

RAD's Solutions for Power Utility Communications

Service Assured Networking





Designing the Migration Path

For most power utilities, the need to migrate from TDM/SDH/SONET-based communications networks to Ethernet/IP-based ones is spurred by a shared set of drivers – smart grid automation, obsolete equipment and evolving security requirements, to name a few. But determining just how to get there – and how quickly – is a decision that must be carefully weighed.

One option is a flexible, evolutionary path, with some portions of the network moved to packet now, and others to gradually follow. More radically, another strategic decision might involve the swift migration of the entire network (except perhaps the most mission-critical applications like Teleprotection) in a single phase.

Addressing Communications Challenges

Product Obsolescence

While old RTUs and substation PDH/SDH multiplexers are outdated, the need to maintain legacy equipment and the installed base remains

New Equipment

Identifying and investing wisely in future-proof gear

Support for Growth

Ensuring that solutions will enable higher capacity, scalability and variable infrastructure range

Performance Guarantee

Confirming that new technologies and products can support the performance requirements (clock synchronization, low delay, etc.) of both existing and new equipment

Cyber Security

Considering the potential vulnerabilities introduced by any new solution, and putting safeguards in place to mitigate related threats

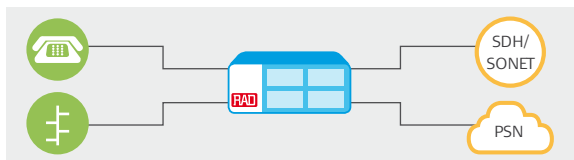
RAD Value Proposition

For more than 30 years, RAD has worked closely with its worldwide energy utility customers to provide field-proven communications solutions that address the automation, Teleprotection and core operational network needs of their transmission and distribution (T&D) grids.

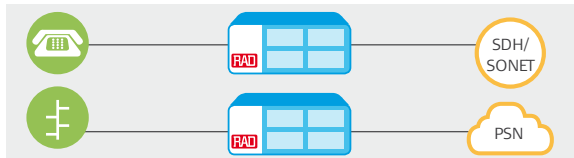
Service Assured Networking: RAD offers reliable, secure, scalable, managed, and performance-guaranteed solutions for automation, protection, security, and ICT networking that support multiple deployment mode scenarios over fiber, DSL and PDH.

