SatMagazine

An IoT / M2M Revolution?

Cloud Comms

Thank Goodness 2017 Is Here

Crew Safety = Good Business

The Year Ahead Will Be Unique

The New Way To Do Data Centers

Adopting Ubiquitous IIoT Connectivity
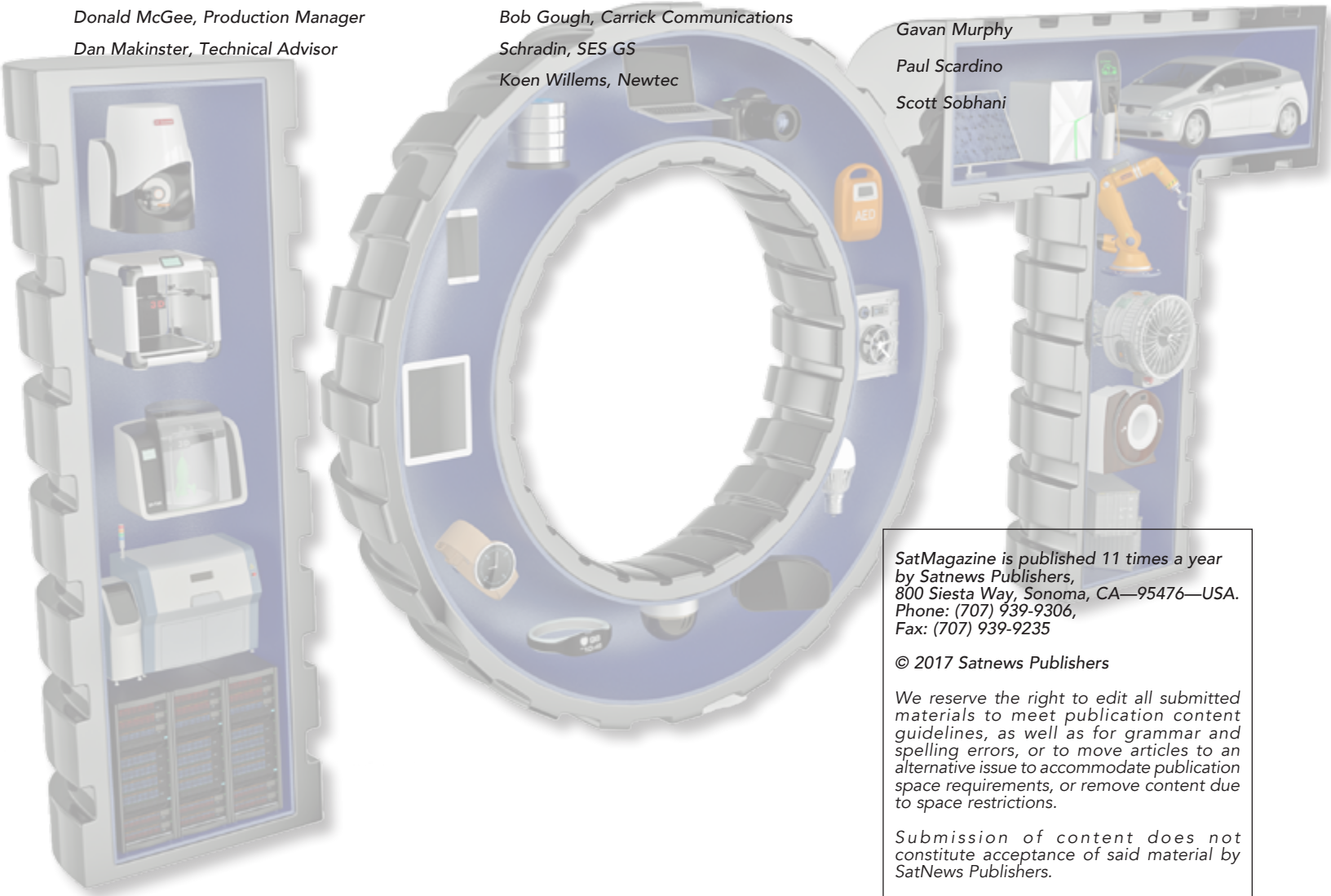
SatMagazine

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Electron Energy Encompasses Rocket Lab

With a stated mission to remove the barriers to commercial space by providing frequent and dedicated launch opportunities, Rocket Lab was created in 2006 by Peter Beck to deliver a range of complete rocket systems and technologies for fast and affordable payload deployment.

The company has announced the flight qualification and acceptance of the first stage booster of their Electron launch vehicle. All primary components of the stage—including engines, vehicle structures, avionics and software systems—were designed, developed and tested in-house at Rocket Lab.

Rocket Lab plans to initiate full vehicle testing in early 2017, once international launch licensing has been completed. The tests will occur from Rocket Lab Launch Complex 1, located on the Mahia Peninsula.

Electron is a two-stage vehicle which is 1.2 meters in diameter and 17 meters in height and is designed to deliver a 150 kg payload to a 500 km Sun-Synchronous Orbit (SSO), the target range for the high-growth constellation-satellite market. Dedicated Electron launches are priced from US$4.9 million. Electron is a carbon-composite, affordable, smallsat launch vehicle that uses Rocket Lab's 3D-printed Rutherford engines as the main propulsion system. Electron is 17 meters in length, 1.20 meters in diameter and has a lift-off mass of 12,800 kg.

"Rocket Lab has had a hugely successful year with qualification of all major vehicle systems, completion of Launch Complex 1 and considerable growth of our team and customer base," said Peter Beck, Rocket Lab CEO. "Our focus with the Electron has been to develop a reliable launch vehicle that can be manufactured in high volumes—our ultimate goal is to make space accessible by providing an unprecedented frequency of launch opportunities."

rocketlabusa.com

InfoBeam

Falcon 9 Explosion Anomaly Is Determined

Over the past four months, officials at the Federal Aviation Administration (FAA), the US Air Force (USAF), the National Aeronautics and Space Administration (NASA), the National Transportation Safety Board (NTSB), along with several industry experts, have collaborated with SpaceX on a rigorous investigation to determine the cause of the anomaly that occurred September 1 at Space Launch Complex 40 (SLC-40) at Cape Canaveral Air Force Station in Florida.

This investigation team was established according to SpaceX's accident investigation plan, as approved by the FAA. As the primary federal licensing body, the FAA provided oversight and coordination for the investigation.

Investigators scoured more than 3,000 channels of video and telemetry data covering a very brief timeline of events—there were just 93 milliseconds from the first sign of anomalous data to the loss of the second stage, followed by loss of the vehicle.

Because the failure occurred on the ground, investigators were also able to review umbilical data, ground-based video, and physical debris.

To validate investigation analysis and findings, SpaceX conducted a wide range of tests at its facilities in Hawthorne, California, and McGregor, Texas.

The accident investigation team worked systematically through an extensive fault tree analysis and concluded that one of the three composite, overwrapped pressure vessels (COPVs) inside the second stage liquid oxygen (LOX) tank failed.

A SpaceX Falcon 9 launch vehicle engaged in liftoff.

Specifically, the investigation team concluded the failure was likely due to the accumulation of oxygen between the COPV liner and overwrap in a void or a buckle in the liner, leading to ignition and the subsequent failure of the COPV.

Each stage of Falcon 9 uses COPVs to store cold helium, which is used to maintain tank pressure, and each COPV consists of an aluminum inner liner with a carbon overwrap. The recovered COPVs showed buckles in their liners. Although buckles were not shown to burst a COPV on their own, investigators concluded that super chilled LOX can pool in these buckles under the overwrap.

When pressurized, oxygen pooled in this buckle can become trapped; in turn, breaking fibers or friction can ignite the oxygen in the overwrap, causing the COPV to fail.

In addition, investigators determined that the loading temperature of the helium was cold enough to create solid oxygen (SOX), which exacerbates the possibility of oxygen becoming trapped as well as the likelihood of friction ignition.

The investigation team identified several credible causes for the COPV failure, all of which involve accumulation of super chilled LOX or SOX in buckles under the overwrap. The corrective actions address all credible causes and focus on changes which avoid the conditions that led to these credible causes.

In the short term, this entails changing the COPV configuration to allow warmer temperature helium to be loaded, as well as returning helium loading operations to a prior flight proven configuration based on operations used in over 700 successful COPV loads.

In the long term, SpaceX will implement design changes to the COPVs to prevent buckles altogether, which will allow for faster loading operations.

SpaceX is targeting return to flight from Vandenberg's Space Launch Complex 4E (SLC-4E) with the Iridium NEXT launch on January 8 (Please see *http://www.satnews.com/story.php?number=1267433707*).

SpaceX greatly appreciated the support of their customers and partners throughout the anomaly investigation process—the company looks forward to fulfilling their manifest in 2017 and beyond.

www.spacex.com

InfoBeam

OneWeb's New Jobs and Blue Origins New Steel in the New Year

New jobs becoming available at the start of a New Year... now there's a positive announcement to start off 2017.

OneWeb plans to build a constellation of nearly 650 small satellites in LEO and will construct a pair of major new space manufacturing facilities at Kennedy Space Center's Exploration Park in order to accommodate the satellites' production.

The company will expand broadband Internet access around the world, with a first batch of 10 launching in early 2018.

The company had a nice 'holiday bonus' with a billion-dollar momentum boost from investors.

On December 19, OneWeb announced a $1 billion investment by SoftBank Group of Japan, which owns Sprint, and they added that earlier investors were pumping in another $200 million.

"*OneWeb is a tremendously exciting company poised to transform Internet access around the world from their manufacturing facility in Florida*," said Masayoshi Son, chairman and CEO of SoftBank in a statement.

The companies said the new investment would create 3,000 jobs over four years, though no total was projected for Florida.

The local satellite manufacturing operation, announced in April, was expected to bring 250 jobs.

Artistic rendition of the OneWeb Satellites manufacturing facility to be built in 2017 at Kennedy Space Center's Exploration Park, on NASA land managed by Space Florida.

Photo is courtesy of OneWeb Satellites.

Founder Greg Wyler says the company's goal is to connect every school by 2022, and "*fully bridge the digital divide*" with affordable Internet available to all by 2027.

The roughly 330 pound spacecraft will be built—at a rate of as many as 15 a week—by OneWeb Satellites, a joint venture between OneWeb and Airbus.

A roughly 100,000 square-foot satellite factory is being designed for construction next year at Exploration Park, on NASA land managed by Space Florida.

"*The SoftBank investment is a major testament by the marketplace on the credibility of OneWeb*," said Space Florida President and CEO Frank DiBello. "*It's not only a billion dollars, but it represents distribution capability. When you add that with the other investors that are already in there, they have a very impressive array of financial supporters.*"

Those supporters include Airbus Group, Qualcomm, Hughes Network Systems, Intelsat, Coca-Cola and Virgin Group.

Ground has not been broken yet on the satellite factory, but DiBello said the design-build project remains on schedule.

"*The company has made significant progress on the design part of that,*" he said. "*They should be able to still meet their intended delivery date on the facility by this time next year.*"

OneWeb's factory will sit across the street from a more massive facility in which Blue Origin plans to build stages for giant New Glenn rockets, which will stand up to 313 feet tall.

Portions of the complex totaling 750,000 square feet, which is expected to employ about 330 people, are already in place.

"*The team has made extraordinary progress,*" company founder Jeff Bezos, the billionaire founder and CEO of Amazon.com, said in an early December update. "*As you can see here, the first steel is now going up.*"

The New Glenn facility could be completed late next year or in early 2018. Blue Origin, in 2018, hopes to fly space tourists on suborbital New Shepard spacecraft launched from Texas, and aims to launch an orbital New Glenn rocket from Cape Canaveral Air Force Station's Launch Complex 36 by the end of the decade.

DiBello said crews were installing 100 pieces of steel a day at the Merritt Island factory site.

"*They're moving at light speed,*" he said. "*Even though their motto is 'step by step, ferociously,' and they liken it to the turtle, the reality is they're moving very quickly.*"

oneweb.world/

blueorigin.com/

InfoBeam

451 Research Offers Their Voice of the Enterprise IoT Report

451 Research's latest _Voice of the Enterprise: Internet of Things (IoT) Organizational Dynamics_ survey of nearly 1,000 enterprise IT buyers worldwide reveals that 71 percent of enterprises are gathering data for IoT initiatives today.

This is a three percentage point increase from the previous quarter's _Voice of the Enterprise: IoT Workloads and Key Projects_ survey.

Security remains a concern, with 50 percent of respondents citing it as the top impediment to IoT deployments. This was followed closely by 41 percent who cited IoT's lack of perceived Return on Investment (ROI) and benefits.

Nonetheless, organizations are forging ahead with IoT initiatives and opening their wallets to support IoT deployments. Enterprise IT respondents with IoT initiatives underway expect their mean IoT-related spending to grow by a robust 33 percent over the next 12 months.

451 Research's latest study indicates that IoT deployments and usage will be particularly strong in enterprise initiatives around data and transactional intensive workload categories, such as data analytics and security.

IoT-specific projects include things like data collection and analysis of financial, healthcare or industrial functions; the uptime/reliability of mission-critical line of business servers and applications; as well as monitoring the efficiency and costs related to a specific business operation or department such as a hospital emergency room.

Furthermore, there is a distinct and significant portion of IoT transitions occurring organically as Enterprises' IT systems, networks and infrastructures are naturally becoming IoT-enabled by intelligent sensors and predictive analytics capabilities embedded in IT equipment, such as semiconductors, motherboards, devices (_e.g._, cameras and HVAC systems), servers, applications, smartphones, switches and routers.

"_When it comes to IoT adoption, pragmatism rules_," said Laura DiDio, Research Director at 451 Research and lead author of the study. "_The survey data indicates enterprises currently use IoT for practical technology purposes that have an immediate and tangible impact on daily operational business efficiencies, economies of scale and increasing the revenue stream._"

The survey reveals that data analytics is playing an increasingly crucial role in delivering value to IoT ecosystems with 69 percent of respondents using data from IoT endpoints (_e.g._, security and compliance) to reduce risk.

