

Power Grid Communications

Solutions for the Energy Sector



data communications



Let Energy Flow. Communicate.

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, while critical assets must be protected from cyber security threats. 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 and securely 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 that allow seamless and economical transition to Smart Grid, as well as provide layered security protection. Connecting 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, RAD's wide range of product solutions are specifically designed to ensure the dynamic flow of energy.

ACCESS⁺

EtherAccess

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

300 certified RAD partners in more than 165 countries

Solution Versatility

Services

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

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



Hybrid TDM/IP Multiservice Access Nodes, MSAP



Fiber/SHDSL Multiplexers and Modems



SDH/SONET Multiplexers and ADMs



Digital Cross Connects



Wireless Multiplexers

Topologies

- Point-to-Point
- Point-to-Multipoint (Star)
- Multi-drop
- Resilient Ring

Built-in Redundancy for Service Protection

Networks

- Fiber
- Copper/xDSL
- Wireless/Satellite
- PDH/SDH/SONET
- Ethernet/IP/MPLS
- ATM



Ethernet Aggregators, Access Devices and Converters



Industrial Ethernet Switches



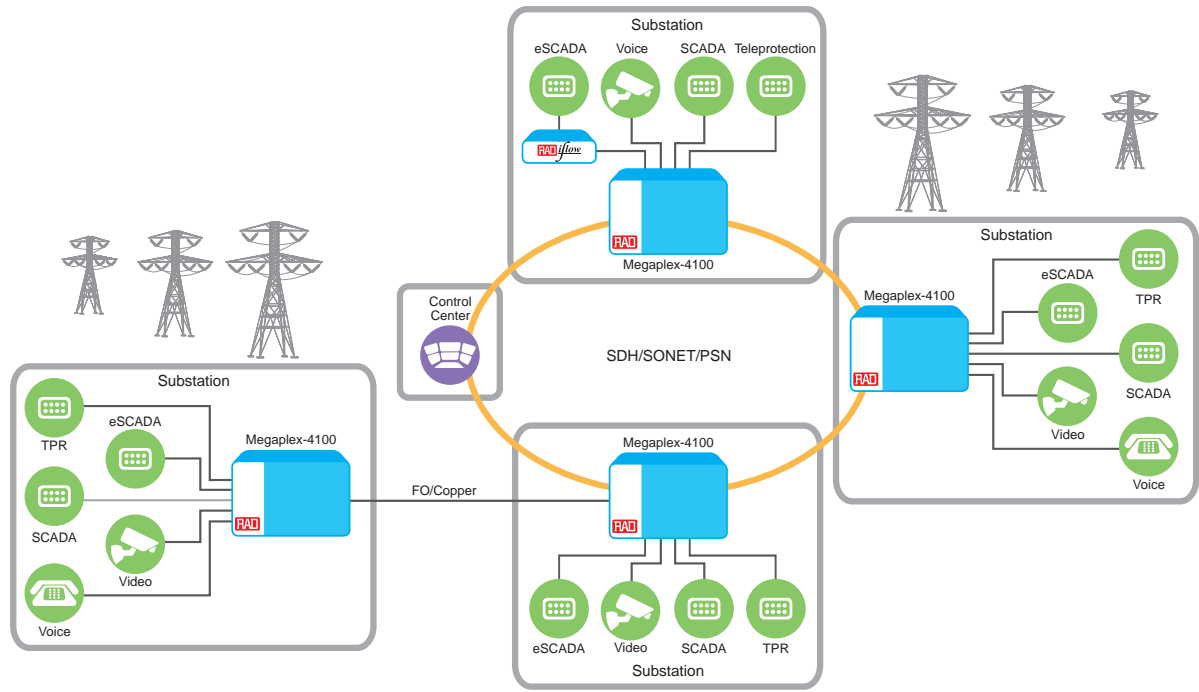
TDM over IP Multiplexers



TDM/PDH Subrate Multiplexers

Applications

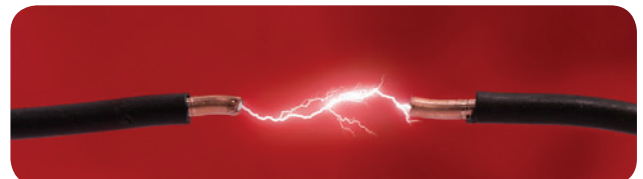
Multiservice Substation Connectivity



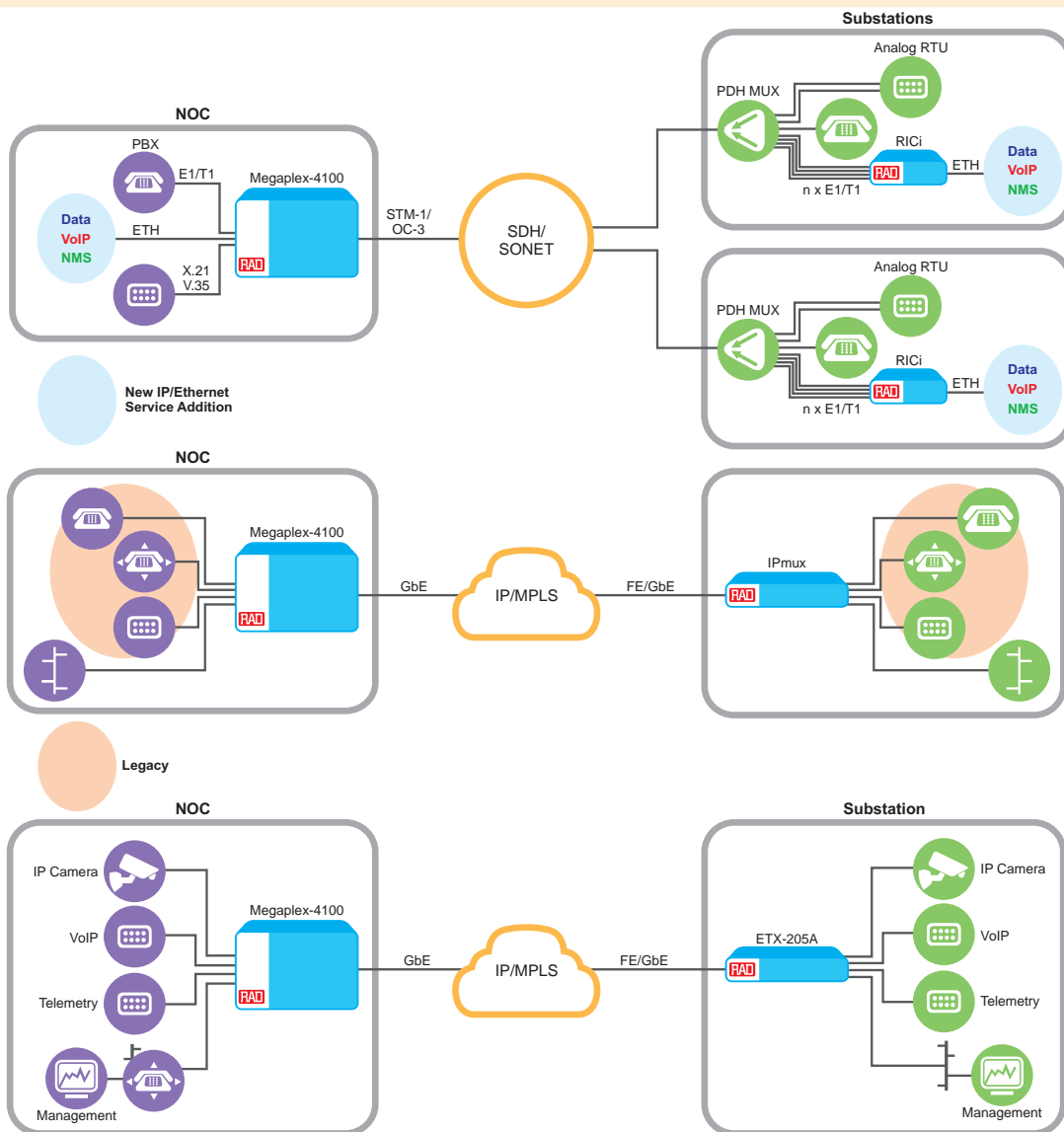
Substation communications for legacy and Ethernet-based devices over SDH/SONET or Ethernet/IP

