world to remain a market leader in the arenas we choose to compete in. Europe whilst well developed in many markets continues to offer both geographic and solution growth opportunities. Our plans involve a heavier concentration of resources in this market. The more traditional economic cycles tend to affect the core regions at different times thereby allowing for a compensatory effect as one continent suffers others bloom. The current conditions are therefore somewhat, albeit increasingly unusual. Fortunately the satellite markets remain buoyant as the drive for improved communication mediums expand and improved technologies are adopted. Skyware Global, with its long standing market position as well as its continued, indeed, expanding investment in its engineering capability enable us to be well positioned to answer all market calls with affordable, high quality and technologically advanced solutions. There is no doubt that Europe is a critical business market place, Skyware Global intends to continue to lead the way across the DTH and VSAT arenas.

Roundtable

Gabriel Racah, ORBIT

Maritime satellite communications continues to grow as shipping companies realize that always-on broadband communications allows them to streamline their operations and reduce overhead costs. From electronic charts and maintenance training to fuel savings and efficient routing, many of these maritime SATCOM solutions are led by European companies and adopted by European ship owners.

The satellite industry is an important domain in ORBIT's business. In view of the wide range of applications (communications, navigation, Earth observation, etc.) and the growing demand by both commercial and defense customers, we believe that this industry is inherently more resilient to the challenges of global economy and will continue to grow on a global scale.

Dimitrios Papaharalabos, Europe Media Port

The European satellite market is an exciting business area to be in. There are new satellites being launched every year with new capabilities and more capacity to meet the current and future needs of emerging digital technologies and new applications. EMP is a European based company with a vision to become an established player in the global satellite teleport industry with uplink solutions mainly via South East Europe and around the Mediterranean Sea to the rest of the world.

Doron Elinav, Gilat

We see the European market as having potential for growth — specifically in two main segments; consumer-based Internet connectivity through Ka Band capacity, and defense applications, such as On-The-Move solutions. Looking a bit further into the future, we think that the availability of Ka Band capacity will open new opportunities for additional applications and markets, such as DSNG and enterprise connectivity.

Anything that happens in Europe has an impact on the global opportunities, as well. This is for two main reasons: First, Europe is one of the leading regions in terms of progress of Ka-band and capacity, and as such, other regions are looking at the European example to see how to add Ka-band satellites. Many European satellite operators are global or cover additional regions, so their experience will be relatively easy to replicate on a wider scale. Second, Europe is in many aspects a hub to satellite services in other regions, such as Africa, Middle East and Latin America. What happens in Europe directly affects most of the globe, as the services originate from Europe.

Svend Lykke Larsen, KVH

There is no question that the world's economy, not just Europe's, has taken quite a hit in recent years. However, as a diversified company serving many markets, KVH is well-positioned to weather the storm. We believe that we are one of the few maritime companies that managed to grow through the toughest part of the global recession, and we look forward to ongoing success in the European market, and all the other markets in which we operate, in coming years. The commercial maritime market shows great promise, particularly as we offer high-performance, low-cost solutions like the TracPhone V3. These solutions can provide the outstanding reliability that commercial mariners need for safety and business efficiency, without breaking monthly communications budgets.

We expect that the European satellite market will continue to grow in the coming quarters and years, despite the current economic challenges. When economies begin to stabilize, we should see more activity in the commercial maritime sector, and a significant recovery from the yacht industry, as well. We expect that this strengthening of the European satellite market will support parallel growth in KVH's commercial and leisure maritime markets. As commercial mariners feel more comfortable expanding budgets for onboard communications and crew welfare, and yacht builders and owners feel more comfortable

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adding satellite communications and entertainment to a wider range of vessels, they will turn to the industry leader, KVH, to provide the most innovative mobile satellite technology and the best service the industry has to offer.

Peter Guggenbach, RUAG Space

We expect that the institutional European market will remain stable in the future. Thus potential for growth is limited in this segment and we see the main opportunities for growth outside this market segment, especially in the U.S. and in Asia.

We do not expect more growth in Europe as in other parts of the world. In the mid term, it will be more the emerging countries which drive growth on the commercial satellite market. However, as stated initially, the SATCOM market is not a regional one. Growth outside Europe means business opportunities for European companies, too. And European companies, including RUAG Space, are in a good competitive position to realize these opportunities.

Catherine De Peuter, Futron

The European satellite industry is second to only the United States in terms of overall financial strength; this ranking has remained constant in the past years and is expected to remain unchanged in the near future. The satellite industry lags behind other industries according to most economic indicators, because of its long lead time to get to markets, its truly global nature and its dependence on the government and commercial sectors to almost equal degrees. On the downside, if the economy improves suddenly, investments in telecommunications networks often go to the terrestrial networks, because they are more easily contracted for and often less regulated, or at least, more transparently so.

Europe is a global player, with strong satellite manufacturers and operators. Adding in the continent's financial foundation, Europe's largest actors are well positioned to lead international efforts. However, Europe's industry is highly concentrated. So while large European-based multinationals are highly competitive internationally, the region needs to stimulate entrepreneurial activity and small scale activity. There is a reason that SpaceX and Virgin Galactic are U.S. companies — the environment attracted global innovators. So looking forward, this is the type of macro-environment European leaders and decision-makers need to consider. This type of decision-support — which combines market, technical and business insight — is Futron's sweet spot. We have done well with European clients in the past, and look forward to adding value to their operations in the future.

John Restivo, Teledyne Paradise Datacom

The European market has the diversity within it to drive product development for our leading satellite modem and RF product ranges. The diversity of applications within the region, for example GSM backhaul in unregulated markets, drives development of new functionality, like LinkGuard™ a modem tool for identifying unwanted interference to satellite carriers. Equally the use of more compact flyaway's, driveaway's and fixed terminals in Europe drives the development of higher power density RF equipment that fits into smaller packages. All these developments translate into products we successfully market into other regions of the world to positively improve sales and returns to our shareholders.

Dr. Harald Stange, Romantis

The satellite markets in Europe are dominated by the broadcast sector, as well as some data and Internet services from Europe being driven into the EMEA region. It's different in the North American market, where all of the key VSAT equipment manufacturers are located. Moreover, such hardware companies have become complex service providers, launching their own satellites.

As I have already mentioned, we are on the way to having vertically integrated business here in Europe that will serve service demands in our region and we will also be able to compete in a global market, as well. A certain part of the VSAT market will be taken by the recently launched Ka-band satellites, but such is primarily targeting the consumer market — there won't be so much of an effect on the enterprise market. We're concentrating on B2B solutions based on traditional Ku-band satellites, but also working on our own Ka-band products for enterprises, as we foresee some oversupply of HTS capacities with interest from operators who wish to diversify these satellites services into the B2B markets, as well.

John Suranyi, Sencore

We are very optimistic about the near future and see huge growth potential for Sencore solutions in the European marketplace. In fact, industry studies show that the global broadcast and media technology sector is staging a strong recovery in the aftermath of the recession — which bodes well for technology providers.

Content providers around the globe are looking for ways to move their content into new markets and geographies. As analog TV systems are shut off and digital standards are adopted worldwide, the need for new satellite distribution networks will continue to rise. As a key provider of equipment and services for the delivery of high-quality compressed video services over satellite, Sencore will continue to serve these emerging and expanding applications.

Mary Cotton, iDirect

The European market is a financially mature market, and despite some of the big issues being experienced by EU states with respect to their own economies, such as Greece and Ireland, we're still growing our business, and we're doing so through segmentation. It's a part of our strategy within the Western and Central European markets to become more relevant to customers within the key verticals and segments. Because of the economic issues in Western and Central Europe, iDirect is looking at emerging markets, particularly Russia and CIS, and determining how to become more focused and segmented.

Our success in winning the ground infrastructure project for Global Xpress with Inmarsat has expanded our reputation, specifically in the European satellite market. It illustrates our expertise as a company in handling very large network opportunities and turnkey projects as well as supporting emerging Ka-band opportunities. Inmarsat is headquartered in the UK, and their emergence into the Ka-band arena will have a dramatic impact on our industry, as will the emergence of other satellite operators in the region.

In general, the emergence of Ka-band is going to change the industry; it's the biggest game-changer since TDMA. This will be a significant and positive change within Europe. iDirect has a detailed understanding of the requirements most critical for success with this new technology. Our primary advantage lies in our technology approach; the band-agnostic nature of iDirect hubs and remotes means that we're ready to work with Ka-band today.

Roundtable: European Satellite Markets

Phillippe Manzano, Globecast

For the time being, video has been quite a resilient market segment. The slowdown in the advertisement business, which occurred in 2009, was quite a short one. Of course, new projects have more difficulties to emerge in the present situation. We, however, consider the European video market as viable over the next year or two. HD is still a big growth opportunity in this market.

Other markets offer higher expectations in terms of growth. Europe, however, is a key market for GlobeCast, stable and trustworthy, with plenty of business opportunities. In terms of technology, being a mature market, technology trends often begin here and then spread to other regions of the world. So keeping an eye on this crucial region can offer clues as to where the global market as a whole is going.

David Hochner, SatLink

We see the European market as a growth driver. With our partners and our business located on the continent and with the growing demand for world-wide connectivity, we view Europe as a continuing market. We tend to look at markets at increments of 5-10 years and with further advances in satellite and fiber technologies, the markets in Europe as well as those that are more pan-European should continue moving forward. Opportunities for growth are many. Some of these include the opening data, broadcast and mobile markets linking Europe to Africa, while others are the broadcast markets with a need for increasing digital broadcast services.

Because the European satellite operators are world leaders, their actions have great impact on the global satellite industry. Operators such as SES WORLD SKIES and SES ASTRA are based in Europe. With their global coverage, they are able to be leaders around the world. Additionally, Eutelsat is an industry leader whose coverage also is outside of the European continent. Operators such as AMOS, though not located in Europe, operate their fleets for the European market and have strong penetration among local operators. SatLink works with all of the above, acting to link Europe with the rest of the world and thus their operations affect our services and create opportunities for our company.

Howard Hausman, MITEQ

The European market is the most important foreign market to MITEQ. At the beginning of the economic crisis, capital was hard to attain so projects were put on hold, but the demand was still there. People want more connectivity all over the world. Satellite communications is a key portal to attain that connectivity so I expect continued growth. Growth for a subsystem manufacturer like MITEQ is in increased demand, requiring better utilization of the limited available bandwidth. Maximum utilization of this limited bandwidth is accomplished by designing higher precision and higher technology equipment, which is what MITEQ does best.

Roundtable: European Satellite Markets

New business and new technology is usually rolled out in the most active markets such as Europe. People are the same all over the world and demand the same connectivity, what happens in the US, happens in Europe, happens in the Far East, and happens all over the world. MITEQ services the satellite communications industry over the entire planet and looks forward to growth in any and all areas of the globe.

Roberto López, Hisdesat

In the current context with important economic and financial problems in virtually all the Western economies, it is certainly more difficult to grow in terms of new contracts and investments. It is also true that the use of new technologies for the development of space communications is a must for developed countries. The information provided by the satellites is increasingly essential and is being incorporated naturally into our daily lives. The ability to predict natural disasters, imaging for high-resolution mapping, planning agriculture crops, promote the maritime safety of our vessels, facilitate military operations, etc, are enough reasons to bet on an industry that puts the space at the service of society. These capabilities improve the quality of life of all citizens and have become key elements to transform our environment in a friendlier place to live in.

The challenge consists of offering services that are useful, efficient and sustainable from a financial point of view. In this sense, the cooperation public-private partnerships are a good way to overcome the current crisis.

Europe plays a significant role in the global satellite market. Projects are becoming more numerous and have a coverage that spans the globe. We are no longer a niche market to move forward with a global and open vision of the future, supported by both, public and private agencies. In this sense, it is essential to count on the support of the European institutions that have capabilities in the space sector to promote the development of a market that is increasingly efficient and competitive. This is the best and only way to succeed globally.

Dr. Matt Perkins, SSTL

SSTL sees two areas of significant commercial growth. Firstly, in telecommunications there seems to be an ever growing demand for bandwidth which leads, on the one hand, to demand for very large satellites. However, somewhat paradoxically, as many communications satellites get bigger, a market for smaller satellites is created as not every operator needs the capacity of a very large satellite. We see this market developing on two fronts — additional services such as Ka-band broadband services and also growth from new entrants, typically smaller organisations or nations wanting their own system rather than relying on bandwidth purchase.

The other big growth area in commercial space is in Earth observation — we believe initiatives like DMC3 will really open up peoples eyes to the amazing things that can be done with the current generation of small satellite technology. One trend that worries us is the provision of “free” data, for example from the EU/ESA GMES Sentinel satellites, which has the potential to undermine the business cases for commercial providers and operators. This needs to be carefully studied as it could hold back new commercial systems for a long time.

As a U.K.-based manufacturer, we see Europe as our “home market” and it is, therefore, very important, with SSTL supporting institutional and commercial programs in Europe. However, SSTL has always operated globally and many of our customers are outside of Europe. SSTL will continue to operate globally. For example we are currently building satellites for Nigeria, Canada, Russia, and Kazakhstan, and in 2008 we created a U.S. subsidiary to address the U.S. market.

Steffano Vittor, Vizada Networks

We have a positive approach to growth in services from the European market for the coming years, mainly driven by the strong growth in emerging market countries that European industry wants to capture its equal share of. We also see an increased interest in the exploration and production of natural resources within the same areas. All of these create business opportunities for a remote communication services company like Vizada Networks

As a recognized European Satellite Services company Vizada Networks will continue to expand globally following our customer base wherever their business opportunities will take them and with continuous focus on providing robust, reliable and state of the art services.

Arnold Friedman, SS/L

European satellite operators have a healthy growing business both within Europe and outside of the continent. We work with SES, Eutelsat and Hispasat who provide services around the world. Some of their growth comes from providing services in Latin America, Southeast Asia, and the Middle East, but there is also significant growth in parts of Europe for services such as broadband and HDTV.