Other highlights from the 451 Research _Voice of the Enterprise: IoT Organizational Dynamics_ survey:

» _90 percent of enterprises will increase IoT spending over the next 12 months and 40 percent of respondents will raise IoT-related investment by 25 percent to 50 percent compared to 2016._

» _Enterprises are split regarding a present IoT skills shortage: 54 percent of respondents to this question said lack of trained IoT staff is not an issue for their organization, versus 46 percent who said they are having difficulty filling IoT-related positions. The latter group identified IoT security and data analytics as the areas with the greatest dearth of expertise._

» _68 percent of corporations currently take advantage of IoT data to optimize operations, such as performing preventative maintenance, reducing downtime in factory equipment and fleet management._

» _42 percent of enterprises use IoT data to develop new products or enhance existing products and services._

The _Voice of the Enterprise: IoT Organizational Dynamics_ study focuses on enterprise end-user adoption and the business and technology drivers associated with IoT and related data analytics adoption and challenges.

Based on research conducted in August through October 2016 with nearly 1,000 enterprise IT professionals worldwide, the quarterly study combines 451 Research's analysis with survey responses and in-depth interviews from a panel of more than 48,000 senior IT buyers and enterprise technology executives.

**451research.com/**

InfoBeam

Visiona Satellite Set for March Launch

Based in São José dos Campos, Brazil, is a firm that was founded in 2011 as a subsidiary of Embraer Defesa e Segurança Participações S.A. — Visiona Tecnologia Espacial S.A. — and this company is now involved in all manner of spatial activities, from R&D, satellite leasing, Earth stations and more.

This firm has been working on this project with Thales Alenia Space on the Geostationary Defense and Strategic Communications (SGDC) satellite.

With an Arianespace supported launch scheduled for March, the satellite will be shipping to French Guiana shortly, as the work on this spacecraft should be completed by the close of January.

This is the firm's first geostationary satellite project and will feature 50 Ka-band transponders for comms coverage over Brazil for Telebras Telecomunicações Brasileiras and seven X-band transponders for the Brazilian Ministry of Defense.

One unique aspect regarding this build was the ability for 63 Brazilian engineers to work in France with the satellite experts at Thales as the satellite was manufactured.

Visiona has also formed a new division that will work on building imagery of Brazil that will be garnered from various, global satellite operators.

According to the firm, they already have a number of important partnerships in place: Airbus, DigitalGlobe, Remote Sensing Technology Center of Japan, SI Imaging Services and UrtheCast.

InfoBeam

Berg Insight's M2M Research Examines Embedded Systems

IoT Driving Automakers

M2M Research Series

The Global Automotive OEM Telematics Market

According to a new research report by Berg Insight, the number of telematics service subscribers using embedded systems will grow at a compound annual growth rate (CAGR) of 36.4 percent from 26.5 million subscribers at the end of 2015 to 170.2 million subscribers at the end of 2021.

Moreover, Berg Insight forecasts that shipments of embedded car OEM telematics systems worldwide will grow from almost 13.8 million units in 2015 at a CAGR of over 25.1 percent to reach 52.8 million units in 2021.

In Europe, uptake will increase rapidly due to the eCall initiative in the EU and ERA-GLONASS in the Eurasian Customs Union, scheduled to be fully implemented in 2018 and 2017 respectively.

Connected car services have evolved from being a differentiating factor to a common feature with a high attach rate among the premium car brands and are rapidly becoming increasingly common in mid-range vehicles.

GM's OnStar was launched 20 years ago and is today the market leader worldwide with more than 7.0 million paying subscribers and well above 10.0 million active users in total.

BMW includes telematics hardware as a standard feature on all its cars sold in 43 markets worldwide and has the second largest user base with 3.4 million equipped vehicles. PSA is in third place and manages 1.8 million connected vehicles in Europe.

"*Car makers and car owners are starting to see the benefits of connected car services as a growing number of new vehicles are equipped with the technology,*" said Jonas Wennermark, IoT/M2M Analyst at Berg Insight.

However, the really exciting development will happen when we move from telematics services as an add-on to actually design a vehicle with connectivity in mind. Starting with Tesla, several car makers have introduced vehicles with large dashboard touchscreens and the ability to receive Over-the-Air updates.

"*We have also seen Volvo and Bentley launch interesting concierge services for the premium segment, such as fuel-delivery to the customer's vehicle,*" added Mr Wennermark.

berginsight.com

The automotive industry is being shaken up by technology advancements which are impacting the future of the business. A PwC study revealed that electronics systems today contribute to more than 90 percent of innovations and new features in modern vehicles.

Research by **McKinsey & Company** asserts that the vehicle of the future will be connected. The convergence of the Internet of Things (IoT), sophisticated new sensor and telematics systems, Cloud computing networks and Big Data analytics give automakers access to new streams of real-time data from vehicles, which can provide valuable insight into both their products and their consumers.

The continuing shift to more digital cars is being driven by "*digital native*" customers who expect vehicles to act like smart devices, as well as mandates from the US Department of Transportation, which recently proposed new requirements for vehicle-to-vehicle (V2V) communication by the year 2020.

Digital modernization provider Syntel, offers a suite of services that enable manufacturers to convert and migrate their legacy data to modern platforms, where it can be unified and integrated with new data for analysis. By leveraging tools including the **SyntBots® automation platform**, Syntel enables manufacturers to quickly move from outdated mainframe data storage to more efficient, scalable Big Data systems, which has the potential to improve performance while reducing maintenance and support costs by as much as 30 percent.

strategyand.pwc.com/ trends/2015-auto-trends

InfoBeam

Frost & Sullivan's IoT Forecast

Finding and organizing the latest industry data to enable customers to gain all of the market research quickly and via one provider, ReportLinker has published Frost & Sullivan's *"Dynamic Vertical Markets Such as Oil and Gas and Aviation Spur Adoption for Satellite IoT and Provide New Growth Opportunities for S- and L-band Service Providers."*

While only accounting for 25.5 million units globally in 2015, the satellite IoT market is expected to grow at a faster pace than any other satellite market.

With a compound annual growth rate (CAGR) of 19.9 percent, this market will provide new growth and opportunities for mobile satellite service providers that have struggled with the stagnant development of the satellite phone market.

This research provides a base year market size by active units, future growth estimation through 2022, and forecast breakouts for the 6 most significant market verticals within the satellite IoT market.

For the purposes of this study, only S- and L-band satellite technologies are covered as they are the primary frequency bands used for pure-IoT applications.

Global Satellite Internet of Things (IoT) Market, Forecast to 2022
December 2016 - Frost & Sullivan - 54 pages

The scope of the research...

- *Market trends cover the IoT market, satellite technology and its place within the IoT market, technology strengths and barriers, and satellite's viability among cheaper terrestrial network alternatives*

- *Drivers and restraints for the global satellite IoT market outline the key influencing factors effecting the growth in this market.*

- *The base year active unit market size and forecast spans from 2016 to 2022, projecting the overall size of the market and its expected growth*

- *Market share analysis for key market participants used to form the base year for the market forecast in the research provides a closer look at the performance of S- and L-band satellite providers serving the IoT market*

- *Vertical market analysis for the top 6 key areas of growth for satellite IoT and subsequent forecast breakouts for each of these growth areas include the military, oil and gas, aviation, maritime shipping and logistics, land-based shipping and logistics, and heavy equipment monitoring*

Context, opportunities, and use cases for the six key areas of growth are also provided to detail the nature of the growth and satellite's overall capability and relevance to the market.

This research focuses on satellites' increasing role in the rapidly expanding IoT market and how the technology can be leveraged to fill in the gaps left by land-line and cellular-based solutions.

Due to a satellite's complete global coverage and reliability, it is uniquely positioned to facilitate IoT growth in difficult/remote applications, which have been previously impossible to connect.

Thus, instead of positioning satellite as a competing technology, this research shows the potential for satellite to complement other terrestrial networks or to serve as the sole/primary technology for unique applications.

reportlinker.com/

Is IoT The Next Industrial SATCOM Revolution?

By Oscar Glottman, Chief Marketing Officer, Satellite Business Network Unit, Advantech Wireless

The Internet of Things (IoT) and associated Machine-To-Machine (M2M) connectivity has been named the next Industrial Revolution—these technologies will bring major changes in the way all businesses, governments, and people will interact with each other, as well as with the entire world.

Forecasts for growth and the expected numbers of IoT/M2M devices are staggering. One example is the *Ericsson Mobility Report*[1] which states that at the start of 2016, predictions were made that IoT will overtake mobile phones by 2018. Additionally, between 2015 and 2021, the number of IoT/M2M connected devices will annually grow at a rate of 23 percent.

Ericsson also predicts that 28 billion total devices will be connected by 2021, of which close to 16 billion will be IoT devices. Other notable forecasts summed up by *Forbes*[2] in November 2016 are estimates that the total IoT market size in 2015 was up to $900 million, growing to $3.7 billion in 2020 for a CAGR of 32.6 percent. The General Electric prediction is that the IoT investment is expected to top $60 trillion during the next 15 years. The IHS forecast predicts that the IoT market will grow from an installed base of 15.4 billion devices in 2015 to 30.7 billion devices in 2020 and then to 75.4 billion in 2025.

IoT & SATCOM

Predictions are predictions; however, one elements is for certain—IoT is going to be big.

OK, then, what about IoT and SATCOM?

Published in November of 2016, NSR's *Machine to Machine (M2M) and Internet of Things (IoT) via Satellite, 7th Edition*, predicted the global satellite M2M and IoT market will reach 5.96 million in-service satellite M2M/IoT terminals by 2025. That corresponds to nearly $2.5 billion in annual retail revenues, with a doubling of those revenues expected over the 2015 revenues.

Following extensive research at Advantech Wireless, the company has come to some interesting conclusions—IoT/M2M over satellite will also experience a dramatic growth over other SATCOM markets.

Due to these expectations, Advantech Wireless has already readied the firm's award winning ASAT™ Dynamic WaveSwitch™ Multi-Service SATCOM System for IoT. The company also recently released the ASAT Ka/Ku-8200 SATCOM terminal that is specifically designed for IoT/M2M/SCADA and Telemetry applications.

Interesting Facts About IoT/M2M Over Satellite

SATCOM has always been used for industrial M2M. In fact, some industries such as Utilities, Oil & Gas, Lottery, Banking, Government, Sensor Network and Security depend on SATCOM for their service deployments.

Considered by some as the first IoT/M2M objects were the ATM machines that conducted their transactions online as far back as 1974. Since then, SATCOM has always been involved in M2M, Industrial SCADA (Supervisory Control and Data Acquisition) network deployments, telemetry and other concerns.