RAD's Evolutionary Path for Utilities

Phased Migration



Co-existence of Networks



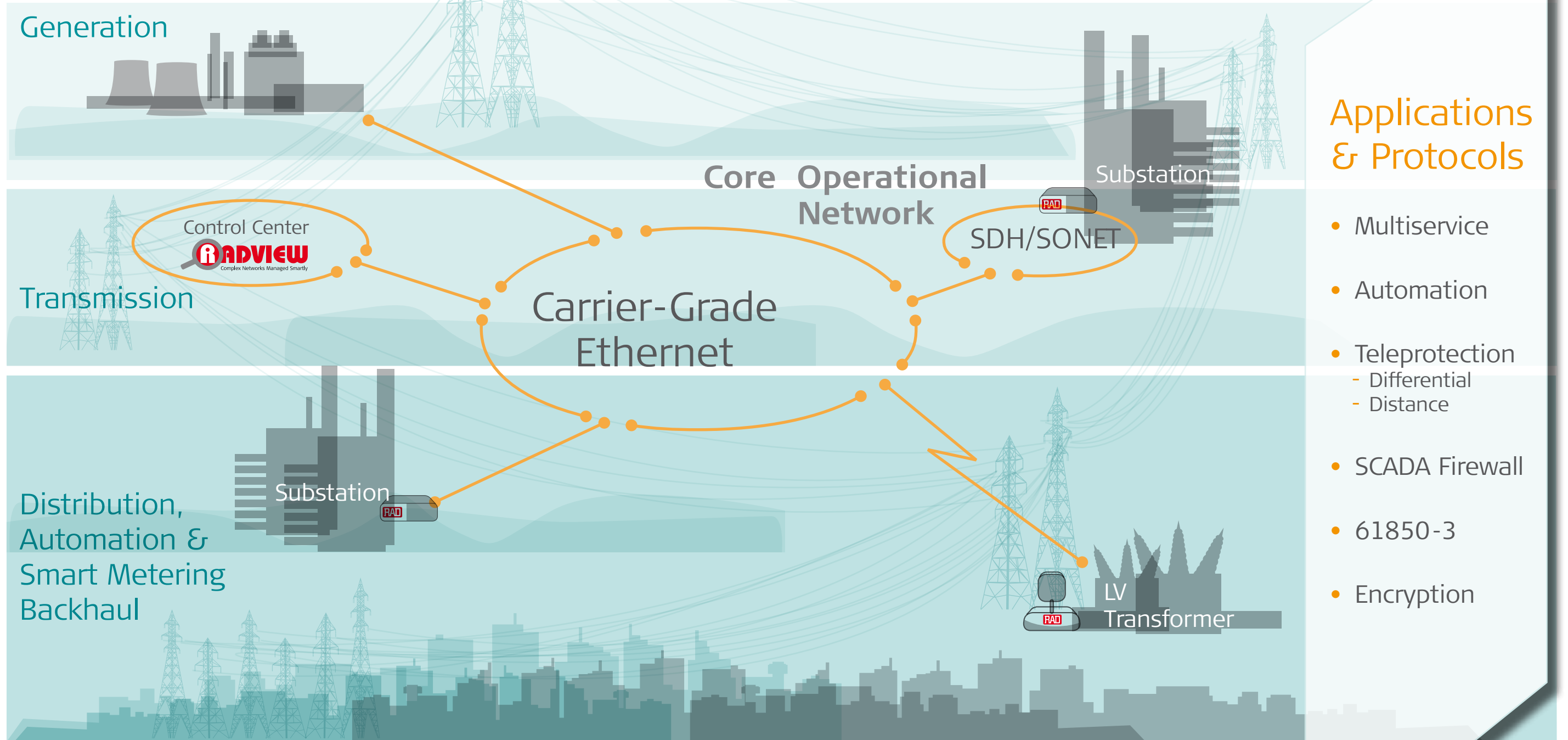
A vast array of capabilities include service provisioning, traffic management, timing synchronization, TDM pseudowire, ongoing performance monitoring, fault management, and various resiliency mechanisms.