Kai Koppenburg, WORK Microwave

The European market has tremendous potential for equipment manufacturers to serve the needs of global users. WORK Microwave provides high-end, sophisticated equipment that brings the latest technologies such as IP-traffic via satellite, Ka-band, and multistream technology, to our users. We believe that our market leadership and our range of superior products will enable us to continue to differentiate ourselves even in a competitive and economically strained marketplace and give us the opportunities for growth.

The growing global demand for communication solutions especially in evolving geographical markets like Africa, Asia, and the Middle East will have a direct impact on the business of the European system integrators serving these markets. As a result the European satellite market will see an increase in business opportunities. WORK Microwave is ideally positioned to take advantage of the rising wave of growth opportunities and expand its business through a combination of technology leadership and cutting-edge, sophisticated products.

Bruno Dupas, Integral Systems Europe

These are major opportunities for Integral Systems. As the leader in providing complete, commercial-based ground segment solutions, we are able to provide our customers with cost-effective, efficient alternatives to proprietary systems that are in-flexible, expensive and hard to manage.

Last month, we announced that Kratos Defense and Security Systems completed its acquisition of Integral Systems and may questioned how such will impact European operations. As part of Kratos we can now leverage the resources of a nearly \$1 billion company that has deep expertise in communications as well as markets that are complementary to ours. Kratos has particular strength in Situational Awareness (SA) and Command and Control (C2) technologies that provide a complete 360-degree view across the entire communications and information infrastructure. It has only been a month since the acquisition, but we are already seeing the first of many significant synergies in areas such as UAS systems and cybersecurity.

Roundtable: European Satellite Markets

We expect the relationship to be of particular benefit to our international military customers as we reach into Kratos' long history of providing engineering and communications services to the U.S. defense and intelligence community, including products and services that are used in some of the largest, most complex and most security-conscious networks in the world.

Joerg Schmidt, DEV Systemtechnik

Europe is a very dynamic and competitive marketplace. To compete successfully, and establish the strong position we currently hold, with the loyal customers we now serve, we have had to demonstrate consistently over the past decade, the performance, innovation, reliability and value we offer customers in Europe. As the field-proven supplier of choice in Europe, we are also in a great position to support the global growth of our Europe-based customers as they expand into global markets. At the same time, customers around the world, are increasingly becoming aware of the DEV reputation for valuable, quality solutions.

Jani Lyrintzis, EB

The opportunity for MSS in Europe will continue to rise, especially as new use cases emerge and MSS technologies advance to allow end-users the ability to connect to the "cloud" over satellite. Although connecting to the cloud over a MSS platform or device is still in a burgeoning phase, it is another example of the European MSS opportunity that will keep users connected, wherever they are.

Jesse van Straaten, Vizada

Due to the economic environment in Europe and the rest of the world, we have seen a slow down over the past few years, especially with the shipping companies who were reluctant to pay for new technologies because of the required investment in the newer systems. However, even during the economic crisis, we saw that cost-efficient communications is vital to the operations of the vessel — which lead to the fact that we as Vizada developed new solutions for cost-efficient communications. The crisis hasn't fundamentally affected the usage of satellite communication.

That being said, the European satellite market is one of our key strategic geo-regions and continues to be a focus for growth and development. We are proud to offer a global reach with our international sales teams and our regionally located distribution network of partners. The positive trends we see in Europe also have an influence in the rest of the geo-regions. Vizada is also looking forward to market growth in other areas of the world such as Asia Pacific, which is following the general trend of the global economy. ↩

SES Expands On The Ground: Getting Ready For Tomorrow's Broadcasting Demands

by Chris Forrester, European Editor, SatMagazine

SES is investing heavily in its ground-based infrastructure as well as in new satellite capacity. This past few days have seen two celebratory events, one to lay the foundation stone on a major expansion of facilities at its Betzdorf headquarters (see separate box), and earlier this summer the official opening of its impressive new Astra Platform Services play-out centre near Munich, Germany.

Indeed, it is sometimes difficult for strangers to imagine the importance of Munich to Germany — and now international — TV. It is a region whose media businesses directly employed 371,000 people in more than 29,000 different firms and generated €72 billion in annual revenues. It isn't Los Angeles, or London, but Munich in Germany, which is more or less the headquarters of Germany's media industry. Of course, there are plenty of other hot-spots, not the least Cologne (HQ for RTL) and Berlin, but Munich has almost completely cornered the media market.

Munich, and in particular its suburb of Unterfuering, can best be described as sitting at the crossroads of German broadcasting. At its heart is Astra Platform Services (APS), sitting on Beta Strasse, but at the junction of MedienAllee and ZDF Strasse. APS is in some impressive company, across the road from Sky Deutschland's brand-new HQ, and just 50 paces from Germany's second public broadcaster ZDF. Right next door is Kabel Deutschland's HQ, and a stone's throw away is commercial TV giant Pro7/Sat1, while around the corner is a Bavaria Film Studios facility.

APS counts almost all these names as very regular clients. But it also has a major customer operating some 8400 kilometres away, in Johannesburg, and in the shape of Top TV. Handling Top TV's extra 60+ channels was one of the reasons APS started building a second Network Operations Centre (NOC). Stefan Hennecke, CTO at APS, says Sky Deutschland remains their largest customer, "but we have enjoyed good channel growth over the past six months. Since 2004 we have grown three-fold and now handle more than 300 channels, and are constantly adding new channels and services."

Hennecke explains that APS' role is to make channel play-out seamless for clients and viewers. "For example, we recently had to handle a change of location for N24 [a German all-news channel] which was bought out by its management from Pro7/Sat1, and the technical service for the channel moved from down the street [from Pro7's HQ] to here! It could have been miles and miles away, it would have been just as complex an operation, but we switched over for them on January 1st. There was considerable time pressure on them and us, and we only won the contract last September. They had to extract themselves from every aspect of their previous home, including all their ingest which is based in Berlin and all their back-office systems, and to make matters even more challenging we had to handle the links to their new Media Sales agency. Play-out and the full automation system for the channel is based here in Munich. They operate live until early afternoon, and then we take over from here. This mixed operational approach is, I think, quite unique. However, they have full access to over-ride our automation system so that when something major happens, like the Japanese earthquake, they re-take control and on that occasion ran a 24-hour schedule from Berlin."



Astra Platform Services (APS) antenna farm

Hennecke adds that what N24 wanted, as with the bulk of his other clients, was a highly-secure environment, with complete systems redundancy extending well beyond simple power back-up installations. "All their archive is kept here, again with full access for them, so they dip into for their own production and promotional use. Given that most of our clients use us for, can I say, fairly predictable movie or series channels, this one is especially dynamic."

"It is the same with the new demands for handling channels to smaller screens, whether computers, iPads, iPhones and the other variants, and the new breed of so-called 'connected TVs' and Over The Top services," admits Hennecke. "There is a strong demand, a strong trend, to see more of these services added by clients. We can already play out to dish viewers, to cable head-ends, and streamed services to these new devices. All of these services are straightforward for us. The next step for many of our customers is those 'on demand' services. We already have the Media Asset Management skills here, complete with encryption and the other needs of any broadcaster. More importantly, perhaps, we can be highly competitive. The broadcast industry today faces some key questions. It used to be that every small town had many video rental stores. They are vanishing, but how will the demand be replaced? Will it be one or two national or international VOD service providers, or might there be 20, or 50 or 100? We don't know. But I suspect that recommendation service engines, as part of the EPG or an online service, will be important. How will this be integrated into a video or service stream?"

A Client Of The Major Kind

Sky Deutschland is another major client, and is also rapidly adding channels including HDTV and 3D-TV offerings. A recent addition is Sky Sports News HD, and adding more than 100 staff for the service. Sky D's subs base has grown a net 183,000 during 2010 to today's nearly-three million homes.

Sky's channel growth is useful to APS, but where are the new demands coming from? Hennecke said that its growth over the past few years meant that fresh investment had to be made. "Our operator's room had 20 full racks of equipment and there was no space for growth. That had filled in less than two years, so

Using APS, and operating from 8,400km away...

- ◇ *Outsourcing, under the Top TV brief, meant APS had to create a system from scratch that operated seamlessly, with NDS conditional access encryption as well as integrating an EPG service, along with systems for programming schedules, metadata gathering and a professional Media Asset Management solution for the opening bouquet of 53 TV and 25 radio channels — and space for expansion. Subs have grown far faster than anticipated and many new channels added. In July Top TV beat off tough competition from well-established MultiChoice and others to win SatCom's Star Award as 'Best Satellite Broadcast Provider for Africa'. TopTV's citation highlights the company's move into TV's new directions, namely its MPEG4 transmissions, and that TopTV has helped bring television entertainment and information to the previous "not haves" of society.*
- ◇ *Frans Lindeque is Top TV's COO. "We looked closely at the world's best service providers in the broadcast media industry, who could have done a very good job for us, but when we looked at the standards being suggested by APS, they were impressive. Their overall performance and the quality levels they met were superb. In fact, the APS operational standards are incredible. Just look at the way they operate in Munich, look at the way they built their own systems. It has all been done so professionally. The team, and the support we got from them, was absolutely stunning. We know they're growing and we'd like to grow with them. I'd like to think that the contract and the relationship were governed by a technological rapport where we all wanted to do the very best we could and with sensible pricing.*

expansion was not a difficult decision to make. We now find that our planned-for growth is in fact happening faster than we anticipated. But what also needs fresh rack space are the new services we are now adding for clients. It is nice to have a new building, but our plan is to cope with growth for the next five to eight years from here and to have the flexibility to add more power, and more air conditioning and more monitoring equipment, as it is needed. This is why we started from scratch. The old building could have coped with a little more but we were also at the end of our flexibility in adding fresh cabling and circuitry, hence the wish to start again. We also wanted to avoid the risks and problems associated with making key alterations to an existing 24/7 facility. Every engineer knows that there are major risks to that strategy."

Hennecke says APS is now geared to offering services almost anywhere on the planet. He says Africa, the Middle East and Central/Eastern Europe are all firmly in their sights. "The task for us is to overcome the sales hype from our competitors

and to show potential clients how extremely efficient we are. But these countries, well outside Germany's borders, are where we will be operating. We have new capacity coming on stream in all of these locations, and places like Africa represent a great opportunity for us. We are perfectly situated to get signals into Africa, and the European content that we already handle is extremely attractive to some potential customers in the Continent. We are working hard on some ideas, and at a reasonable price level. It is highly competitive, but we know that quality, plus our proven track record will help. And this new facility allows us to scale, not just in the number of channels we can handle but in the growing number of additional services that clients want. We now have that space to add new channels."

APS' parent company SES is also responsible for marketing the Ku-band capacity on YahSat, a brand new satellite serving the Middle East and owned by the Abu Dhabi government. Asked whether APS hoped to win contracts out of and into Abu

Portfolio Extension

- ◇ *APS has expanded outside Europe. APS today serves the operation of some 300 TV channels with dozens in High Definition, 3D-TV channels, plus 42 radio channels and 59 data services. These data services are growing fast says APS, as broadcasters tap into delivering programming into multiple devices. The new playout centre will complement the existing premises which continue to operate as a physical back-up.*
- ◇ *Wilfried Urner, CEO of Astra Platform Services, says: "In the past years our customer base has doubled. We have entered new markets such as South Africa and added new services such as Digital Asset Management. The new playout centre will open up further growth opportunities for our fast growing company, and allow us to further develop our product portfolio and expand geographically. It therefore represents a very important milestone for our international growth strategy."*

Forrester's Focus



APS Master Control

Dhabi for Middle East viewers, Hennecke's face broke into a wide grin: "We're hopeful," he admitted.

APS Infrastructure Offerings

- Fully redundant power distribution system equipped with invisibly switching capabilities (invisible switchover between the two systems in case of maintenance etc.)
- Air condition system based on groundwater cooling technology
- Two-stage fire detection system with early fire detection
- Latest generation of Harmonic SD and HD Encoders and Multiplexers for DVB-S/DVB-S2 distribution
- Fully Redundant Snell Sirius 800 routing system
- BFE router control system



APS Opening Ceremony

- Harris Predator Multiviewer systems for service monitoring
- LED Backlight 46" screens and LED room light to minimize heat dissipation in MCR
- In house developed monitoring framework for error detection and display. ↩

About the author

Chris Forrester is a well-known broadcasting journalist and industry consultant and has been reporting on the "broadband explosion" for more than 25 years. Since 1988, Chris has been a freelance journalist who specializes in content, the business of television, and emerging applications, on all delivery platforms.



SES Is Also Busy At Betzdorf

- ◇ *SES' senior officials April 26 laid the foundation stone at a new €34m satellite control centre at its Betzdorf, Luxembourg headquarters. The expansion plans will also see an additional business centre constructed at Betzdorf. Part of the brief is that Betzdorf is ready for the O3b MEO constellation.*
- ◇ *The construction project will include a new Technical Building with associated office space to handle future needs for SES' expanding global satellite fleet of 44 satellites, and an extended antennae field. The new facilities will also host the Satellite Operations Centre (SOC) for satellite infrastructure start-up O3b, whose MEO (Mid Earth Orbit) constellation of initially eight spacecraft will be flown out of Betzdorf starting 2013. Next to the new 5,000+ square metre Technical Building, the extended antennae field will be capable of holding up to 40 large scale satellite communications dishes with the ability to cover an orbital arc over Europe stretching from 62 degrees West to 70 degrees East. SES is also investing in a new 3,500 square metre energy-efficient Business Centre for developing SES divisions, and to host third-party activities on the Betzdorf Mediaport.*
- ◇ *The SES investment is accompanied by a significant investment from the Luxembourg Government and the Commune of Betzdorf, whose contributions will add 3.2 kilometres of roads, water, gas, electricity and vital communications lines to the Betzdorf site, and will be complemented by a new local power grid station and water tower.*

Advances In Vibration Qualification Testing

by Noel Brown, Peter Sims, Julian Simpson and Kim Boldt of Brüel & Kjær

Since World War II, vibration testing has gone hand-in-hand with aerospace and space development. The latest developments in this technology have led to synchronization with data acquisition and has benefitted satellite qualification.

