Power Grid Communications
Solutions for the Energy Sector

Real-time, uninterrupted communications are vital for the reliable operation of power transmission and distribution grids, to enable proper network management, automation and protection, and to ensure the continuous supply of electricity to customers.

This is not an easy task these days, where legacy infrastructure and substation devices must co-exist with newly-introduced IP connections and next-generation equipment. Power utilities must efficiently and economically manage a myriad of interfaces, protocols, topologies, and media, so that mission-critical data, control commands and voice traffic are effectively delivered between operations centers and remote sites.

For close to 30 years, RAD Data Communications has been working closely with its worldwide energy utility customers to address their particular T&D communications needs with field-proven solutions. Our comprehensive AXCESS® portfolio of multiservice communications products connect any type of equipment – from Teleprotection and SCADA RTUs to high definition IP cameras, BPL data collectors and AMI concentrators – over any media and network protocol. Fully equipped with remote monitoring and control capabilities, RAD’s wide range of product solutions are specifically designed to ensure the dynamic flow of energy.
**The Power of RAD**

RAD is the preferred communications vendor for many energy utilities and system integrators around the world. Here are the reasons why:

**Technological Excellence**
RAD’s standards-compliant solutions offer low TCO with multiservice support for any network environment, as well as minimal delay for accurate, real-time transmissions and High Availability design.

**Long-term Product Support**
RAD’s clear product roadmaps and evolutionary approach to life-cycle management ensure continued support for legacy services and seamless introduction of NGN technologies. Our energy utility customers have the freedom to extend their planning horizons with respect to power grid communications, without forced investments in network upgrades due to product end-of-life decisions made unilaterally by vendors.

**Sustainable Solutions**
At RAD, we share our customers’ commitment to the environment and understand their need to meet increasingly rigorous environmental regulation. RAD has been successfully implementing groundbreaking innovation in form-factor miniaturization and power consumption optimization to limit material waste and carbon emissions.

**Customer Commitment**
We apply extensive care and effort to our Global Professional Services program – from RADcare support packages and international training courses to project management and on-site services – to ensure that our customers are completely satisfied with their decision to rely on RAD.

**Selected Customers**

**System Integrators**
ABB, Alcatel-Lucent, Alstom, Arinc, Fujitsu, HP, Telent, Telvent, Siemens

**Partners**
250 certified RAD partners in more than 150 countries
Solution Versatility

Services
- Video
- Teleprotection
- High/Low Speed Data Connectivity
- SCADA
- LAN
- PABX
- Dry Contacts
- Analog Voice FXO/FXS/E&M
- G.703
- VoIP

Interfaces
- X.21/V.35
- RS-232/V.24
- C37.94
- E1/T1
- N x 64 kbps
- Sub-64 kbps
- Ethernet
- ISDN
- Synchronous/Asynchronous

Products

Multiservice Multiplexers and Access Nodes, MSAP
Fiber Multiplexers and Modems
SDH/SONET Multiplexers and ADMs
Subrate Multiplexers
Topologies
- Point-to-Point
- Point-to-Multipoint (Star)
- Multi-drop
- Resilient Ring

Built-in Redundancy for Service Protection

Networks
- Fiber/FSO
- Copper/xDSL
- Wireless/Satellite
- PDH/SDH/SONET
- Ethernet/IP/MPLS
- ATM
- Frame Relay/X.25

Digital Cross Connects
TDM NTUs
Wireless Multiplexers
Ethernet Converters, Aggregators and Access Devices
TDM over IP Multiplexers
Applications
Multiservice Substation Connectivity

- Substation multiplexers support all communications services: Analog voice and VoIP; Hotline/teleconferencing and PBX extension; SCADA and telemetry connectivity for analog/digital RTUs, controllers and relays; Teleprotection; PLC; inter-substation LAN and NOC connectivity; CCTV; PMR and trunked radio (TETRA) systems
- Reliable, accurate and immediate delivery of load data, alarms and signals between central control and multiple stations throughout the T&G grid
- Self-healing, multirate TDM and Ethernet ring support with rapid restoration provide NSPF (no single point of failure) resiliency and a cost-effective alternative to multilink connectivity
- Link and system redundancy to ensure service continuity for mission-critical applications
- Carrier-class management system for centralized control of network elements and easy integration with power utility OSS: Remote configuration, diagnostics and reporting; FCAPS functionality; Northbound APIs; High Availability/Disaster Recovery support
- Small footprint saves rack space and power consumption, as well as cabling and cooling resources
Migrating to IP Communications