We combine a wide variety of technological expertise in TDM and Carrier Ethernet packet-based technology, incorporating multiple legacy and Ethernet interfaces, compliance with IEC 61850-3 and IEEE1613 standards and advanced SCADA security firewalls.

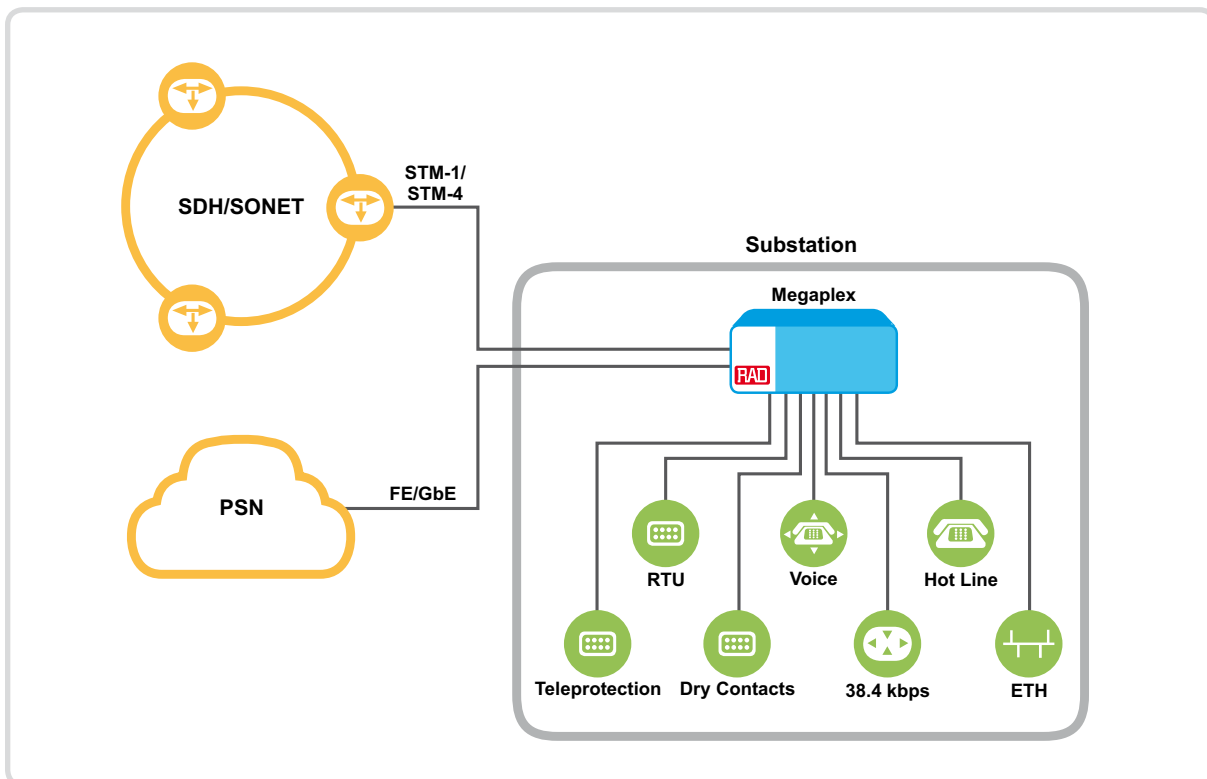
Flexibility in choosing the migration path

