

Cell tower solutions for tier 2 service providers

The exploding growth of smartphones and other mobile data devices is driving huge increases in demand for wireless bandwidth. New 4G Long Term Evolution (LTE) services provide greater bandwidth for mobile devices and will compete with residential broadband services. The 4G LTE high-speed data technology is driving cell sites from traditional DS1 copper to fiber-optic Ethernet based transport. For these reasons, there is a growing business opportunity for independent local service providers to deliver mobile backhaul network services at cell towers. In many areas, often underserved rural locations, large wireless operators and telecommunications carriers are seeking to expand their coverage footprint, giving local service providers the opportunity to step in and offer a mutually beneficial business partnership to provide cost-effective backhaul infrastructure on a rapid deployment schedule.

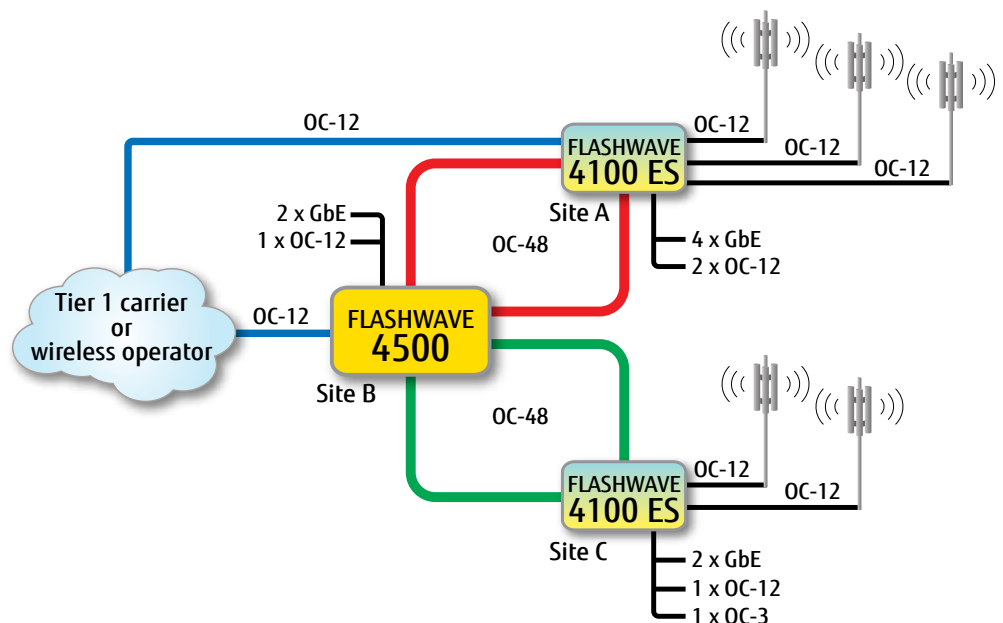
Transitioning networks

The mobile communications environment is in a period of transition, as data services (such as GPS navigation systems, smartphone apps and mobile streaming audio/video) become more prevalent. With the advent of 4G LTE network technology, it becomes necessary to support mobile traffic in an all-Ethernet environment. At the same time, wireless operators still have the need to support older types of communications technology, such as (Time-Division Multiplexing) TDM and Synchronous Optical Networking (SONET). Ultimately, all network communications will take place in an "all-packet" environment as Ethernet technologies become universal.

Typical Network Design

Small local carriers typically require networks that will connect one or more Mobile Technology Switching Offices (MTSOs), one or more Central Offices (COs) and a number of cell tower sites. The example design below is based on an actual deployment for a local service provider in a rural town in Alabama.

This network is based around an OC-48 optical backbone network ring, connecting several COs. At each CO is a hub, providing connections to individual cell towers in various locations, as well as one connection to a large carrier's MTSO. The Fujitsu FLASHWAVE® 4500 Multiservice Provisioning Platform provides the high-volume connection point at the carrier's MTSO, and FLASHWAVE 4100ES Packet Optical Networking Platforms connect the cell towers to the backbone.



A typical cell-tower backhaul network

Growing opportunities for local service providers

Key strengths of Fujitsu Optical Networking Platforms

Fujitsu FLASHWAVE® optical networking equipment leads the market because of its reliability, flexibility and performance. Several features of the FLASHWAVE platforms make them particularly good choices for backhaul deployments:

- **Scalability** – Service providers value the ability to expand their networks rapidly in response to growth in their customer base, or to capitalize on new business opportunities. The Fujitsu FLASHWAVE 4500 and 4100 ES systems are easy and economical to expand without disrupting existing services.
- **Supporting new and older, “legacy” services** – The FLASHWAVE 4500 and 4100ES platforms support transitioning networks as they migrate from traditional TDM to new Ethernet-based services. The FLASHWAVE 4100 ES is also engineered to support an all-packet service environment.
- **Environmentally hardened** – The FLASHWAVE 4100 ES is optimized for outside-plant cabinet deployments as well as in indoor rack or cabinet settings.
- **Centralized management** – NETSMART element management provides centralized point-and-click management for all FLASHWAVE platforms.
- **Flexible voltage operation** – including +24 V DC and –48 V DC.

What is Mobile Backhaul?

Mobile backhaul and cell-tower backhaul are terms that refer to the land-line, “wired” portion of mobile communication. Only the first and last leg of mobile network traffic travels on the airwaves, between the sender or recipient and their nearest cell tower or wireless connection. The remainder of the communication occurs mainly on the wired network between the cell tower and Mobile Technology Switching Offices (MTSOs). Some cell tower traffic is transported to hub cell sites using microwave line of sight technology.

Mobile and cell-tower backhaul service requires high standards of performance to satisfy the demands of both voice and high-bandwidth data services. Among these requirements are low transmission delay, low data loss and high reliability/uptime. Optical network equipment that provides backhaul service must be able to support these performance demands and must also be environmentally hardened (to withstand extremes of heat, moisture and cold) and that can be installed in outdoor cabinets. Another critical requirement is flexible cell tower voltage operation, including the ability to operate at +24 V DC, used at many cell towers or standard telco –48 V DC. Equipment not supporting these voltage options results in higher capital and operational costs for cell-tower deployment.

Fujitsu mobile backhaul solutions

- FLASHWAVE 4500 Multiservice Provisioning Platform
- FLASHWAVE 4100 ES Micro Packet Optical Networking Platform
- NETSMART® 1500 Management System

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