For many years, this market segment was named in the SATCOM circles as "*transactional low data rate SATCOM applications,*" which is in contrast to Enterprise and Consumer Broadband applications over satellite.
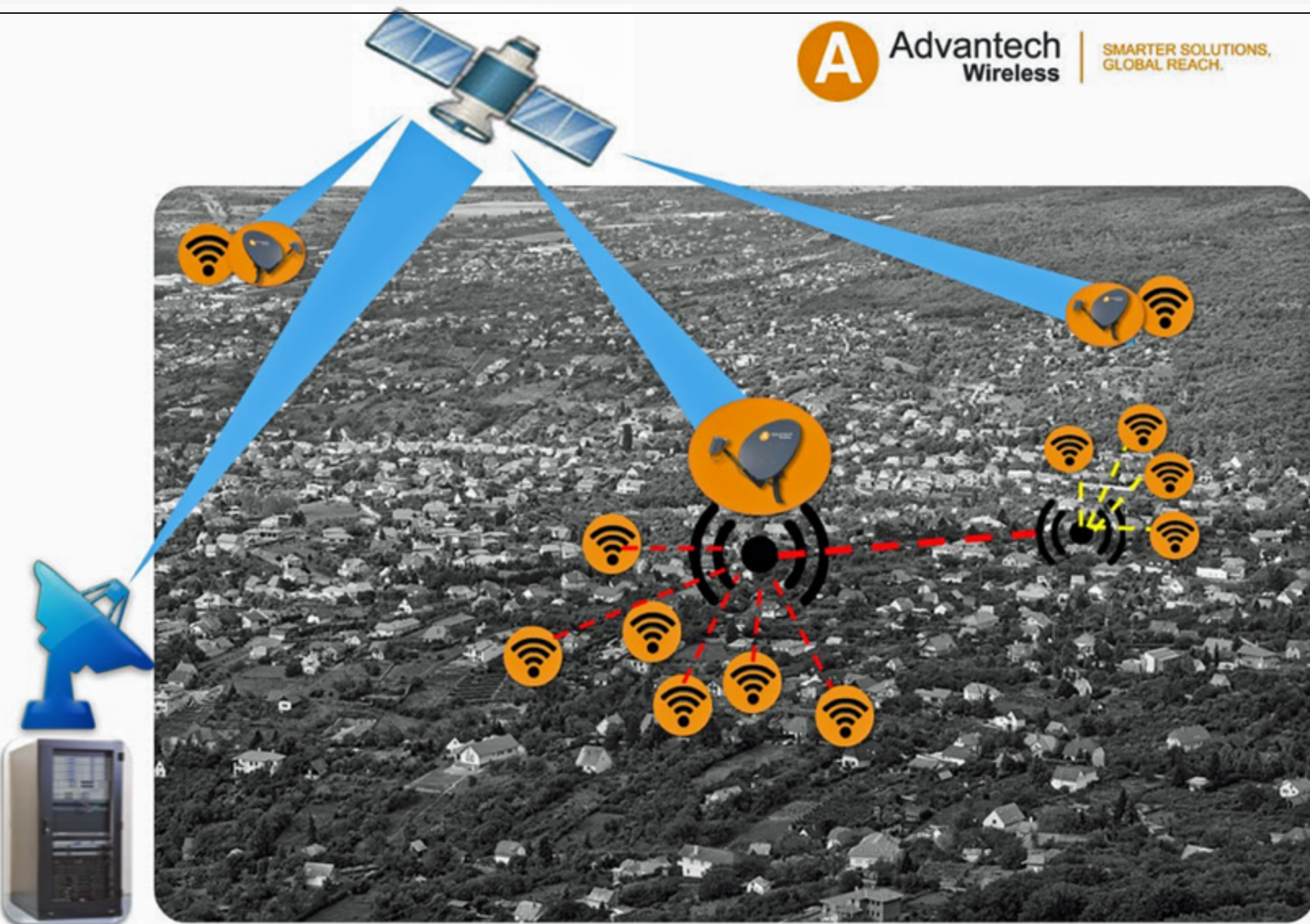
Over the last 10 years, a new and growing SATCOM market has emerged—cellular backhaul over satellite. As cellular connectivity is also often used for IoT and M2M, SATCOM has also been used to backhaul larger numbers of IoT/M2M devices that are connected via cellular, WiFi or other wireless communication methods.
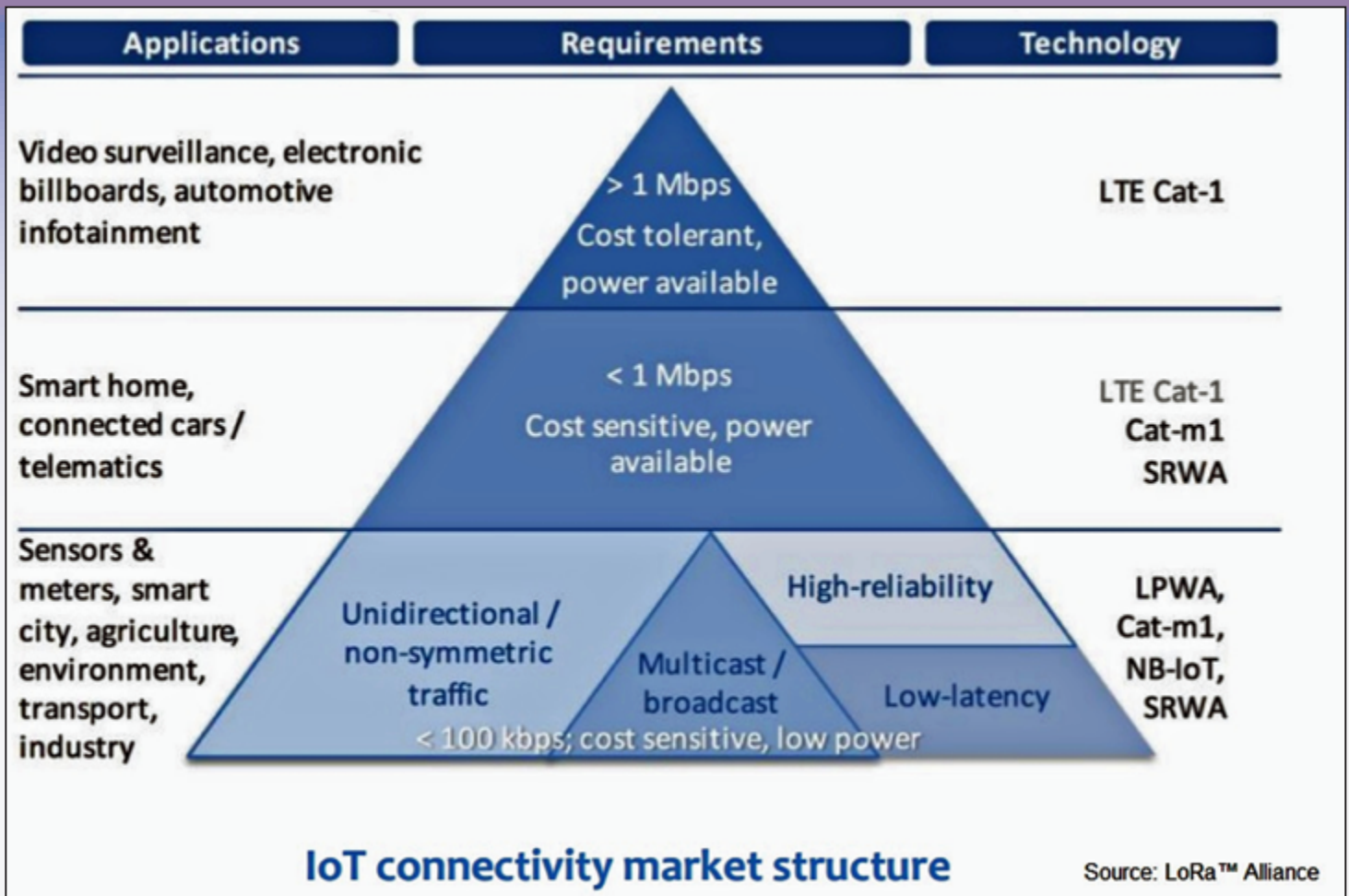
The IoT/M2M market is currently experiencing the advent of ultra-low cost radio transmission standards for IoT, such as LoRa™, Sigfox™, LTE-M, Weightless and NB-IoT. These technologies target the less than $5 per radio transmitter cost range and there are a number of low cost, localized gateways that could concentrate larger numbers (potentially thousands) of IoT/M2M devices in their vicinity.

This trend leads to a new SATCOM application segment for the company— IoT/M2M Gateway Backhaul over satellite. Advantech Wireless expects that if the general IoT/M2M market grows as dramatically as expected, such growth will also spill over into SATCOM.

This is a belief held by numerous companies as well as Advantech Wireless. For example, the October announcement of the IoT partnering between Inmarsat and Vodafone[3] shows the importance of satellite in this sector—

Applications	Requirements	Technology

IoT connectivity market structure

Source: LoRa™ Alliance

"*Thanks to its ubiquitous coverage and high network availability, even in extreme environmental conditions, satellite-powered IoT allows organizations to extend their services beyond terrestrial networks, where they have remote connectivity requirements, for example in the agri-tech, utilities, oil and gas and transportation sectors.*"

New IoT/M2M Over Satellite Requirements

As stated previously, IoT/M2M/SCADA/Telemetry over satellite were traditionally considered low data rate (not broadband)—L-band Pay-Per-Use (every data BYTE charged,) such as Inmarsat BGAN, became popular as well as low data rate and the more expensive traditional C-/Ku-band VSAT systems that supported low data rate random access SCADA devices deployment over satellite.

Advantech Wireless recognized that with the new IoT/M2M applications and massive deployments also comes new IOT/M2M application requirements. The IoT/M2M data rate requirements have grown over the years, with new IoT/M2M applications requiring much higher data rates as can be seen in the diagram on the following page.

In addition, with such massive numbers of IoT/M2M units being deployed, as well as the advent of new IoT/M2M communication standards with low cost transmitters and gateways, it is hard to envision SATCOM or even LTE to be used solely for each individual IoT/M2M device or also for IoT/M2M Gateways backhaul over satellite.

Advantech Wireless foresees that IoT/M2M Gateway Satellite Backhaul may become as popular as satellite cellular backhaul, further increasing the market potential for IoT/M2M over Satellite.
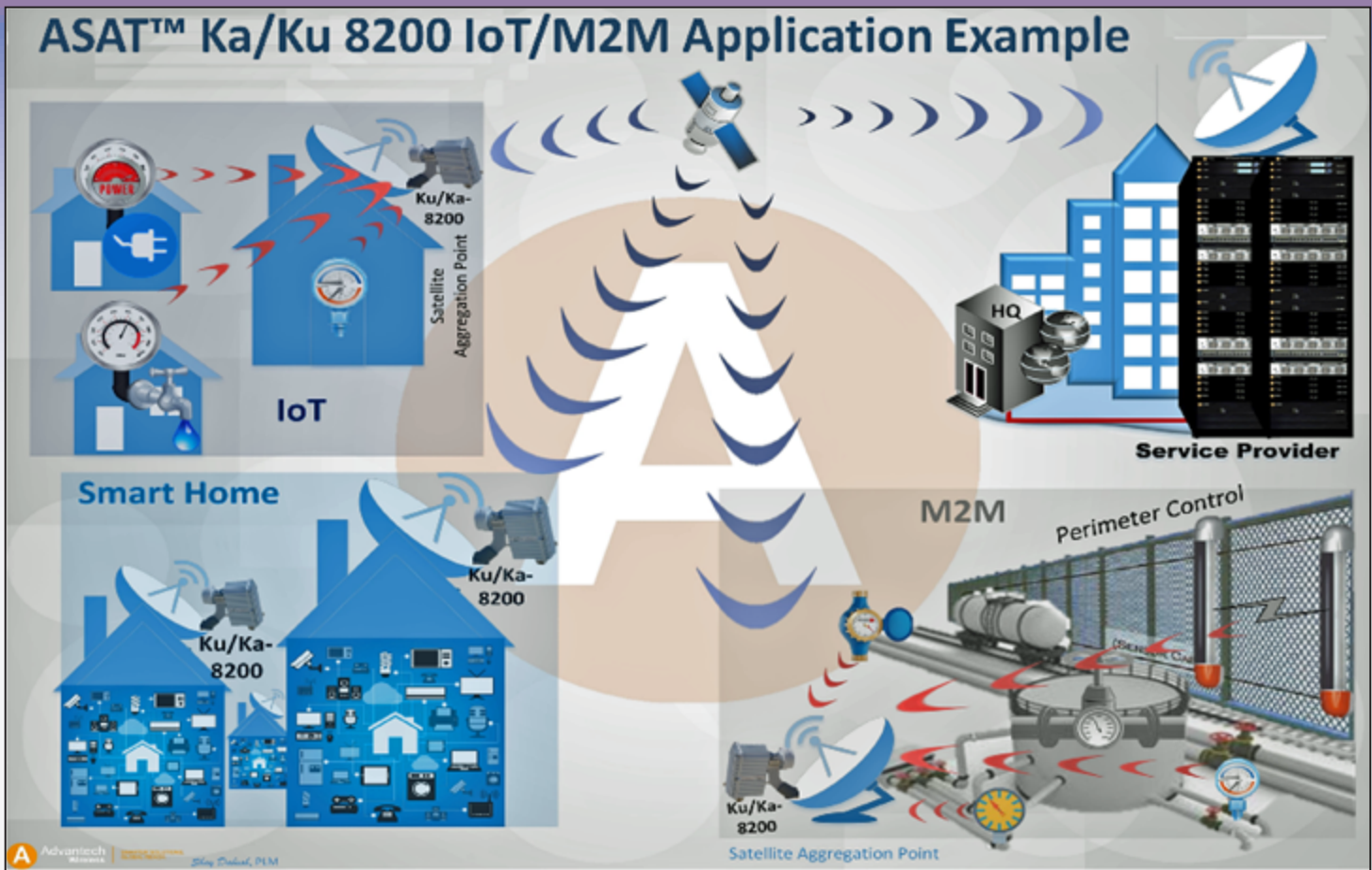
The Advantech Wireless Vision

In order to further tailor the ASAT SATCOM System to IoT/M2M requirements, Advantech Wireless recently introduced a new SATCOM Terminal, the ASAT Ka-8200.

The ASAT Ka-8200 is an integrated VSAT transceiver router that features technological advancements such as Software Defined Radio (SDR) and Direct Modulation, fully integrated with a Ka- transceiver-router in an Ultra-Compact All-Outdoor configuration.

This new ASAT SATCOM Terminal delivers the versatility and ease of deployment required in M2M, IoT and SCADA/Telemetry applications over Ka- HTS satellites.

The ability to combine the ASAT Ka/Ku 8200 with the company's complete line of ASAT VSAT Broadband terminals

ASAT™ Ka/Ku 8200 IoT/M2M Application Example

further enhances deployment flexibility—VSAT terminals could be used for satellite backhaul of a concentration of SCADA, M2M, IoT devices connected via other wireless mediums such as LTE or WiFi, where the Ka-8200 can be utilized for those locations only reachable via satellite, and where data rate requirements exceed 1Mbps.

The Ka-8200 was designed for a wide variety of IoT/M2M/SCADA and Telemetry satellite applications such as:

- *Transaction Oriented Applications: Gas Stations, ATM Machines, Lottery, Self-Service Voting/Info Kiosks*

- *Interactive-TV: VoD, Program Rating, Shopping, Social TV*

- *Sensor Networks such as Oil and Water pipe lines, Smart Fences and Perimeter Control*

- *SmartGrid, M2M, SCADA and Telemetry*

- *Smart Home and Internet-of-Things (IoT)*

- *Large-scale Random Access Messaging Networks*

Another ASAT IoT/M2M addition to the custom designed ASAT Ka-8200 IoT/M2M SATCOM terminal as the enhancement of traditional VSAT Bandwidth-On-Demand (BOD). This was transformed into a dynamically configurable SATCOM access method that enables dynamic configuration to the exact polling requirements of IoT/M2M, guaranteeing

bandwidth when and where needed, as well as preventing the loss of IoT/M2M data.

The result is Advantech Wireless' ASAT versatile SATCOM multi-service access method that dynamically supports multiple modes of operation, such as:

- *Dedicated and variable rate channel per site (SCPC and Dynamic-SCPC)*

- *Highly over-subscribed bandwidth-on-demand (BOD) broadband Internet*

- *Service-Level-Agreement (SLA) defined enterprise broadband*

- *Guaranteed IoT/M2M polled access*

- *High priority unsolicited IoT/M2M access*

- *WaveSwitch™ technology enabling configurable triggered switching (application, traffic, time, external, alarms…) between the above modes of operation, dynamically adapting to the changing application requirements from each site*

Additional, important IoT/M2M features introduced into ASAT SATCOM systems are:

- *Both Indoor and All-Outdoor Satellite Terminals covering varied deployment requirements and budget limitations*

- *Flexible and dynamic data rate support of a few bps to 14Mbps per terminal Configurable SATCOM access method allowing to define exact IoT/M2M polling requirements guaranteeing bandwidth when and where needed and that no data will be lost*

- *Dynamic SATCOM access method supporting both Solicited (Polled) and Unsolicited IoT/M2M data transfer modes*

- *Open platform and extensive NBI for seamless integration with IoT/M2M applications and management systems*

- *Efficient Ka HTS waveforms for lowest CAPEX*

- *Extensive Multi-Service NMS for straight forward service operation, with special IoT/M2M support*

- *Integrated ASAT Billing System facilitating both monthly, pre-paid and pay-per-use service models*

- *Scalable ASAT Hubs accommodating SATCOM deployments from 50 to over 500,000 sites per high density chassis and beyond*

- *ASAT Dynamic WaveSwitch Multi-Service SATCOM System allowing both Bandwidth and Waveform on-the-fly adaptation, efficiently delivering IoT/M2M as well as high quality broadband services over a common SATCOM system*

The Next Industrial SATCOM Revolution

With the massive tripling or quadrupling of a new age of IoT/M2M devices and new applications, IoT/M2M will deliver a massive change to this industry over the coming years. Ubiquitous broadband Internet and mobile cellular technologies brought to users the "Connected Society"— new generations and new businesses now interact differently and more effectively than was previously possible.