- Continued support for TDM
- Future ready, hybrid TDM and Ethernet design
- Ethernet over SDH/SONET and pseudowire for a smooth migration
- Carrier-grade Ethernet for performance assurance of operational networks, enhanced security, timing distribution and simplicity

RAD Solutions for Power Utility Communications

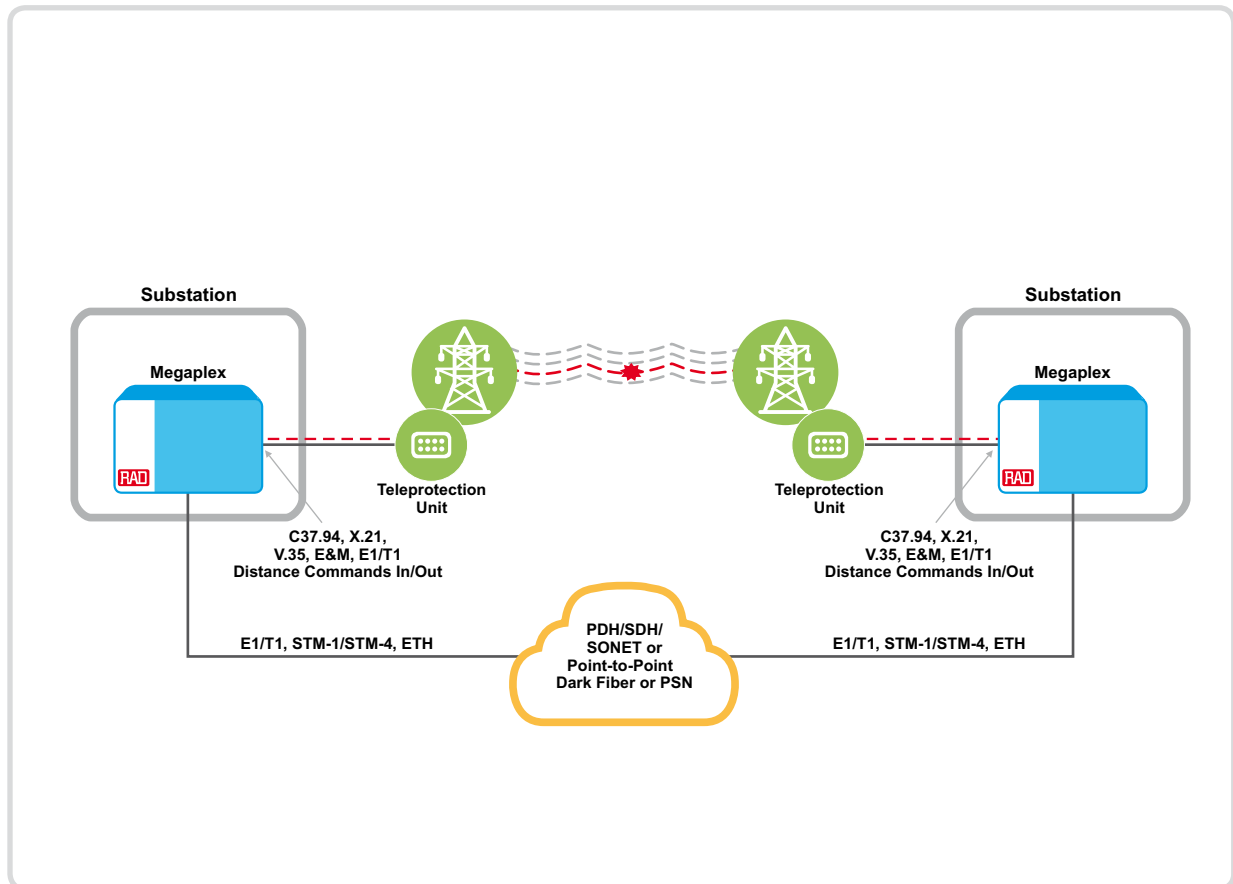


“Hybrid” Substation Multiservice Connectivity and Migration



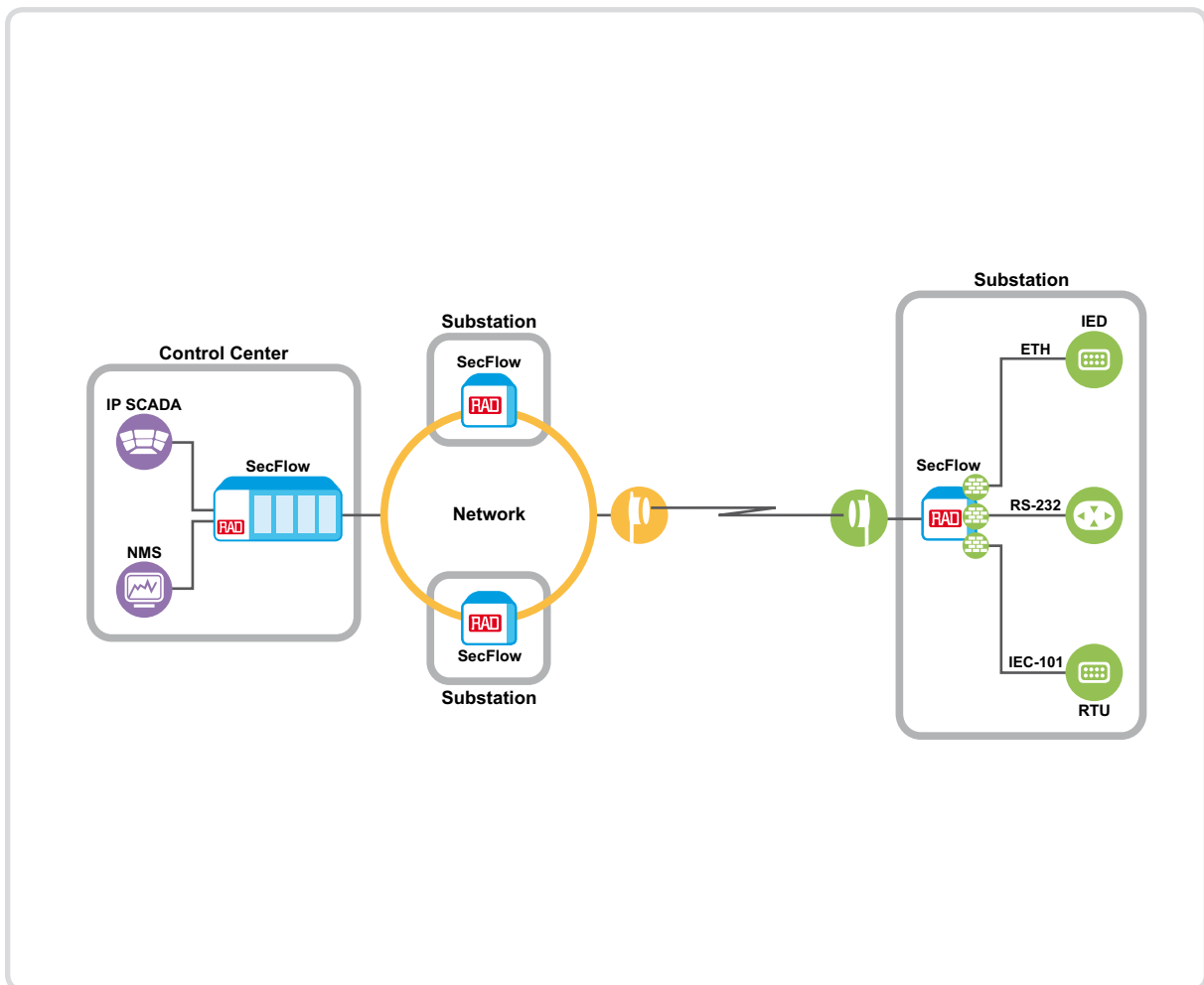
- Powerful cross-generation multiservice TDM and Carrier-grade Ethernet capabilities, including TDM DSO cross-connect and SDH/SONET, Gigabit Ethernet switching and OAM, pseudowire for TDM over Ethernet/IP, and NG-SDH/SONET for Ethernet over PDH/SDH/SONET
 - Easily configurable connectivity of all serial automation and Teleprotection devices to either the existing SDH/SONET network, new SDH/SONET rings or, in parallel, to a new PSN
 - Dedicated Teleprotection interfaces for differential C37.94 and distance relays
 - Supports analog and digital voice and Ethernet IED, or IT devices with versatile rates from RS-232 low speed traffic up to STM-4/OC-12 or GbE
 - Guaranteed smooth migration to PSNs by ongoing support for legacy devices
- Traffic Duplication can be performed using the Megaplex to transport in parallel identical real-time mission critical traffic streams on both an SDH/SONET network as well as a Carrier-grade Ethernet network. This feature is based on the Megaplex's ability to simultaneously connect to both SDH and Carrier-grade Ethernet networks. Traffic Duplication offers:
 - Lower latency due to Carrier-grade Ethernet fast performance
 - Better resiliency
 - Additional bandwidth for non-mission-critical IT traffic
 - Future-proof network readiness for phased or full migration to PSN. The power utility may maintain a dual network topology and gradually migrate to a complete Carrier-grade Ethernet network.