- Single-box solutions for multiservice substation connectivity over copper, fiber and wireless, supporting 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&D 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
- Connectivity for IEC 61850-compliant devices



Migrating to IP Communications

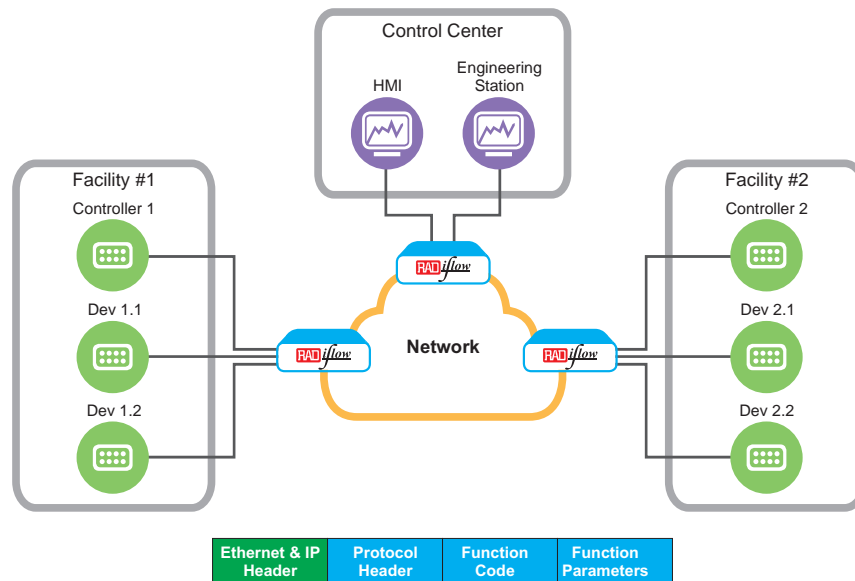


Connecting new IP/Ethernet-based substation equipment over existing SDH/SONET infrastructure or PSN: Migrating substation communications to reliable, resilient Ethernet/IP

- Single-box support for all types of legacy TDM and Ethernet-based substation communications, including eSCADA, IED, SCADA, Teleprotection, video/CCTV, and voice
- Easy integration of NG services and equipment over existing TDM infrastructure
- Service continuity for legacy applications and equipment, even after core networks are replaced with IP/MPLS, supporting robust service quality, performance assurance and low latency levels for mission critical traffic
- 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
- Help protect critical infrastructure and IP-based SCADA systems from malicious cyber attacks with distributed security and authentication
- Precision timing transport ensures a smooth migration to the PSN

