Service
Assured
Solutions

2021 Catalog

RAD
Your Network's Edge®

PUSHING THE EDGE OF
40 years
INNOVATION

Evolve Any Service over Any Network

●

As a global telecom access solutions vendor, RAD is committed to enabling service providers and critical infrastructure operators to evolve any service over any network. By keeping at the forefront of pioneering technologies and engaging in **co-innovation** with our customers, we strive to help service providers move up the value chain at a pace that is right for them, while offering their end-customers and network operators added value – be it in **network edge virtualization and vCPE, industrial IoT,** or **5G xHaul.**

Service Providers

Migrate to NFV/SDN edge virtualization and 5G xHaul **today** with RAD's Service Assured Access solutions.

Critical Infrastructure

OT/IT convergence, industrial IoT backhaul with edge computing and cyber-secure operational WAN with RAD's Service Assured Networking solutions.

With 40 years of innovation, a significant worldwide presence in over 150 countries and an installed base of more than 16 million network elements, RAD has a proven track record of delivering value and addressing our customers' needs.

RAD is a member of the $1.5 billion RAD Group of companies, a world leader in telecommunications solutions.

Business Edge vCPE –
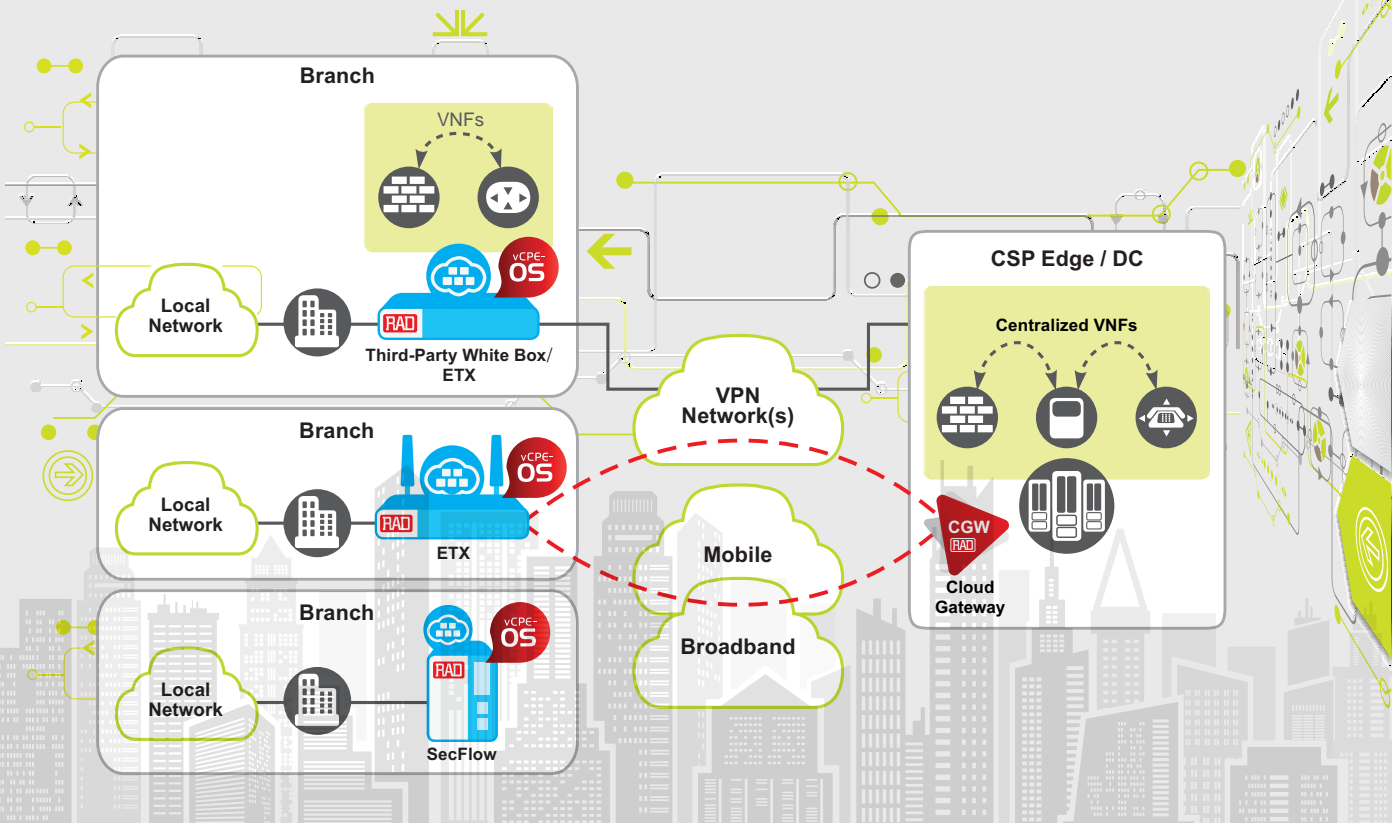# Cloud Adoption Made Easy

