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Improving Reliability for WiMax Antenna Sites

Multi-function SNMP traps that address monitoring and maintenance issues for remote communications towers may deliver the competitive edge for WiMax providers.

For want of a nail the shoe is lost, for want of a shoe the horse is lost, for want of a horse the rider is lost - George Herbert.

Herbert's insight into the importance of support devices holds up just as well in the twenty-first century world of communications as it did when first quoted in the seventeenth century world of warfare by horse. In the high-stakes battle of Internet providers, WiMax represents the latest up-and-comer to challenge DSL and cable technologies. This new wireless technology is gaining attention for its ability to provide high-speed, high-throughput broadband connections over distances of up to 30 miles instead of a few hundred feet. Exhibiting a surprising amount of utility, WiMax can be used for a number of different applications, including "last mile" broadband connections, cellular backhaul, and high-speed enterprise connections for businesses.

Yet, one of the biggest challenges to any advanced wireless operation is the maintenance of continuous and economical service regardless of weather conditions and power irregularities or outages. Without reliability, the battle is over. This necessitates 100% attention to several issues such as the monitoring of electric power and environmental conditions within each of many sites blanketing a service area, and also mandates the ability to protect and remotely manage multiple communications-related devices.

The need to avoid "field trips"

With an array of cellular towers linked to main communications hubs in each service area, every coverage "umbrella" is likely to have dozens of remote sites that are vulnerable to lightning strikes, heat, wind and other conditions that cause power sags, spikes and outages.

For a WiMax-type provider with its armies of towers, any random spike or power outage means that a platoon of service trucks must roll. This enormously expensive and time-consuming "reactive" strategy can impact both the price and reliability of service. While each site is traditionally equipped with standby batteries, that power only lasts a finite number of hours, so reliable alarm notification and timely restoration of devices to normal mode is vital.

To avoid physical site visits, a system operator must have the ability to remotely cycle power when a device freezes-up or when a new configuration requires rebooting. Also required is the full-time monitoring of cabinet

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entry and events, as well as protecting and managing the devices within the cabinet. Most importantly, the ability to remotely handle all of these functions through SNMP [Simple Network Management Protocol] over a private IP network enables the direct control necessary to ensure reliability.

Providing all of this functionality, however, traditionally mushrooms into an expensive proposition -- thereby threatening the competitive pricing that WiMax service provides will need to combat the WiFi market.

In response, manufacturers of devices for the telecommunications industry have scrambled to provide the necessary monitoring and control functionality within a cost-effective package -- a good example being the SNMP-Link Model SL81 Remote Site Manager from Omnitronix of Seattle, Washington. This network-peripheral hardware device provides: remote monitoring and management services (such as handling serial alarms), on-board contact closure alarms, on-board temperature and humidity sensors, remote serial access, and alarm notification/resolution. With this device, network staff situated at the head-end can talk directly to serial devices at distant locations. Once an alarm condition is detected, for example, a technician can connect to a serial device to diagnose and correct the problem -- thus preventing the need for a service run.

Juggling switching issues

At the same time, such a device can also address switching challenges. Typically, the arrayed-cell sites of any WiMax provider will contain base station radios, backhaul radios, switches and routers. The POP sites will have considerably more hardware, so an express need exists for a switching device that is versatile enough to adapt for the various equipment types within the network. Quite often, several stand-alone relays are called for, adding to the expense and complexity of equipping a site.

To keep costs down, a multifunction unit like the Omnitronix device possesses a self-contained, robust relay system that handles all switching. Each of eight relays may be separately set to accept varying input voltages of 48vdc, 24vdc, 110vac or 220vac and are capable of switching loads of up to 10A. The mechanical relays have three connection points, so that they can be wired "normally off" or "normally on." As a result, even if power is interrupted, the switch will remain in its "normal" setting so that service is not interrupted. This prevents a single point of failure to greatly improve reliability.

The relays take their cues from the heart of the monitoring device via SNMP input.

Remote access options

As a final consideration, a monitoring device must have serial ports and a console server to allow multiple access paths to any other device on the system. This provides a benefit in instances when the back-haul goes down or a microwave transmitter stops operating. A network manager can simply telephone into the system and either jump onto an Ethernet bridge or communicate through an RS-232 serial connection.

A triumphant entry for WiMax?

By itself, monitoring and control won't win any communications war, but without bulletproof reliability WiMax will have trouble winning its conflict against the established wireless communications standards. The combination of multiple features within one monitoring device may prove far more vital to victory than its small contribution initially suggests.

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