POWERING PON WITH CONVENTIONAL CABLE BROADBAND EQUIPMENT

Billions of dollars of public funding are being allocated to expand high speed broadband connectivity into unserved or underserved parts of the rural US and Canada, and cable operators are taking advantage of these government incentives to expand their network footprints. One of the most common methods for expanding the network is through passive optical networks (PON). PON remote optical line terminals (R-OLTs) – located in remote service areas – distribute fiber connections for homes and businesses. These OLTs are critical elements and therefore keeping them running in all conditions is essential to network reliability.

OLTS MODELLED AFTER HFC NODES

HFC nodes and amplifiers are designed specifically for cable broadband, with standards and best practices developed to help ensure network reliability and operational efficiency. Many HFC node manufacturers are leveraging the HFC-based designs and interfaces to build OLT functionality into modules that retrofit into existing nodes. Like traditional cable broadband network elements, the OLTs have been optimized to operate at maximum power levels below 100 W, allowing operators to install and upgrade without major power challenges.

OUTDOOR REMOTE BROADBAND POWER

Cable broadband HFC power systems – designed primarily to power HFC nodes and amplifiers – consist of an uninterruptable power supply (UPS), batteries for standby operation, and an enclosure to house the power supply and batteries. An integrated DOCSIS® cable modem provides the operator with remote visibility into the power system, where utility power, battery voltage, network load and system health can all be monitored through an element management system (EMS).

In normal operation (utility power is present), the power supply acts as a power conditioner – cleaning utility impairments like voltage spikes and surges – and adds protection against short circuits within the coaxial network. This is also the time when the power supply is charging and balancing the batteries. When utility power is lost, the power supply seamlessly switches the network load from utility power to backup battery power and alerts the operator. When utility power is restored, the power system switches back to normal operation.

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REMOTE POWER MANAGEMENT

The only difference when using HFC power supplies for fiber OLTs is the means of remotely connecting to the power supply for monitoring and diagnostics. Traditional HFC power supplies utilize use DOCSIS® cable modems to communicate power health back to a network operations center, whereas fiber PON sites do not have access to DOCSIS®. Fortunately, the latest HFC power supplies feature simple form-factor pluggable (SFP) ports to provide flexible communications options for remote connectivity. An SFP interface is a modular slot for a media-specific transceiver, such as for a fiber-optic cable or a copper Ethernet cable. Fiber optic transceivers are typically vendor-specific and designed to operate with the PON system that they are connected to. RJ45 Ethernet transceivers can provide more generic connections for external modems using wireless or fiber connectivity without the need for specialized optical transceivers.

DON'T FORGET ABOUT EXTENDING RUNTIME

Remote OLTs are typically located far from a local headend, which means that it can take a long time for a technician to travel with a portable generator during extended utility outages. Adding battery storage capacity can provide greater resiliency, which is especially important for weather-related situations.

CONCLUSION

The guiding principle is clear: repurpose proven standards, technologies and systems developed for the coaxial portion of the network to save time and cost while improving network reliability. For power, this principle allows operators to simplify the operational processes while maintaining confidence in the resiliency of the network to utility power anomalies and outages.

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Greg Laughlin is a strategic marketing manager for broadband markets at Enersys. In his 15+ years at Enersys, formerly Alpha Technologies, Greg has served as a senior product manager for DOCSIS® power supply communication and gateway products, with a US patent awarded around broadband HFC connectivity enablement. Prior to Alpha, Greg worked for MCI, WorldCom, and Electronic Data Systems as a systems engineer, managing remote datacenter management systems. Greg holds an Electrical Engineering degree from Colorado Sate University and a master's degree in Computer Information Systems from the University of Denver. He currently sits on several SCTE committees and is vice-chair of the SCTE Smart Cities working group.

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