Virtualization
by RAD

The acceleration in enterprises' digital transformation is driving major changes in telcos' business customer needs. As emerging services and applications pose special requirements in terms of performance, latency, resiliency, and local storage, compute infrastructure is getting increasingly closer to the edge. As a result, CSPs are extending compute services and storage closer to users.

RAD's vCPE edge portfolio includes everything CSPs need to deploy virtualization services today:

- Slim, high performance disaggregated operating system

- A range of thin and thick CPEs hosting VMs or containers

- A domain orchestrator to remotely manage virtualization functionalities and automate operations

It is designed to help service providers leverage their "real estate" – that is, the network and customer edge – in introducing value-added services (VAS) beyond simple connectivity, such as hosted zero-trust secured access (Secure Access Service Edge services – SASE). RAD's solutions enable managed business routers/customer edge replacement, overlay VPN over fixed/mobile broadband network and multi-cloud access.

Business Edge vCPE – Benefits and Principles

RAD's Virtual Business Edge Solution Benefits:

- Freedom to choose any vCPE hardware (x86 or ARM-based), per branch site requirements, with a common operating system in all vCPEs to minimize integration efforts and reduce costs.

- Host value-added VMs or containers at the end-customer's premises or in data center/cloud as needed.

- Rapid transition from branch-HQ connectivity to branch-cloud connectivity.

- Open, lightweight vCPE-OS with a powerful embedded router, firewall and virtualization resources manager. It runs on a fraction of a CPU core, requires extremely low memory and provides market-leading throughput.

- Support "cloud-first" business customers with economical SD-WAN and cloud access services.

RAD's vCPE architecture follows three main principles:

- **Disaggregation**: Freedom to use any hardware (x86 or ARM-based), with the same common vCPE-OS operating system.

- **Automation**: All vCPE solutions are managed by the RADview Domain Orchestrator for consistent operations of business services and edge devices, across all sites.

- **Virtualization**: vCPE functionality is shaped by the introduction of hosted virtual functions (VMs or containers) by any vendor, at any time.

Solution Components

RAD's business edge portfolio features a range of hardware devices catering to the requirements of business sites, all featuring an embedded router and a next-generation firewall. These include a disaggregated **uCPE (Thick CPE)** hosting VMs/VNFs over an x86 NFVI; a disaggregated **pCPE (Thin CPE)** – a cost-effective ARM-based platform hosting value-added services as containers; and an **IoT Gateway**, which is a pCPE packaged in a ruggedized device designed to address business sites with harsh environmental conditions.

The vCPE-OS serves as the virtualization infrastructure with embedded routing and firewall functionality. It is used to operate all CPE platforms, whether x86 or ARM-based, in ruggedized and non-ruggedized enclosures.

SD-CloudAccess – a book-ended economical SD-WAN solution comprised of a client that is either embedded in vCPE-OS or available as a uCPE-hosted VNF, and software embedded in a cloud gateway. It allows application-aware traffic distribution across multiple links with SLA-guaranteed access to public, private and telco cloud services.