Satellites appear to have a serene life — floating gracefully in orbit, their forms seem untroubled by the Earth-bound stresses of gravity and vibration. However, that same mass of technology has to endure being stowed as the unhappy payload of a launch vehicle. There, the satellite must endure the noise and subsequent vibration of the ~145 dB interaction between the rocket engines and launchpad environment, the jarring transonic climb phase, pyroshock as stages separate, turbulent boundary layer excitation, and more besides. These forces can induce fatigue in resilient metal structures, not to mention the sensitive electrical components of satellites.

Given these huge stresses, and the fact that damaged satellites cannot be easily repaired once deployed, it's vital they are thoroughly tested before their violent ride into orbit. Qualifying the durability of satellites is a critical stage in their development, helping to prevent sending useless objects on one of those expensive trips into space. Consequently, the space industry probably has the most demanding requirements for vibration testing, and indeed, the development of vibration testing techniques has been closely connected to the aerospace and space industries.

The concept of vibration testing as we know it today is relatively new and has been continuously developed since its origin during World War II when the impetus was the desire to test parts and equipment for use in aircraft. Even then, structural and mechanical failures due to vibrations were not the only problems, as the use of complicated electronic and electro-mechanical equipment made control systems and communication instrumentation sensitive to the vibrations encountered during mobile operation.

Space Applications

Depending on the stage of a project, different testing regimes are adopted to establish the robustness of components, subsystems, and fully assembled satellites. Design qualification tests are usually carried out on a structural model — a complete physical replica — during the development phase, in order to demonstrate that the design enables the equipment to withstand the vibration levels it will see during launch, as well as a qualification margin. The tests also allow verification of the spacecraft's mathematical model by measuring motion at 'resonant frequencies', at which elements of the spacecraft structure are prone to self-vibrate once vibration is initiated. Then, acceptance tests are carried out on the actual flight model of the satellite, in order to verify workmanship and ensure the equipment does, indeed, operate satisfactorily in its final configuration and will not degrade during launch.



Stresses are few once safely floating in the weightless realm, but satellites have a hugely perilous and expensive journey to get there.



Test Hardware

Vibration tests are conducted with mechanical shakers. These shakers come in a variety of sizes and operating configurations, ranging from small, permanent-magnet types to the larger, electromagnetic units. Small or medium shakers can be cooled using ambient air, while larger shakers require a water-cooling system. In Brüel & Kjær's LDS V900-series of shakers, water-cooling is applied to the field coils, resulting in quieter operation and a cooler body temperature that minimises the temperature effects on the equipment under test. This makes water-cooled shakers ideal for applications requiring high forces, or large payloads tested for short durations. The absence of air blowing around the shaker and test equipment also makes water-cooled shakers particularly appealing in clean-room environments. Combining four large shakers in a custom quad setup is a typical way to test the largest assembled satellites.

Controlling the mechanical shakers is a power amplifier that provides the current and voltage. In turn, a vibration controller governs the signal that is sent to the amplifier, while interfacing with a computer that allows the operator to enter test parameters and observe channel information. The controller provides a low voltage drive output to the power amplifier by using a closed-loop control method. Through this, it constantly monitors and modulates the output drive signal, ensuring it meets the programmed specification.

Meanwhile, accelerometers measure the applied vibration levels on the actual shaker. This serves the purpose of controlling the test by supplying feedback to the controller, so that any difference between the output drive signal and the physical vibration performance of the shaker can be compensated for.

New Control Architecture

When dealing with complex test objects such as satellites, controlling tests accurately is difficult. The core concern for vibration qualification testing is the safety of the test object, so the large amount of different modes in which the satellite can vibrate require monitoring and control feedback to be effected

from as many points as possible. After all, breaking the structural model during testing would be a significant setback — however, breaking the flight model would be a disaster. Consequently, the latest generation of vibration controllers, such as Brüel & Kjær's VC-LAN, offer many channels for control and limiting of diverse points on the satellite.

With a modular concept such as the VC-LAN has, these controllers can be combined to allow as many as 64 channels for control and limiting of complex structures, with more than 1,000 channels of abort monitors possible. Such allows the test to be instantly stopped by a single overload at any one of those separate points. This channel count comes from advances in connectivity that allow integration with data acquisition hardware via a standard LAN connection. Brüel & Kjær's PULSE data acquisition has similar modular architecture, so with the two systems a scalable solution is achieved, with essentially as many abort monitors as necessary.

Setup Simplified

Setting up tests is a laborious part of satellite testing that typically takes far longer than the test itself. The operator is responsible for correctly attaching the unit under test to the shaker, attaching accelerometers, and the general preparation of the setup. Finally, the operator programmes the controller and observes the vibration test to completion. Understandably, the setup process is very open to errors, meaning that user-friendly simplicity is highly prized.

Integrating data acquisition and vibration control brings great benefits throughout the vibration testing industry, but it comes into its own in the field of satellite testing by providing



concurrent and integrated data acquisition with hundreds of input channels. Since testing and development centres on data, the ability to combine data collection with the same setup that controls the test has the potential to save a huge amount of time and effort. Setup time, resources and errors can subsequently be drastically reduced, while the capital investment is limited to one intelligent system that can be reconfigured at leisure.

Advanced Technology

The modern drive to save time and simplify testing procedures has caused developers of the new generation of controllers to invest a significant effort in technological solutions. Consequently, setup problems such as signal under-ranges and overloads can now be virtually eliminated. This is thanks to dual, parallel analogue-to-digital converters that work in harmony to deliver an exceptionally wide 130 dB dynamic range for the input channels, without multiple-input voltage range circuitry.

Consequently, setup errors are greatly reduced and initial ranging can be completely eliminated. For tests with multiple input ranges this brings a significant benefit, as testers previously had to run a preliminary low-level test to make sure all of the input ranges were properly set for the full-level test, and wouldn't result in overloads. In the past, getting round this problem by setting all of the inputs to full-scale was not an option either, as it would result in a loss of data resolution on low level signals. With the new technology however, right-the-first-time data capture is automatically taken care of, reducing the testing stresses that satellites have to undergo, as well as the risk of producing unreliable data



— and possibly having to repeat the test.

Controlling a vibration controller is usually the domain of a dedicated PC, and the modern controllers interface via a standard LAN connection. Via a router, they can subsequently be operated wirelessly, if need be, or otherwise located very close to the shaker. In addition to reducing cabling, which can present a significant problem, the entire test can thus be analysed and run remotely. In fact, the VC-LAN features full stand-alone capability with a built-in battery backup to safeguard against power failure. Besides this, the controller can operate without a PC, allowing tests to be programmed and then operated without a PC attached — further insuring against unwanted actions.

Ultimately, it's all about data, however, so an embedded database makes it quick and easy to recall test setups and data, featuring keyword searching. Using the ASAM-ODS industry standard file format is important to make it easy to share data with other users, and interface with standard programs like Microsoft® Excel®. Simplified reporting is another factor that is hugely appreciated by testers, who can thus spend their time doing what they do best, while the software takes care of the rest. ↩



Executive Spotlight

Patrick Shay, Vice President & General Manager, Data Services, Iridium

Patrick Shay has more than 20 years of management experience in the telematics industry with specific expertise in the GPS and wireless markets. As vice president, data services, Iridium Communications Inc., he provides the strategic leadership necessary to guide the company's growth in this rapidly expanding segment. Under Shay's direction, the Machine-to-Machine (M2M) business continues to be the fastest growing market segment at Iridium, serving customers in industries such as transportation, maritime, aviation, oil/gas and government. He is also chair of the ProTECTS Alliance, a global industry group focused on the promotion of two-way emergency messaging and tracking solutions with more than 40 members worldwide. Prior to Iridium, Shay held vice president positions at Hughes Telematics, Sirius Satellite Radio and Rand McNally where he created and launched innovative new services in the wireless and GPS marketplace. Mr. Shay began his career with Motorola, where he led the global sales team for the company's GPS and Telematics business.

SatMagazine (SM)

It's been two years since we last talked. At that time, you had recently joined Iridium to head up the company's data services business. Before we get started with questions, please refresh our readers' memories as to your background in the field and your current responsibilities with Iridium.

Patrick Shay

Sure. It's great to talk with you again, and I have a lot of exciting news to share with your readers. By way of background, I was deeply involved in integrating GPS and wireless devices with

Motorola during the early phases of what eventually became the booming telematics industry. I also served as vice president of data at Sirius Satellite Radio, where we created and launched a variety of data services. As vice president and general manager of data services for Iridium, my team works closely with product management and the engineering team to help shape global market requirements for Iridium data products and services. I am fortunate to work with a talented and tenured team, and we work closely with our growing ecosystem of value-added



The Iridium 9602 short-burst data modem, smaller than a matchbook, provides an embedded solution for a wide range of tracking, monitoring and messaging devices.



Executive Spotlight

partners who spearhead our penetration into newly evolving, higher-volume market segments for mobile machine-to-machine (M2M) data.

SM

We understand M2M data is Iridium's fastest growing vertical market. How fast is it growing?

Patrick Shay

As of the end of the first quarter of 2011, our commercial data subscribers grew 62 percent compared to the same quarter in 2010, and our government data subscribers grew at 80 percent, year-over-year. This is a substantially higher growth rate than our commercial and government voice service subscribers.

SM

What is driving the rapid growth?

Patrick Shay

Market demand for mobile data is booming in the government, consumer and enterprise marketplace, including vertical segments such as transportation and telematics, safety and security, maritime, aviation, utilities and industrial. Large

organizations both public and private are integrating mobile data into their enterprise resource planning and logistics management infrastructure, in a move to improve visibility over assets and supply chains. In the consumer arena, GPS-enabled mobile phones and messaging devices are giving rise to a totally new Location-Based Services (LBS) industry market. To a large extent, the proliferation of GSM/GPRS wireless networks around the world has been driving this growth. A recent Frost & Sullivan report projects that the number of cellular mobile data connections will exceed 400 million by 2017. Iridium's M2M business is a subset of this growth, and we are riding this overall market wave.

The fact is that only about 10 percent of the Earth's surface is reached by terrestrial wireless networks. What about the remaining 90 percent? The only practical alternative is two-way satellite data links. There is an enormous market potential in satellite M2M, and Iridium is uniquely positioned to seize a large market share in it. Tim Farrar, an industry analyst with TMF Associates, estimates that the addressable worldwide market for low-data-rate satellite M2M devices will grow by more than 20 percent annually to more than 3.4 million units in service by the end of 2014.

Executive Spotlight

SM

What is Iridium's value proposition for M2M?

Patrick Shay

Iridium is the only mobile data communication carrier providing coverage over the entire face of the globe. Iridium's constellation of 66 low-Earth orbit (LEO) cross-linked satellites provides latency of less than 60 seconds for end-to-end delivery of data messages anywhere on Earth. Importantly, Iridium short burst data (SBD) provides full duplex (two-way) data connections. This means data can flow both to and from the mobile data device, enabling remote programming and interrogation capabilities. As the world's furthest reaching communication network, we offer a standardized data communication vehicle that works across trans-national borders, and covers the large parts of the world without reliable GSM/GPRS coverage. In many cases, our partners are bringing to market dual-mode GSM/GPRS and Iridium devices with the least-cost routing and automatic failover to Iridium when beyond the range of terrestrial towers.

SM

Tell us about the new SBD device you introduced last year.

Patrick Shay

The Iridium 9602 SBD Transceiver is a major driver of our rapid growth in satellite M2M. The matchbook-sized Iridium 9602 is 69 percent smaller, 74 percent lighter and considerably less expensive than the first-generation Iridium 9601 SBD transceiver, which we designed the Iridium 9602 to replace. The unit's very small form factor and low power signature offer greater flexibility to value-added manufacturers (VAMs) and resellers (VARs) embedding the Iridium 9602 into their products.

SM

How has the marketplace accepted the Iridium 9602?

Patrick Shay

In a word, spectacular. We are working with more than 90 value-added partners who are embedding the Iridium 9602 module into a broad range of GPS tracking, monitoring and remote control solutions. Many of these are dual-mode satellite/cellular devices with least-cost routing software and automatic failover to the satellite data links when out of range of cell towers.

The Iridium 9602 is a game changer for Iridium and our partners. Until now, we have mostly found our SBD M2M applications used in niche markets such as automatic tracking of helicopters and vehicles as well as telemetry from remote scientific instruments. Now, with the smaller, lower-powered Iridium 9602, we are dealing with partner companies serving much broader enterprise and consumer markets.

Probably the most exciting prospect is our entry into the fast-growing personal tracking, messaging and SOS alerting market. Several of our partners, such as DeLorme, Track24, ACR Electronics, NAL Research and Blackbird, have already announced their new Iridium 9602-based handheld devices for two-way tracking and messaging. Others will hit the market over the next few months.

SM

When we last talked with you in 2009, you were involved in forming an industry group to promote standards for personal satellite emergency notification devices (SENDs). Can you give us a report on the progress made in this area?

Patrick Shay

I remain the chairman of the ProTECTS Alliance (an acronym for Promotion of Two-way Emergency Communication and Tracking Systems), which provides a bridge connecting the manufacturers and suppliers of these devices and the global search-and-rescue (SAR) community. One of the primary goals of the alliance was to address the pressing need for minimum standards for these products, especially in how they interface with the SAR first responders who must respond to SOS messages from them.

We formed a close relationship with a Special Committee of the Radio-Technical Commission for Maritime Services (RTCM), which was already working on creation of an industry standard for SEND products. One of our first achievements was to work with the National Search and Rescue Committee (NSARC) to develop a standardized message format for emergency messages meeting the requirements of SAR organizations such as the U.S. Coast Guard, U.S. Air Force and others. I'm happy to report that the RTCM SEND special committee voted at its April 2011 meeting to approve the standard and present it to the industry and related government organizations soon. Our next step will be to address how private, commercially-operated message centers refer SOS calls to appropriate first responder organizations with jurisdiction over the location of each emergency.

