The growing global demand for 3G and LTE mobile connectivity presents a significant challenge in many underserved rural areas. These markets are often located in difficult-to-serve, remote areas where terrestrial fiber or microwave services are not readily available to support the backhaul links for base station locations. To bring service to these areas, cellular operators require a low-cost and effective means for interconnecting cellular base stations, regardless of distance, infrastructure, or terrain. Satellite technology, which can be rapidly and cost-effectively deployed to nearly any area around the globe, is an ideal solution for meeting this challenge.

Modern day 3G/LTE mobile networks support a combination of voice and data traffic and require a high-performance, cost-effective, next-generation cellular backhaul solution that can be quickly and easily deployed to any location. Hughes JUPITER System is ideally suited to serve such networks. With industry leading latency (~650 ms) and jitter (~25 ms) performance, the JUPITER System offers the best user experience compared to other VSAT systems. Furthermore, through the use of Time Division Multiplexing (TDM)/Time Division Multiple Access (TDMA), the JUPITER System is highly economical on satellite bandwidth utilization, particularly when traffic is dynamically shared and assigned on an as-needed basis among multiple sites.

**JUPITER System for Radio Access Network (RAN) Backhaul**

The JUPITER System offers operators a powerful solution for satellite backhaul, which has a low total cost of ownership and is highly scalable. The figure below illustrates the star architecture of the Hughes satellite cellular backhaul solution on the JUPITER platform.

**TDM/TDMA**

With TDM/TDMA, remote sites share the same satellite capacity for their traffic, and the capacity is dynamically assigned as needed to each RAN.

In a dispersed multisite network, peak busy hour occurs at different times at different site locations. This can be effectively accommodated by dynamic sharing of the same satellite capacity, a key attribute of a TDM/TDMA system, where a TDM/TDMA system will allocate satellite capacity to different sites and times on an as-needed basis. This is in contrast to SCPC solutions where the satellite capacity is either statically or variably assigned on a per-site basis only.

Hughes offers a full range of satellite-based RAN backhaul solutions that have been specifically designed for mobile operators to enable rapid and cost-effective service expansion into rural or hard-to-serve markets. These solutions provide high-quality links while optimizing space segment resource utilization by coupling the appropriate satellite technology with intelligent traffic optimization.
In addition, the time to implement a satellite backhaul connection is quite short. Once the satellite solution is installed, the service can begin immediately. Also, satellite offers a significantly lower CAPEX versus the cost of installing and maintaining a terrestrial backhaul system using fiber or microwave (with multiple hops) to hard-to-reach rural areas.

**Bandwidth Optimization**

For applications where the backhaul traffic is not optimized or not already IP, the Hughes solution for cellular backhaul integrates a bandwidth optimizer that significantly reduces the traffic from the data and control channels sent over the space segment. Key functions of the optimizer include:

- Increase of network throughput
- Reduction of satellite bandwidth requirements
- Improvement in network response times and reliability
- Enhancement of mobile users experience and network performance
- Minimization of effects of latency

**Conclusion**

The Hughes JUPITER System is an efficient and economical satellite backhaul solution. With efficient TDM/TDMA channels and a highly scalable architecture, the JUPITER System provides a lower overall total cost of ownership. The JUPITER System (which is based on DVB-S2 on the outroute and TDMA on the inroute), when combined with high-throughput satellites, meets most RAN backhaul requirements, including very-high-capacity links. It can effectively handle the ever-increasing demand for data over 3G/LTE networks through its powerful features and efficiency. Additionally, the JUPITER System has been successfully tested and integrated with leading RAN equipment manufacturers, ensuring that operators can successfully implement a backhaul system in the shortest period of time.

### Some of the key features that make the JUPITER System ideally suited for cellular backhaul include:

**Industry-leading latency and jitter**
- 650 ms latency, 25 ms jitter

**High efficiency**
- DVB-S2 Forward Channel
- FM/TDMA with 8PSK and 90% efficiency

**High-throughput remote terminals**
- More than 100 Mbps throughput

**Low power consumption**
- 11 W IDU

**Base station/NodeB synchronization**
- GPS, NTP

**Security**
- AES256

**Power options**
- AC power supply (90–240 VAC)
- DC power supply (12/24 or -48 VDC)

**Scalability**
- Highly scalable gateways

**Full network management system**
- Provides ease of managing every network element

### Proprietary Statement

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