Applications

Smart Grid SCADA Security

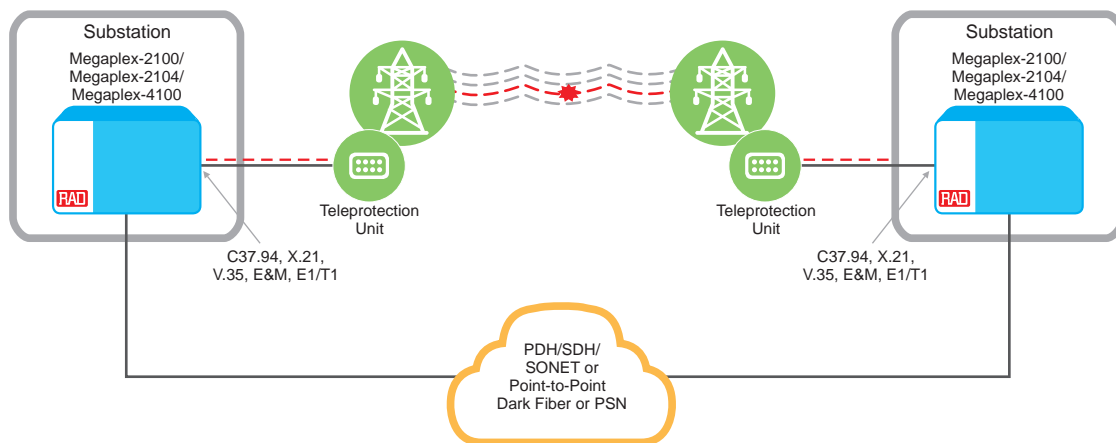


SCADA Security: Distributed, SCADA-aware firewall integrated in network switches



- Secure Ethernet-based and serial SCADA installations throughout the power grid to protect from cyber security threats using the RADiFlow Ethernet switches with built-in firewall/VPN. Monitor application traffic and stop unauthorized and potentially damaging activity
- Full security functions in a single switch: Service validation, remote access, inter-site VPN and access control
- Ruggedized switch ensures operation in harsh environments, standard compliant with IEC 61850-3, IEEE 1613 EMI
- Integrated firewall on each port provides a network-based distributed security solution equivalent to the use of personal firewalls on each system in the network, with service-aware inspection of traffic in every end-point and role-based validation of SCADA flows
- Built-in QoS to support mission critical services

Teleprotection Connectivity



Teleprotection connectivity with ultra-low end-to-end delay

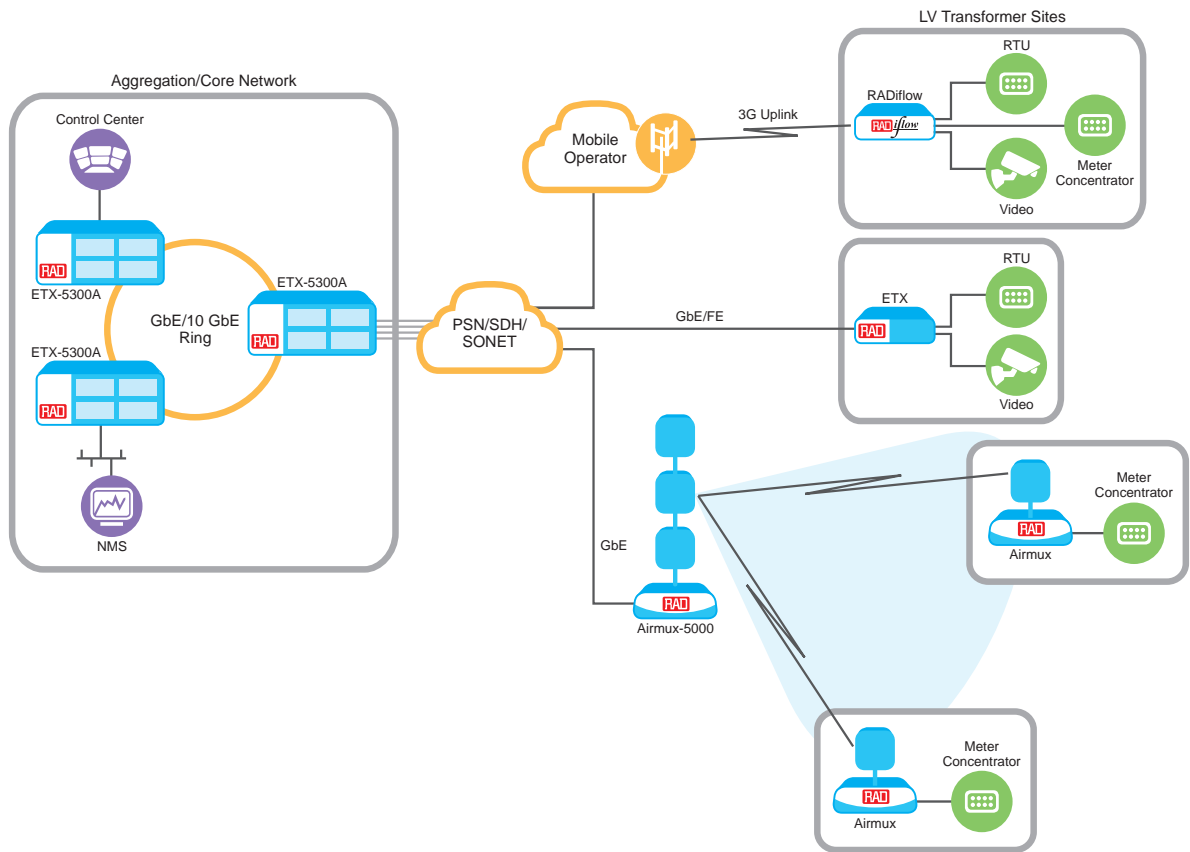
- Deliver Teleprotection signals with mission-critical accuracy over dedicated fiber, TDM or IP, to help central control better manage the power grid load and to protect termination and transformation equipment from severe damages resulting from faulty HV lines
- A wide variety of Teleprotection communication channel interfaces, including C37.94, X.21, E1/T1, E&M, and V.35
- 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