SM

You mentioned that the ProTECTS Alliance aims to foster two-way data connections. Why is that important?

Patrick Shay

Two-way communications solves one of their most pressing needs for the international SAR community — reducing false alarms. A return link allows first responders (a) to determine whether the SOS message is legitimate or a false alarm caused by an accidental activation or user misunderstanding, (b) determine the nature of the emergency so they can respond with the appropriate resources in the most cost-effective manner, and (c) reassure the sender that help is on the way.

SM

We see that your satellite replenishment program, Iridium NEXT, appears to be on track for launches starting in 2015. How will Iridium NEXT affect your data services business?

Patrick Shay

Iridium NEXT will enable data speeds up to 1.5 kbps in the L-band, and much higher for certain specialized data applications through the Ka-band feeder links. Importantly, Iridium NEXT will be backward compatible. That means all of the products being brought to market now will be able to operate on the new constellation without modifications.

SM

Lastly, what projects have you completed that bring the broadest smile to your face?

Patrick Shay

Actually, it's not what we've completed so far that makes me smile. It's the prospects for the future. We are poised at the brink of a growth market with an opportunity to seize a commanding market share. At Iridium we have a spectacular team that is continuing to shape the future of the mobile satellite data communications marketplace. ↩

For further information regarding the Company's products, head over to Iridium's website at <http://www.iridium.com/products/>

Department Header

Event: SATCON 2011



For the tenth consecutive year the satellite industry will be converging on New York City for the SATCON exhibition and conference October 12 & 13 at the Jacob Javits Convention Center.

SATCON has grown each year since 2002 as an annual industry showcase and conference. This year SATCON combined with CCW will again feature a world-class program with 175 speakers, 40 sessions and over 250 exhibitors displaying the latest satellite communications and content delivery technologies. More than 6,000 people are expected to attend. SATCON attendees will be treated to two full days of panel sessions focused on Government and Military, Broadcast, Media and Entertainment and Mobile Satellite Applications with additional sessions covering digital signage, emergency response, business strategies and new technologies. Leading expert speakers will provide SATCON attendees with strategies for managing their communications infrastructure including video, data, voice and Internet using satellite, fiber mobile and wireless technologies. Here are just a few highlights of the SATCON 2011 program.

The program on Wednesday, October 12th, includes:

- **KEYNOTE: Next Generation Satellites: A Conversation** with Mark Dankberg, CEO, **Viasat**, and Pradman Kaul, CEO, **Hughes Communications, Inc.**
- **Future Resiliency in SATCOM:** A discussion of recent DoD policy and strategy and the need for resilient space architecture
- **New Technologies and Choices for Comms-on-the-Move**
- **Update: Future Commercial Satellite Communications Services Acquisition (FCSA)**
- **New Techniques: Extending the Life of the Satellite**
- **Delivering Satellite-Based ICT for Disaster Preparedness... Sustainability**
- **Fundamentals of Satellite Communications, Part 1**
- **KEYNOTE Panel - International 3D Society — Your World in 3D - Separating the Facts from the Hype**
- **File-based Distribution Over Satellite**
- **What is the Satellite and Fiber Model for the Next Generation Program Delivery for 'Old Media'?**

The program on October 13th includes:

- **Government & Military Keynote: Lt. Gen. Michael J. Basla, Vice Commander, Air Force Space Command, U. S. Air Force**
- **Hosted Payloads On The Horizon: Opportunities and Challenges**
- **Hosted Payloads Alliance (HPA) meeting and briefing (RSVP Required)**

- **Advanced Technologies – What's Next for COMSATCOM in the Military?**
- **Financing Satellite Businesses: New Strategies for a New Market Environment?**
- **MSUA: Competition in Mobility Services: MSS and FSS Operators go Head to Head**
- **Fundamental of Satellite Communications, Part 2**
- **Are We Winning The War Against Satellite Interference?**
- **Dynamic Digital Signage: How Satellite Generated Dynamic Place-based Media is Creating New Opportunities**

What's New @ SATCON This Year?

"We have some great new sessions, and I am especially excited about New Techniques: Extending the Life of the Satellite which addresses the challenges and benefits of in-orbit servicing from the perspective of the service providers, satellite owner-operators, and the satellite services end users. The military and industry keynote speakers are sure to attract a full house, and we have a terrific panel lined up for the Hosted Payloads on the Horizon: Opportunities and Challenges panel session this year." — Susan Irwin, SATCON Conference Chair and President, Euroconsult USA

The speakers on the Hosted Payloads panel include:

- **MODERATOR: Patricia Cooper, President, SIA,**
- **SPEAKERS: Robert "Tip" Osterthaler, (USAF, Ret), President & CEO, SES US Government Solutions**
- **Charles Baker, Deputy Assistant Administrator for Satellite & Information Services, National Oceanic and Atmospheric Administration (NOAA)**
- **Don Brown, Vice President, Hosted Payloads, Intelsat General Corporation**
- **Byron Browning, Chief, Space and Airborne Branch, Army CIO G6, U.S. Army**
- **Don Thoma, Chairman of the Hosted Payload Alliance and Executive Vice President Marketing, Iridium**

What About Special Events?

"I am looking forward to the Military Breakfast presentation by Lt. Col. Gregory H. Coile, Product Manager SATCOM, U.S. Army PM WIN-T, PEO C3T entitled 'Connecting Soldiers in Afghanistan with Satellite Communications' which is an invitation-only event for our DoD attendees, and the Hosted Payload Alliance (HPA) meeting will be a great opportunity for the industry to learn more about current initiatives that are strengthening government and commercial partnerships within the satellite industry." — Michael Driscoll, Vice President and Event Director, CCW/SATCON.

SATCON attendees can also attend sessions in the CCW conference program that include top speakers and topics related to HD, 3D, multiplatform content delivery and mobile media production.

SATCON attendees can register separately to attend the **SSPI Future Leaders Dinner** being held on the evening of October 12 — info at www.satfuture.com. Since 2006, SSPI's Future Leaders Dinner has honored men and women under 35 with the talent and motivation to advance into leadership positions in the satellite industry, as well as one executive recognized for mentorship of the next generation. During the Future Leaders Dinner, SSPI presents the *Promise and Mentor Awards*.

Registration

Attendee registration at SATCON is online at www.satcon-expo.com. **SatNews** readers, apply for your complimentary pass using **VIP Code CCG16**. Contact the organizers of SATCON at info@jdevents.com with any questions. ↵

Repair, We Must — The Importance To The SATCOM Industry

Since Newtec opened its doors in 1985 it has consistently worked to ensure the products it researches, designs and manufactures are as reliable as possible. But even with the hardest of kits there are still occasions when components fail and repairs are necessary. The general approach has always been to have a centralised system with all repairs carried out either in a main facility, or in Newtec's case, at one of its regional repair centers around the world. This, however, is changing as Newtec makes a new emphasis on third party partners. Certified partners will soon handle the vast majority of in- and post- warranty repair services and there are many benefits for the satellite communications industry to take as a result.

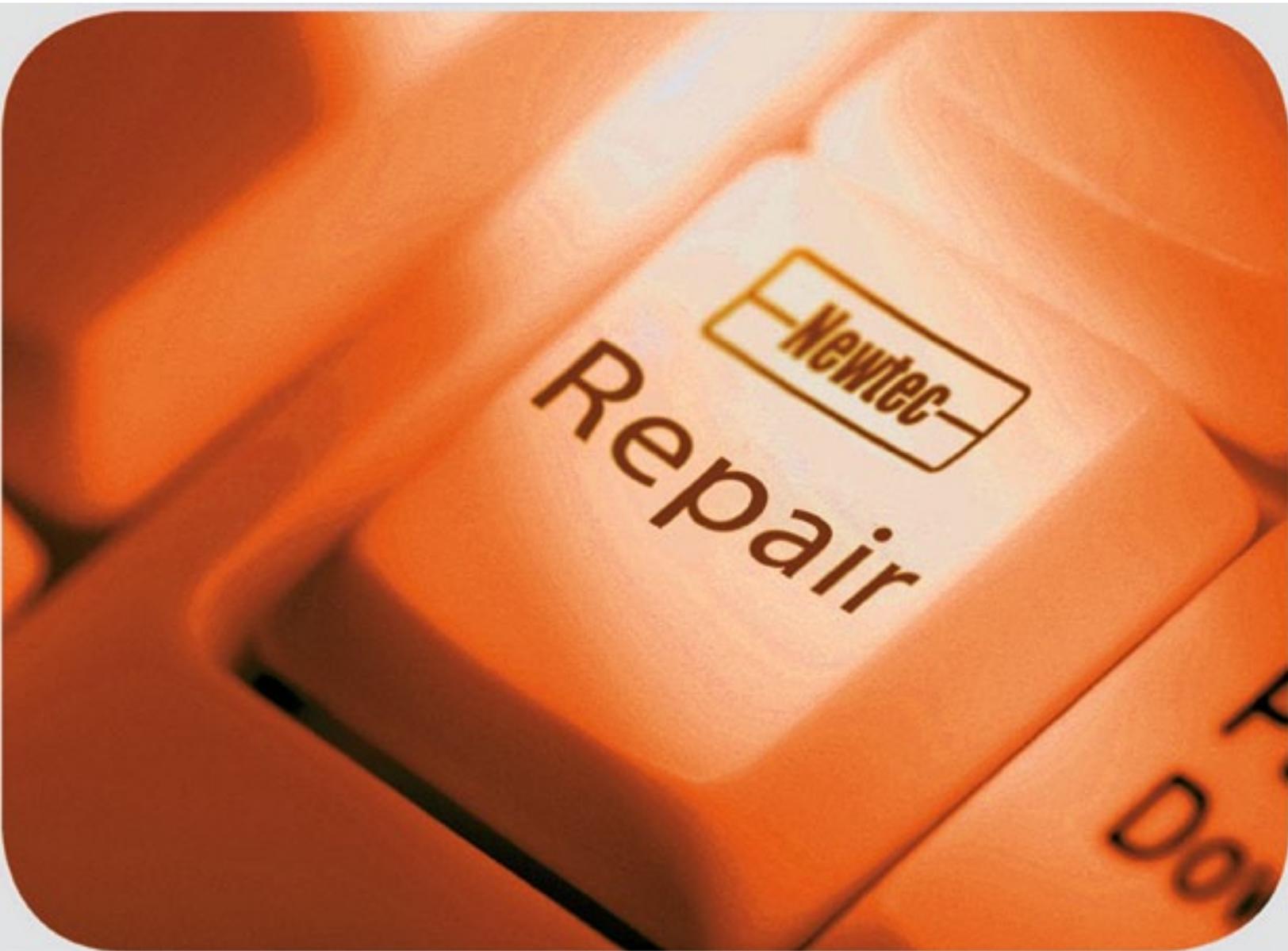
The aim is to provide a faster, flexible and more effective service for end-users. These users include large organizations and individual consumers, from broadband via satellite customers, to IP trunking engineers and major international broadcasters. A speedy service is particularly important for journalists from global news networks operating in some of the

world's most difficult war-torn and geographically epic regions. They rely on Newtec equipment to send stories back home as and when the news breaks, and technology malfunctions must be repaired quickly.

Therefore, the importance of having viable repair centers to provide the most optimal and expedient service cannot be underrated. Newtec's new program to authorise independent repair centers in every region of the world will eventually see 80 percent of repairs carried out close to the location where the fault happened, with only a fifth of faults being dispatched to a centralized location.

Authorized Repair Center Locations

In February, **NPO SvyazProekt**, a Russian satellite communication and digital TV system integrator, signed a landmark deal to become Newtec's first third party repair center for Russia, the Ukraine, and other CIS countries. More recently, Turkey-based **SVS Telekom** signed up to become the second global center, and the first in the Middle East. The centers will guarantee reduced



turnaround time for repairs and will optimize the entire logistic process. They are the first two centers in a network which will eventually span the world.

Both of these *Authorized Repair Centers (ARC)* were Newtec distributors who wanted to add to their service offering by including this value added service for their end-users. In the next year, ARCs will be certified in India, South America and Italy where staff training and investment in repair infrastructure is currently underway.

Sander Boom, Newtec's Vice President of *Customer Services and Production*, said centers are being certified in regions that can be helped the most by the ARC initiative. "The authorized repair centers present us with a great opportunity to gain access to new regions and to understand the culture and needs of the local area. This in turn enables us to serve our customers to the best of our ability. Maintaining the highest possible quality is always at the forefront of our approach and we will continue to measure everything to ensure a transparent system. We are ISO9001 certified, and global repair processes are part of it. Everything must be traceable and transparent."

Repair Flexibility + Speed

The certification process ensures the highest possible levels of workmanship and that the product knowledge of center staff is of an extremely high calibre. Rigorous selection and training processes are in place. It takes a minimum of six months for an ARC to become authorized and partners around the world have already begun investing heavily in the scheme.

Luca Catalano, CEO of Italy-based **Communication Video Engineering (CVE)**, which is soon to become a Newtec ARC, said, "We design, implement and provide advanced technology solutions for broadcast and telecommunications companies. Being able to repair products in region adds a lot of value for our customers, many of which operate in the broadcast industry where quick and flexible repair centers can make a real difference. We were really keen to offer this as part of our service portfolio, like we do with our most important technology partners."

High Standards

Importing and exporting solutions to make repairs can be a bureaucratic and expensive process, and having repair centers within the country of origin dramatically reduces turnaround time and keeps costs down. But these are not the only benefits for the satellite industry, and having ARCs actively boosts sales, as well.

Training is at the heart of the ARC initiative, with courses being run throughout the year at Newtec's headquarters in Belgium but also world-wide in Newtec's regional offices and facilities located in the US, Singapore, China, the UAE, Brazil, Germany and France.

Topics span the industry, covering everything from Earth station design to bandwidth optimization, IP network design and ASI, to IP migration. A proportionate number of engineers at the ARC must meet the required level of training to be certified in the scheme. Once they have become certified, they are then able to undertake complex tasks, including maintenance, and replacing and retrofitting Newtec products.