Distance and Differential Teleprotection



- One product supports both Distance trip command relays and Differential Teleprotection delivery over TDM or IP network
- Wide range of Teleprotection interfaces – Serial, G.703 Co-Dir, E&M, C37.94 – to extend Differential Teleprotection relay over TDM and Ethernet networks
- Reduce CapEx and OpEx by using a single-box solution for all substation communications services, including voice, data, automation and Teleprotection signals
- Redundancy hierarchy from the Teleprotection interface up to the communication link ensures 0 msec (Zero) hardware protection and Sub-10 msec end-to-end delay over PSN
- Tested Interoperability with most of the leading vendors of Teleprotection contact relays (Alstom, ABB, Siemens, SEL, Schneider)

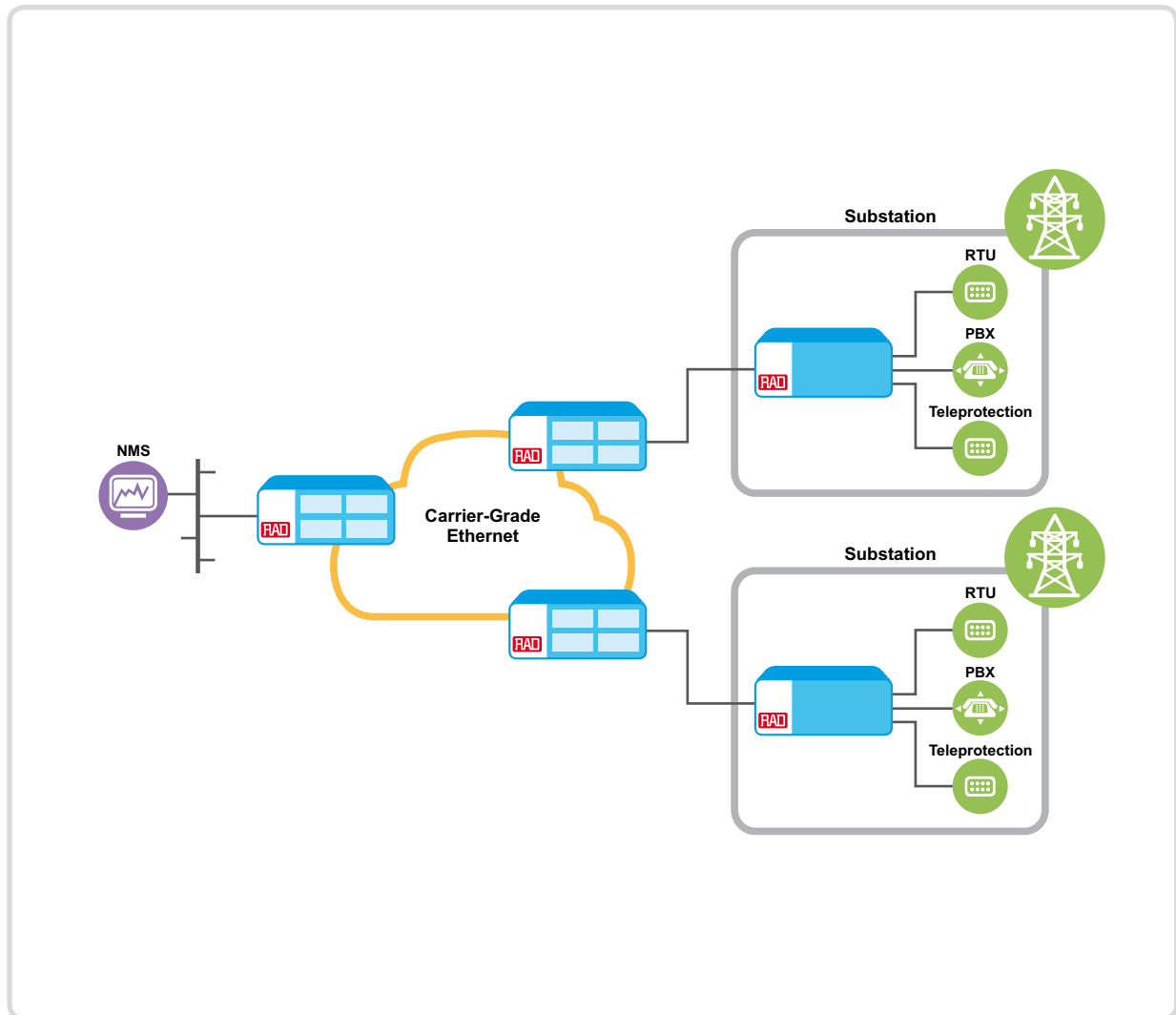
IEC 61850-3 Secure Substation Communication



- Support Ethernet-based IEC 61850 substation communications
- Support for serial-based RTUs and new Ethernet IEDs over various topologies using fiber optic rings, 2G/3G cellular modems and external radio systems
- Comply with IEC 61850-3 and IEEE 1613 environmental standards

- Protocol conversion from IEC-101 to IEC-104, or Modbus serial to IP, DNP3, IEC to 61850 and others
- Using IPSec encryption and a dedicated distributed security SCADA firewall suite

