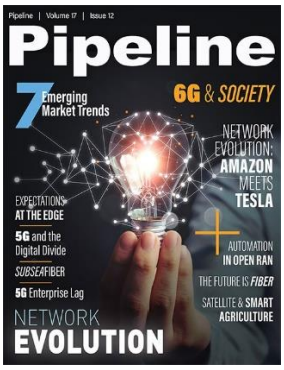

www.pipelinepub.com
Volume 17, Issue 12

Making Smart Agriculture a Reality with Cellular Backhaul Over Satellite

By: Doreet Oren

The need to bridge the digital divide is now stronger than ever. It is exacerbated with the COVID-19 pandemic causing a rise in demand for connectivity and especially a surge of demand on cellular networks. We see a record need for video streaming and bandwidth-hungry applications, the result of working and studying from home, increasing reliance on digital communication, and additional connectivity requirements to support businesses in new ways.

Backhaul over satellite for quick deploy

Not everyone in the developing world can afford or has access to computers, but many have 4G smartphones. Because of this, accessing the Internet from their mobile phones via satellite backhaul is the fastest solution for bridging the digital divide. There is a need to reach underserved areas quickly with a satellite alternative to the terrestrial networks that do not provide an adequate solution or are nonexistent altogether.

Satellite backhauling has become an economically viable solution answering the strictest service level agreements (SLAs), and for many mobile network operators (MNOs), it is no longer a niche play. In the past, the satellite option for cellular backhaul (CBH) was often used only as a fallback for hard-to-reach rural areas such as islands, mountains, and deserts, where terrestrial infrastructure such as fiber, next-generation copper, or microwave was either too expensive or unfeasible.

The economics as well as the need to overcome technical challenges have brought LTE satellite backhauling to the forefront in more established markets as well as in the developing world. Clearly, the traditional markets of Asia, Africa, and Latin America are prime candidates for connectivity due to the lack of terrestrial infrastructure.

Satellite backhauling is a quick solution that can be deployed anywhere. Extending cellular networks outside of crowded urban areas is the primary reason MNOs adopt a satellite backhaul solution. At times the requirement comes from the government, which is looking to include the rural population in the country's economy, with a sincere desire to narrow the digital divide. Often in these cases, it is mandatory for the mobile operator to supply such connectivity to the underserved or unserved areas. Other times, competition between MNOs in increasing their subscriber base drives MNOs to extend networks; this is to avoid paying roaming costs to a competitor when their subscriber moves out of their current coverage area. In other cases, there are areas where an opportunity arises to support tourist attractions such as hiking trails, scenic travel routes and ski resorts that require connectivity.

IoT: the new oil of the digital economy

The Internet of Things has raised the stakes and increased complexity further, with billions of connected physical devices around the world now collecting and sharing data. With the number of devices on the planet already surpassing the number of people, this trend will continue. And with access to cheap computer chips and the ubiquity of wireless networks, it's possible to turn anything into a part of the IoT.

More specifically, IoT utilizes specific sensors, protocols, networking equipment, programs and applications to transfer and analyze data to obtain value-generating information across an ever-growing set of business use cases. These include precision agriculture, Industrial IoT (IIoT), SCADA, enterprise IoT (EIoT), telemedicine, logistics, smart city, drones, environment and more.

IoT has expanded its footprint around the globe, including to places that have limited or even no Internet connectivity, including remote farms and factories, ships, mines and oil rigs. The data generated by these IoT implementations is key to the cost-efficient operation, monitoring, planning and advancement of the businesses they support. This data has been coined the “new oil of the digital economy.”

Focus on agriculture

The world population is expected to increase from just over seven billion people today to nine or ten billion by 2050. This is an extraordinary number of people to feed, and if we don’t start implementing smart agriculture systems now, the world will face massive food shortages in the years to come.

IoT sensors help farmers collect real-time data about their crops. This data is transported and analyzed to make better decisions about how and when to harvest, including when crops are ripe, how much water is being used and if an irrigation system is needed, general soil health, whether they need more fertilizer, and other relevant input.

Leading this innovative use of IoT in agriculture is TIM Brazil, which created the "4G TIM No Campo" project. The project's main objective is to make digitization possible and to offer innovative solutions for Brazilian agribusinesses. Specifically, the goal is to enable time-sensitive decision-making for better crop management by collecting, transferring and analyzing data bi-directionally between farmers, machines, and administrative offices. The "4G TIM No Campo" solution provides a robust network and cutting-edge infrastructure to connect people, machines and software to analyze all stages of the growing and harvesting processes.

Why is this project so important? According to research by McKinsey & Co., Brazilian farmers are increasingly turning to technology for operations: 85 percent use WhatsApp daily for farm-related purposes. However, the strong digital agriculture presence in Brazil is still challenged by several factors inhibiting adoption. One of these concerns is inadequate Internet connectivity.

In order to make the program a reality, a cellular backhaul over satellite solution was needed to extend 4G coverage to the country. In partnership with TIM, Gilat Satellite Networks supplied 4G backhaul over a multi-spot beam Ku-band satellite to reach Brazil's most remote areas. Satellite backhaul supports the agribusiness IoT market and extends coverage to highways and improves the quality of life of the region's population by enabling access to pervasive 4G mobile connectivity.

Cellular backhauling over satellite provides the required connectivity to unserved or underserved rural areas and can be deployed quickly to meet time-to-market demands. For satellite backhauling to meet the mobile operator's requirements, the solution must provide end-to-end encryption, maintaining IPSec data security with CMPv2 without compromising performance under fade conditions. Furthermore, the solution should have the flexibility to be configurable for either layer-3 or layer-2 services, thus providing seamless integration to the cellular network core.

Connectivity is essential

The use cases for 4G connectivity vary from providing regular voice, mobile data and IoT services to improving communication between office and field and making onboard computers manage real-time information.

As agricultural production becomes more digitally managed, connectivity becomes essential. Contingency measures must be taken to guarantee the desired SLAs. To address this, TIM uses satellite backhauling in conjunction with landline links to enhance its service.

One example of a farm participating in the "4G TIM No Campo" solution is Citrosuco, one of the largest orange juice companies in the world. The solution expands far beyond the company's groves and will bring connectivity to several neighboring cities, serving an area of 1.9 million hectares. Citrosuco is the first agricultural company to go 100 percent digital and will have the technology in all its farms located in the interior of São Paulo and Minas Gerais.

According to the company, robust cellular technology and backhauling over satellite provide the necessary infrastructure to optimize processing, enable easier decision-making and support all digitalization initiatives. This investment is driving the company to higher operational and sustainability standards.

Another great benefit of the program is the ability to provide 4G coverage at 700MHz to neighboring cities, benefiting thousands of inhabitants of the region where the farms are located.

What's next?

Two significant trends are emerging that drive the expansion of IoT applications: the surge in private wireless networks and the use of edge computing. As the IoT network connects more devices and technology advances, networks must move to decentralized architectures where processing is being done at different aggregation points. Deploying private networks with edge computing on-premise addresses modern business needs for increased data collection, processing, and real-time analysis.

The satellite industry is bound to play a vital role in the enablement of key IoT applications. With the advantage of ubiquitous reach, reliable and secure communications and quick deployment, satellite backhauling of the cellular network brings great promise to mobile operators.