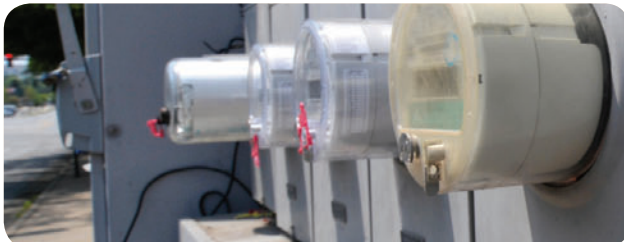
Transformer Site Backhaul



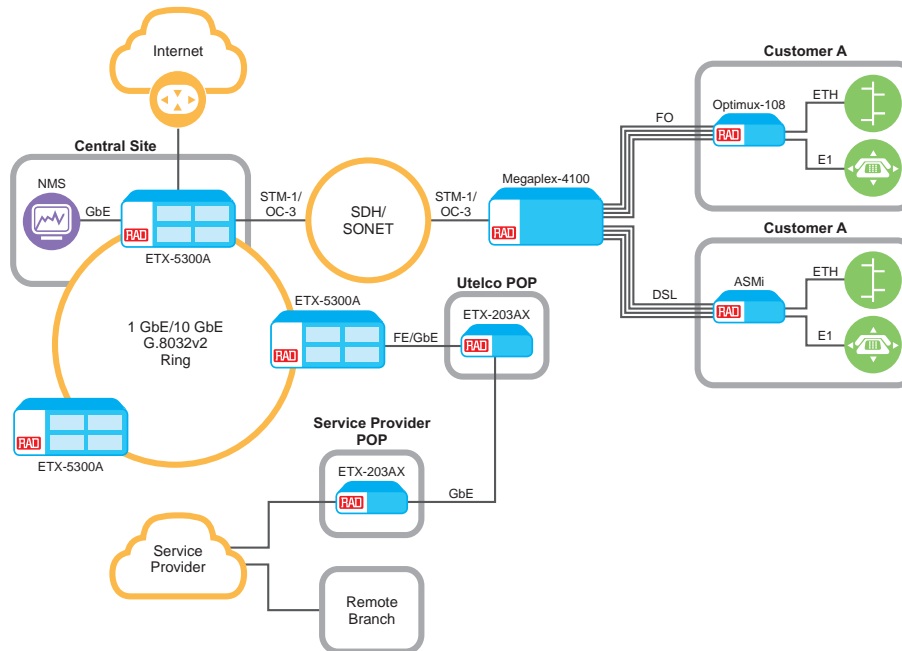
MV/LV transformer site backhaul

- Reliably transport medium voltage (MV) and low voltage (LV) transformer site signals to central site aggregation over fiber, copper, wireless or mobile networks
- RAD's multiservice, multi-generation devices enable connectivity over SDH/SONET or Ethernet/IP/MPLS with end-to-end performance monitoring, fault management, timing synchronization, and full redundancy
- Get a full suite of traffic management, performance and link testing tools for communication assurance from the transformer sites to the control room

- No single point of failure with full path redundancy and ring protection
- Central network management for all devices reduces installation and operating expenses
- Secure connection with integrated firewall and encryption



Utelco Services



Utelco business connectivity and carrier of carrier 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





www.rad.com



data communications
The Access Company

Specifications are subject to change without prior notification. This document contains trademarks registered by their respective companies. The RAD name, logo and logotype, are registered trademarks of RAD Data Communications Ltd. RAD product names are trademarks of RAD Data Communications Ltd. ©2012 RAD Data Communications. All rights reserved. Catalog number 802448, Version 6/12