"It is an investment for our distributors and partners to become certified. We are expecting a boost in sales in areas where authorized repair centers become certified as end users become more confident that they will receive a local service dealing directly with the people they know already. Also, sales teams at the distributors become empowered to sell Newtec products as they gain additional knowledge," said Mr. *Boom*.

Overall Benefits

In the fast-moving satellite communication industry a quick, flexible and cost effective repair network is vital to staying connected when the inevitable happens. Newtec is proactively training and certifying trusted partners around the world. This not only boosts the service offering for industry members but also sales of products as distributors take ownership of the aftercare. New ARCs are set to open before the end of the year in India, South America and Italy. The broad certification and training that the regional distributors will go through will prepare them for the task of dealing with delicate warranty issues while providing the key to increasing sales. In the broadcast industry where every second can count this is particularly important – however, these changes will benefit the industry as a whole. ↩

Newtec Authorized Repair Centers

SvyazProekt (NPO SP) – Moscow

Newtec ARC for Russia, Ukraine and other CIS countries. *NPO SvyazProekt is a satellite and digital TV communication system integrator. NPO has worked in the Russian market since 2004 (since 1999 as Teletech Consulting) and offers consulting, preparation of technical project, designing, delivery and installation of equipment and assistance certification services.*

SVS Telekom – Istanbul

Newtec ARC for Turkey as well as neighboring countries Azerbaijan, Afghanistan, Pakistan + the wider Middle East. *SVS Telekom was established in 1995 and provides broadcasters, telecom companies, ISPs, and military organisations with mobile and fixed satellite communication equipment, solutions and services. SVS Telekom offers complete turnkey solutions, engineering designs, maintenance and consultation on all types of communications systems.*

ARCs are set to open before the end of the year in India, South America and Italy



Executive Spotlight

Terry Magee, Executive Vice President, Wavestream

Terry Magee has more than 40 years of experience in positions of leadership and management in the defense industry. At Wavestream, Terry has responsibility for business development, sales, marketing and product management. Terry's distinguished career is marked by 27 years of service in the U.S. Navy as a Naval aviator with extensive operational experience and tours on staffs and in the Pentagon. His four command tours included command of two Aviation Squadrons on the Duluth and the Kitty Hawk. Mr. Magee subsequently served as president of Orincon, overseeing significant sales and market growth until the company's acquisition by Lockheed Martin. He has since served in senior operational and strategic positions with Lockheed Martin, including the development and execution of capture plans for numerous large programs and C4ISR/IT Maritime Strategies and campaigns. Mr. Magee holds an MBA from the Naval Postgraduate School, and a BA in Biology from SUNY Brockport. He is active in several professional organizations, including AFCEA, San Diego Military Advisory Council and Tailhook, and community organizations, including Operation Home Front, United Through Reading, Palomar College Foundation and Achievement Rewards for College Students.



SatMagazine (SM)

Good day, Mr. Magee. Thanks for taking the time from your busy schedule to talk with us and our readers. Having a great deal of experience within the commercial space in engaging the Department of Defense (DoD) and other government agencies for various projects, what would you say are the most challenging aspects of your business?

Terry Magee

A few facts that define our business will help in appreciating my answer. First, Wavestream is a third tier component provider. We provide amplifier equipment to system integrators building satellite terminals. The integrators in turn provide equipment to those responsible for the overall system. As a result, it is often difficult to get the attention of, and communicate with, those who are initially defining requirements and making system level decisions. Second, we sell a commodity. There are many companies providing high powered amplifiers for satellite ground terminals. Despite the fact that we have invested in and apply very

sophisticated technology to this market, it is not always obvious to the buyers of these systems that we can greatly outperform competitive products because of our basic technology. Third, we bundle our technology with a manufacturing focus based upon reliability, energy efficiency and survivability, which lowers total life cycle costs. Our products don't break, they don't fail. We design every product to operate over the full temperature range to meet all specifications. We then test every unit to insure it meets or exceeds those specifications. This approach is a significant factor in our customer pricing. Fourth, Wavestream is a relatively new company and we find many customers do not yet know about us and the value we bring to the market. We've missed opportunities because we haven't communicated rapidly enough to introduce ourselves across the entire market spectrum. Wavestream is well known and I believe, well thought of in the military market. However, we are just beginning to open the door and enter the airborne and broadcast markets. As a result, we are often asked to participate in projects and programs where the initial vendor has failed. Naturally, this creates skeptics and



Photo courtesy of AvL Technologies

Executive Spotlight

is difficult to do. Our successes, however, are borne out by the fact that more than 15 percent of our revenue this year will come from programs where Wavestream was brought in after the initial failure of a competitor's lower priced offering.

So, to answer your question, the single most challenging aspect of our business is "communications." This includes communications with our customers in terms of learning and understanding their issues. Likewise, our customers communicating with us to understand the day to day issues we face in dealing with vendors and the market environment. A good example is life cycle costing. Wavestream needs to communicate with Government program managers concerning life cycle costs to insure cost savings factors are included in evaluation criteria. Wavestream needs to communicate to our customers how we can satisfy requirements, as well as with vendors and employees on the need to continuously improve our ability to save end-users costs over the entire system life cycle. Of course, there are many such examples, from information concerning flow down of Government budgets to requirements for new capabilities. We must continuously try to improve communications. It's not always easy.

SM

As you look at your efforts on behalf of Wavestream, what are the one or two most important projects, in your opinion, that you are most proud of completing? Why are these successes so exceptional?

Terry Magee

We have several areas where we have introduced new products or practices to change and grow our business.

- Prior to 2009, two to three customers accounted for over 90 percent of our business. Now, we have 20 customers that account for 90 percent of our business.
- To broaden the areas of application beyond the standard product, we introduced our embedded product line, which is now a primary component of our business and is sold into the COTM, UAV, and aircraft terminal markets. We have taken a standard product and repackaged it for one-off applications that apply to multiple industries and customers.
- We have added eight products applicable to the broadcast and international markets over the past year. This has generated significant growth outside of the DoD space and now accounts for over 20 percent of our business.

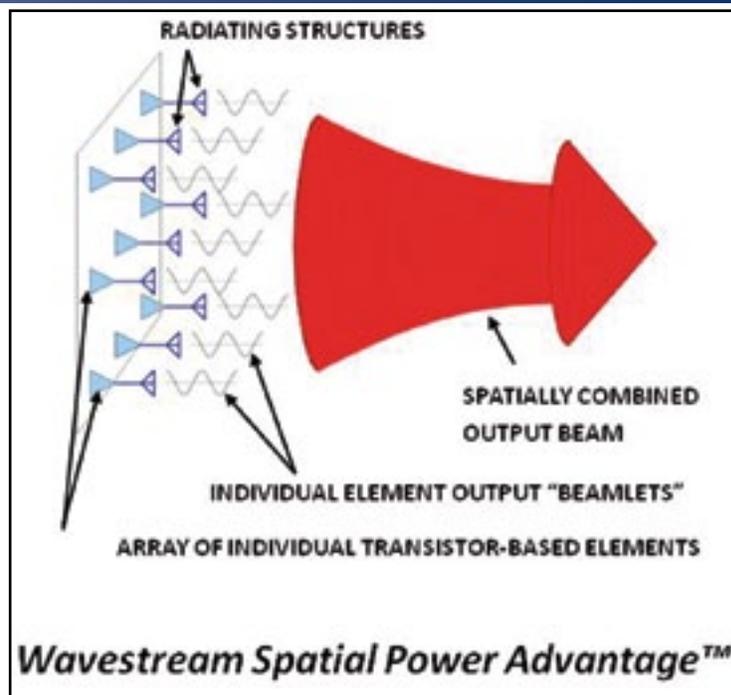
The significance of these efforts is they show we have expanded the use of our core technology via investments in product development, marketing and sales. Of key importance is the introduction of our broadcast amplifiers into customers such as HBO, demonstrating our concept of replacing tubes in teleport applications, and the growth of our COTM homeland security products into China. Wavestream has moved from being a "one-trick pony" into a thriving, growing entity within the worldwide satellite communications industry.

SM

When discussing amplifiers, one of the areas promoted by Wavestream is the Spatial Power Advantage™ technology. Would you please describe this technology and why such is an important part of Wavestream's offerings?

Terry Magee

Wavestream uses spatial power combining to achieve industry-leading efficiency, high power output and a smaller product footprint. Our patented technology combines the outputs of many transistors in free space, yielding combining efficiencies



which are double or triple those achieved using traditional means. Wavestream's Spatial Power Advantage provides the ability to reach higher output powers without complex or costly combining, helping keep the size, weight and component costs down. It also results in reduced power loads and significantly reduced thermal loads, again minimizing size, weight and energy costs. For the first time, we have provided the market with significant improvements in high power SSPAs to effectively compete and replace TWTAs, which require costly and time-consuming tube replacements every four to seven years. Our SSPAs do not require replacement, can operate from a cold start, and are much lighter and more efficient to support the growing trend toward greater mobility and global reach. Going forward, our technology approach provides us with a flexible platform to apply



Globecomm terminal, photo courtesy of Globecomm

Executive Spotlight

to any device technology. This will be an extremely critical differentiator as technologies evolve, and more system applications with increasingly bandwidth-intensive demands continue to drive the need for products that offer greater efficiencies and significant cost savings.

SM

With conversations running rampant regarding how the commercial sector can aid the budget-slashing government agency and military segments, what role can, and will Wavestream play in assisting in this arena?

Terry Magee

These issues are not new. Wherever the Government can take advantage of commercially funded R&D, it saves money in development and production costs because unique products are not being built. The difficulty for the Government is differentiating from the policy and the practice. The practice of taking advantage of non-military designed products means there has to be a process of requirements rationalization, e.g. is 80 percent of the solution good enough to take advantage of commercial systems/products. If vendors have to significantly redesign, engineering and production costs will not be reduced. Sometimes the Government can take advantage of commercial equipment, sometimes requirements are such that there are no replacements, and sometimes, there is a mix. The key piece of the puzzle is Government practice needs to provide a means to make timing and quantity commitments to achieve the desired savings. IDIQ contracts will not necessarily achieve these goals.

SM

What are your thoughts regarding the push for hosted payloads for military and government payloads aboard commercial vehicles?

Terry Magee

Good for everybody. I think the concept has merit and provides the ability to get proof-of-concept systems deployed quickly, helping get new capabilities to the war fighter sooner. This also enables the government to reduce costs via cost sharing.

SM

Without the necessary, reliable equipment to conduct MILSATCOM mission support, lives are in jeopardy... what role does Wavestream play in offsetting the lack of communication product release in a timely manner to ensure operational environments have the best equipment at hand?

Terry Magee

As mentioned earlier, our role as a third tier supplier is somewhat limited. We've been able to listen to customers who have plans, but not necessarily funding. We work with these customers to insure that when funding is available, we can provide the desired amplifiers in a timely manner. Of course, this involves risk. But to be a "partner" with a major customer, risk is often a major requirement.

SM

What products can we expect to see over the next year in both the commercial and the military/government space? What are your thoughts regarding Wavestream's potential successes over the next year or so?

Terry Magee

One of the primary advantages of our spatial combining technology is it provides an architecture that is agnostic to the type of chips used to amplify the power. Specifically, as GaN or other chip technology matures to a level providing superiority over the GaAs technology we now use, Wavestream can deploy this new capability. Right now, we are waiting to see reliability and

costing mature before we make the next investment in building these new products. We are, in the meantime, surveying and building multiple prototypical solutions. Ultimately, the goal of incorporating any new technology into our architecture is to permit our SSPAs to have greater and greater power levels while maintaining significant space and weight advantages.

SM

What are your main concerns regarding the global economy for our industry and, in particular, the business environment within the United States?

Terry Magee

Around the world, mobile communications applied to emergency situations, homeland security, military and Satellite News Gathering (SNG) continues to grow. Wavestream, in conjunction with our new parent, Gilat, is rapidly expanding our international presence and plans to be a major player in these emerging applications. As the dollar is weakened in relation to foreign currencies, our products also become less expensive to purchase. Low price and superior, field-proven technology provide a good combination for us internationally. Within the U.S., we continue to focus on the military market, and will increase our push into the SNG and other broadcast areas. Specifically, Wavestream is providing products that reduce operating costs for teleport operators. We are not expecting customers to have new money to spend due to growth, but because they have the need to maintain capability at lower cost to remain profitable. The biggest concern overall is on-going Government delays in making decisive financial decisions and the need to move forward with a consistent plan. Further procurement delays, continuing resolutions, and debt issues only cause further erosion of the industry base which is awaiting decisions.

SM

Lastly, a major concern in our industry is the lack of appropriate candidates to fill crucial positions to sustain and drive new products by our companies. What are your thoughts on how we can support and further STEM education for our youngsters? Is Wavestream engaged in any of these endeavors?

Terry Magee

In the late 50s and 60s, the space program captured the imaginations of young people around the country. As a person who grew up in this environment, I never imagined or even considered that I wouldn't be part of this national effort. Today, I don't see a strong national commitment to anything as large or encompassing as the space program from a technology standpoint. Without such a national focus, it is difficult to convince those not already leaning towards math and science to be interested in taking the steps necessary to be successful.

At Wavestream, we strive to foster an environment of leadership and commitment to innovation. The company's founders came from academia, and commercialized solid state technology developed at Caltech to help build the successful Wavestream business you see today. We continue to maintain close ties with academia and when appropriate, recruit the best and brightest to support our growing engineering staff. Businesses such as ours can all help, but often other directions appear easier or more glamorous and interesting. It is an on-going challenge, and one not easily met without local and national commitments toward showcasing the opportunities for creativity and success individuals can avail themselves of, by engaging in the fields of mathematics, engineering and science. Wavestream is just one example of what can be achieved when individuals put their minds together and take a chance on an idea. ↩

Product Perusal

Mandated ECDIS — Nexgen SATCOM Required For Nexgen Navigation

A revolution is underway that is fundamentally altering how navigators and deck officers navigate and captains manage their vessels. The mandated use of *Electronic Chart and Display Information Systems* (ECDIS) moves the bridge beyond the time-honored process of paper charts and pencils to a digital era of navigation, route planning, increased safety, and improved vessel performance.