The RADview Domain Orchestrator provides consistent operations of business services and edge devices, across all sites. It offers full life-cycle support (zero-touch provisioning, software updates and maintenance), SDN/NETCONF support, VNF onboarding and chaining, and automatic setup of network tunnels.

ETX-1p, SecFlow-1p/vp
pCPE Platforms

ETX-2v/2i
Universal CPE Hosting VNFs

vCPE-OS
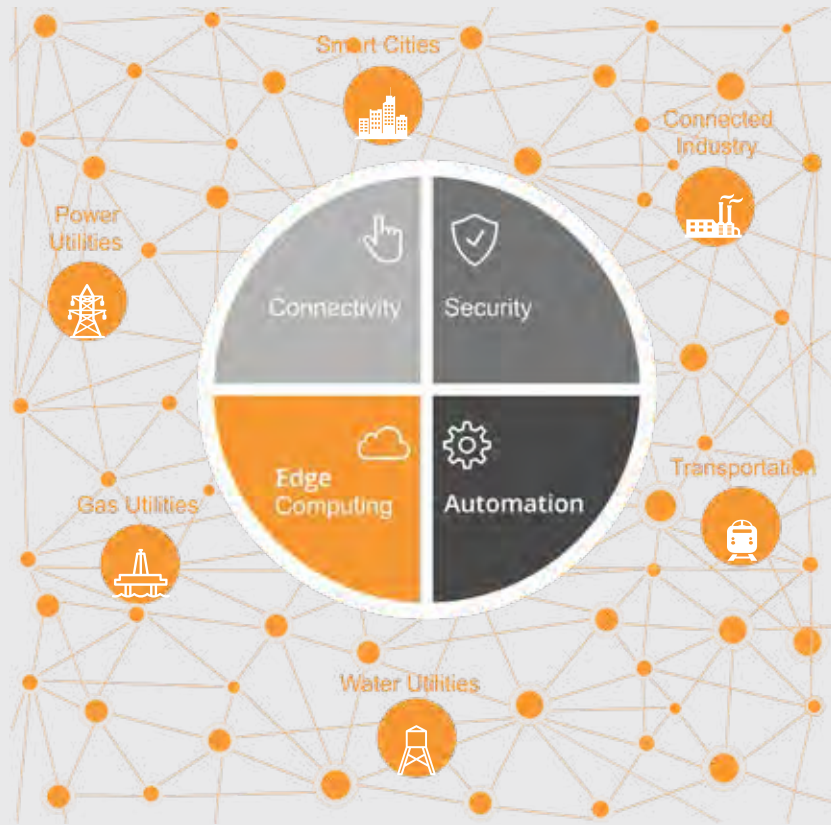**Open Carrier-Class Operating System**

Cloud Gateway
SD-CloudAccess Hub

RADview
Management and Domain Orchestration

Secure Industrial IoT Backhaul with Edge Computing

RAD offers a comprehensive solution for secure networking for Smart Energy (generation, transmission and distribution), Smart Transportation, Industry 4.0, Smart Cities, and more, to allow fast, secure and economical deployment of thousands of new remote IIoT sites with always-on reliability and mission-critical protection.

Power Utilities
- Smart Grid
- Re-closers
- Load breakers
- RTUs/SCADA PLC
- Secondary substations
- Meter concentrators

Smart Cities
- Smart parking
- Traffic monitoring and control
- Bike sharing
- Smart lighting
- Public safety
- Payment kiosks (PoS)

Connected Industry
(Smart Factory/Industry 4.0/ Society 4.0)
- Production floor monitoring
- Remote PLC control
- Automated quality control

Transportation
- Traffic control
- Info boards
- Kiosks

Gas Utilities
- Flow meters
- Volume/pressure/level sensors

Water Utilities
- Flow control
- Quality
- Leakage detection
- Pump/valve control
- Meters

