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MARKET Briefs

Executive Summaries of Market Trends and Opportunities in Key Market Segments and Regions Worldwide

Satellite Internet of Things Market

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by Elisabeth Tweedie

There is absolutely no doubt that the Internet of Things (IoT) is a rapidly growing business. Whether we're consciously aware of it or not, digital transformation is impacting all aspects of daily life. Connected devices are becoming pervasive; from refrigerators that let you know when you're going to run out of milk, to sensors monitoring the moisture content of soil; from self-driving cars, to tags tracking the movement of containers, across oceans and continents. A recent study from Fortune Business Insights projected that the global IoT market would reach US$ 1,854.76 Billion by 2028, up from US$ 308.97 Billion in 2020, a CAGR of over 25%. NSR is predicting that the total retail market for satellite IoT is also forecast to experience significant growth, reaching around US$ 1.8 billion by 2029, up from around US$ 700 million in 2020.

Growth is coming from many sectors, as companies around the world are looking to IoT to drive greater efficiencies and improve the bottom line through real-time monitoring of thousands of assets, which should lead to better asset utilization, reduced waste, increased output and improved safety. Research commissioned by Microsoft in 2019 and 2020 amongst 3,000 IT professionals in the US, UK, Germany, France, Japan and China bears this out. It showed that 91% of organizations were using some form of IoT, and 90% of them viewed it as "critical to their success." These figures were relatively consistent across the four segments surveyed: manufacturing, healthcare, retail and energy. The main reasons given for using IoT were: safety and security, optimizing operations, quality assurance and productivity.

Many of the segments served by IoT have been affected by Covid. The impact however, has been mixed. The automotive industry, for example, one of the larger users of IoT, scaled back production, leading to decreased demand. Ironically, now as demand is picking up again, a shortage of chips for the industry is still keeping production low. Conversely, in some other segments, healthcare for example, demand has surged as the pandemic led to greater use of remote patient monitoring. The research conducted by Microsoft showed that one third of decision-makers plan to increase their investment in IoT due to Covid-19, while another 41% say they'll maintain the same level of commitment.

Several factors have combined to accelerate usage of IoT. Technology advances in semiconductors, increased use of cloud computing, standardization of IPv6, and in some cases government support for research and development (R&D), these have all helped to increase the ubiquity of IoT. However, the fundamental technology necessary for this growth, is communication. 5G, other cellular technologies and WiFi are the obvious choice for many applications, but there are large markets and parts of the world where satellite is the best solution. Maritime and aeronautical applications obviously fall into this category, but there are also many remote areas where there is no reliable cellular coverage, and a need for monitoring and/or tracking; pipelines and cattle for example are critical applications in this segment.

Also, technological advances leading to smaller antennas and cheaper bandwidth, have combined with satellite's reliability and inherent ability to scale, resulting in satellite's reach for IoT applications expanding to include other geographies.

Key Segments for Satellite

There are several key segments that are particularly attractive to satellite Service Providers, either because the segment offers particular growth opportunities, or because satellite is the only possible solution, or because it's a segment already dependent on satellite for other applications, so potentially offering an easier path to entry. We'll take a brief look at some of these, then consider three key applications in more detail.

Cargo tracking and monitoring for containers and other large items being transported, is a key IoT application. Appropriately tagged cargo is tracked on both sea and land. Obviously, satellite is needed at sea, but given the large distances traveled by some trucks, a satellite-based system offers a ubiquity on land that can't be achieved with terrestrial systems.

Transport companies also rely on IoT for electronic recording of hours driven, and monitoring of operational devices and events: fluid levels, vibration, and speed for example. Combine these and you have a system for better fleet management, which

will facilitate cost-efficiencies and forecasting of vehicle replacement timing. This of course, also applies to heavy machinery, such as agriculture and construction equipment, where information about usage and fuel consumption not only improves asset tracking, but also helps fleet optimization.

Maritime is another key segment. At sea, the equipment on merchant fleets and cruise vessels is being equipped with sensors for performance monitoring, to improve efficiencies and ensure any preventative maintenance needed is carried out at the appropriate time. Oil and gas rigs, in common with ships, are using IoT to monitor the status of equipment and predict, and therefore prevent failures. In the fishing industry, several countries have mandated the use of Vessel Monitoring Systems (VMS), to monitor activity and ensure active reporting of catches.