Through ECDIS, ship's officers and fleet managers will gain easy access to:

- Interactive electronic charting
- Improvements in vessel safety and efficiency
- Reductions in operational costs through effective route planning and lower fuel consumption

At the same time, the demand for ECDIS data and regular updates is dramatically increasing the bandwidth demands on the bridge of your vessels due to the need for regular chart updates as well as ongoing and refresher ECDIS training

A global, affordable SATCOM solution is key to meeting those needs, optimizing the effectiveness of an onboard ECDIS system, and maximizing the investment in the equipment. That's why competitive fleet operators are choosing a KVH turnkey mini-VSAT Broadband SATCOM solution integrated with the CommBox™ Ship/Shore Network Manager to ensure that they have the fast, affordable, reliable, and efficient data connections required to make ECDIS a reality. KVH's end-to-end commercial system equips each vessel with a powerful, cost-effective communications suite perfect for ECDIS, ship operations, and crew morale thanks to:

- The global mini-VSAT Broadband network with downloads as fast as 2 Mbps, high quality connections, and low latency
- The commercial-grade 24" (60 cm) TracPhone® V7 or 14.5" (37 cm)
- TracPhone V3 antennas
- The CommBox Ship/Shore Network Manager with QuickFile™ data transfers

The Costs Of ECDIS Compliance

In a nutshell, the International Maritime Organization's ECDIS regulations require commercial vessels as well as passenger vessels over 500 gt to carry at least one ECDIS system on the bridge with a staggered rollout between 2011 through 2018. Many options exist for ECDIS technology itself as well as for navigator and deck officer training. Fleet operators are already taking into account the costs for this hardware, electronic navigation chart (ENC) service subscriptions, and the training programs needed for crews. However, it is critical that vessel owners and fleet managers also recognize the additional, recurring cost to connect their vessels to the required updates. Where charts used to be provided on paper or as computer disks when the vessel reached port, the reality of ECDIS makes real-time updates a must. This means that vessels need to be equipped with a broadband system, which, in the world of global shipping, means a SATCOM system. Along with the simple hardware cost for a SATCOM system is the cost for the airtime itself and when you're talking about weekly updates to ECDIS charts, that cost can rapidly explode.

Currently, the most widely fielded SATCOM service at sea is provided by Inmarsat. However, the old L-band technology upon which Inmarsat relies is prohibitively expensive. While costs will vary based on negotiated pricing, sending or receiving a single megabyte (MB) of data using Inmarsat's FleetBroadband service typically costs between \$10 and \$13. According to ENC provider ChartCo, a typical weekly ECDIS update involves downloading a file approximately 3.2 MB in size. Using FleetBroadband, that would cost a single vessel \$32 per week or \$1,664 per year. Spread that over a fleet of 50 vessels and the fleet manager is facing an \$83,200 annual bill for ECDIS updates alone without including the other day-to-day shipboard operations, crew calling, Internet access, etc., that these systems also support.

Using a traditional VSAT system may save some money in the airtime costs, but you're faced with dramatically higher hardware and installation costs coupled with systems cobbled together with antennas, modems, and services from completely unrelated providers. The result is a potential service and support nightmare. If you're planning to invest in a SATCOM system to provide access to regular ECDIS updates, perhaps it's time to consider an alternative, one that will provide an end-to-end solution with dramatic savings for ECDIS compliance as well as a range of other applications and functions.

Nexgen, Affordable Maritime SATCOM

After more than three years of uninterrupted operation, the mini-VSAT Broadband network is the world's fastest growing maritime broadband service thanks to rugged, fully stabilized antenna technology from KVH Industries, powerful Ku-band satellites, ViaSat's ArcLight® spread spectrum mobile broadband technology, and end-to-end service and support. A managed airtime network solution, mini-VSAT Broadband equips commercial vessels with Voice over IP (VoIP) telephone lines with optimized service and prioritization of applications, as well as the highest data rates available today with speeds as fast as 2 Mbps shore-to-ship and 512 Kbps ship-to-shore.



TracPhone installation on a commercial tanker

Product Perusal

Hundreds of vessels are online simultaneously around the globe, including ships of the U.S. Navy, Vroon, Nordic Tankers, Mowinckel Ship Management, and the U.S. Coast Guard. The TracPhone antennas are also significantly more affordable, considerably easier to transport and install onboard a vessel, and remarkably easy to position for clear line of sight to the mini-VSAT Broadband satellites. The mini-VSAT Broadband service and KVH's TracPhone V7 and TracPhone V3 maritime terminals are fully approved by the FCC and meet the strict regulations of the International Telecommunications Union (ITU).

Adding Capabilities + Reducing Costs

KVH's CommBox Ship/Shore Network Manager integrates seamlessly with the TracPhone V7, TracPhone V3, and mini-VSAT Broadband. The combination of these systems is a fast, affordable, and versatile broadband pipe supporting Internet and voice services while simultaneously equipping customers with an array of business-critical, value-added capabilities:

- Web compression and acceleration to get the most out of the fleet's data use while allowing fleet IT managers to control or prevent access to applications that might use more bandwidth than they find acceptable
- Easy ship-to-shore and shore-to-ship file transfers, including file compression and synchronization among files and folders so only changed items are transferred
- Management software that provides shore-based remote access to monitor communication activity on a fleet's vessels at all times, along with IP routing for remote operations, and diagnostics of the vessel network from fleet headquarters
- Configurable firewalls and encryption for data and network security
- Automatic least cost routing between mini-VSAT Broadband and other services, with configurable rules that determine when to switch, as well as the activities that are available with each service

- Crew e-mail tools that give each crewmember a dedicated roaming e-mail account for use on any vessel in the fleet, as well as on shore.

From the perspective of a fleet manager considering a cost-effective SATCOM connection for ECDIS, the most important element of the CommBox system is the powerful QuickFile application, which makes the most efficient use of a fleet's data connection through:

- Optimal compression algorithms, used on a per-file basis
- Reduction in the amount of data sent and the time the file transfers require
- One-to-many transfers for the convenience of transferring data or a document from the office to every vessel in the fleet
- Synchronization of files and folders using the highly efficient differential synchronization (DiffSync) function, which further reduces the amount of data transferred over the links by limiting transfer to only the data that has changed since the last synchronization
- Unlimited number of transfer jobs, for all vessels
- Complete visibility thanks to transaction logs for each vessel
- Advanced scripting features
- Support for multiple fetch/delivery protocols like FTP, CIFS, NAS, and email

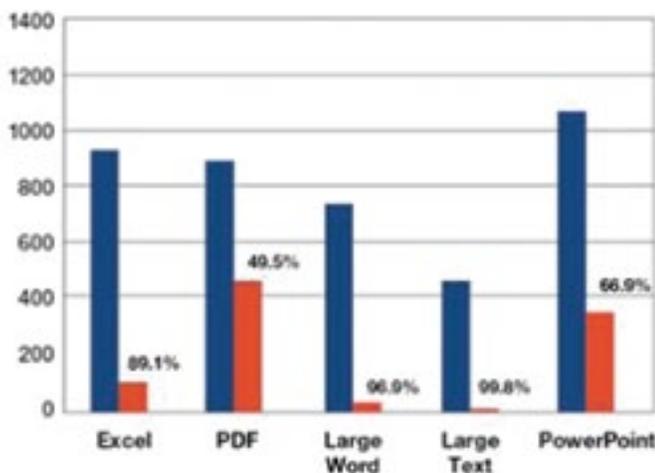
The average compression results presented in the figure in the previous column illustrate QuickFile's compression capabilities even before taking advantage of the DiffSync capability. With DiffSync you will have cost savings and data reduction that will be in the 99 range.

Combo Benefits

The combination of mini-VSAT Broadband's low airtime costs and the capabilities of CommBox open a tremendous array of benefits beyond affordable ECDIS updates. By equipping vessels within a fleet with the mini-VSAT Broadband/CommBox solution, you gain easy, affordable access to a broadband connection that supports:

- 24/7 real-time engineering, fuel, performance, and system monitoring
- Access to tech manuals
- Ongoing/refresher training for ECDIS and other functions
- Access to real-time weather services
- Pre-paid crew calling as well as e-mail and Internet access
- GSM cell phone connections via the mini-VSAT Broadband network, and more.

Moving from L-band to the next-generation mini-VSAT Broadband SATCOM system adds a new level of versatility to shipboard communications and dramatically reduces the costs for complying with ECDIS update requirements whether for one vessel or a fleet. Mandatory ECDIS is coming to the commercial maritime industry and with it comes a dramatic increase in data and bandwidth requirements. Vessels need affordable and fast solutions for convenient global compliance and KVH's TracPhone V-series, mini-VSAT Broadband service, and CommBox Ship/Shore Network Manager with QuickFile are a perfect solution. ↩



Typical Data Compression Results Using CommBox and QuickFile with mini-VSAT Broadband (blue = Original File Size; orange = Compressed File Size)

A Case In Point

3G Backhaul Over Satellite: Challenges + Opportunities

by Yves Hupe, President, Memotec (wholly-owned subsidiary of Comtech EF Data)

Very few people believed in the value of satellite backhaul for providing mobile services in rural regions and in developing countries until early 2002. Since then, mobile telephony has spread and reached out to countries where the GDP level did not seem sufficient at first to allow people to acquire mobile devices and pay for subscription packages. The practicality of mobile telephony, combined with newer types of usage (SMS) and business models (flat rates), the affordability of low-cost (refurbished) handsets and the adoption of government regulations for universal coverage have led to tremendous demand for mobile services in those areas, served by satellite links.

The same pattern is expected to repeat itself as 3G takes hold across developing countries. Markets are opening up faster than ever, as demonstrated by the key role social media via mobile devices is playing in supporting current civilian actions across the Middle East. 3G networks are currently being rolled out at expedited speeds across Africa. These events provide only a glimpse of the potential usage requirements expected as the popularity of iPhone®, BlackBerry®, and other smartphones continue to increase. But how will 3G services be deployed over the next few years, and what role will satellite play in the future for backhauling of 3G base stations?

In order to assess where 3G satellite backhaul could fit, let's first picture how and where 3G services are, or will be, deployed in developing countries. If we examine expected usage patterns over the next 2-3 years, it becomes evident that 3G mobile broadband traffic growth will be concentrated in key areas:

- **Urban Centers:** This is the obvious, populated with higher ARPU, tech-savvy and business users.
- **Hot Spots:** Resorts, mining camps, isolated remote urban areas (>400 km from a main city). A typical example is the vacation resort. The tourists will resemble the usage behaviors of tech-savvy users with high purchasing power. They will use smartphones, laptops and/or tablets equipped with 3G USB dongles.

- **Bridging the digital divide government sponsored programs (Universal Service Obligation or Educational):** In these cases, mobile broadband access is used in a nomadic form for Internet access instead of conventional terrestrial (unavailable) means. This can be illustrated with the prominent village leaders who will likely rely upon 3G USB dongles and satellite backhaul services because there is no connectivity in the village. They may also offer or resell VoIP service to other villagers, but may not even be using smartphones.

The power and efficiency of the backhaul RAN infrastructure is critical to supporting 3G mobile broadband traffic requirements. While a fiber infrastructure is a sure-fire method of supporting demand, it is not ubiquitous; it is costly in time and financial resources to deploy. And, in many developing regions, it does not take long before it is cut off by vandals or due to negligence. For these reasons, the cases of 3G hot spots and mobile broadband USO deployment will likely be served by satellite links, while metro areas will be served by a combination of fiber and short-range, new generation, high-capacity Ethernet microwave links.

Another factor to consider is the potential of newer generation base stations. The progress made in spectral efficiency, energy consumption and overall cost is likely to drive deployments in less populated and remote/rural areas. The current trend of outsourcing operations and the availability of substantially lower cost equipment will generate a rationalization and replacement of older units, justified by the lower operation costs of these new generation BTSs. By the same token, the new BTSs are also technology agnostic and equally 2G/3G/4G capable (software defined radios), allowing mobile operators to offer 3G and mobile broadband services at a minimum incremental cost from a radio point of view.

There is also an increasing trend amongst consumers to move away from SMS communications and access social media sites using 3G enabled semi-smartphones, which is the case in the Philippines and Indonesia. And, while only a relatively small portion of these countries' population may currently afford smartphones, many will seek high-speed Internet access via Internet cafés and refurbished PC/laptops using dongles that will deliver greater levels of data traffic on their networks. As a result, it is very likely that the deployment of 3G mobile broadband in remote and rural areas served by satellite links today will happen much faster than initially anticipated. Driving forces are pressures from the device market and from the user community, and facilitated by the embedded readiness of the radio network. This situation raises some specific challenges when considering satellite backhaul deployment:



A Case In Point

- **First, the amount of bandwidth needed by mobile broadband applications will potentially be a show stopper for enabling such services given the cost of satellite transponder capacity. Therefore, a new backhaul paradigm different from the widely used point-to-point SCPC satellite link model will be needed to offset this additional bandwidth amount and associated operation costs.**
- **Secondly, mobile broadband applications are often very delay sensitive. Although the satellite delay cannot be overcome, there are technologies ready to be deployed which can help mitigate the delay affect for most common applications.**
- **More importantly, when considering rural deployment, literacy is most likely to be the key issue that could slow down the deployment of 3G mobile broadband services. Yet, one shall not underestimate the cleverness of these young populations as demonstrated with the case of the widespread usage today of Twitter in the Philippines and Facebook in Indonesia.**
- **Last but not least, device cost. The exponential growth of 2G mobile [voice] services really kicked off in developing countries like Africa only after manufacturers made available low price handsets to consumers combined with the availability of second-hand handsets. There are no reasons not to believe though that the same phenomenon will repeat with smartphones and other mobile computing devices. Nokia, for example, already started such an initiative of a low cost “semi-smartphone” targeted at the Indian market.**

To alleviate or mitigate the first two challenges identified above, hereafter is a snapshot of a few technologies available today, grouped together by category and focused on the deployment of 3G and mobile broadband services outside mainstream urban areas:

Inspection + Policy

These technologies are used to filter out unwanted applications (like peering) and limit/regulate bandwidth consumption from heavy users. The objective of these technologies is to control the affect of “bandwidth-hog” users who can consume up to 90 percent of the network capacity. This is particularly applicable on limited satellite access links. The technologies are embedded in network device(s) located at the entry point of the application and Internet data traffic into the mobile packet core, i.e. co-located to the GGSN:

- **Deep Packet Inspection (DPI) – The DPI function analyzes the traffic and then filters out unauthorized applications from the network (e.g., VoIP in some countries).**
- **Policy and Charging Rules Function (PCRF) – In order to avoid known situations where 1 percent of users use 90 percent of the network bandwidth capacity, the PCRF function ensures that only those who pay for premium service get what they paid for, while typical users are applied fairness access rules. (See Figure 1)**

RAN Acceleration + Caching

These technologies are used to mitigate the affect of satellite delay in terms of user experience (except for real-time interactive applications like gaming), and also participate in reducing the overall bandwidth demand. They may be located either next to the GGSN, or in the RAN, depending on the targeted mobile service (2G, 3G or HSPA/4G) and scope of application (whole network or only the portion served by satellite links).