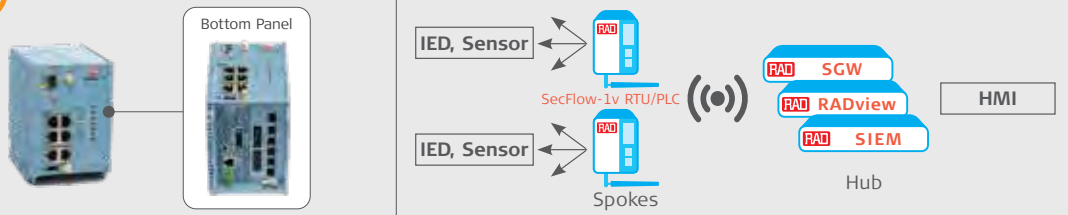# RAD's Solution for Industrial IoT Backhaul with Edge Computing

RAD's comprehensive offering for industrial IoT (IIoT) with edge computing includes ruggedized, multiservice and compact IIoT gateways, a VPN aggregator, and advanced security information and event management (SIEM). RAD's IIoT solution hosts both networking and non-networking-related functions on the same hardware to reduce the number of devices in the network and increase security and reliability.

Some key use cases and applications include:

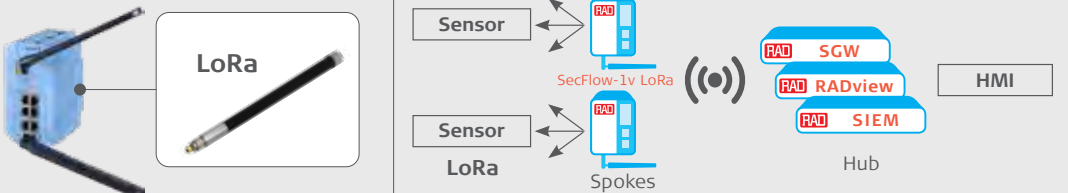## Less Boxes, Better Security: IIoT Gateway with Built-in RTU/PLC

Bottom Panel

IED, Sensor — SecFlow-1v RTU/PLC — SGW / RADview / SIEM — HMI

Spokes — Hub

PLC software can be added to the SecFlow using edge computing. HMI users can remotely control all units in the field and adjust the operation of sensors and relays as necessary.

- No physical access to the SecFlow-contained PLC
- Includes SCADA firewall, stateful firewall IPsec, OpenVPN and PKI
- Ladder logic; master/slave inter-connectivity options
- Northbound interface to HMI: Modbus, DNP3, IEC 104, BACnet

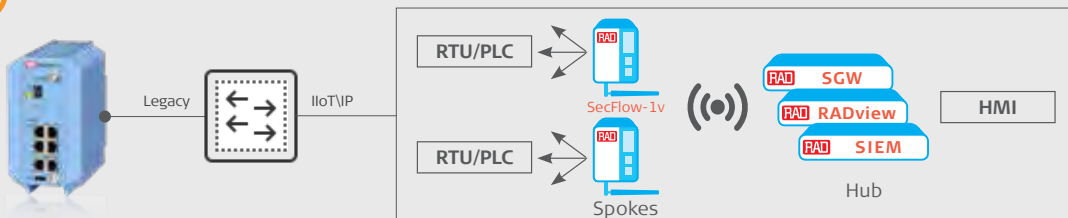## Complete Wireless Coverage: IIoT Gateway with Built-in LoRa Base Station

LoRa

Sensor — SecFlow-1v LoRa — SGW / RADview / SIEM — HMI

LoRa — Spokes — Hub

Connect large volumes of low-cost sensors using unlicensed LP-WAN backhaul to dramatically reduce CapEx and OpEx.