Mining is another industry where satellite has significant role to play. Many mines are located in remote, inaccessible areas, which rarely justify the deployment of terrestrial networks. Predictive maintenance is a key application for this sector. Additionally, sensors installed around the mines can provide advance warning to help prevent contamination, erosion, flooding and other disasters.

Pipelines carrying oil and gas traverse many thousands of miles in remote geographies. Supervisory control and data acquisition, commonly referred to as SCADA, is a key method of ensuring the integrity and viability of these pipelines. Sensors monitor the flow rate, pressure and the health of valves, motors and pumps to prevent leakage and unforeseen failures.

In many parts of the world, utility companies are turning to smart grids, and satellite enables them to extend this to more rural customers.

Cargo tracking and monitoring for containers and other large items being transported, is a key IoT application.
(Image courtesy of Mobilogix)

IoT is an integral part of this, needed to facilitate automation and predictive maintenance. Gaining this level of visibility into their generation and distribution systems can reduce manpower needs, decrease downtime and enable utilities to streamline operations and improve customer satisfaction. For example, in 2017 when Houston was hit by Hurricane Harvey, over 250,000 people lost power. However, thanks to the prior installation of smart meters, CenterPoint Energy, the local utility company, was able to recover and reconnect users quickly, avoiding an estimated 45 million outage minutes.

Agriculture

Agriculture is a key segment that has really embraced the use of IoT in recent years. This is particularly true, in regions with vast farms that cover thousands of acres, where it is virtually impossible for farmers to know what goes on in all corners of their land. According to a report on Autonomous Farm equipment by Fact.MR, the global autonomous farm equipment market is projected to reach US$150 Billion by 2031, demonstrating a CAGR of over 10% from its current size. The sheer size of many of these farms, also means that it is highly unlikely that the entire area will be covered by cellular or WiFi. NSR highlights this market as the most significant one for satellite, projecting the number of satellite in-service units grow to over 790,000 in 2029 from 130,000 in 2019. This accounts for 26% of growth in satellite IoT sites during that time period. There are many drivers behind the market for IoT in farming, the main one being the need for increased food production. Factors such as the ability to react instantly to changing weather conditions, insight into crop planting, more precise harvesting and precise and timely data regarding soil, weather and pest conditions all play a role in realizing this goal. To date global take-up has been patchy, according to the report, Europe currently leads the way, with the US and China representing other significant countries.

Precision crop farming uses sensors to capture and transmit a vast array of data including, lighting, temperature, soil condition, humidity, carbon dioxide levels and pest infestations. Together this data enables farmers to detect anomalies and calculate optimum levels of fertilizer, pesticides and water needed, thereby increasing output whilst reducing costs.

Weather stations will update the farmer as to variations in microclimates on their farms. As well as assisting with irrigation needs, this is also used for feeding livestock. Smart irrigation systems control and monitor moisture levels, automatically dispensing water as and when needed. Similarly, sensors monitor the irrigation pipelines for leaks, alerting farmers when repairs are needed. Proactive monitoring can also identify the need for preventative maintenance. In some cases, these alerts will be transmitted directly to equipment manufacturers to trigger delivery of spare parts and onsite repairs.

Disaster Prevention and Mitigation

An exciting development has been the application of IoT for monitoring and prediction and early identification of natural disasters, as well as to aid rescue efforts. Currently, the vast majority of disaster management is reactive. Predictive management is in its infancy, but it's badly needed and is starting to happen. It is likely to become even more essential in the years ahead, as climate change contributes to increasing the frequency and severity of natural disasters. According to an October 2020 report from the United Nations, in recent years, extreme weather events have dominated the disaster landscape. In the period 2000 to 2019, there were 7,348 major recorded disaster events claiming 1.23 million lives, affecting 4.2 billion people (many on more than one occasion) and resulting in approximately US$2.97 trillion in global economic losses. This is a sharp increase over the previous twenty years. Between 1980 and 1999 there were only 4,212 disasters. According to the report much of the difference is explained by a doubling of climate-related disasters including extreme weather events: from 3,656 climate-related events to 6,681 in the same time periods. Looking at the significant number of climate related disasters recently: major floods in Germany, India, Afghanistan, China, Pakistan and Japan and wildfires in the US, Canada, Turkey, Italy and Greece, to name but a few, it seems inevitable that the number of climate related disasters will continue to rise. It's therefore easy to understand why there is a great need for early warning, prevention and mitigation systems and solutions that can aid rescue workers. IoT is the key to making this happen.