- **Web Acceleration – HTTP acceleration/compression enhances Internet browsing, email transmissions, document downloading and social media by accelerating the loading of multimedia content.**
- **Video Acceleration – To conserve bandwidth during peak traffic times, video acceleration controls the downloading of video (using transcoding, transrating, resizing, and decimation technologies), adjusted to real-time network status and usage.**
- **Caching – To conserve bandwidth, caching intelligently monitors frequently accessed files (even if they have changing URLs) and then stores/caches them at the edge of the RAN. The user experience is enhanced with accelerated uploads and downloads. (See Figure 2)**

Satellite Technologies

Peak bandwidth requirements to serve a 3G base station (BTS) in the same area is typically around four to eight times (8 Mbps vs. 1 to 2 Mbps) the bandwidth required by a 2G BTS.

However, as much as voice traffic is essentially symmetrical in nature, mobile broadband traffic is mainly asymmetrical, with most of the bandwidth demand being on the down (hub to remote) path. In addition, data traffic — in particular, non-streaming video — is far more bursty than voice traffic. Data traffic is not necessarily focused within a peak hour and can be rather spread out in time and space (geographically). Therefore, point-to-point network topologies are not best suited anymore when deploying 3G and mobile broadband services. A point-to-multipoint (or rather hub and spoke) topology is the best solution, where the downpath traffic to all the remote sites can be statistically multiplexed spatially and temporally, taking advantage of the inherent bursty nature of such traffic.

New, advanced satellite modems based on enhanced, low overhead DBV-S2 downlink coding are available that have been specifically designed to accommodate such architecture and provide substantial performance. Combined with other techniques, such as IP header and payload compression, Adaptive Coding & Modulation (ACM) and Group QoS, the actual needed transponder capacity for the downstream path can be managed within the same range as a traditional 2G point-to-point network.

When considering the return or uplink path (from the remote site to the hub), the three key parameters are jitter, link resilience to errors and power. Power is the most costly and rare resource in most locations served by satellite links. Jitter and link resilience are also important as voice and signaling traffic still co-exist with data applications, which are adverse to excessive delay/jitter and packet loss, which results in degraded KPIs and voice quality. For these reasons, using dedicated SCPC return paths from each remote remains the most efficient solution to carry both 2G and 3G services, compared to alternative VSAT-based offerings. In addition, using SCPC dedicated return paths combined with newer Forward Error Correction (FEC) techniques, such as our VersaFEC®, enables further optimization and reduction of power requirements. The result is the reduction in satellite backhaul costs, which can include both CAPEX (power, antenna and/or RF amplifier) and OPEX (energy). (See Figure 3)

A Case In Point

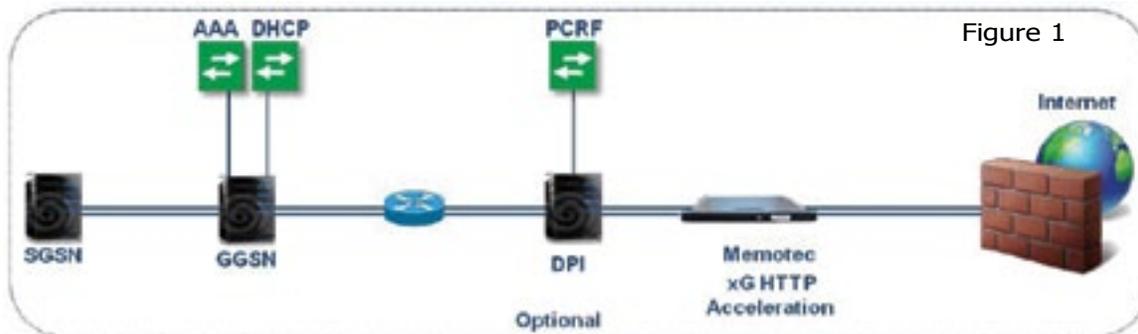


Figure 1

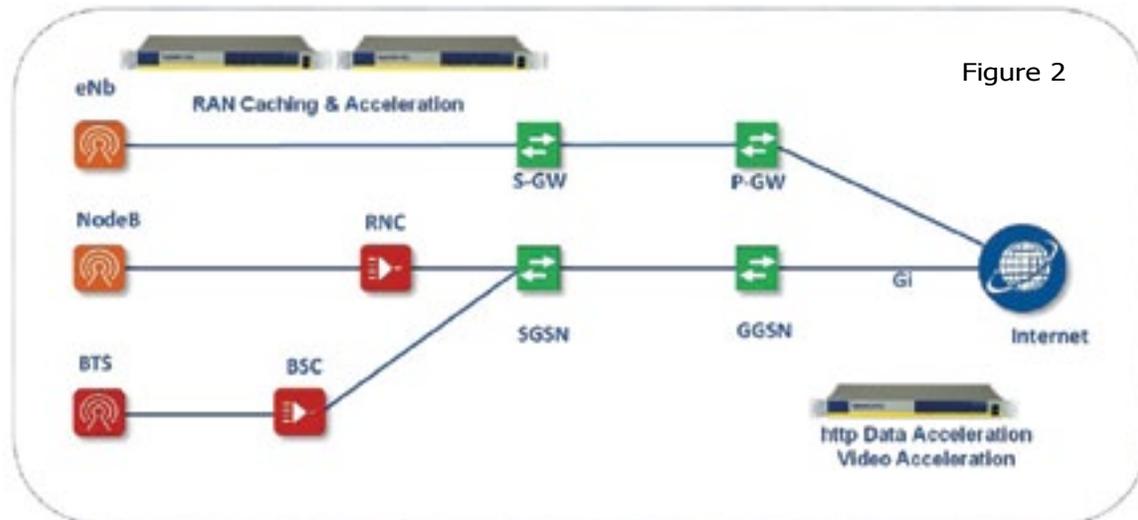


Figure 2

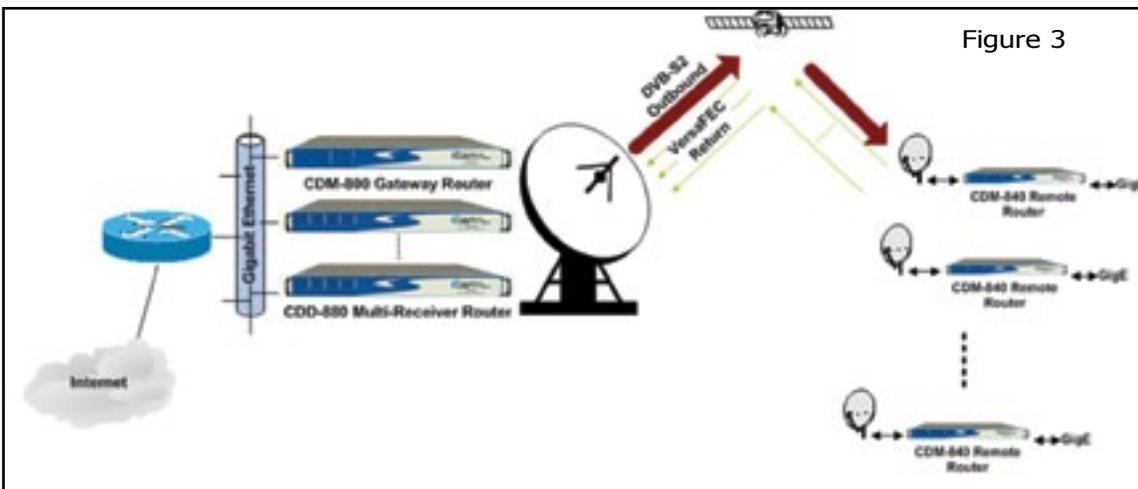


Figure 3

that, when combined, can overcome the last two technical challenges and deliver economically sound, cost efficient and workable 3G satellite backhaul solutions.

The expanding availability of 3G combined with specific usage patterns will drive traffic and revenue in rural regions and developing countries. Addressing these requirements demands hands-on expertise in satellite communications and mobile infrastructure that very few companies possess. Since 2000, we have delivered market-leading satellite solutions based on our advanced modem and bandwidth optimization techniques. Working closely with partners and customers worldwide, we developed an extensive product portfolio that addresses real deployments and market requirements while respecting budget and performance considerations. Put them to work in your network! ↩

About the author

President and CTO of Memotec Communications, Yves Hupe is a seasoned telecommunications industry executive with broad international business knowledge. He has more than 17 years of experience in the Service Provider market sector. In his previous role as VP Marketing and Product Management at Memotec, Yves was instrumental

in the company's growth and repositioning the firm into the fast expanding cellular backhaul business, resulting in triple sales revenue. Prior to joining Memotec, Yves has successfully occupied national and foreign corporate executive positions at Tier-1 companies (Alcatel-Lucent group) and startups, in Marketing, Business Development and Market Strategy. A Canadian resident, Yves is active within Montreal's vibrant high technology business community.



Backhaul Solutions

We have seen that there is a demand today for deploying 3G / mobile broadband services in areas which can only be served by satellite links (hot spots, USO programs). This demand will likely happen much faster and on a broader scale than initially anticipated, pushed by consumer usage (multimedia social media), technology readiness (Multi-service Software Defined Radio BTS), and other factors, such as energy savings (OPEX/CAPEX) from newer generation BTSs.

However, the rollout of 3G mobile broadband services in remote and rural areas faces several challenges, including the cost of computer-enabled devices, literacy, latency and the cost of satellite bandwidth.

While it is expected that the first two challenges would quickly be resolved over time, technologies are available today

Executive Spotlight

Lars Persson, CEO, SSC

Lars Persson has served as the President and CEO of SSC since 2007 and has been instrumental in leading SSC from a Swedish based company to a global one with presence in 12 countries. SSC is a world-leading facilitator of space programs that enables governmental agencies, companies and other commercial or research institutes to make better use of space. Through the SSC group of companies, SSC provides specialised competence in space systems, space and satellite operations, rocket and balloon systems, launch services, flight test services as well as maritime surveillance systems. More than 40 years of experience and local presence on all continents, make SSC one of the most experienced and established businesses in the field. Persson has been active in developing the global marketplace throughout his 31-year career, having served as Board of Director and/or CEO for a number of IT, telecom and space industry companies. He has been influential in the deregulation and commercialization of the European telecom carrier market, as well as the cellular market including mobile applications. In addition, he has also been working with international Venture Capital and has been an advisor to U.S. funds investing in Europe.



SatMagazine (SM)

Would you please provide a brief company history, and how SSC has performed over the years?

Lars Persson

The SSC was founded in 1972. After taking over the European Space Research Organization's (ESRO) activities in northern Sweden, we started doing business all over the world. In 2003, we acquired LSE Space in Germany, and since then, have grown to include several specialized companies with 18 facilities in 12 countries around the world. We are a corporation with a single shareholder, the Swedish government. Our current annual revenue stands at approximately \$160 million. Over the last 40 years, SSC has evolved into a conglomerate. The global space community relies upon us for space operations management services and a broad range of mission-critical solutions that propel them to the forefront of the space enterprise. One of our greatest accomplishments is PioraNet, the world's largest commercial network for ground station services. In addition, we lead the market in proven, flight-demonstrated green propulsion technology, greatly reducing hazards to people and our planet. We have the skills, dedication, experience and support that enables development of novel technology leading to new types of missions to be performed in space. The last four decades have been extremely successful and the future looks even brighter.

SM

Can you offer an overview of SSC's acquisition of subsidiary companies and how it increases the Company's capabilities?

Lars Persson

SSC began by offering design, test, launch and operations capabilities. However, our goal was to become a global organization that helped people make better use of space. We knew this meant looking beyond our walls and aligning with other leading aerospace companies that work in other sectors of the industry.

We initiated that process by acquiring companies, including ECAPS, NanoSpace, LSE Space, LSE Space Middle East, Universal Space Network, SSC Chile and Aurora Technology. Collectively, SSC now offers satellite management services, sounding rocket and balloon launch services, micro-gravity experiment equipment, airborne maritime surveillance systems and propulsion systems. Our global network of ground stations offers a responsive, secure and cost-effective alternative to high, lifecycle costs associated with ground station ownership. We offer the world's largest commercial network for ground station services, assuring greater than 99 percent reliable global comprehensive satellite access. Our dynamic team of software and spacecraft engineers, applied physicists and scientists provide expert customer counsel.

SM

What does the merging of technologies and talents bring to SSC?

Lars Persson

It brings a level of expertise and global reach unmatched in the industry. Because all of the subsidiaries operate as one company, the integration of new technologies and talents enables us to act as a true partner, allowing our customers to focus on their core business. We are able to share infrastructure and maintenance costs between multiple customers. We combine our strengths to deliver proven, reliable, responsive and cost-effective solutions that customers can trust.