- Aggregate hundreds of battery-operated, low-cost sensors per base station
- Unlicensed spectrum
- LTE backhaul
- LoRaWAN gateway, optional LoRa server

Seamless Connection for Legacy SCADA: IIoT Gateway with Protocol Conversion

RTU/PLC — Legacy — IIoT\IP — SecFlow-1v — SGW / RADview / SIEM — HMI
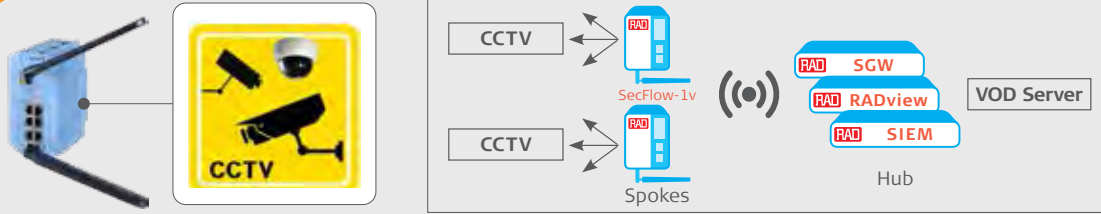
Spokes — Hub

Enable brownfield deployments with built-in conversion or third-party, container-based software. Connect legacy SCADA, NG SCADA and cloud-based IIoT systems, using the following:

- IEC 101 to IEC 104, Modbus-RTU to Modbus-TCP
- DNP3-RTU to DNP3-TCP, IEC 104 to DNP3-TCP
- Modbus to MQTT
- Many more

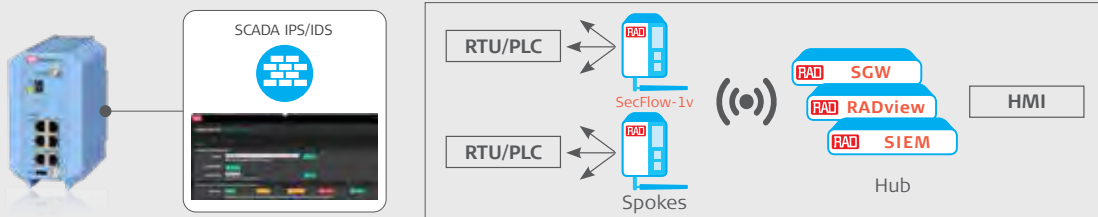## Surveillance VOD over LTE: IIoT Gateway with Local DVR

Use Case

Monitor thousands of CCTV cameras without fiber while making LTE surveillance affordable.

- Videos retrieved per event and per relevant geography
- LTE data consumption only per event and on-demand to save LTE bandwidth and reduce OpEx
- Video recording, transcoding
- SD card local storage
- Fits greenfield or existing CCTVs
- Immune to camera vandalism

Bring SCADA Security to the Edge: IIoT Gateway with SCADA IPS/IDS

Use Case

Monitor SCADA traffic between PLCs, log relevant activity and, if necessary, actively block traffic for intrusion prevention.

- SCADA firewall on top of SecFlow's stateful firewall
- IPsec, OpenVPN, PKI
- Intuitive UI for L3, L4 and L7 (SCADA) firewall configuration
- Syslog into RAD's SIEM
- SCADA protocols supported: DNP3, IEC 104, Modbus

BYO-GW – Build Your Own (IIoT) Gateway:

DIY

Customize your own solution with an open platform (LXC/LXD on ARM) and intuitive development environment to add various industrial IoT applications as edge computing virtual machines.

SecFlow
Industrial IoT Gateways with Edge Computing

SecurityGateway
VPN Aggregator, Router and Firewall

RADview
Network Management, Firewall Configurator and Security Management (SIEM)

Service Providers
Migrate to NFV/SDN edge virtualization **today** with RAD's Service Assured Access (SAA) solutions.
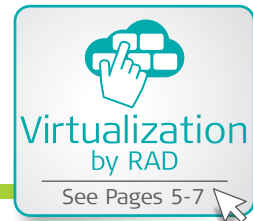
For mobile, business and wholesale service providers, RAD provides an economical migration path to network edge virtualization via the disaggregation of software and hardware.