Satellite IoT can be used for forest management and prediction and early identification of natural disasters such as forest fires.

IoT in the form of multiple strategically located sensors, coupled with the use of the Cloud, and Augmented Intelligence (AI) to make sense of all the data collected, is now being used in many locations around the world to aid in disaster prevention and mitigation. Applications include, tsunami warnings, flooding and wildfire prediction and prevention of collapse of critical infrastructure. Some of these locations are able to employ local terrestrial communications, but many others are in remote areas where satellite is the only solution. One example of this is the Indian National Institute of Ocean Technology (NIOT) which has a network of connected buoys in the Indian Ocean to act as an early warning system for tsunamis, such as the one in 2004, that killed 228,000 people in 14 countries and left two million homeless. The buoys are deployed along the unstable fault line that caused that tsunami. Beneath each buoy is a Bottom Pressure Recorder (BPR). These detect sudden increases in pressure under the sea, which indicate the formation of a tsunami. The BPR communicates to the buoy via an acoustic modem, and the buoys use satellite communications to transmit real-time information to the shore stations, so that local residents can be informed. The buoys are also use to collect other marine information, such as currents, conductivity and temperature.

Forest fires around the world are increasing in both number, size and duration, as global warming continues to create the ideal conditions for them. Current systems for monitor-

EXECUTIVE SPOTLIGHT

Cynthia Harty, VP-Strategic Business Development, ST Engineering iDirect

Cynthia Harty is Vice President-Strategic Business Development at ST Engineering iDirect. Cynthia's expertise lies in operations and the introduction of new products, services and solutions to market, establishing channel and pricing strategy. As VP of Business Development, her focus is on the augmentation of the company's 5-year plan and the partnerships that will enable the introduction of incremental capabilities to a product, solution or service and different go-to-market strategies.

Please give us a brief overview of the key features and benefits of your IoT solution?

We are offering flexible IoT Solutions utilizing our existing ST Engineering iDirect hub infrastructure that ease the entry of Service Providers into the IoT market. Our solutions utilizes a family of compact, lightweight IoT terminals that feature a tightly integrated satellite modem and flat-panel antenna design in Ka-band or Ku-band variants for fixed and mobile environments. For our Evolution and Velocity hub platforms, IoT waveform enabled universal linecards (ULC) provide simplified integration into an existing 5IF hub chassis as the IoT modulator and demodulator. Hidden carrier technology allows for IoT and VSAT carriers to coexist in the same bandwidth, ultimately optimizing use of allocated bandwidth. A Hub Base Station (HBS) element is available for activation on the Dialog platform. And what's more, we are also providing optional service enablement solutions that offer Service Providers IoT-as-a-Service options to speed up market entry.

Explain a little bit more on the full turnkey solution that you offer?

We can provide customers with a complete connectivity solution that's built on a flexible service enablement platform paired with IoT-as-a-service options for fixed and mobile IoT environments. These solutions ease the entry of Service Providers into the IoT market by reducing the upfront capital investments and operational complexity usually required to launch an IoT platform and service. Our IoT Solution provides a complete network management system (NMS) that supports both operational support system (OSS) functions as well as business support system (BSS) functions via an application program interfaces (API).

Cynthia Harty

Your solution is specifically for GEO satellites, how does it compare to the non-GEO solutions now entering the market?

There are many narrowband service options available in L-Band, UHF and the newer smallsat constellations. Many of these services are limited in terms of use cases to Low Data Rate (LDR) applications only. They feature predefined payload sizes and pre-defined polling intervals ranging from per-minute to per-day, for example. Furthermore, they often don't offer the flexibility in increasing throughput beyond the stated data rate and are not cost effective for higher data requirements, limiting use cases to Low Data Rate (LDR) applications only. We offer greater flexibility around branding and customized service plans, message size, polling intervals and bandwidth allocation depending on their end user application requirements in both voice and data use cases.