SATCOM has definitely played an important role in the birth of the "Connected Society," especially in areas where cellular coverage access was not available.

Now, with the shift from Internet-of-People to Internet-of-Things, Advantech Wireless believes that, in a few years, this transformation will lead to the equivalent of a new industrial revolution as well as a new SATCOM revolution. Satellite communications will play an even greater role, especially when combined with the advanced technologies of HTS and LEO satellite constellations.
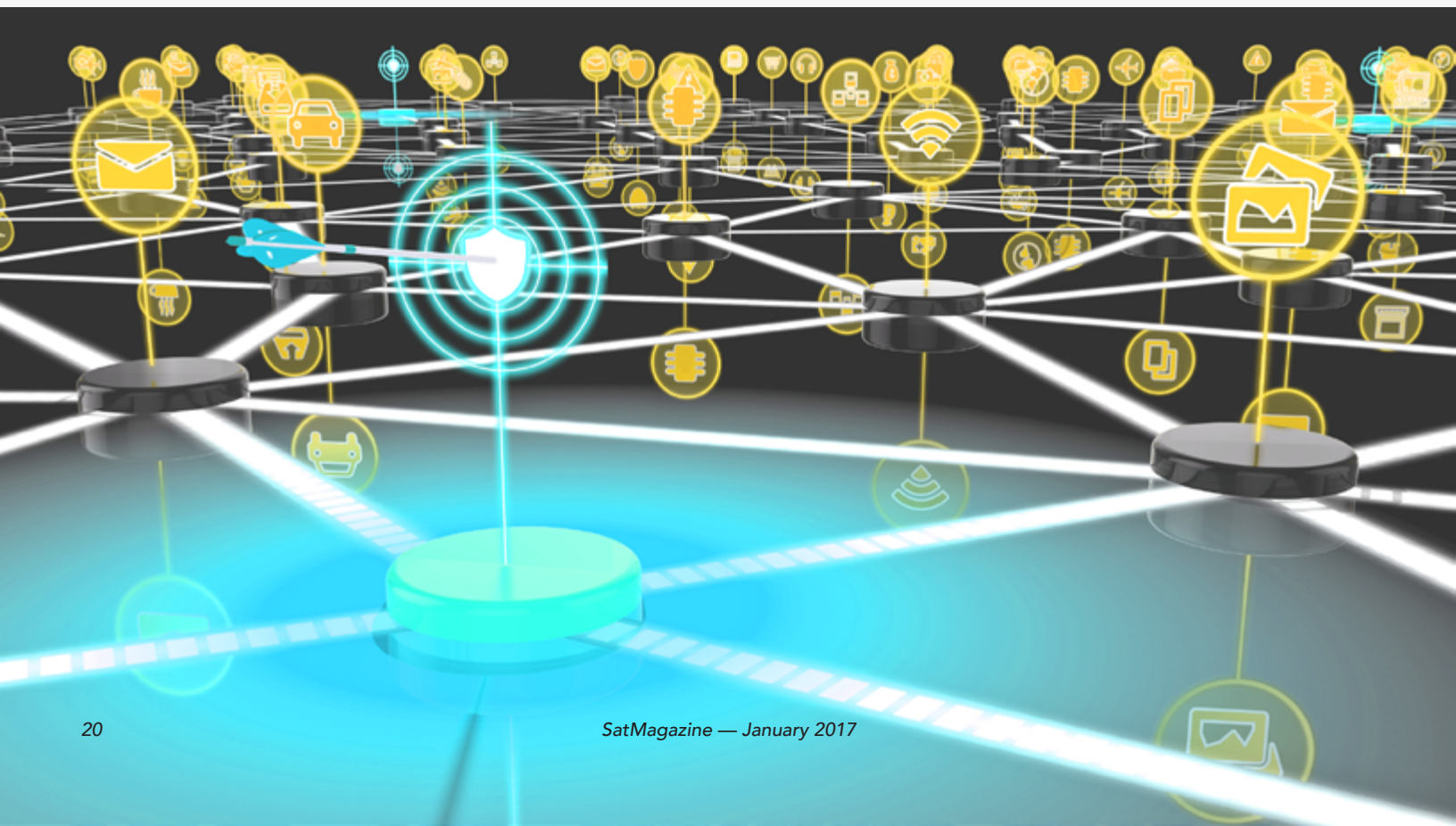
advantechwireless.com

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The Diverse World of Remote Monitoring...
A Rock Seven Perspective

By Nick Farrell, Director, Rock Seven

While the Internet of Things (IoT) grabs headlines for what the technology can do to improve everyday lives, from connected kitchen appliances to home security, there is a whole world of remote monitoring applications that, sadly, don't receive the same, mainstream attention.

From industry to science, academia and education, IoT is helping the world to develop solutions that benefit the environment, the safety of workers and the lives of communities in third world countries. The nature of such applications, often designed for remote monitoring in out of the way or hazardous locations, means that a GSM connection to the Internet is not always available.

In these cases, developers are turning to low cost SATCOM services such as Iridium Short Burst Data (SBD) which, though only capable of low-bandwidth connectivity relative to broadband speeds, can provide a highly reliable, global satellite link where 'small data' is the requirement. The beauty of Iridium SBD is not only the low-cost airtime, which can be as little as $0.04 but also the hardware is more affordable to purchase.

The Rock Seven RockBLOCK system, for example, is less than $200. Likewise, terminals can be also be rather small. RockBLOCK is just 76.0 x 51.5 x 19.0 mm, so they can be easily integrated into almost any sensor or monitoring system.

Designed to work with any platform with a serial or USB port, including Arduino™, Raspberry PI™ and Intel Edison, as well as Windows, Mac and Linux computers, RockBLOCK is a simple and reliable way to integrate two-way communication into sensor and measurement based research projects. RockBLOCK can send messages of 340 bytes and receive messages of 270 bytes using Iridium Short Burst Data (SBD), which offers global, pole-to-pole coverage.

The RockFLEET system offers the same communication capabilities as the original RockBLOCK product but also comes in a sealed form factor for permanent installation and offers GPS tracking functionality as standard.

The availability of low cost SATCOM and computers such as the Arduino and indeed the Raspberry Pi is allowing for the development of data-centric monitoring systems on a budget, which is a vital factor for many non-profit and research operations working in IoT.

Many of these projects don't need a high bandwidth VSAT link. Instead, they need a compact, low-cost way to transmit bits and bytes—in this area of connectivity innovation, small is most definitely the best. This makes the technology suitable for a vast array of applications and Rock Seven has been lucky enough to be part of some exciting projects.

Measuring Health Initiatives

According to RockBLOCK user SweetSense Inc., IoT, a market anticipated to reach around 25 billion connected devices by 2020, doesn't have to be just about marginal quality of life improvements, such as Internet connected coffee makers, for the people of 1st world countries. IoT can also help to bring critical lifesaving services to rural Africa, Asia and other emerging economies.

The SWEETSense™ system combines commercially available front-end sensors, selected for specific applications that include water treatment, sanitation, energy, infrastructure or other applications, with a comparator circuit board that samples these sensors at a reasonably high rate.

SWEETSense™ consists of a low-power, cellular or satellite enabled, fully integrated instrument customized for installation in community and household level environmental service interventions. To meet the design criteria, key features were realized, including distributed processing between hardware and the Internet cloud and remote automated recalibration and reconfiguration. Data reported by the sensor can be downloaded from any browser with a protected login. Software includes automatic and manual updating of sensor calibration, reporting and alarm parameters with the ability to be integrated with other web-based platforms.

Photo of Rock Seven's RockBLOCK.

Photo of the SWEETSense™ unit.

SWEETSense™ is used to monitor the effectiveness and impact of global health campaigns. The product can generate data to provide vital feedback, helping to improve the project it is monitoring and the development of future projects.

In one recent study in Bangladesh, SWEETSense™ instruments demonstrated more than a 50 percent exaggeration of latrine use when compared to household surveys. That result may enable funders and development engineers to rethink how they implement improved sanitation programs in the country.

In another example, in 2014, about 200 SWEETSense™ sensors were installed in rural water pumps in Rwanda. The purpose was to identify pumps that were broken in order to dispatch repair teams.

According to a survey, before the sensors were installed some 44 percent of the area's pumps were broken at any given time and an average of about seven months to get a pump repaired was required. After the sensors were in place, the repair interval was reduced to just 26 days; consequently, only 9 percent of pumps were broken at a time.

This is being mirrored in a project in Kenya, which uses SWEETSense™ integrated with the RockBLOCK system due to lack of terrestrial communications infrastructure in the areas that were to be monitored. SWEETSense™ is being used to monitor remote boreholes that provide drinking water to thousands of people.

For IoT projects in Africa or other developing regions, keeping costs reduced is vital. Battery life is also very important. SWEETSense™ is a battery powered device, so it has to last a long time while maintaining connectivity. That's one of the key reasons RockBLOCK has been selected as the standard fit satellite connectivity for SWEETSense™ projects outside of GSM coverage.
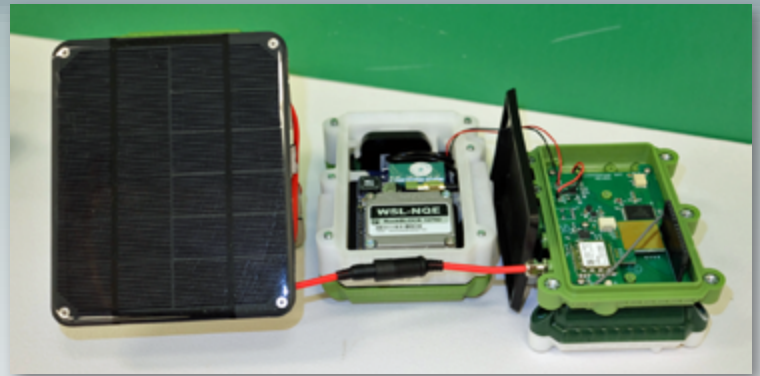
Reliability of connection is also important to SweetSense Inc., alongside the fact that RockBLOCK doesn't need a separate antenna pointing in any particular direction. Installation is easy—as long as a RockBLOCK equipped SWEETSense™ unit can see the sky, it will be connected to the Internet.

Supporting Environmental Research

With the growing need to secure new data from remote and inhospitable areas of scientific interest that have to be balanced against commercial challenges and tough competition for academic budgets as a background, Rock Seven has seen an increase in the Iridium SBD products being used for environmental science applications in the Arctic and Antarctic.

Several successful deployments have proven the robustness of RockBLOCK and the RockFLEET systems. These applications highlight their suitability for reducing costs in the research sector as well as in commercial industries that operate in remote environments, such as oil & gas and mining.

RockBLOCK is currently being used by a team from the National Institute of Water and Atmospheric Research—New Zealand (NIWA) to measure the effects of storm waves on sea ice. The product has been integrated on specially developed wave buoys deployed onto sea ice floes in the Arctic and Antarctic by NIWA. The system transmits GPS

position and signal strength data from the buoys every hour, allowing the teams to plot the movement of the ice against wave data.

"*The research is vital as it supports investigation into current environmental changes at the Poles while informing the development of future models,*" said project contributor Scott Penrose, Software Architect at Digital Dimensions. "*RockBLOCK helps us collect data from our wave buoys using Iridium Short Burst Data, which is the easiest and most cost-effective way, especially considering the low cost of the device itself. Despite this, the system is more than capable of operating in such extreme environments while providing reliable data according to our set schedule.*"

Rock Seven's Iridium technology is also being used in the Arctic by the Laboratory for Cryospheric Research, which is dedicated to the monitoring and understanding of the frozen earth including glaciers, ice caps, ice shelves, snow and sea ice.

Laboratory members are undertaking research across northern Canada, including monitoring glacier changes in Kluane National Park, examining ice shelf and sea ice interactions along northern Ellesmere Island, and measuring glacier and ice cap dynamics across the Canadian Arctic Archipelago. A team from the laboratory is using Rock Seven's RockFLEET product, combined with a solar panel and extra battery pack, to provide long term position monitoring of sea ice in the region.

Operating in such extreme environments can be costly, which means research teams are, more often than not, seeking ways to reduce their financial outlays. RockBLOCK and RockFLEET fulfill this need while still providing the reliability of much more expensive systems in terms of hardware and airtime costs. There is real potential for technology transfer from research to commercial industries based on these developments.

Rock Seven is noting more interest from the Oil & Gas industry, for instance, where data originating at facilities in remote or hazardous locations can determine and inform the company if an engineer needs to visit a facility, or not.

Monitoring at Sea

Another innovative application Rock Seven has been involved with is remote monitoring on v. These boats are designed for evacuation from a diving support ship fitted with a saturation diving complex where the divers live under pressure and go to their work site by transferring under pressure to a diving bell that will take them to depths of over 300 meters, Hyperbaric lifeboats are expected to be able to safely transfer divers currently in saturation and unable to decompress for days to a hyperbaric reception facility where they can be decompressed safely.