SM

What do SSC technologies and capabilities contribute to the business of your subsidiaries?

Lars Persson

SSC is the parent company, providing our customers with complete, integrated solutions supported by the broad scope of capabilities that our diverse team has to offer. SSC, itself, offers design, test, launch and operations capabilities. ECAPS focuses on green propulsion-based products for space application, while NanoSpace produces Micro Electro Mechanical Systems (MEMS)-based products for space application. LSE Space is a space consultancy that supports satellite and manned missions with a wide offering of spacecraft operations and ground systems engineering services. LSE Space Middle East provides on-site project management in the rapidly developing markets of the Middle East, Asia and Africa. Universal Space Network provides highly responsive, operationally robust and cost-effective solutions to satellite operators via PioraNet, a global network of satellite ground antennas, network management centers and high bandwidth terrestrial communications. The SSC Chile Station in Santiago is the most reputable TT&C tracking facility in South America. Aurora Technology is a consultancy featuring a team of software and spacecraft systems engineers, applied physicists and scientists. Together, we operate under the SSC brand as one unified team.

SM

What makes SSC unique?

Lars Persson

Our global presence and ground station network sets us apart. Most of the world's space agencies and satellite owners are customers in some sort of fashion. We can provide all sorts of services ... from hosting to full outsourcing. Second, our investment in green propulsion is going to be a game-changer in launch ranges. This further emphasizes our commitment to caring for and preserving the planet. Finally, because we are committed to being the dominant provider of sat com services in the world, we are willing to invest and make key purchases in strategic locations to build a truly global business.

Executive Spotlight

SM
Where do you see your main growth opportunities in the short term? Long term? What is your business strategy for growing the business?

Lars Persson

Our three biggest growth areas are in PrioraNet, NanoSpace and the ECAPS product line. These are our immediate priorities. Down the road, we see tremendous opportunities to capitalize upon the number of satellites and capacity for information download, both of which are growing rapidly. In addition, more of our customers are moving toward outsourcing. The space industry demands global access. Therefore, our strategy for business growth is to continue building our organization by selecting companies in key geographic regions around the world that allow us to better serve local customers in a global way. We will continue to strive to be as an extension of our customers' missions; to be a part of a basic infrastructure that they rely upon every day.

SM
How does SSC's ability to share resources and upgrade space operations assets offer customers greater value?

Lars Persson

It allows them to effectively reduce infrastructure costs by as much as 65 percent. SSC offers tailored service provisions. Instead of building infrastructure for peak needs, we help customers reduce it down to something below peak, and then, tap into us only during peak times, without having to carry the additional capacity. Customers only pay a fraction of the cost, while obtaining access to more technology than ever before.

SM
How can SSC help customers meet changing infrastructure needs in a dynamic geopolitical environment?

Lars Persson

With SSC as their partner, customers don't need to build new infrastructure or maintain existing ones. We can provide services ranging from hosting to full outsourcing, including ground communication around the globe.

SM
With 31 years of IT, telecom and space industry experience, how different is the market place today than when you started your career? Where do you see the industry heading over the next year or two? In five years?

Lars Persson

Today, the use of satellites for research, security, navigation, etc. is rapidly growing. The average person connects to space more than 50 times per day via television, GPS and more. Furthermore, the number of countries with their own satellite capacity is growing. All of these factors were not in play three decades ago. As we look ahead, the need and benefit of space will continue increasing, as access to space becomes more commercialized and achievable for more countries, organizations and people. Many countries are developing their own national space policies and promoting their own space agencies, a sign of a growing technical workforce and a source of inspiration for students to study math and science. New countries are entering the arena with their own satellites. As time progresses, satellite usage and communication increasingly mirrors the telecom industry ... you don't need to own the infrastructure as long as you control the information. Therefore, increased outsourcing, along with international cooperation between countries and companies, arises when the parties realize there are commercial alternatives such as SSC with its global network. Furthermore, we are enabling better, more economical use of future satellites. By measuring propellant levels for satellite owners — through technology such as SSC's MEMS — we can extend the lifetime of satellites. We are also making satellites more environmentally friendly through green propellants like SSC's ECAPS.

SM
What is your most significant accomplishment during your tenure with SSC?

Lars Persson

I am most proud that we are now a true global player and can accommodate most customer needs for satellite management services, covering ground station and engineering services. We have evolved into a focused commercial company with a couple of signature products — namely NanoSpace and ECAPS technologies — that are commercially available. ↩



EGNOS — It's Here, So Use It!

by Charles Villie, Team Leader, EGNOS, European Commission

EGNOS — the European Geostationary Navigation Overlay System — improving the quality of GPS signals, is a genuine European success story of innovation and cooperation in space science and technology. Charles Villie, Team Leader of EGNOS at the European Commission explains exactly what EGNOS is, its implementation and the services it provides.

What is EGNOS?

EGNOS is the first pan-European satellite based augmentation system (SBAS). The system is composed of transponders installed on three geostationary satellites and of a ground network of about 40 positioning stations and four mission control centres, all interconnected.

EGNOS' signals complement those of GPS (and *Galileo*, once operational) in order to provide users with more precise positioning. In addition, EGNOS provides users with information on the reliability of the GPS signals — 'integrity data'. Consequently, any application requiring better positioning accuracy than that provided by GPS alone, can benefit from the three services provided by EGNOS — notably, the free *Open Service*, the *Safety of Life* service (SoL) for aviation and the EGNOS *Data Access Service* (EDAS).

EGNOS — key steps

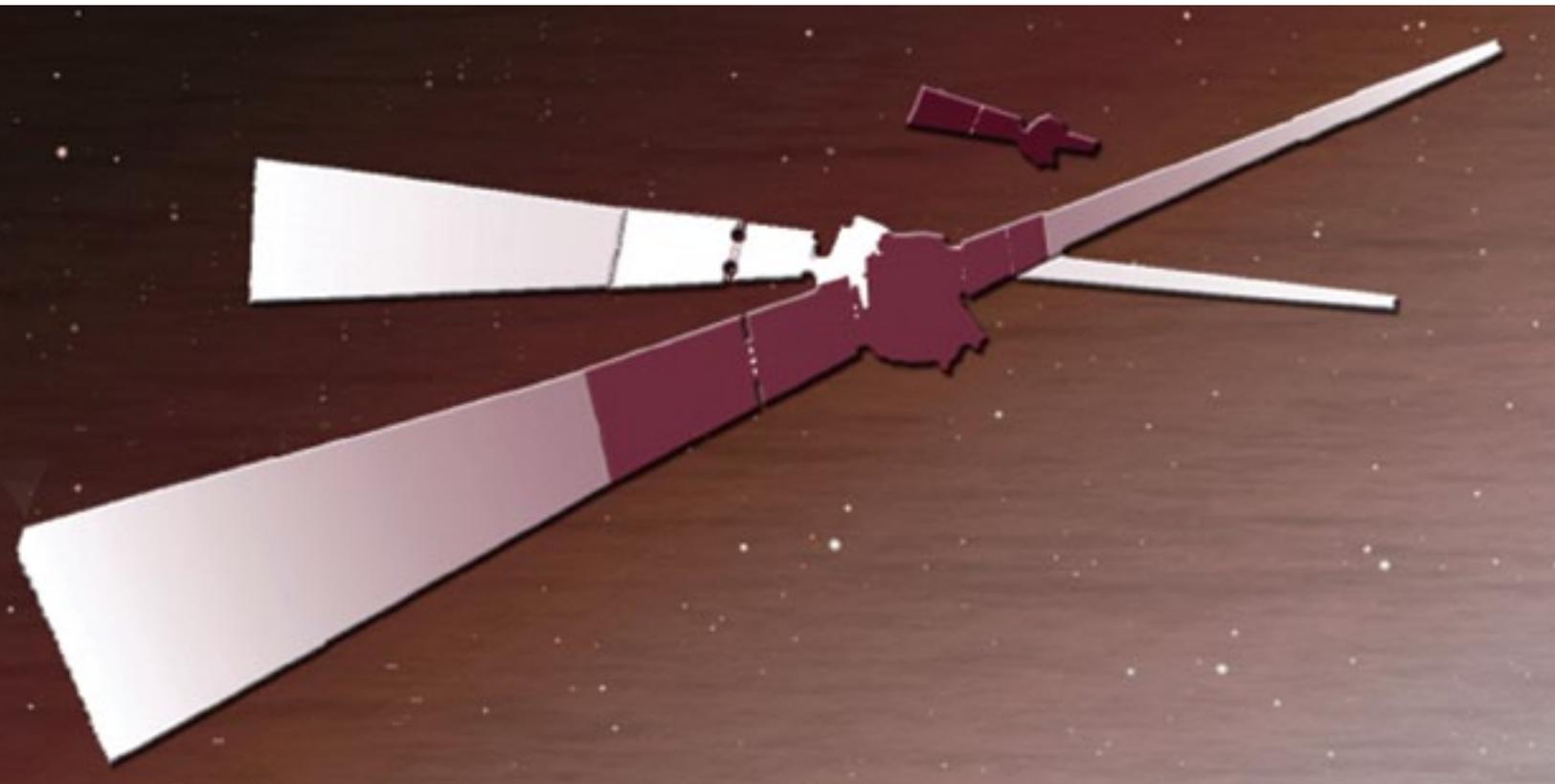
EGNOS is Europe's key contribution to GNSS that today serves the needs of land transport and agriculture, as well as timing and aeronautical applications in Europe and its neighboring regions. EGNOS was originally built as the first generation European GNSS system. It was a sort of trial run and first step towards Galileo. The initial concept foresaw that EGNOS should cease once Galileo became operational.

However, it now exists fully in its own right and is Europe's unique SBAS, delivering integrity protection to users. Time can change a lot and Europe is evolving with it. Based upon an independent European navigation-satellite based infrastructure, and having passed the certification steps, EGNOS is demonstrating that it will likely remain an independent SBAS on its own for the next decades, in parallel to Galileo. The irony is that it will even augment the precision of Galileo in the future.

EGNOS performance

The new prospect of longevity of EGNOS is, in part, due to the fact that it is interoperable with its U.S. equivalent (WAAS), as well as the Japanese (MSAS) and Indian (GAGAN) SBAS systems. EGNOS significantly contributes to a truly global navigation network of systems that no centralised constellation of satellites (like Galileo and GPS) is likely to offer in the mid term. The measured performances of EGNOS are excellent, providing the best SBAS performances worldwide today. Accuracies of the order of 1-2m and availabilities of better than 99 percent for *Approaches with Vertical Guidance* (APV) are consistently measured for most of Europe.

This Vertical aspect of navigation is indeed the reason why EGNOS is such a boon to aviation traffic in Europe. Lowering the decision height for the pilots is of particular interest for the *Aviation Air Navigation Service Providers* (ANSPs), as it assists in guiding the planes automatically to minimum of 250 foot, whereas most airports offer 500 to 1000 foot vertical guidance. An automatic and reliable check of the position at low altitude allows the pilots of aircraft to reduce their risk of collision with airfield obstacles. EGNOS also allows planes to land in adverse weather conditions.





Location of EGNOS sites (some recently set up RIMS not shown)

Now that the EGNOS Safety of Life service (SoL) is operational, the aviation actors are focused on publishing the corresponding SBAS procedures as well as investing in EGNOS SBAS receivers. After 15 dedicated years of development, the European SBAS EGNOS SoL service is on the verge of being recognized and subsequently adopted by civil aviation.

EGNOS allows aviation users to perform APV procedures, and soon LPV200 (even lower minimal down to 200 foot) safely without additional ground-based infrastructure, using low cost receiver equipment onboard. It will benefit business aircraft or rotorcrafts that already have a SBAS receiver onboard, as well as flights to regional airports where traffic volume does not justify an investment in Instrument Landing System (ILS).

Pilots are saying that flying EGNOS is “ILS like”, *i.e.*, is the same interface as flying ILS. Some European ANSPs are even thinking of phasing out their *VHF Omnidirectional Range (VOR)* or their ILS over the next decade and rely on EGNOS as sole means of navigation. These major decisions will continue to increase the pressure on the provision of EGNOS Service to deliver to the highest degree of performance, every single day.

In comparison, WAAS has been operating its Safety of Life service in aviation since 2003 over the continental United States. Since 2007 it covers Alaska, Canada and Mexico. More than 2,300 WAAS procedures have been published to date, outnumbering the **ILS CAT I** procedures in the U.S. With North America and Europe, SBAS currently covers the highest air traffic areas in the world.

Since 2009, one of the **European Commission’s** main priorities has been to steer EGNOS through its transitional phase — consisting of EGNOS passing from the status of a research project to a system which can be exploited by users, thereby delivering maximum benefit to the citizens of Europe. In line with its mandate of programme manager, and after becoming the owner of all the EGNOS assets, the European Commission is proud to have contributed to the shaping of the EGNOS technology. This has been carried out in close partnership with the **European Space Agency**, **Eurocontrol**, European Industry, and the *Aviation National Supervisory Authorities*, and is now shared with the *Global Navigation Satellite Systems (GNSS)* user community.

Two key steps have been achieved under the aegis of the Commission, one in October 2009 with the declaration of the open service of EGNOS, and the second, more important step, with the declaration of the Safety Of Life service (SoL) for aviation on March 2, 2011.

Through its successful management of EGNOS and implementation of its services, the European Commission has demonstrated its capability to steer its space-based programmes to success. The Commission procures directly the Service Provision and future Geo-stationary satellites contracts, and decides on the industrial work orders to industry via a delegation agreement with ESA. The Commission also performs the safety verifications of the system and has organized the compliance of the certification of the Service Provider ESSP SAS, a company based in Toulouse France, to the requirements of the Single European Sky.

We have come a long way together. EGNOS is here, and is here to stay. Use it! ↩

For further information, please visit the EGNOS portal at:

<http://egnos-portal.gsa.europa.eu/>



EGNOS covers Europe's ECAC Member States, shown above...



A flight tested, EGNOS-enabled, Dassault aircraft