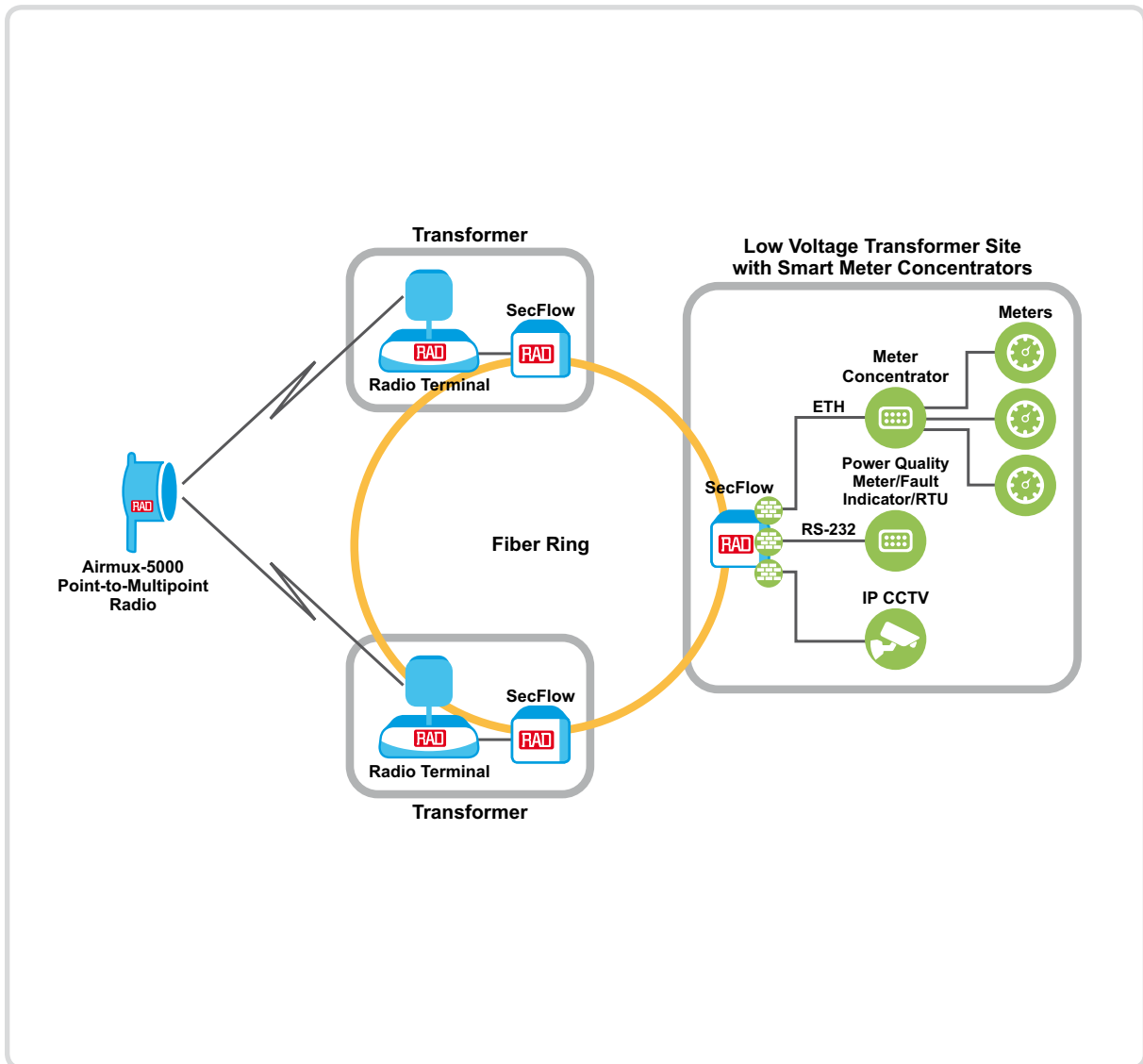
Operational Core Network Using Carrier-Grade Ethernet



- Carrier-grade Ethernet is ideal for replacing SDH/SONET for operational applications, offering various advantages:

- Simplified architecture and management
- Increased security (802.1X, MACsec)
- Lower latency
- Assured QoS using Carrier Ethernet tools
- Ongoing performance monitoring

Distribution Automation & Smart Metering Backhaul



- Reliable backhaul of LV transformer sites using point-to-point radio, fiber optic and/or cellular
- Single communication link for smart meter concentrators and distribution automation RTUs

- Smart and Safe City deployments can share high bandwidth and secure network for video surveillance or energy efficiency solutions

Integrated Security and Firewall Tools

Security risks can emanate from many different directions. Unmanned secondary substations (as well as most primary substations) may be easy to penetrate regardless of security precautions. However, physical breaches of facilities are not the only threat.

RAD Offers Embedded Security Mechanisms to Secure Mission-Critical SCADA Traffic

- Distribution of protection on each end device
- Port-level access control
- L2-L3 filtering
- IPSec L4 VPNs
- Remote technician gateway
- SCADA protocols firewall