This transfer under pressure is the only way of evacuating saturation divers from a stricken ship. Decompression from saturation would cause certain death so modern saturation diving vessels are fitted with at least one hyperbaric lifeboat that can carry up to 18 divers to safety.

When on board the diving vessel, any occupants of the saturation diving chambers will be monitored closely to ensure their health and safety. This poses a challenge should the occupants have to be moved to a hyperbaric lifeboat in an emergency, as the conditions inside the lifeboat chamber have to be maintained to close tolerances of temperature, gas mixture and pressure. The resources available to maintain these conditions within the lifeboat chamber are strictly limited and to maintain the conditions stable for any amount of time is difficult. This makes the monitoring of available resources and conditions within the chamber critical.

A key challenge of remote monitoring of hyperbaric lifeboats has been the size and power requirements of SATCOM antennas. There has also been a cost consideration, with the majority of SATCOM services locking users into annual contracts. Considering that not a single hyperbaric lifeboat has ever been launched in a real emergency, it's somewhat understandable that diving operators may be reluctant to fund a fleet of lifeboats with an open SATCOM connection when, thankfully, the likelihood of a lifeboat being needed is slim.

To enable SATCOM for data transmission from a hyperbaric lifeboat, a development team has decided to use the RockFLEET system, which addresses the size, power and cost challenges. RockFLEET was primarily designed as a ship tracker,; however, Rock Seven also offers Machine-to-Machine (M2M) capabilities with a module based on RockBLOCK technology, allowing it to be used for almost any kind of remote monitoring connection.

The M2M module enables equipment on board vessels to be interfaced with RockFLEET, allowing two-way data transfer between vessel and shore. It can be used for low-cost delivery of data such as vessel telemetry or condition monitoring, or for more intelligent operations such as initiating automatic alerts based on environmental conditions, or indeed the monitoring of environmental conditions aboard a hyperbaric lifeboat.

Smaller equipment and lower operational costs are opening the door for a myriad of IoT applications on the water. RockFLEET user Hydrosphere has developed a data and telemetry system for navigation buoys. The project was started as a way to lower costs of buoy maintenance. By providing a low-cost data link from each buoy, engineer visits can be reduced and money can be saved on upkeep.

Hydrosphere is using RockFLEET to send position and telemetry data from sensors on buoys and can tell i.e., whether the navigation lights are working or not, or if the batteries/solar-panels are charging properly. With this data, maintenance schedules can be adjusted and there is a significantly reduced need to visit the buoys by boat. The system also monitors buoy position and sends an alert should the buoy move out of its required location either by a mooring failure, collision or extreme weather.

IoT in Education

One of the great things about small, low-cost SATCOM is that almost anybody can become involved—Kraken (The Poseidon Project) is a 'smart buoy' developed by Sutton Grammar School in the UK. The system is based around an oil spill response unit that aims to make it easier for oil companies to clean up spills quickly and effectively. Kraken consists of a series of buoys that cooperate to give an image of the spread of oil by using sophisticated GPS and radio technology. Using this, companies can get a picture of where oil has spread/will spread and can clean it up as fast as possible.

RockBLOCK is used to transmit the GPS position and other collected data from a set of buoys (called 'Nymphs') via a central management system on the 'Kraken' buoy to allow monitoring of the situation in near real-time. The location of each buoy is determined as a latitude and a longitude and accurate, synchronized timekeeping (GPS time) is available for all of the buoys. GPS modules on the Nymphs communicate with an Intel Arduino device.

The team aimed to fully use the benefits of an entire network of buoys by allowing the Nymphs to relay each other's transmissions to the Kraken, in case some drift out of range. Each Nymph broadcasts the GPS data it has stored in its memory to all other buoys, which receive and store this data in their own memories. This means that each time a buoy transmits its memory contents, it is transmitting GPS data on behalf of all the other buoys (not just its own location).

If a buoy moves out of range of the Kraken, its data will still reach the Kraken providing that other nymphs are still in range to act as relays. The Kraken collects all these data transmissions to send back to shore via Iridium SBD, enabling tracking of the location of each buoy in the network while using only one RockBLOCK device.

In addition, the buoys also contain an on board battery voltage monitor, which ensures that the team knows how much longer the batteries will last. Also, there is an internal temperature sensor (located near the edge of the buoy to be as close as possible to the outside water temperature) connected to the Arduino via a one wire interface.

No Limits

The concept of 'small data' is well-proven with the applications described above. There are a multitude of possibilities and a burgeoning niche of engineers, experts, academics and even school children creating new systems with real potential to change the world for the better. While we may all appreciate a hot cup of coffee ready for us first thing in the morning, the benefits of IoT can and should be more fundamental for society.

Considering the valuable results from the diverse projects that RockBLOCK and RockFLEET have supported so far, Rock Seven is confident in the need for technology dedicated to small data applications.

Cost, size and weight are vital to open up IoT to more developers. As more companies, organizations and individuals join the fold, more creative and socially important applications for the IoT will be realized. That can only be a good thing for everyone... even coffee lovers.

rock7.com/

Thank Goodness 2017 Is Here...

By Chris Forrester, Senior Contributor

This past year has been a tough 12 months for the world's mainstream satellite operators.

Revenues have been under pressure, transponder lease rentals are— at best—flat and the cost per gigabit of throughput has been firmly trending downwards. This lower cost-per-gig is sometimes good news for players such as Intelsat with its new 'Epic' series of High Throughput Satellites (HTS); however, when these lower costs apply directly across the industry and where bandwidth isn't designed for HTS usage, then the news is bad.

Worse, perhaps, the past three years have seen considerable downward pressures from the US government, initially under the military "sequestration" of funding and curbing of bandwidth usage. Sequestration severely impacted the "headwinds" talked about by just about every major satellite operator throughout 2015 and 2016. Based on 2013 obligations, the 2014 sequestration cuts represented some 8 percent of reductions (about $43 billion).

The USA's Department of Defense (DoD) recognizes the role that commercial satellites can—and are—playing in supplying bandwidth to the military, and while there are obvious uncertainties over the new Trump administration and whether or not his tenure will lead to changes, the overall view is that the DoD understands the agency must work in harmony with commercial operators.

There are increasing signs that the "bottom," in terms of cut-backs, has now truly flattened out. 2016 was better than 2015, and a ton better than 2015 in terms of forward bookings. In fact, there are some signs that 2017 to 2018 might see a tangible boost to the DoD's spending. The industry can only hope such is truly the case.

One recent report (from investment bank Berenberg) talked of "*Government-revenues stabilizing, even growing*" and such projections are endorsed by further buoyant forecasts from SES and Intelsat. These endorsements indicate that the bottom of the government trough has been reached and that this sector is now on a gentle, upward trajectory.

Certainly, deep examinations by the industry's financial analysts are significantly more positive about prospects for 2017. For example, investment bank Jefferies described 2017 as a period of "rehabilitation" for satellite operators.

Jefferies' equity analyst Giles Thorne suggested that the industry's CEOs and CFOs could do a better job "*of firmly*

distinguishing between the cyclical price deflation seen in widebeam in certain regions for years—the structural price deflation from HTS, the [Q3/2016] results season saw a number of comforting sound bites."

Intelsat said the company was finally seeing sequentially flat renewals in legacy Network Services. Eutelsat reported that pricing and volume behavior pricing in their Data segment was tracking to the Strategy Update guidance, and SES said that their focus on Tier 1 customers on a managed service model was working on stabilizing Enterprise. From outside the corporates, we note much more constructive commentary from industry insiders."

Thorne added that throughout last year the de-rating following on from Eutelsat's May 2016 profits warning was "overdone. He said, "We argued that the market had over-interpreted the content of the warning, that HTS won't cannibalize all legacy data revenue and streams, and that HTS will ride the strong elasticity of the data segment to unlock incremental volumes in new / old applications and ultimately revenue growth. In this note, we look at sector-wide events since that note and how they validate our thesis. We remain of the view that there is value in the sector."

The Jefferies bank report to clients was critical of Eutelsat's "clumsily worded and dramatically over-interpreted downgrade statement (and associated results call), effectively suggest that the long-running cyclical oversupply conditions in data (specifically trunking, corporate networks / VSAT in Latam and Africa) will be exacerbated by the arrival of high throughput satellites (with their structurally lower cost to serve)."

Moreover, Eutelsat's May statement was accompanied by a few worrying asset sales as well as a troubling dispute between the company and Abertis-backed Hispasat, which seemed to have spooked the market. Indeed, Eutelsat's share price remains firmly in the doldrums, down some 40 percent on the pre-May 2016 position.

However, Thorne remains a fan, and said, "We have always disagreed with the market's interpretation of the Eutelsat profit warning. This industry has many risks and opportunities, but mass cannibalization of legacy data by HTS and / or the complete failure of HTS to unlock growth are not on that list. The industry, the technology behind it and the applications it serves are simply not that fungible, fickle or homogenous."

Eutelsat admitted that revenues are still tough to predict, especially in the 'Data' segment. CEO Rodolphe Belmer said, "[The 'Data'] segment continues to decline with two effects, a positive effect on volume, which is growing, and a negative effect on price, which is in decline. The most declining regions, I would say, in terms of price are Latin America, the Middle East and Sub-Saharan Africa. And it's very consistent with our forecast and with our business spending that there is nothing new, nothing worse than what we had anticipated in this segment."

Jefferies is backing Eutelsat as a growth stock and gives the company a 23 euros price target. "We still see Eutelsat's absolute multiple as far too low. Its covered dividend yield of ~6 percent (and growing) should be a buying signal alone. The path back to a defensive growth multiple is still some time away (pending visibility on the mobility and residential broadband opportunity) but the groundwork for flat y-o-y revenue in Government in FY18 is a material stepping stone."

There are some worries in Eutelsat's 'Video' segment, not the least of which is how the operator handles third-party wholesalers of their bandwidth. Undoubtedly, there is some downward pressure on some of Eutelsat's video 'hot spots', with little in the way of positive price improvements. Management see this taking a year or two to work itself out.

However, there are plenty of other strong signals that recovery is in the air, and not just helped by growth in 'Data', and extending beyond Eutelsat. Staying with Eutelsat just for a moment, the fact is that HDTV transmission remains barely 15 percent of Eutelsat's video business—and this percentage has to grow over the next few years, while Ultra-HD (UHD) can only improve overall revenues.

Indeed, for SES the UHD picture is getting rosier by the month. As this column is being written, the operator is carrying more than 20 channels into Europe and North America (the position one year earlier was a single channel). That number will grow.

SES is carrying 2434 HDTV channels (up 6 percent y-o-y, and 33 percent of the total) which—if nothing else—reveals a target for Eutelsat and other operators, as well as indicating how annual growth in HD and UHD might evolve directly across the board. Paris-based Euroconsult expects the global number of UHD channels to grow to almost 800 by 2025 and that number could even be more, according to some forecasts.

SES also acquired a major global play-out operator (RR Media, headquartered in Israel) and bundled that purchase into the existing SES Platform Services operation to create the merged MX1 division—that move ensures growth in content handling as well as a feeder for the firm's satellite capacity.

Global TV Channels*			
	SD	HD	UHD
2015	40451	7244	0
2019	45067	11945	39
2024	48503	19225	786
*Euroconsult			

Jefferies praised SES' management, stating that the company "*just gets it.—[Their] output is a superior growth profile to its FSS peer, Eutelsat, (albeit at a higher multiple). We see the Enterprise issue as diminishing while O3b is already proving their commercial merits. We remain cautious on SES's mobility distribution strategy, that caution informed by recent events at Global Eagle. We are comfortable with two years of uncovered dividend as the EBITDA growth keeps leverage within the target range.*"

"*We've always been a fan of how the CEO repositioned the message when he took the role in 2014, moving to the premise of "what does satellite have to do to remain relevant? To us, this far better captures the inherent challenges of the industry at this point in time. In our view, his response is the correct one too: you have to be global and scalable, you have to focus on key verticals, you have to innovate at every level of the business to deliver differentiation. A deceptively simple message, decidedly hard to deliver; we think SES 'gets it' and will deliver sustainable growth.*"

SES has the considerable asset of O3b now firmly in the firm's portfolio and SES has used their financial muscle to rework O3b's borrowing and to commit to O3b's expansion.

There could be threats to O3b's MEO position in the industry and that position has not been helped by a slew of filings made with the FCC on November 15, 2016. Somebody joked that the only group in November that did *not* make an FCC filing for a new satellite constellation were the Boy Scouts of America. The November 15 deadline for applications to be considered by the FCC this year saw a flood of paperwork hit the FCC's 'in tray.'

Other than the Boy Scouts, 11 commercial operations made applications to launch new satellite constellations to the FCC on November 15. SpaceX and that firm's plan for as many as 4425 satellites made headlines around the world. However, Elon Musk's group was far from alone in this regard—Telesat of Canada formally proposed 117 craft, and two pre-production craft will launch next year to secure that firm's frequencies for the larger system.

Other well-established operators include O3b (now part of SES), which wants to extend their current system with 16 new inclined orbit (called O3bI) satellites that will be additional to the firm's approved 24 equatorial MEO satellites. The O3b submission adds transmission frequencies as well as fresh orbital planes, with the end result being full Earth coverage (and not just the 63 degrees North to 63 degrees South current services).

Satellite builder Boeing is applying for a 60 satellite, Ka-band constellation in three, clever, highly inclined Geo+ orbits (ranging from 27,355-44,221 kms), which will serve the Americas, Asia and the whole of Europe and Africa.

ViaSat has applied for permission to launch 24 Medium Earth Orbiters at 8200 kms with MEO to GEO links. Perhaps not coincidentally, ViaSat is also looking to raise an extra $500 million via an issue of fresh equity. The company wants to expand their current portfolio of three conventional GEO craft with two-dozen MEOs that will echo the SES/O3b relationship of GEO and MEO orbiters. ViaSat's new birds would use a mix of Ka- and V-band frequencies, and the company says they will guarantee zero interference with any terrestrial transmissions.