Our solution enables our partners to leverage their existing capacity, ST Engineering iDirect platforms and systems to launch an IoT service over Ku or Ka band, supporting both Low Data Rate (LDR) as well as Medium Data Rate (MDR) applications. Future development

will support High Data Rate (HDR) applications as well.

What market segments will your IoT solution be serving?

Our solutions can support a myriad of use cases.

Transportation, which includes land, rail, and maritime, is by far the largest satellite IoT vertical due to satellite's reach, reliability, and added security benefits. IoT provides a highly effective solution for asset tracking, fleet management, telematics and analysis of the mobile workforce.

In the Maritime sector, IoT finds use cases in tracking and management of small vessels. This is especially important for the small-scale fishing industry, which has IoT requirements around catch reporting for traceability and regulatory compliance.

In the Oil and Gas and Energy sector, use cases include pipeline monitoring, equipment telematics, predictive and preventative maintenance and beyond line-of-sight monitoring of pipelines and electricity distribution networks. This also applies to water networks, in terms of flow and pressure. IoT can also replace the need for on-site technicians for remote monitoring, advanced meter reading and asset tracking.

In Mining, IoT provides asset tracking of trucks, trailers and heavy equipment, site operations including safety and security. Construction is another sector that holds big potential for satellite IoT. It is used for asset tracking offering intelligence on engine hours, mileage report alerts, fuel consumption and location. On construction sites it gives important insight into operations, most notably safety and critical area monitoring as well as to track progress and security on site. Again, drone line of sight use applications enable easy inspection or survey.

As demand for sustainable farming practices increases, Agriculture, namely precision farming, is becoming increasingly popular. Satellite IoT has an integral role to play here to help analyze different aspects of the farm such as soil, harvest and crop management, fertilizer monitoring and greenhouse and open field management. Important environmental factors such as rainfall, temperature, wind speed, CO2, power production and consumption of solar panels can be closely watched. IoT can also be utilized for livestock tracking and asset tracking for farm machinery as well and drone beyond line of sight for inspection of crops.

Can you cite a specific example of how your IoT solution will be implemented in the market and what benefits does it provide to your client?

We are currently working with a number of our customers and partners helping them implement industrial IoT solutions across a range of vertical markets, including utilities, oil & gas, maritime, transportation and environmental monitoring. In one specific example, we had a customer that was suffering performance issues with their incumbent satellite IoT solution. Having limited control over their satellite resources, they suffered from congestion, high latency and data losses for a time critical monitoring application. This was further compounded with high connectivity costs. Using our IoT solution, they were able to re-purpose their investments in ST Engineering iDirect infrastructure and run the same application over their existing network and capacity. This has enabled them greater control over the end –to-end service, to offer higher reliability and scalability, all while maintaining an optimum cost of connectivity.

How do you see the IoT solution you are currently providing evolving, in other words, why should your potential clients invest in it now?

As we move towards the implementation of Industry 4.0 and begin to realize the plethora of opportunities that advanced technologies such as 5G, edge computing, automation, orchestration and virtualization bring to the table, here is an opportunity to obtain a complete connectivity solution from a single, trusted source. As the industry leader across many market segments it's our vision to constantly evolve our solutions to meet the current and future needs of our customers. It's what has made us and our customers successful.

As part of this future vision, we are pioneering a world-class cloud-based satellite ground infrastructure platform that enables multi-orbit, multi-access technology services in a converged telco environment driven by the best business case and market strategy.

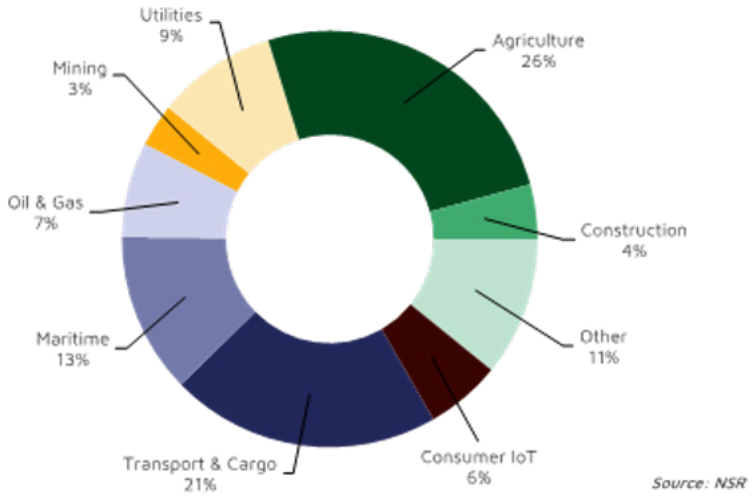
Our model for ground infrastructure is one that's fully digitized and virtualized, is based on open standards, and orchestrates dynamically configured space resources with real-time demand on the ground. It advances key aspects of a satellite network from more powerful waveforms and more intelligent bandwidth allocation to more capable remotes. It transforms satellite service delivery so that it's perfectly seamless, significantly more economical, infinitely scalable, and can deliver whatever data rate and functionality is needed for any possible application that satellite connectivity can support