RAD's solutions allow service providers to enrich their business service offering as they add value off the edge to businesses transitioning to the cloud.
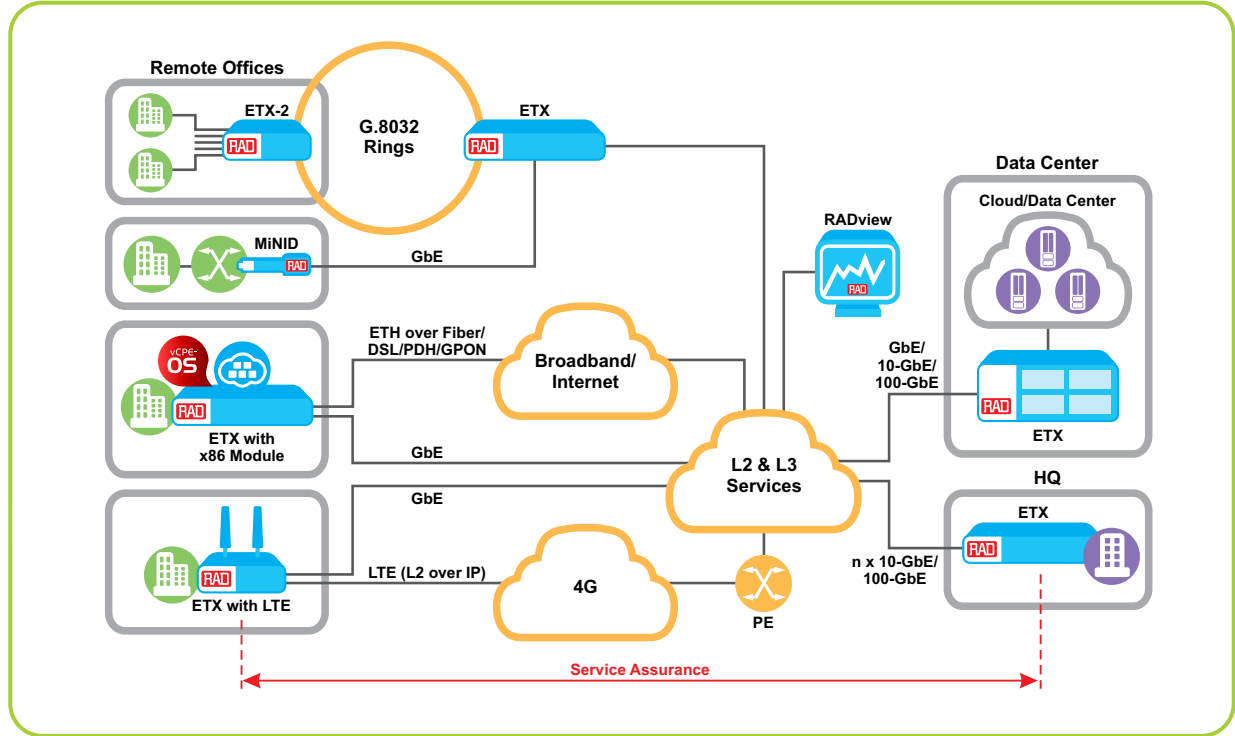
In addition, RAD's solutions deliver edge virtualization and cloud access with performance assurance, service flexibility and operational efficiency, as well as 5G xHaul.