Kepler Communications of Canada wants as many as 140 small LEO satellites to serve the growing Internet of Things (IoT) market. Karousel, a new entity backed by Columbia Capital and Telecom Ventures, wants a 12 satellite system in a highly elliptical Geostationary orbit. Audicy Corp is seeking permission to launch a three satellite MEO system. Theia Holdings wants a 112 fleet of craft for Earth Observation (EO) and communications at 800 km.

Not all of these plans will launch. However, inevitably some will, especially those companies with deep pockets and who are able to muscle through the set-backs that are guaranteed to interdict the plans of any new proposal. Indeed, some of the proposed constellations will provide real competition to existing players.

Top of this list has to be ViaSat's rival system to that of O3b. Market analysts reckon that ViaSat's proposals could mean much tougher competition to O3b in the medium to long-term. ViaSat could be in business within six years of receiving their license.

SpaceX is also presenting a robust concept, telling the FCC that their system is designed to provide a wide range of broadband and communications services for residential, commercial, institutional, government and professional users worldwide. "*With deployment of the first 800 satellites, SpaceX will be able to provide widespread US and international coverage for broadband services. Once fully optimized through the Final Deployment, the system will be able to provide high bandwidth (up to 1 Gbps per user), low latency broadband services for consumers and businesses in the U.S. and globally,*" the company said.

As mentioned, not all of these plans will make become reality; however, O3b will no doubt maximize their 'first mover advantage' to cement business prospects before the OneWeb, ViaSat and other constellations muscle into their unique territories.

Nevertheless, the market is increasingly positive about the prospects for the global fixed-satellite services industry, particularly as such relates to the video broadcast business. The ongoing shift to HD in emerging markets, and to Ultra HD in mature territories, is likely to continue to drive demand for capacity at premium orbital positions. SES and Eutelsat are well positioned to benefit from this trend.

Maritime and aeronautical traffic and communications are two other growth sectors, despite being highly competitive. Euroconsult is forecasting a 5 percent CAGR for maritime expansion over the 2015 to 2025 period. Aeronautical—and in particular, In Flight Entertainment (IFE) and connectivity—is another segment that is forecast to enjoy strong growth prospects during 2017.

A recent Euroconsult report (**FSS Operators: Benchmarks & Performance Review**) stated, "*At the half-year mark of 2016, FSS revenues were falling by 4 percent year-over-year with 2/3 of operators reporting lower revenues and global FSS operators particularly impacted,*" according to Dimitri Buchs, Senior Consultant at the research firm and editor of the report. "*Intelsat, SES and Eutelsat are all forecasting a decrease in revenues in FY2016 in their financial guidance.*" *The impact on pricing has accelerated in recent months, especially in data-driven markets, where pressure from HTS systems and terrestrial networks is highest. This is set to lead to lower operating margins, forcing the industry to adapt to a new environment where satellite operators have no choice but to lower their pricing and increase their commercial flexibility.*"

"*A more positive outlook for the FSS industry is foreseen after 2017 as players are expected to have progressively adapted their strategy to a changing landscape. The overall market direction is towards greater satellite cost-effectiveness through larger payloads, lower launch costs and other cost-optimization options offered by recent innovations. In the coming years, the increasing competitiveness of satellite infrastructure, with HTS benefiting from a much lower break-even point than regular payloads, should allow operators to maintain decent return on investment despite lower pricing. The number of FSS operators providing HTS capacity is expected to grow to 25 by the end of 2019; this implies that half of FSS operators will still not have any available HTS capacity in-orbit in 2019.*"

In other words, roll on 2017 and 2018—ahead is a stronger and healthier period for this dynamic industry.

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In November of 1998, Chris was appointed an Associate (professor) of the prestigious Adham Center for Television Journalism, part of the American University in Cairo (AUC), in recognition of his extensive coverage of the Arab media market.

Crew Safety Is Simply Good Business

By Gavan Murphy, Director of Marketing, EMEA, Globalstar

Commercial organizations across a wide range of sectors now recognize that retaining key staff is important for better operational efficiency as well as a healthier bottom line for the company.

For organizations competing to attract and retain talent, a commitment to staff welfare is a key topic today. Gavan Murphy, Director of Marketing EMEA at Globalstar, explained that this topic of conversation is underpinned by the drive to ensure that workers, wherever their business requires them to be located, have access to trustworthy safety devices.

Ensuring the welfare of skilled and professional crew is, now more than ever, extremely important. Even in today's highly competitive marketplace, when investment in technology— and, indeed, any operational spend—is under ever closer scrutiny. More and more commercial organizations perceive the need to do more to promote crew safety. These companies have also awoken to the business benefits of crew safety as being a crucial component of their operations. Whether involved in heavy construction, public utilities, natural resource management, commercial fishing, supporting oil and gas operations in remote regions, or developing alternative sources of energy, improving working conditions and promoting welfare for crew is essential.

There is also the added urgency of safeguarding staff who work in potentially hazardous environments.

This recognition may have been a long time in coming, but today's businesses across the globe take the view that retaining the most expert, knowledgeable staff is simply good business. Highly experienced team members often perform duties more rapidly than more junior employees and they have more know-how upon which to draw when faced with challenging situations—including crises events. Being able to rely on highly experienced teams also encourages better overall efficiency when carrying out specialist operations or even when providing ongoing maintenance. Retaining these key employees is now seen as an important human resources issue.

Providing remote working professionals with the communications capabilities to help improve their safety surely goes a long way to achieving these business goals. Enabling reliable, resilient tracking and instant connectivity with colleagues and security teams helps to ensure optimum resource allocation as well as alleviating stress for workers who are carrying out complex and/or dangerous tasks.

To add to the safety imperative, access by the emergency services in remote, mountainous areas, in deserts or at sea, often requires specialist support such as an air ambulance.

All told, wherever they are, crew members require a communications system they can trust, rain or shine, 24/7, and one which enables an always-on link with colleagues. When there's an emergency, lone, remote and at-risk workers need to know they can rapidly summon rescue and that first responders can speedily pinpoint their location.

A satellite-based tracking and communications solution offers the only viable communications lifeline.
Since launching in 2007, Globalstar's SPOT family of devices have been providing enhanced safety for an ever growing variety of organizations.

Wind Worker Safety

For instance, any major construction project comes with operational hazards. However, if a company is involved in wind energy production, fire is a particularly acute risk. Additionally, when these crews are deployed in regions where there may be political instability, the need to provide staff with a communications and safety lifeline becomes even more crucial. This is especially true when operating in remote regions, which are hard to access and/or with minimal communications infrastructure.

Energy giant General Electric (GE) has recently started to equip their wind energy employees in Pakistan and Morocco with SPOT Gen3 handheld GPS messengers, while further SPOT deployments in new markets across Europe, the Middle East and Africa are also projected. GE plans to track and protect workers as they install, operate and maintain onshore wind power installations in emerging markets.

Supplied by Globalstar's value added reseller, Crambo Wireless S.A., GE will also furnish SPOT units to wind power workers in Saudi Arabia, Egypt, Ghana, Kenya, and elsewhere in Africa, as well as Central Europe and the Balkans. By mid-2017, GE personnel working at approximately 70 wind farms in EMEA and Asia are expected to have enhanced safety—

thanks to SPOT. GE did consider a number of alternative technologies, including GSM, parabolic antennas and radio repeaters, before deciding on the SPOT Gen3 product.

In the event of an emergency, SPOT instantly sends the user's GPS co-ordinates to alert first responders through the GEOS International Emergency Response Coordination Center (IERCC). Following a period of extensive testing, GE determined that SPOT, the Globalstar network and the IERCC had performed flawlessly.

Carlos Chivite Trincado, Environment Health and Safety (EHS) Technical Director at GE Renewable Energy, a role in which he has specific responsibility for developing new markets, said, "*Our wind installations can be located in the middle of the desert, such as in Pakistan and Morocco, or they can be positioned high in the mountains or on the coast, all areas where GSM might not reach. Wherever they are, we need to know our staff can work safely, and are connected: We must be confident in our workers' security before we undertake any new wind energy development. The peace of mind that SPOT gives is an important part of providing the best possible working conditions for our crews as they operate in some very challenging circumstances.*"

Supporting O&G Workers In Africa

Companies in the oil and gas space were among the first to acknowledge the diverse capabilities of satellite technology, so it's not surprising that as exploration and production activities accelerate, the interest in satellite solutions among oil and gas providers, as well as those many companies which support them, has again surged.

Tunisian civil works contractor, Kilani Enterprise for Public Works, has been using Globalstar's SPOT devices since 2013 as their only means of safeguarding staff who are carrying out operations in southern Tunisia's vast desert, including operations that support Africa's oil industry.

"*The operational challenges posed by inadequate GSM coverage in the regions where oil is extracted are compounded by remote, inhospitable terrain, and additional security risks,*" said Karim Chagra, Health Safety Security Environment (HSSE) Manager with Kilani Enterprise for Public Works.

Such is the company's trust in SPOT and Globalstar that, more recently, as local exploration and production activities expanded, Kilani deployed a new, complementary, Globalstar-based tracking and safety solution to support all staff.

Safeguarding UK Water Staff

UK-based specialist wireless solutions provider Lone Worker Solutions kicked off 2016 by announcing a five year contract to provide remote working staff protection for British regional water provider Northumbrian Water Group (NWG). After conducting a rigorous competitive selection process involving 46 technology providers, NWG chose LWS's proprietary LoneWorker Manager platform, a solution centered around SPOT to protect all 1,500 of their staff. Employees carrying out their duties in remote regions in the north of England where mobile or 4G coverage is poor are now equipped with SPOT Gen3 units. If a NWG staff member is faced with an emergency, with a single touch of SPOT's SOS button, an alert is sent to an accredited, state-of-the-art, 24-hour Alarm Receiving Centre (ARC), as well as to NWG's in-house employee support hub for prompt handling.

Diane Somerville, Health, Safety and Environment Consultant Team Leader at NWG, said, "*Ensuring the safety and wellbeing of our staff is an extremely high priority for Northumbrian Water Group and it helps us attract and retain skilled employees. Feedback from staff on the new solution has already been overwhelmingly positive. We are delighted that we are delivering on our ongoing commitment to improving the quality of working life for our team.*"

As 2016 drew to a close, Lone Worker Solutions was announced as the winner in the category of 'Best Deployment of Lone Worker Technology' in the esteemed 2016 UK Security and Fire Excellence Awards.

Ensuring Safer Working Conditions

Skilled professionals who work in remote and potentially hazardous environments have begun to expect better, highly reliable safety equipment while performing their jobs, especially when operating in remote and dangerous environments. Globalstar is proud that the firm's SPOT system, now with some 300,000 devices deployed, has to date initiated more than 4,800 rescues across the globe. Furthermore, in many of these situations, multiple lives were saved.

In consideration of the critical roles which solo workers and remote crews perform every day, whether finding new sources of energy or harvesting the bounty of the ocean to put food on dinner tables, organizations everywhere increasingly hold the view that these valued employees truly deserve state-of-the-art technology to help them work smarter and safer.

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Based at Globalstar's European HQ in Dublin, Gavan is responsible for the development and implementation of Globalstar's marketing strategy across the European, Middle Eastern and African regions. He spearheads the marketing of Globalstar's consumer products, including the SPOT tracking solutions portfolio, as well as the B2B marketing of voice & data solutions for a range of vertical sectors including maritime, energy, safety and security, commercial fishing and shipping, construction and heavy industry and the burgeoning M2M sector. Prior to joining Globalstar in 2008, Gavan worked with leading global mobile provider Vodafone as Channel Development and Category Manager.

POV: The Year Ahead Will Be Unique— But Not Too Different

By Robert Bell, Executive Director, Society of Satellite Professionals

A friend of mine once coined this wonderful phrase—"unique but not too different"—to define the goal of all sales and marketing.

Your products or services need to be unique—or at least demonstrably different—or nobody will purchase them. However; if they're too different, nobody but wild-eyed Early Adopters will take the risk of engaging with your offerings.

For decades, this was not much of a problem in the satellite industry. The business was renowned for the stability of its financial performance and the evolutionary (did somebody say "snail's?") pace at which its technology changed. This very stability made the satellite industry so attractive to private equity: we offered a stable stream of earnings in a business whose performance did not correlate with the business cycle of most other industries.

Those days of "yore" are rapidly receding in the rear view mirror. At the close of December 2016, a few trends became crystal clear:

—The price per kilogram to get a payload to orbit is heading downward

and likely to continue doing so for a while

—Transponder pricing per megahertz or megabit is going the same way

—Despite capacity gluts in some markets, there will be a lot more satellites and much more bandwidth in GEO, MEO and LEO over the next few years

—It's a brave new world and every business in the industry is adapting at a furious pace, driving a wave of innovation, fear and excitement not seen for years

From Scarcity to Abundance

From their first days, satellite services have been ruled by scarcity. There were never enough orbital slots, launch inventory or bandwidth at the correct price to give customers everything they wanted.

As any real estate mogul will tell you, scarcity is great if you are the seller but not so great if you happen to be the buyer. The stately financials and measured innovation of the business was the rational

response to managing scarcity, and the operators of successful satellites were rewarded by reliably high margins for the risks they took.

After so many years running businesses driven by scarcity, however, we may be facing a future of abundance. If so, it will be brought to us by cheaper launches, immense increases in processing power and a broad range of satellite configurations from smallsats in LEO to massive spacecraft in GEO.

That's just the start. Next year, a new generation of flat panel antennas will go commercial. If they succeed, they may eventually transform the economics of data networks by drastically reducing terminal cost and complexity.

Meanwhile, the software-defined satellite—of which the Eutelsat/ESA Quantum is the first example—will reduce one of industry's biggest risks and hurdles to innovation: that of designing and flying satellites that nobody wants.

If It's Space, It Can't Be Old

I'm not very fond of the term "*new space*" because the alternative is so grey and creaky. In a business that is always doing new things, how about if we refer to the companies already established in it as "*incumbents*" and the folks in the pre-commercial or early commercial stages as "*emerging*?"

