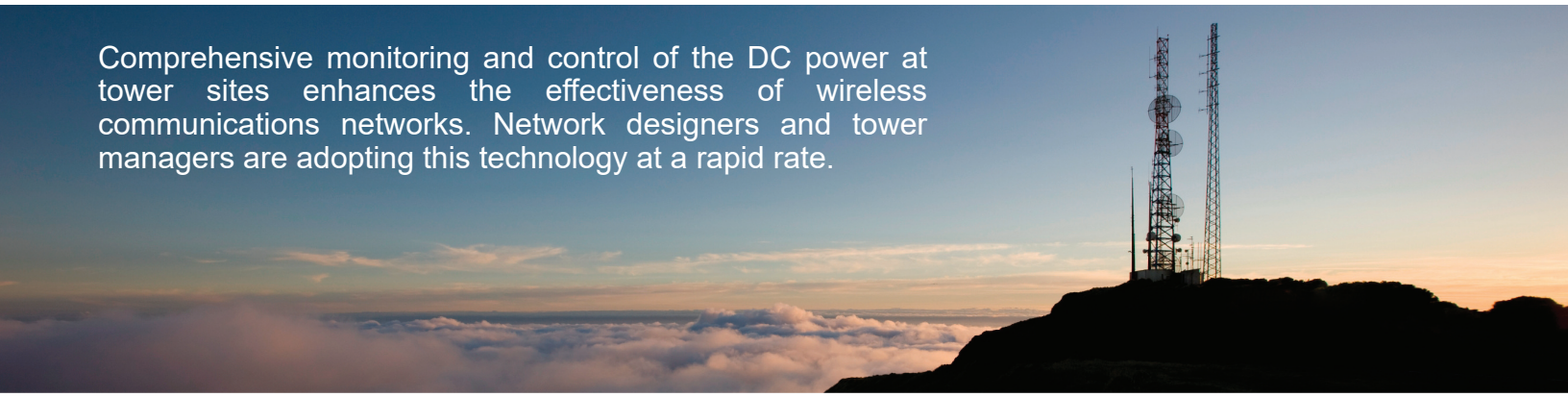
Benefits of Advanced DC Power Management at Tower Sites



Comprehensive monitoring and control of the DC power at tower sites enhances the effectiveness of wireless communications networks. Network designers and tower managers are adopting this technology at a rapid rate.

Even the most robust, well-designed communications networks can experience problems with network devices such as RF radios, base station repeaters, RF amplifiers, network switches, and other network devices. External events such as power surges or lightning strikes can cause network devices to lock up, and with the transition of radio network equipment from analog to digital within the last decade, onboard firmware in these devices can also occasionally freeze. While these instances are infrequent, they do occur.

A well-designed communications network will often allow for these events to occur without affecting the overall operation. However, such events often require a visit to the communication tower site resolve the problem, which can be sometimes as simple as cycling power to the troublesome device. Sending a technician to do this can be both costly and time consuming. And if the affected devices are non-operational, this can occasionally cause disruptions to the communications network.

Within the last decade there has been a technology shift in radio and network devices. The IT world has converged with the RF world.

The ability to remotely monitor devices within a radio network is becoming the standard. This change in technology is also occurring with DC power plant products, with some DC power conversion equipment manufacturers leading the way in providing, via Ethernet, remote power monitoring and remote power control capabilities for their DC products such as DC power supplies, DC distribution panels and inverters.

Virtually all communication networks require DC power plant infrastructure to power various network devices and communication tower sites. This DC power plant infrastructure is critical in maintaining reliable power. Being able to remotely monitor and control DC power plant devices such as rectifiers, power supplies, distribution panels, batteries and inverters, provides substantial benefits.

Communications network operators can monitor power conditions for each device that is connected to the DC plant, enabling the monitoring of parameters such as:

power consumption of individual devices; fault conditions; system voltage levels; AC mains status; and backup battery conditions, including voltage, state of charge and runtime remaining.

Although DC power plants vary based on each site, a typical site comprises a primary and secondary power source. The AC primary is typically provided by the electric utility company. The secondary source is typically a battery bank, which is sized to provide the required amount of backup time should the AC mains fail. In very remote areas where AC mains from a utility is not available, solar power and generators are sometimes used to supplement the battery bank.

Most devices within a communications network will operate from DC, so converting from AC mains power to DC is required. Depending on the number of devices (loads) that are at the site, the DC power from the power supply is distributed to the loads using a distribution panel. (While most devices are DC powered, some require AC; in this case, an inverter is used to convert the DC to the AC.) Many power supplies developed specifically for these applications incorporate circuitry to power the load(s) and charge the battery bank simultaneously to keep the battery in optimal condition. In the event of an AC mains failure, the energy stored in the battery bank is diverted to the loads to provide continuous, uninterruptable power to these devices.

This functionality is important; a failure of the AC mains should not cause a network to shut down, and having a seamless transition to battery power in the event of a mains failure is crucial to maintaining network operation. A low-voltage disconnect device can also be incorporated, or installed externally, which will automatically disconnect the battery bank should the battery voltage become too low. Over-discharging a battery bank can permanently damage the batteries.

By using an intelligent DC power supply and DC distribution panel with Ethernet monitoring and control, communication network operators can remotely cycle DC power to individual devices, often resolving issues without having to physically visit the site. The ability to remotely disconnect, or load shed, non-critical loads while maintaining critical loads online, enables longer preservation and runtime of the backup battery bank in the event of an AC mains failure. The ability to monitor battery voltage at a site and determine how much runtime remains on a battery bank enables technicians to schedule their visits to the site for corrective action.

The Modular Power Series from ICT is a hot swappable, redundant N+1 DC power system with Intelligent networked control, advanced battery management, and load distribution with remote power control over an Ethernet link.

Innovative Circuit Technology Ltd. (ICT) is a company which recognised early the advantages that remote monitoring and control of DC power infrastructure at a radio communications site could provide. ICT released its first intelligent DC distribution panel with remote monitoring and power controlin 2010, and has since added fixed and hot swappable DC power systems and inverters, all with remote monitoring and control, to its product portfolio. No additional software is required; just a PC, tablet or smartphone using a standard web browser is all that is needed to access the easy-to-use graphical user interface.

Communications network designers are adopting this technology at a rapid pace. It enables them to provide more robust network designs with more monitoring and control capabilities. It provides benefits not only to the network operators themselves, but also to the users of the network. The ability to have comprehensive monitoring and control of the DC power plant at communication sites ultimately enhances the effectiveness of these networks.

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