Key SAA solutions include:

- Market-leading EAD portfolio supporting the latest MEF 3.0 specifications for delivering Carrier Ethernet services, including comprehensive SLA assurance, end-to-end visibility and life-cycle management capabilities over any access

- Programmable cell site gateways for fast rollouts of 5G deployments with fronthaul/midhaul/backhaul support and future 5G upgrades

- Service-assured vCPE Toolbox portfolio allowing service providers to introduce IP VPN and value-added services off their own data center and/or off the vCPE platform itself

- Seamless migration from TDM to IP, supporting an existing installed base and services, while introducing next-gen communications

Business Services

Carrier Ethernet for L2 VPNs

Virtualization
by RAD
See Pages 5-7

Your Benefits:

- Easily plan, deploy, provision, and maintain SLA-based business services over any access: fiber/copper/TDM/mobile
- Carrier Ethernet demarcation and aggregation switch up to 100G

- MEF 3.0-certified with standard NETCONF/YANG northbound interfaces
- Cost-effective aggregation with dynamic edge support for monitoring and policing

- vCPE functionality at the customer edge for introduction of value-added services
- Enhanced service provisioning, visibility and reporting using RADview Service Manager and RADview Performance Monitoring portal

ETX-2/2i
1G/10G/100G Carrier Ethernet Demarcation

ETX-2/2i
EADs with x86 Module, LTE and Broadband Options

MiNID
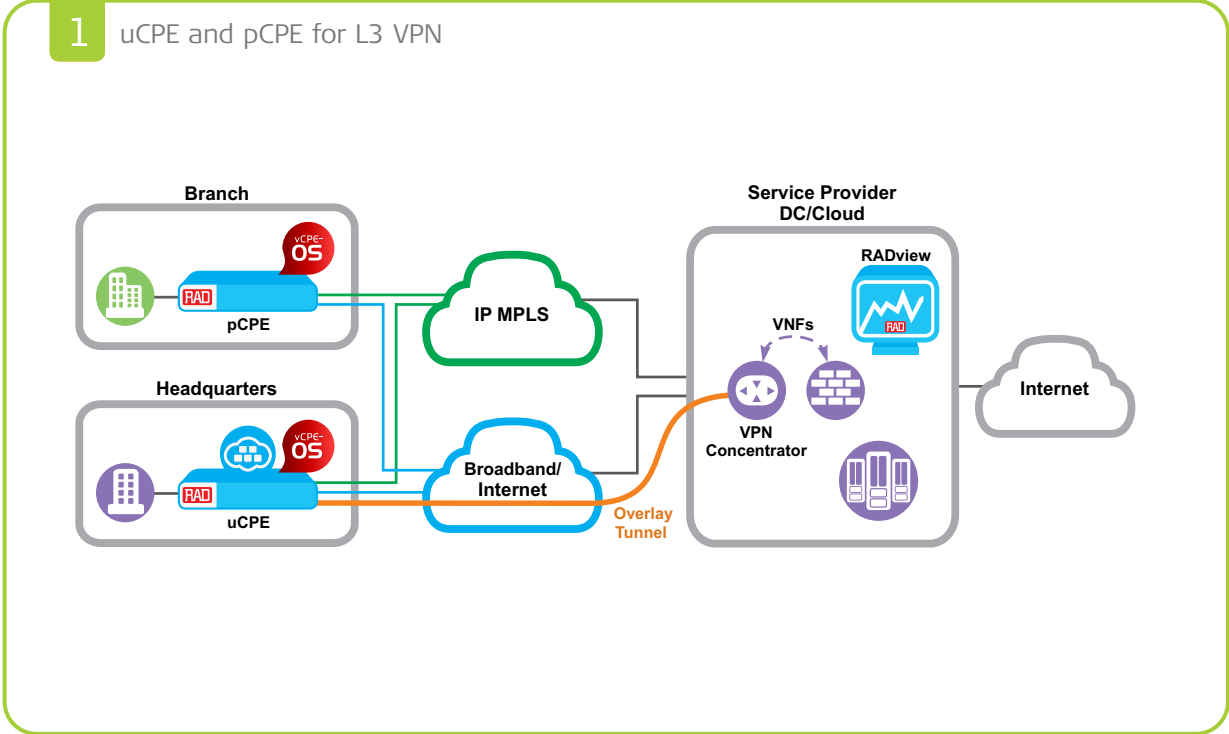Miniature Programmable Network Interface Device