ing and early detection primarily rely on observation, often from optical satellites or drones. However, there are several different methods being developed to aid in prediction or very early detection. These include equipping forests with CO_2, heat and smoke detectors, to be used in conjunction with drones.

Monitoring Critical Infrastructure

IoT is also starting to play a significant role in the monitoring of critical infrastructure, such as bridges and dams. Failure can occur simply as a result of age. However, in some cases extreme weather will also come into play, particularly with dams, where excessive rainfall can cause build-up not only of water, but also of debris, causing additional stress and strain on the structure itself, which if it's breached can lead to flooding downstream potentially damaging agricultural land and homes. For example, in 2017, heavy rainfall caused considerable damage to the Spillway of the Oroville Dam in California, necessitating the evacuation of 188,000 people. Installation of sensors on the dam structure, coupled with weather data can help mitigate the chances of a major failure. In the US, 69% of dams are privately owned. Many of the owners don't have the financial resources to conduct all the necessary inspections and preventative maintenance. IoT has the potential to play an important role in this market. According to the Association of State Dam Safety Officials the average age of dams in the US is 56 years, meaning that many are at an age when structural failure becomes more likely. Appropriately installed sensors on the dams themselves as well as on the gates and hydraulics, can supplement visual inspections to avoid a disaster. One company taking this to heart is Myriota, a smallsat startup company, which earlier this year announced that it is partnering with a sensor company to provide dam operators and owners in Australia, with a dam monitoring solution.

Growth in Satellite M2M/IoT Sites by Application 2019-2029



Satellite IoT Market

As previously mentioned, according to NSR, the total retail market for satellite IoT is forecasted to experience significant growth, reaching around US$ 1.8 billion by 2029, up from around US$ 700 million in 2020. This market is divided between MSS systems, the new LEO systems and traditional GEO systems. MSS operators such as Iridium, Globalstar, and Orbcomm have been in the business for many years and have a well-established base of customers, primarily mobile. However, these systems use different frequencies: L-Band for Iridium and Orbcomm, and S-Band for Globalstar; bandwidth for these frequencies, tends to be more expensive than at Ku or Ka. The smallsat LEO constellations are relatively new entrants to the satellite market and there are many of them including: Kepler Communications, Astrocast, Lacuna, and Kineis.

Given these forecasts it is not surprising that many existing satellite Service Providers are keenly eyeing this market, yet wondering about the best way to enter. The plethora of solutions available make it hard for them to choose. Should they totally change their business model and go with one of the startup constellations, many of which only offer a full turnkey service, and given their numbers, some of which may not be in business in a few years' time? Should they align themselves with the established L-Band players, or should they stick with a GEO solution, which means minimal change to both their equipment and their business model? Hard decisions to make. For an established VSAT operator this will be a totally new venture, and one that they may prefer to enter slowly, before making a major commitment.

For these Service Providers, ST Engineering iDirect, offers a unique cost-effective, highly scalable and efficient solution that gives Service Providers the key to the IoT market, enabling them to enter it at their own pace. Regardless of whether a Dialog, Evolution or Velocity hub is being used, Service Providers will be able to seamlessly integrate the additional functionality into their existing hub. The solution from ST Engineering iDirect, incorporates an IoT optimized waveform, a cloud-based

FEATURED APPLICATION

Satellite IoT for Agricultural Applications

From Ancestral Farming to Agribusiness

For thousands of years, farmers have yielded crops that are at the mercy of farmers' best judgement and incremental improvements through now-rudimentary inventions such as mechanical improvements. Nearly every aspect of traditional agriculture can be monitored, measured, forecasted, or otherwise tracked to gain valuable information. Sensors applied to equipment, livestock, vehicles, and more all offer an ever-increasing set of data points. When these are collected and synergized by IoT technologies, the agriculture industry becomes as tech driven as any other on the planet to drive decision making.