Therefore, Intelsat is an incumbent and OneWeb is emerging. Arianespace is an incumbent and I think SpaceX deserves to be considered "*emerged*," having accomplished one of the toughest jobs in its market: keeping their customers after blowing up one or two rockets with expensive payloads resident on them.

I raise this because emerging companies and incumbents generally have different attitudes to the exploitation of near-Earth space. This was made abundantly clear to me by the CEO of an incumbent who made enjoyably impolitic comments at the Global SatShow in Istanbul in November.

He said something like this: "*All these new companies think that it's a wide-open market. You have companies doing business whose idea of launching satellites is to crank down a window on the International Space Station and toss cubesats out. They think they can build a 400 or 600 or 2,000-satellite constellation and operate it without interfering with anybody else. It's ridiculous! For us, Earth orbit is crowded. It is full of radio frequency interference that we take enormous trouble to coordinate. It's not virgin territory.*"

I tell this story not to suggest who is correct and who is wrong. I tell it to suggest that incumbents and emerging companies have an enormous amount to learn from one another.

Video Didn't Kill the Radio Star

If you take public comment at face value, the leaders of emerging companies can sound a lot like the leaders of dot-com and fiber network companies before the infamous crash of 2001. Flush with cash from a speculative investment bubble, they declared they were going to transform commerce and make obsolete every brick-and-mortar business.

It turned out not to be the case—not only because hubris eventually caught up with investors, but because those brick-and-mortar businesses did not stand still. They adopted the Jedi mind tricks of the dotcomers and used the new technologies to make their existing businesses run better, faster and cheaper. There was, and continues to be, plenty of disruption, but video failed to kill the radio star, contrary to that 1979 hit song by the Buggles.

The real relationships between incumbent and emerging companies is represented by the decision of ViaSat, an incumbent hardware maker, to bet the company on building and launching ViaSat-1—and then to start designing three enormous GEO spacecraft to raise the ante. It is represented by Intelsat's EpicNG architecture and the $25 million it invested in OneWeb. It is the Hughes bet on Jupiter and the SES acquisition of O3B Networks.

These are big, established companies investing in services that have the potential to displace their own. That is what big, smart tech companies—think Apple, Google, Facebook and Microsoft—do to maintain their dominance as the technology fundamentals shift beneath them.

It happens in small ways as well as big. This year I interviewed the founder and CEO of a cubesat company. To my surprise, he said that one of his best lines of business at that moment was supplying space-qualified components to incumbent satellite manufacturers. Why? Because his cubesats were getting into orbit much faster than conventional satellites, which meant that the components were on more missions. (Hey, they're just cranking down the window and tossing them out, right?) Those extra trips to orbit produced value that he could turn into sales.

What's Next?

I don't know what will happen during this year, let alone the three, five or ten years it will take to sort out the emerging and incumbent companies in the market.

Harvard professor Clayton Christiansen wrote a famous book, *The Innovator's Dilemma*, that may offer a clue. In it, he charted how tech innovation works. Companies seldom succeed by bringing new technology to existing markets. Instead, they bring a cheaper but more powerful technology to a new customer segment.

If the incumbents are prospering by selling big disk drives to mainframe and minicomputer markets, the emerging company introduces a smaller, faster, cheaper drive for personal computers, where the big drives are unaffordable.

The bad news for the incumbents is that, once established, those smaller, faster, cheaper drives tend to invade the established markets from below. That's where the disruption occurs, as the incumbents lose their existing markets and are unable to compete in new ones.

Can it happen here, in this industry that got its start in 1957 with the launch of Sputnik? Sure. Consider high-throughput satellites. They started life as the solution to delivering Internet to homes and small offices at a competitive price. Now they are rapidly finding adoption for military applications, oil & gas, retail and other markets.

In Australia, incumbent satellite operators are reported to be up in arms because the satellite launched by the government for the NBN digital inclusion project is also being used by mining companies as a cheap substitute for traditional and much more expensive VSAT.

What's next? Will emerging space and satellite companies disrupt incumbents from below? The Big Four tech companies have figured out how to make disruption work for them by investing in it.

Do the Intelsat investment, the Eutelsat/ESA Quantum satellite and the SES acquisition signal that incumbents in this business can do the same, at the same time as emerging companies keep rolling out those ambitious plans to launch hundreds or thousands of satellites?

Well, welcome to interesting times.

Robert Bell is executive director of the Society of Satellite Professionals International, the industry's largest membership association, which is dedicated to making the industry one of the world's best at attracting and managing the talent that powers innovation. He can be reached at rbell@sspi.org.

The New Way To Do Data Centers

By Scott Sobhani, Chief Executive Officer and Co-Founder, Cloud Constellation's SpaceBelt

The ongoing onslaught of rapid technological advancements demands new solutions for data storage and transport.

Data centers have come a long way since the first giant mainframes of the '60s, which had to be housed in their own rooms due to their size and the noise and heat they generated. These early computers were so expensive—running into the millions of dollars—that only universities and government agencies owned them; multiple organizations rented and shared them.

From megacomputers came the microcomputers of the '80s. Personal computing was born—yesterday's equipment made way for the new servers, which had a much smaller footprint, creating a leaner data center. As computers no longer cost millions of dollars, organizations could assemble banks of servers into rooms, which grew progressively larger.

What started as single-room environments became dedicated buildings with thousands of servers.

The next great leap forward in data centers was born of the Internet and innovations in software delivery. They led to the Cloud as the need to easily share software and services not only with remote offices, but also with a growing mobile user base, grew by epic proportions.

This worked for a few years, until hackers became smarter and the protection of private and customer data became a board-level concern.

Hybrid cloud offerings have evolved over the past five years to solve these challenges, with the promise of protecting and managing critical data on private, on-premises infrastructure and providing organizations with the ability to host customer-facing applications in the Cloud.

Unfortunately, hacks to the application layer, IoT and DDoS attacks continue to plague today's corporate networks.

As a result, cyber security has become an industry so big that there seems to be a new security solution added to the network stack every day.

The Many Hazards To Data Security

Legitimate concerns over the risk of data breaches and the need to keep data secure and private, whether personal or organizational, has led to worldwide jurisdictional restrictions and stringent laws regarding how data is moved between countries. What's worse is that nations have the legal right to monitor, copy, save and try to decrypt any data as that information passes through their jurisdictional boundaries.

What many people are unaware of is that any data that passes across Internet lines, whether public or private, requires a public address header for routing encrypted packets to the proper network. This provides ample opportunity for surreptitious targeting and decryption of sensitive data. No matter what new restrictions are enforced, the perception remains that data is unsafe from those who pry.

Another cyber security hazard comes from leaky Internet and leased lines. Today's cloud environments run across hybrid public and private networks using IT controls that are not protective enough to stay ahead of real-time cyber security threats. Sensitive data can be exposed to acts of industrial or political espionage through unauthorized access to enterprise computers, passwords and cloud storage on public and private networks.

Sadly, the system created with the intention of enabling people to freely communicate around the world is being surreptitiously exploited in a way that prevents exactly that from occurring. The Internet was intended as a sustainable tool for bringing the world closer together, but has rapidly become divided by a quagmire of protectionism—the reverse of promoting global information sharing. Clearly, a change is in order.

Planet-Compromising Energy Consumption

The number of data centers in the United States continues to increase, according to the Department of Energy's **Lawrence Berkeley National Laboratory**; the total server installed base is projected to increase by 40 percent from 2010 to 2020. Though they are becoming much more energy efficient, these data centers continue to account for almost two percent of total US electricity consumption.

Multiply this one example by all the data centers rising up around the world, and all will note the consuming, disproportionate amount of energy resulting in a huge carbon footprint. The negative impact on the planet is significant.

Ian Bitterlin, Britain's foremost data center expert and a visiting professor at the University of Leeds, recently commented, "*If we carry on the way we have been, it would become unsustainable – this level of data center growth is not sustainable beyond the next 10 to 15 years. The question is, what are we going to do about it?*"

A Hybrid Cloud In Space

The current dilemma calls for a shift in thinking. Instead of looking to the Earth for places to store and move data, the sky should be examined for the repository of information.

Imagine a world without borders, where data flows freely without limitation... where there are no jurisdictional barriers interfering with the exchange of information or ideas... a world where the sharing of information can travel across the globe in less than a second.

This is a world where information is secure, safely traveling above and beyond the Internet and all leased lines. This is a new way of conceptualizing data transport and storage—and is possible.

What makes this scenario possible is a set of new technologies that now provide an independent space-based network infrastructure for cloud service providers and their enterprise and government customers to experience secure storage and provisioning of sensitive data around the world.

By placing data on satellites that are accessible from everywhere via ultra-secure dedicated terminals, many of today's data transport challenges will be solved. This will provide a safe haven for mission-critical sensitive data, a place without interruption or exposure to any surreptitious elements or unintended network jurisdictions.

An infrastructure of this kind enables government entities, large enterprises and providers to take advantage of a new way to store and transport data. Even better, this model saves money as well as carbon emissions.

As a result, cloud service providers will be able to offer better services at a third of the cost of doing business today as they will not have to add CapEx and OpEx for expansion. Major corporations who deal with mission-critical data, whether in healthcare or pharmaceutical, military or financial, will achieve major market differentiation while reducing their carbon footprint globally. CSPs and their customers don't have to keep investing in more infrastructure and paying huge electricity bills.

Restoring The Dream

Organizations today face multiple, serious threats regarding global communications. The Internet is no longer a place where information can be securely stored and transmitted, which means that an alternative must be found.
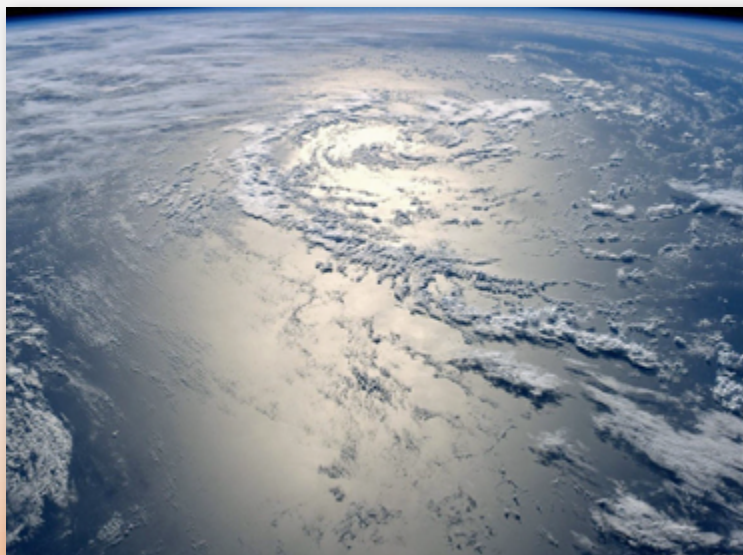
A space-based network, free of the many jurisdictional, regulatory and security issues the Internet faces, will enable data to flow freely around the world again. The new space-based technologies will create a safer, faster communications experience for organizations of all kinds across the globe.

spacebelt.com/

Scott Sobhani, CEO and co-founder of Cloud Constellation Corporation and the SpaceBelt Information Ultra-Highway, is an experienced telecom executive with more than 25 years in executive management positions, most recently as the Vice President for business development and commercial affairs at International Telecom Advisory Group (ITAG).

Previous positions include CEO of TalkBox, Vice President and General Manager at Lockheed Martin, and Vice President, General Manager and Senior Economist at Hughes Electronics Corporation. Mr. Sobhani was responsible for closing more than $2.3 billion in competitive new business orders for satellite spacecraft systems, mobile network equipment and rocket launch vehicles.

Scott co-authored "Sky Cloud Autonomous Electronic Data Storage and Information Delivery Network System," "Space-Based Electronic Data Storage and Network System" and "Intermediary Satellite Network for Cross-Strapping and Local Network Decongestion" (each of which are patent pending). He has an MBA from the University of Southern California and a bachelor's degree from the University of California, Los Angeles.

Adopting Ubiquitous IIoT Connectivity To Transform Operations

By Paul Scardino, Senior Vice President, Engineering and Marketing, Globecomm

From a technology standpoint, the satellite-integrated Industrial Internet of Things (IIoT) is ready to deliver connectivity anywhere, anytime for industrial users to achieve global ubiquity for their operations.

However, now big ideas from visionary business leaders are needed to drive the type innovation that leads to wide scale deployments and robust growth for the industry.

That was a prevailing theme from many the of industry leaders who gathered at **Globecomm Techforum 2016** in Hauppauge, New York, late last year to discuss satellite's vital role in ubiquitous connectivity and the evolution of IoT's core components: devices, networks and applications—or, DNA.

Panelists represented a wide range of companies involved in IoT at every level, from service providers such as AT&T, to satellite network operators Iridium and Inmarsat, to satellite service companies such as Global Satellite Engineering, Comtech EF Data and iDirect as well as industrial technology vendors like Telit. Even cutting edge IoT adopters Bluetown and Talon weighed in on the driving factors of Industrial IoT adoption.

Globecomm demonstrated IoT readiness and global connectivity through a partnership with AT&T that combines connectivity from three different satellite networks with the service provider's global terrestrial cellular networks to link 29 billion devices. The ubiquitous connectivity that satellite provides covers gaps in cellular networks to enable industrial users to gather data from their devices, equipment and people anywhere they might be deployed around the world no matter how remote, whether a ship at sea, a remote oil and gas platform or an 18-wheeler traveling between urban centers.

Globecomm's industrial service offering enables IoT devices to automatically switch to satellite networks when cellular connectivity is unavailable, eliminating the need for businesses to purchase cell and satellite service separately and allowing them to use both to manage their devices, networks and applications.

Bryan McGuirk, Globecomm's Chief Commercial Officer, said, "*The ecosystem of companies serving IOT is critical its success and as a result of hosting the technology forum, Globecomm is even better positioned to succeed with its dual mode satellite/cellular offering with AT&T.*"

What's needed in the IoT industry now is the type of leap of faith that creates the exponential acceleration of technology adoption, according to Patrick Schwerdtfeger,, a consultant on technology trends that includes big data, artificial intelligence and social media—he delivered the opening keynote address at the Globecomm Techforum.

