Fiber Solutions Boost Operators' Backhaul Networks

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Gazing out over the next several months, wireless operators see an enormous force heading straight at them. It is the surging flood of broadband traffic, fed by the widespread use of smartphones and mobile video applications. With the first waves already crashing onto networks, that flood of traffic threatens to become a tsunami as operators roll out bandwidth-intensive 4G and LTE services in the coming months. Unless they begin to prepare right now, that tsunami could bring down their networks.

Despite the global economic downturn, demand for wireless services continues to skyrocket. Operators must make the investments necessary to boost the capacity of their backhaul networks; if they cannot deliver the mobile speeds and performance their subscribers demand, those subscribers will defect to competitors. According to Visant Strategies, the number of U.S. base stations that support more than 24 Mbps of backhaul capacity will grow more than 20-fold between 2009 and 2015. Although operators now rely mainly on copper T1 and microwave for backhaul capacity, many ultimately will turn to fiber for their network upgrades.

Backhaul Migration is a Technology Mix

To shore up their backhaul networks ahead of the coming surge of 4G/LTE traffic, most operators today use a combination of copper, microwave and fiber. As they migrate their networks, they likely will continue to lease T1 lines, which currently provide backhaul service for about 90 percent of North American cell sites. However, operators need alternatives; T1s cannot scale quickly enough to handle fast-rising traffic volumes, and leasing costs account for up to 40 percent of current operating expenditures (OPEX).

To reduce their costs, many operators often add microwave to their backhaul mix. Although microwave can shoulder some of the bandwidth burden, particularly in sparsely-populated areas, it is not an ideal alternative. Requiring line-of-sight configurations, microwave is susceptible to capacity, spectrum, power and weather-related limitations.

Fiber Is the Preferred Solution

Consequently, operators want to take fiber to their cell sites wherever practicable, especially in densely-populated areas. Unlike T1 lines, fiber scales cost-effectively via wavelength division multiplexing. Operators can increase its capacity by simply adding wavelengths as traffic volumes dictate. Further, fiber requires fewer electronics than do copper and microwave; it is not subject to weather attenuation, electromagnetic interference or line-of-sight restrictions; and it potentially can reduce power costs.

Until recently, however, deploying fiber to the cell site has been an expensive, complex and time-consuming operation. According to New Paradigm Resource Group, fiber today goes to less than 16 percent of North America's 250,000-plus cell towers and the number of those towers is growing by about 18,000 annually.

Fortunately, the emergence of a wholesale fiber-connectivity market promises to make fiber a more effective and affordable solution in backhaul networks. In addition to cable TV companies, providers such as Verizon Communications, Qwest and Level 3 Communications are rolling out fiber-to-the-tower services. These offerings bring fiber into backhaul networks faster than wireless providers could do on their own--and enable multiple operators at a given tower to share the cost of that fiber. Nevertheless, some significant challenges remain, namely, the need to create a demarcation point at each cell site and to terminate, cross-connect, and manage the fiber.

Solutions that Put Fiber to Work in the Backhaul

Wireless providers need connectivity and cable-management solutions that put fiber to work in the backhaul network as quickly and cost-effectively as possible. Specifically, they want solutions that are:

designed to withstand harsh outdoor conditions

sufficiently flexible to accommodate growth and provide easy access to the installed fiber and

reduce OPEX by streamlining installation, troubleshooting and maintenance.

The All-important Demarcation Point

To bring fiber into the cell site, operators must create a demarcation point where they can cross-connect that fiber and manage it to accommodate operational requirements quickly and easily. A cross-connect solution effectively serves as that demarcation point, enabling operators to make circuit changes with minimal re-cabling and labor costs. Technicians can simply patch into the corresponding circuits with a patch cord for reconfiguration or monitoring purposes. During network element rearrangements, a cross-connect manages all rerouting, terminating, and maintenance functions from a centralized location.

A Plug-and-Play Strategy Reduces Costs

Given the relentless demand for mobile-broadband services, operators know they must deploy additional backhaul capacity as quickly as possible. Many wireless operators, like their wireline counterparts, opt for connectorized "plug-and-play" fiber solutions, rather than splicing, to create network junctions. By minimizing the need for highly-skilled splice technicians, connectors greatly reduce or even eliminate splicing costs, which translates into faster installation times, easy access for troubleshooting and maintenance and significant reductions in both installation costs and OPEX.

Responding to the need for superior optical equipment, leading vendors today design, test and manufacture fiber-optic connectors to ensure maximum performance and long-term reliability in the most severe outside plant (OSP)

conditions, including extreme temperatures, moisture, ultra-violet (UV) radiation and chemical exposure. Featuring high-quality factory-termination methods, the latest-generation connectors provide easy access points in underground or aboveground installations.

Fiber Termination, Splicing and Slack Storage

Optical hardware, tested to withstand the toughest environmental conditions, is another critical component of any fiber-in-the-backhaul strategy. Providing centralized points for fiber termination, splicing and slack storage, the hardware houses passive optical components such as splitters and wavelength division multiplexers (WDMs). When designed to incorporate fiber density and management capabilities, this optical hardware provides easy connector access; bend radius protection; clear cable routing paths; and physical protection of the fibers.

Smart Operators Ask for Help

Wireless providers are in the business of providing bandwidth; they often don't have the expertise for do-it-yourself fiber installations. Pressed by the need to boost backhaul capacity as fast as possible, many operators enlist the help of outside experts. These professionals work closely with operators to design, engineer, furnish and install fiber-based backhaul networks that deliver maximum reliability, scalability and efficiency. By taking advantage of fiber solutions and expertise now available, operators can fortify their backhaul networks to handle the coming tsunami of mobile-broadband traffic.

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