John Deere is the epitome of a leading agriculture supply company that is embracing IoT in a big way, paving the way to Precision Agriculture which is big business for equipment providers such as John Deere as well as farms and farmers. As early technology adopters, John Deere was one of the first in the agricultural arena to begin using satellite for a variety of applications onsite at farms and between them, leveraging the scalability, flexibility and, of course, reach of satellite communications.

Today, Precision Farming businesses are using IoT connected sensors, for example, on tractors to check the moisture level in the soil to ensure that each individual seed is planted at precisely the right depth. Without this, if all seeds are planted at the same depth, varying moisture levels in the soil will impact the growth so that not all the crop ripens at the same time. Ultimately, part of the crop is wasted at harvest time. Smart tractors and sprayers guided by GPS and sensor data can save fuel and seed, decrease workload, and reduce the amount of herbicides and pesticides needed.

Some examples of IoT applications in agriculture include:

Precision farming: Precision farming devices collect a vast array of data specific to crop farming, field microclimate, and the ecosystem. This data enables farmers to detect anomalies or infestations; estimate optimal amounts of fertilizer, water, and pesticides that their crops need; reduce costs; and increase outputs.

Monitoring environmental conditions: Weather stations located throughout agricultural microclimates can send updates over satellite for a real-time status of environmental conditions. This data can guide farm managers on the deployment of day-to-day operations, such as irrigation and livestock feeding.

Smart irrigation systems: Farms can optimize the use of water through smart irrigation control and monitoring systems that automatically trigger irrigation systems when soil moisture levels are low. Sensors can also detect faults and leaks in water pipelines to trigger repairs and reduce water waste.

Livestock tracking: Livestock monitoring collects data on stock health, well-being, and physical location.

Predictive maintenance and equipment monitoring: Telemetry data from equipment enables the proactive diagnosis of issues and the remote servicing of equipment. It can also generate notifications to call a service technician.

Asset tracking: By tracking fuel consumption, maintenance, and location of light and heavy machinery, farming operations can prevent theft and vandalism of security systems. With asset tracking farms can trace produce as it moves through the supply chain.

Drone beyond line of sight: Drones can be used for crop inspection, high value crop monitoring, and maintainance.

Why Farms Need to Leverage Data

The list of ways the agriculture industry might leverage data is as long as there are species to sow and reap. By collecting and analyzing data, the industry has an infinite number of ways to improve agricultural practices using IoT applications. Satellite IoT adds another layer of scalability by adding its inherent characteristics of reach to often out-of-reach and disparate farm sites. All of these applications together roll up to a few overarching themes, namely, increasing productivity and profit while reducing waste.

Precision farming, or Smart Farming, is using IoT applications for better asset management and monitoring. These applications can run the gamut to include microclimate and soil conditions, crop growth, livestock health and activity, infestation detection, any sort of anomaly, and equipment health and malfunction, to generally maintain better control over the agricultural process. By more fully monitoring assets and learning from the data, IoT is quickly becoming an essential business operations tool required to compete.

Success Criteria for Smart Farming

Getting these technologies onto farms and completely instantiated in the agriculture industry will require a period of education and good implementation. A critical requirement of any IoT solution is ease of use. Depending on resources and the size of a farm, there may be no IT manager so IoT systems need to be easily installed and up and running quickly. Terminals must also be small, with low power consumption, offering easy access to all frequency bands and the cost of the solution must be affordable. Above all, farmers must see fast Return on Investment.

The success of the IoT's impact on Smart Farming is also dependent on the creation of a robust ecosystem. This involves several steps: harvesting the data from the field, passing it to the cloud and analyzing it using AI and machine learning before making meaningful data available on platforms that farmers can easily access to aid decision-making. Real-time information on weather and environmental factors for example, will provide key data on when to irrigate. Each of these are businesses unto themselves that will play a part in IoT for agriculture.

