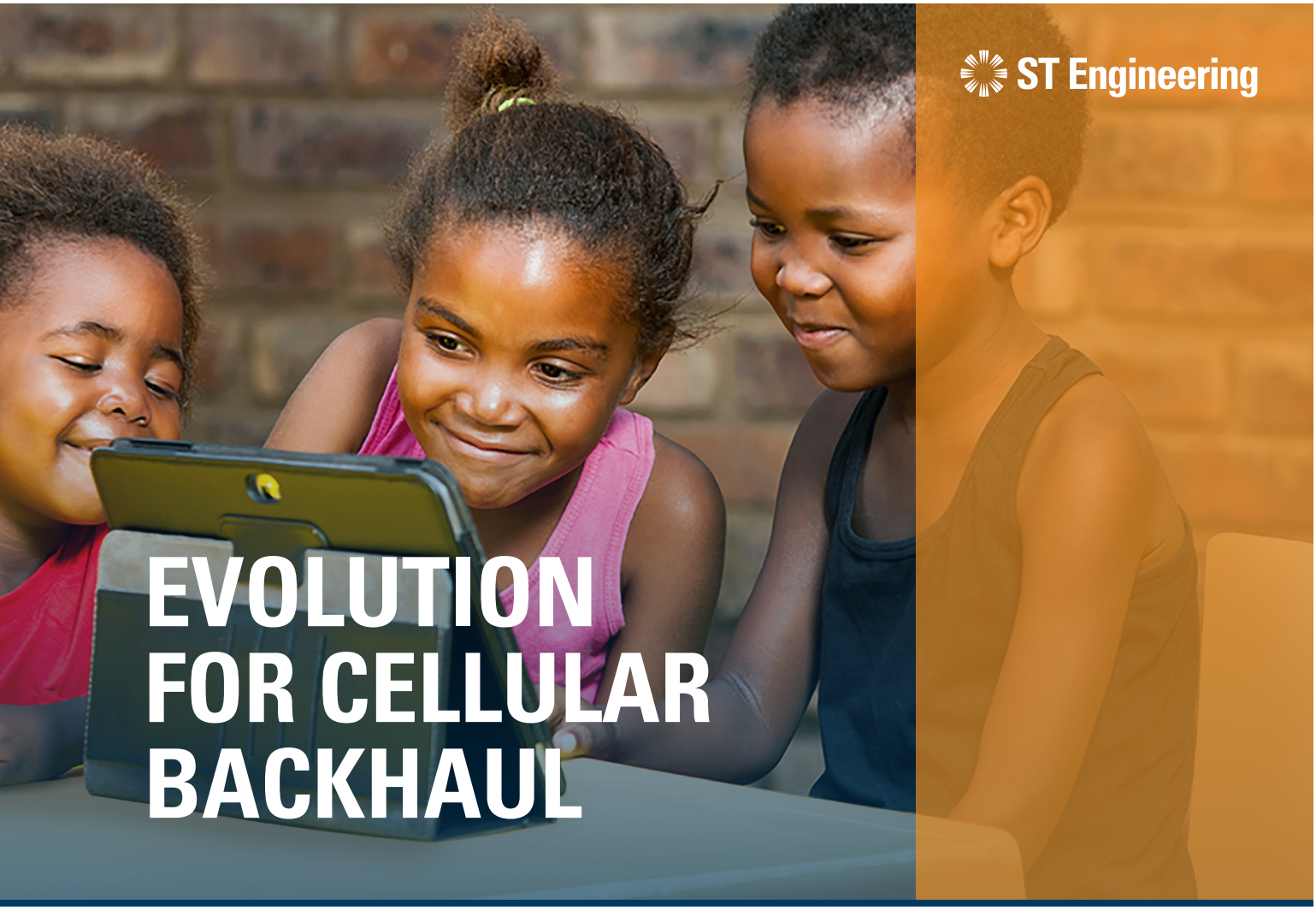


ST Engineering

EVOLUTION FOR CELLULAR BACKHAUL

The demand for connectivity is surging worldwide. More people in more places are connecting for work, entertainment, social communications, and education — using smartphones, tablets, and other easy-to-carry devices. In many underdeveloped parts of the world, smartphones are often the only Internet access technology that's both affordable and available.

To keep pace with growing demand, mobile network operators must look outside of their own networks. This is where satellite connectivity's inherent capabilities as a backhaul solution, strengthened by recent innovations, can help mobile operators build out their networks and increase subscriptions. In fact, Northern Sky Research (NSR) forecasts that the deployment of satellite backhaul sites will reach approximately 160,000 units by 2028.

EVOLUTION

powered by Newtec iDirect

Using Satellite to Expand Mobile Networks in Remote Areas

Many mobile network operators are already familiar with satellite connectivity, having relied on satellite service providers for years to help them backhaul traffic and extend network coverage in underserved areas. Satellite connectivity added distinct value given its imperviousness to terrain and line-of-sight restrictions, as well as its quick and easy deployment and ability to directly interface with all IP technology.