Historical technology introductions similar to what IoT is going through now needed someone to think in exponential terms in order to trigger a rapid acceleration of adoption. As an example, Patrick pointed to the use of supercomputers to map the human genome. When the project began in 1990, many experts declared this would take decades to complete. However, as computing power advances 100 fold every year, the project was completed in 2003, well ahead of the projections.

He also noted similar advances in big data, artificial intelligence, and autonomous driving and highlighted the contributions of Apple founder Steve Jobs, SpaceX as well as Tesla founder Elon Musk and others who accelerated the pace of innovation.

"*All these people that we know so well, what sets them apart is that they think bigger,*" Schwerdtfeger said. "*As a result of doing that they end up in a place nowhere else has gone and they are usually the first one to market each time.*"

Shiraz Hasan, AVP of Business Development, IoT Solutions, AT&T, concurred with the sentiment as he noted that 61 percent of customer organizations are pursuing IoT initiatives. His talk focused on AT&T's multi-network strategy with Globecomm and the keys necessary to drive adoption of this technology. The challenge is to get Industrial IoT customers to start thinking big, which means getting them to think outside their comfort zone, he said.

"*There is still a lot more potential for the number of IoT connected devices to grow from 20 billion to 60 billion in 2021 as some of the projections state,*" Hasan said. "*At AT&T, we're seeing that growth and I don't believe IoT is just hype anymore. If we don't adapt, we will be left behind and we believe multi-network connectivity will drive further adoption.*"

Multi-network IoT connectivity is what started AT&T and Globecomm down the path of collaboration more than four years ago, when a large container ship company contacted both firms to link more than 250,000 refrigerated containers on 400 ships. Connecting these ships required satellite

Communications-On-The-Move (COTM) for oceanic vessels as well as knowledge of available, alternative coverage. Globecomm provided Ku-band coverage to 95 percent of the shipping routes and the backup/failover service was handed to Inmarsat's L-band platforms. All of the networks had to comply with maritime cellular operation, which made the technology integration quite challenging.

The time has now come for businesses to see the value of ubiquitous IoT connectivity and how this can affect their bottom line. IoT brings data in from an array of connected devices and sensors deployed in the field, whether they are for industrial, asset management, automotive, healthcare, energy or smart cities. Regardless of the myriad of short-range networks used at the device level, satellite provides the critical backhaul link to bring data back to the enterprise where it can then be collected and analyzed and used for greater situational awareness and business intelligence.

Hasan said AT&T in collaboration with Globecomm on the shipping container project four years ago has resulted in all parties now seeing a solid return-on-investment and how the technology can transform businesses. "*Where the client started out and where they are today, are two different criteria. They are doing multiple things today that they couldn't do when they started*," he said.

The original goal of the shipping container project was an optimized transportation and supply chain. The company wanted better logistics coordination, asset utilization and use of real-time monitoring to help avoid lost or spoiled shipments.

"*IoT is the thread that can weave through virtually every business to produce new levels of efficiency, savings, and even create new revenue models*," Hasan said.

"*From an IoT vendor stand point, large enterprises and medium enterprises need to get creative in order to how to apply this technology so that it affects their bottom line and improves customer satisfaction*," said Fred Yentz, CEO, IoT Platforms, Telit. "*IoT discussions until recently have been consumed about technology but the business owner is the ultimate stakeholder in IoT deployments. We need to move the IoT discussion to the business owner, and we need to describe the technology in terms of business outcomes. That is ultimately the driving point for our successful stakeholders.*"

Jeff Palmer, Director for Global Satellite Engineering, said, "*As IoT and all of these technologies start rolling out, we feel there is a lack of education in the field of what is really capable and that is really limiting deployments to the end users. The expectation in the field is to have an adviser, to say IoT technology is rugged and industrialized. That person in the middle advising the decision maker is what's missing, and they're waiting for someone to educate them on the latest technology, to say this is how you can solve your problems. Having 95 percent of the project to present to*

them gets the project done. That's what we're doing, we're proving it can run on all the L-band networks, on Iridium, on AT&T and that the hybrid technology works."

The tipping point when IoT achieves mass deployments on billions of connected devices is when medium enterprises learn how to apply technology to make money, save money or maintain compliance and see how it really affects their business, Yentz added.

Hasan said there is a lack of understanding and a bit of fear in how to apply IoT. "*It's like the chicken or egg game, where you have to adapt the technology in order to prove the ROI, but most companies want to prove the ROI first before they adopt the technology. In the IoT space, we are limited in our imagination to a certain extent.*"

In the shipping container use case, unforeseen innovations have emerged for the company because of the ubiquitous nature of the multi-network connectivity. What began as a custom built network for machine-to-machine (M2M) communications eventually expanded to encompass business and crew welfare communications. GSM mobile services were added to support voice and SMS for crew calling. A speed variance application evolved to help shipping companies plan better routes and control speed to optimize fuel consumption. Another addition was a geo fencing and tracking application that brought ships in to compliance to cellular at sea operations. Additionally, news and entertainment services were added to the crew services menu.

The important lesson is the shipping container company took a chance—Hasan added, "*Today, they are doing multiple things with the data that they never expected to do or even thought of when they started.*"

For more coverage about the Globecomm Techforum 2016, visit these video posting on the company's YouTube channel:

Achieving Global IIoT Connectivity:
youtu.be/ZdSz5MCsCw8
youtu.be/pIgD2FnLuVM

Applications that Deliver Value:
youtu.be/Vkej7Uf9eW4
youtu.be/HoFfEBfz7tQ

Paul Scardino, Senior Vice President of Sales, Engineering and Marketing for Globecomm, has been involved in the SATCOM and telecommunications fields since 1988 and has been a key driver for Globecomm Systems' success since February of 1997.
*   In Mr. Scardino's previous positions at Globecomm, he was Vice President of the Corporate Sales and Marketing organization as well as Senior Director EMEA Region, responsible for all of Globecomm Systems Inc.'s projects and accounts within Europe, the Middle East and Africa as well as customer specific global accounts.*

The Need For SatHealth™ Connectivity
A NorthTelecom Perspective

By Mahdi N. Mehrabi, Chief Technical Officer, NorthTelecom Group, and Managing Director, APAC

Africa and the MENA region have been marked as areas with huge populations that are underserved by any general means of communication.

An enormous effort is ongoing to bring access to those in remote areas, as well as informing all as to the ease of use of today's communication technologies. Some of these efforts have failed; however, many companies and individuals are ambitiously working on plans that will ultimately lead to future success, which will be of benefit to the entire planet.

In addition to technological and infrastructure issues, there are many barriers to entry into the MENA and African markets. With more than 1.2 billion people living in Africa, and several hundred million living in the Middle East, there are many basic needs—communication may be the last in any individual's list of totally necessary requirements. Such considerations by the citizens in this region of the world doesn't mean efforts should be halted or investments withdrawn in working to ensure all of the people around the globe are connected.

There are several ongoing efforts to address the digital gap in these regions, and satellite has a pivotal role to play in such projects. Broadband connectivity is the main thrust, especially via satellite, which is the pivotal technology of the many propositions that concern the installation of services in this region of the world where additional thought must also be given to existing macro environments and various echo systems.

Does communication simply mean only broadband Internet connectivity?

Examining the progress of broadband technology in the more advanced areas of the world offers a far clearer picture as to how the various stages were completed to achieve a successful connectivity outcome.

Note how nearly every stage of development has contributed to the next advanced stage in terms of the elements involved—technologies, echo systems, infrastructure and so on.

There are many untapped and less invested areas in Africa and MENA where less sophisticated echo systems remain resident. The majority of the users in these areas are far more familiar with technologies such as radio and TV. This is where solid communications knowledge could be leveraged to build a comms system through the addition of more advanced technologies to the already installed legacy systems.

Mixing SATCOM with radio and TV systems and adding offline data through current and legacy infrastructures could be considered as an interim solution, while the long term agenda is pursued to bring comms via satellites to the remote and underserved communities.
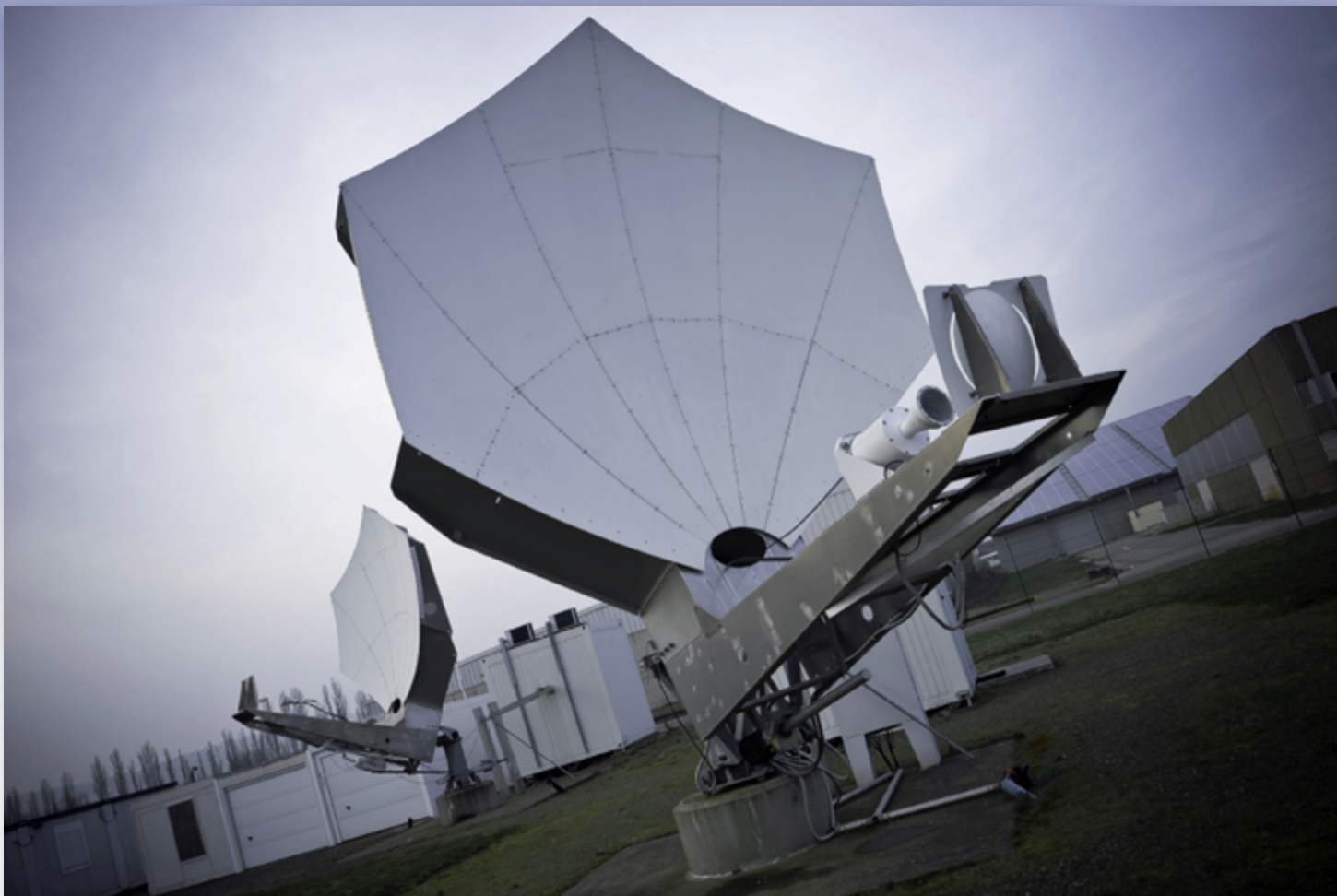
Educating the public via radio and TV regarding connectivity possibilities is quite doable. Those legacy system are already in place and are cost effective in presenting information as well as easy to maintain.

Leveraging exiting ecosystems to educate people as to the next steps to take could certainly deliver more content to areas such as healthcare, lifestyle, general education as well as foreign languages. Such programs could easily be delivered through any number of channels, with the ultimate goal being that of satellite information delivery.

At the forefront of any national system is public health. Education and awareness of available programs are among the main elements that could be achieved through the delivery of information for such services, all via satellite connectivity.

A Video on Demand (VoD) healthcare channel with pre-recorded information, as well as offline content, would be able to deliver basic health information and inform viewers regarding nearby health stations. Medical services could be presented to show how expert staff could be made available for communications regarding symptom inquiries and diagnosis results.

The SATCOM availability of doctors, nurses and health care works could well leverage a country's health care system to high efficiency and effectiveness, as well as bring enormous value to the community and the health of a nation's citizens. SATCOM technologies support communications between patients and medical staff with convenience and fidelity, as well as manage the transmission of medical imagining and health informatics data from one site to another.

Concepts such as Telemedicine (SatHealth™) are among of the fastest growing areas within the SATCOM environments around the globe. Living in this era of globalization, and with the mobility of today's comms, isolation may well be negated through the use of satellite technology.

Telemedicine will enable the healthcare specialist community to be connected around the globe and enable them to share their expertise and even determine the cure for new diseases and the most effective treatments from the common cold to as yet unknown medical challenges.

Reporting unusual conditions or a communicable disease quickly and then receiving information regarding the proper precautionary measures can save the thousands of lives—even millions.

SatHealth is all about life saving, timely communication with medical professionals and SATCOM is a major actor in this crucial market. Spread the word...

northtelecom.com/

Mr. Mehrabi has deep experience in technology and business development and has lead innovative and challenging projects and concepts over the past six years.
Having more than 18 years of experience with proven successes in telecommunications and aviation fields, and having founded and managed a number of businesses and projects in the telecom arena in general, and the satellite industry in particular, he is now transforming and contributing his expertise and competence into the company's APAC operations.