Different connectivity capabilities will be required to address the full spectrum of applications from monitoring of farm machinery to the provision of Internet access to farm buildings. Satellite's inherent capabilities—such as its ability to reach remote areas, scale, and to extend coverage for other providers—make it an ideal enabler of IoT.

Network Management System (NMS) from hiSky, and a portfolio of small form-factor IoT terminals with integrated modems and antennas for mobility or fixed use cases. In addition, ST Engineering iDirect makes market entry easy, by offering IoT as a service, with a range of flexible business model options, enabling Service Providers to cautiously enter the market; maybe with just one customer initially. This way it's possible to minimize the upfront capital investment and steep learning curve usually associated with entry into a new market.

For Dialog, hiSky's Hub Base Station (HBS) functions as a modulator and demodulator and is paired with a protocol processing server. For Evolution and Velocity hub platforms, IoT waveform enabled universal line cards (ULC) provide simplified integration into a 5IF hub chassis as the IoT modulator and demodulator. Dedicated IoT timing groups are employed on the ULC, and hidden carrier functionality is implemented. This means that the IoT carrier can run under other VSAT outbound carriers on the same hub chassis. hiSky packet processing software is implemented on an integrated gateway server.

The application server is managed through the cloud-based hiSky 360 NMS, allowing Service Providers to configure, operate and monitor the platform and its components.

One of the particularly unique features of ST Engineering iDirect's solution, is the size of the terminal. No bigger than a laptop and incorporating a flat panel phased-array antenna, in either Ku or Ka-Band for connection to Geostationary satellites. There are two versions. The Dynamic Terminal for Comms-on-the-Pause (COTP) and Comms-on-the-Move (COTM) and a fixed terminal for fully outdoor applications. In the fixed version the terminal is mounted on poles or buildings. It supports Power-over-Ethernet (PoE) as well as solar power. This terminal provides several wireless connectivity options: Wifi and Bluetooth Low Energy (BLE) for phones, tablets and sensors, and wired options for IoT devices and sensor gateways such as LoRaWAN (Long Range Wide Area Network). It's intended for deployment in extremely remote areas for use in mining, pipelines and other energy verticals, as well as for agriculture and other remote sensor backhaul applications. The dynamic terminal incorporates an integrated phased-array antenna for automatic satellite acquisition and tracking and fast beam switching, incorporating polarization and frequency switching. The antenna design is tightly integrated with the satellite modem into a single unit featuring Ethernet, WiFi, Serial and Bluetooth interfaces and optimized for low power consumption.

"...Different IoT market segments have different requirements in terms of bandwidth...The IoT solution from ST Engineering iDirect can handle all of these..."

Different IoT market segments have different requirements in terms of bandwidth. Low data rate events-based usage such as smart meters, asset tracking and remote monitoring, these applications tend to generate small data bursts of bandwidth, up to 30Kbps, for a total usage of perhaps 1-2MB per month. Other events-based applications such as SCADA, industrial control and maritime vessel management systems, tend to have a higher throughput, maybe 10-100Kbps and a total usage of up to 25MB per month, and at the high end, demand based or continuous throughput usage will be much higher, 10-500Kbps leading to hundreds of MBs per month total usage. IoT backhaul is one classic example of this, other use cases include surveillance and telematics for heavy equipment. The IoT solution from ST Engineering iDirect can handle all of these. ST Engineering iDirect's Dialog, Evolution or Velocity platforms, is ideal for IoT aggregation, whereby data from multiple sensors connect to a single device or endpoint, which then connects to the satellite.

So, for a Service Provider looking to enter the IoT market, but who is reluctant to completely change its business model, equally unenthusiastic about the idea of needing omnidirectional or tracking antennas, and also very reluctant to commit to a new operator who may not even be around in a few years-time; sticking with a GEO solution and a well-established, trusted partner makes perfect business sense. For these Service Providers, the solution from ST Engineering iDirect, is the ideal choice.

Elisabeth Tweedie is Associate Editor of the Satellite Executive Briefing has over 20 years experience at the cutting edge of new commmunications entertainment technologies. She is the founder and President of Definitive Direction (www.definitivedirection.com), a consultancy that focuses on researching and evaluating the long-term potential for new ventures, initiating their development, and identifying and developing appropriate alliances. She can be reached at: etweedie@definitivedirection.com

YOUR KEY TO IoT

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