Satellite networks have made significant gains in performance and efficiency through DVB-S2X and HTS. There are new methods to compress, optimize, and manage video and heavy data seamlessly over satellite networks, minimizing latency and capacity usage. Sophisticated bandwidth management capabilities improve the end-user experience and satisfy demanding applications. Furthermore, satellite connectivity can ensure mobile networks handle the IP traffic protocols in 4G/LTE networks and meet security standards in the most efficient and seamless way, often relying on Layer 2 over Satellite (L2oS) architectures.

iDirect Evolution

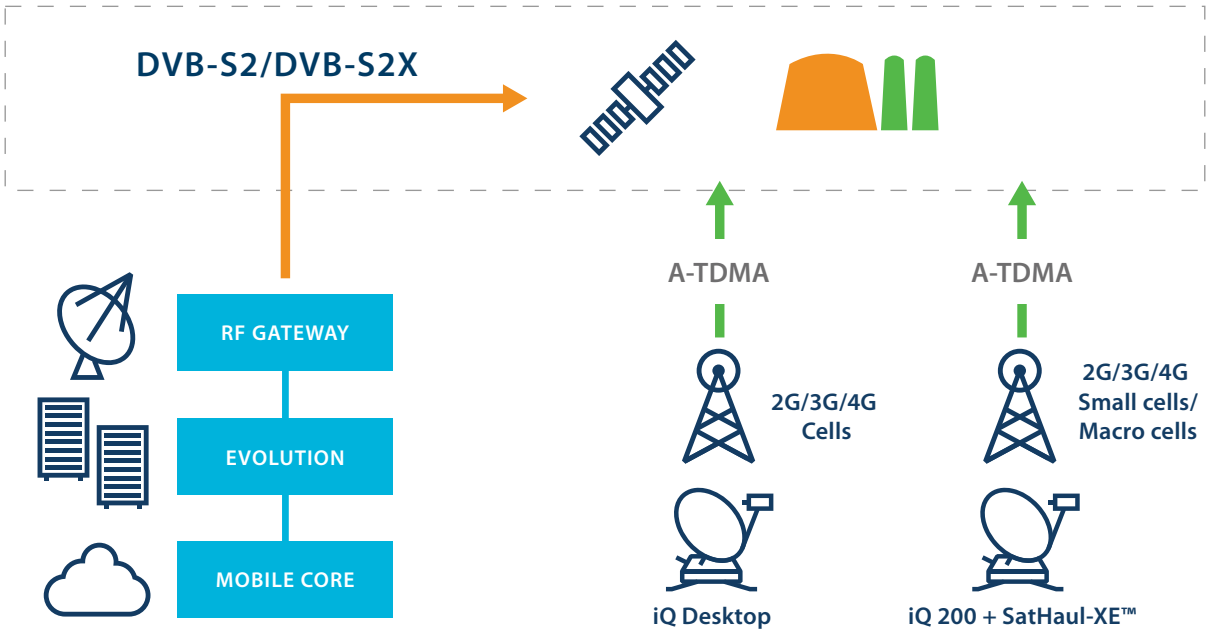
ST Engineering iDirect is a leader in satellite ground infrastructure and solutions for the cellular backhaul and trunking markets. We help mobile network operators grow their subscribers in previously unreachable areas, maintain mobile connectivity in emergency situations, and build 5G-compatible and hybrid networks.

Our Evolution platform enables mobile network operators and service providers to cost-effectively manage a multitude of small, medium, or large networks, including 2G, 3G, and 4G/LTE. We enable high QoS and high QoE through efficient use of DVB-S2X and Adaptive TDMA waveform technologies coupled with advanced acceleration and compression technologies while maximizing an operator's business profitability.

The Evolution product line is comprised of a hub and line card system, network management, operating software and a portfolio of modems that support a range of features and throughput levels and can adapt to growing network requirements via software-defined capabilities.

Evolution Benefits at a Glance

- **Efficient, proven platform for different services**
- **Advanced QoS/QoE and performances**
- **Advanced traffic acceleration and compression**
- **Easily scalable through software-defined architecture**
- **Dynamic bandwidth management according to traffic**



Evolution for Cellular Backhaul

Flexible, Efficient Core Architecture

The Evolution Universal Hub can connect to any frequency band on all satellite architectures. It is built on DVB-S2/S2X ACM with Adaptive TDMA and multiple technologies to allocate bandwidth efficiently over distributed networks, while automatically adjusting to dynamic traffic demands and changing network conditions.

Modular Design for Scalability

Modular design and flexibility allow customers to operate a shared bandwidth platform spanning multiple satellites, bands, transponders and topologies and grow networks one at a time as their business expands. Our modular hub and line card system enables service providers to minimize initial capital costs, offer multiple service types from a central hub, and scale business one network at a time in a "pay as you grow" manner. Further, it enables them to operate across all business models, including VNO and managed service models and easily add new capabilities with over-the-air software upgrades.

Integration with Telecom Core Networks

Evolution mirrors the quality and reliability of terrestrial services, ensuring an enterprise-class user experience, and can operate seamlessly as part of an integrated global IP network. Features like our Layer 2 over Satellite (L2oS) use switching to pass Ethernet packets end-to-end over the network enabling a satellite network to behave like a mainstream access network. By doing so, they can implement a variety of modern, converged network architectures; pass any Layer 3 protocols; and more easily integrate into hybrid network scenarios.

Traffic Acceleration and Optimization

The ST Engineering iDirect SatHaul-XE™ Optimization Suite is an advanced set of tools focused on TCP Acceleration features with TCP optimization, IPSec for mobile networks, and compression for intelligent and efficient delivery of 2G, 3G, and 4G/LTE traffic optimized over the links and integrated back to the core network. Evolution also supports Advanced Encryption Standard (AES) for secure applications.

Advanced Quality of Service

ST Engineering iDirect's bandwidth-allocation algorithm also allows for countless possibilities of Quality of Service levels, bandwidth management, and traffic prioritization. Mobile network operators can map their core networks to satellite networks to prioritize traffic and maintain distinct Quality of Service settings by remotes, bandwidth groups, and applications to satisfy Service Level Agreements.

Building Partnerships to Power the Future

In just a few years, connectivity will look drastically different than it does today. Mobile networks will be responsible for delivering huge amounts of content to remote locations, urban centers, disaster-ravaged areas, and more — seamlessly and instantly. With the aid of satellite connectivity, service providers can work with mobile network operators to power a more connected future.

Newtec iDirect