- Easy integration of NG services and equipment over existing TDM infrastructure: Intelligent electronic devices (IEDs), Internet VPN, VoIP telephony, and broadband IP cameras
- Service continuity for legacy applications and equipment, even after core networks are replaced to IP/MPLS
- Circuit emulation solutions feature TDMoIP technology, an industry standard developed and patented by RAD, without compromising service quality or latency levels
- Ensure deterministic QoS for NGN services and advanced grid applications over packet transport using multi-priority traffic management, end-to-end OAM and performance monitoring

- Future-proof solutions streamlined for Smart Grid communications and IEC61850 architecture, including reliable, low-latency Ethernet services between sites with real-time messaging, such as GOOSE/GSSE
- Help protect critical infrastructure and IP-based SCADA systems from malicious cyber attacks with security and authentication protocols, such as SSH, SSL, SNMPv3, and RADIUS

Connecting new IP/Ethernet-based substation equipment over existing SDH/SONET infrastructure or PSN and delivering legacy/TDM services over an IP network
Applications

Video Surveillance Backhaul

- Transmit highly focused video from unmanned facilities and remote relay stations over wireless backhaul using point-to-point and point-to-multipoint sub-6GHz wireless mux solutions
- Ensure high performance for IP-based video surveillance over broadband wireless with accurate clock recovery, low latency and traffic classification for CoS priorities
- Save on OpEx by optimizing use of available bandwidth with asymmetrical upload/download throughput
- Enable simultaneous transmission from multiple locations, while ensuring High Availability and service reliability with MHS (monitored hot standby) and HSS (hub-site synchronization)

- Enable 24x7 remote monitoring and deliver actionable information in real time to allow security and operations personnel at remote control centers to take immediate action when required
- Support secure VPN applications for IP camera traffic between remote substations and NOC
- Provide high capacity to accommodate high resolution IP video throughput from multiple cameras, as well as advanced analytics and command signals for fixed and pan-tilt-zoom (PTZ) cameras

Remote monitoring of unmanned facilities over wireless backhaul

High-capacity video traffic connectivity over fiber
Teleprotection Connectivity

- Deliver Teleprotection signals with mission-critical accuracy over dedicated fiber, TDM or IP, to help central control better manage the power grid load and to protect termination and transformation equipment from severe damages resulting from faulty HV lines.
- C37.94-compliant Teleprotection communication channels allow reliable transmission by minimizing data errors due to EM and RF interference, or ground potential rise (GPR).

- Ultra-low end-to-end propagation delay supports immediate delivery of Transfer Trip commands from protective relay/contact transfer to remote-end substations.
- Maintain performance levels when migrating to packet networks with hard QoS, as well as robust latency and jitter protection.
Applications

Smart Meter Backhaul

Backhauling smart meter data over SDH/SONET or PSN

- AMI (advanced metering infrastructure) connectivity solutions for smart energy grids, transporting meter data and meter management traffic between collector points and control rooms
- Enable automation of power distribution networks while utilizing existing cores with intelligent Ethernet over PDH/SDH/SONET backhaul solutions that provide quality of service for two-way data communications between the RF, WiMAX or BPL/PLC field area network (FAN) and the utility operations center
- Support secure, real-time smart meter networking over native Ethernet/NG fiber backhaul and IP/MPLS cores with advanced traffic management and performance monitoring

• Applications

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Utelco Services

Enable grid operators to easily and cost effectively increase revenues by leveraging their footprint to provide competitive retail and wholesale communications services.

Take advantage of increasing deregulation to deliver Internet access, voice, LAN extension, and SAN services to enterprises with centralized management.

Intelligent devices support differentiated QoS with end-to-end visibility to distinguish between multiple network maintenance domains for leased bandwidth, shared access and other carrier of carrier (CoC) services.