RADview
Management and Domain Orchestration

Business Services

vCPE

Virtualization
by RAD
See Pages 5-7

1 uCPE and pCPE for L3 VPN

Your Benefits:

- Disaggregation: Freedom to choose any vCPE hardware, per branch site requirements, with a common operating system in all vCPEs to minimize integration efforts and reduce costs
- Virtualization: Enrich business offerings by hosting value-added

VNFs and CNFs (Container Network Functions) at the customer or network edge

- Embedded advanced router with NG-Firewall reduces TCO by eliminating the need to purchase third-party router VNF

- Expand L3 VPN services over fixed/mobile broadband networks with secure overlay tunnels to enhance connectivity and cost options
- Automation with full life-cycle support, ZTP, SDN/NETCONF support, and more, using the RADview Domain Orchestrator

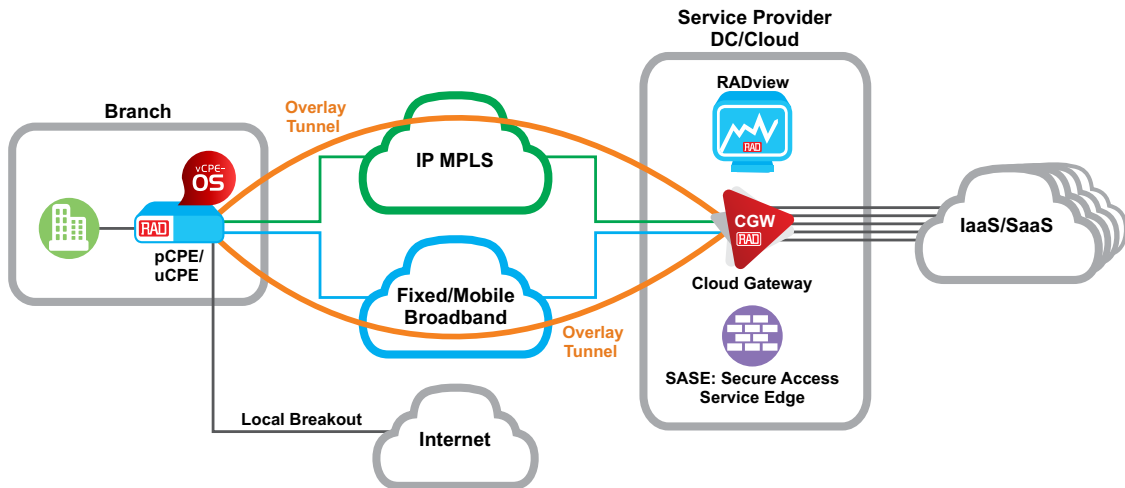**ETX-1p, SecFlow-1p**
pCPE Platforms

ETX-2v
uCPE Platforms

vCPE-OS
Open Carrier-Class
Operating System

RADview
Management and Domain
Orchestration

Business Services

2 SD-CloudAccess

Service Provider DC/Cloud

Branch

Overlay Tunnel

IP MPLS

RADview

CGW

IaaS/SaaS

vCPE-OS

pCPE/uCPE

Fixed/Mobile Broadband

Cloud Gateway

Overlay Tunnel

Local Breakout

Internet

SASE: Secure Access Service Edge

Your Benefits:

- Differentiated business services for "cloud-first" customers enabling SLA-assured, multi-cloud access
- Highly cost-effective vCPE by embedding SD-CloudAccess intelligence in the Cloud Gateway
- Enhances branch connectivity with application-aware traffic steering across multiple links

- By landing traffic in network edge locations, service providers can apply value-added services to cloud-bound traffic, including SASE for zero-trust secured access, from any endpoint to any service
- Use pCPE/uCPE as customer edge clouds, hosting value-added virtual functions in containers/VMs

- Enable secure local internet breakout with embedded next-generation firewall functionality
- Ubiquitous service offering over any access network, using a range of edge devices

ETX-2v, ETX-1p, SecFlow-1p
pCPE Platforms
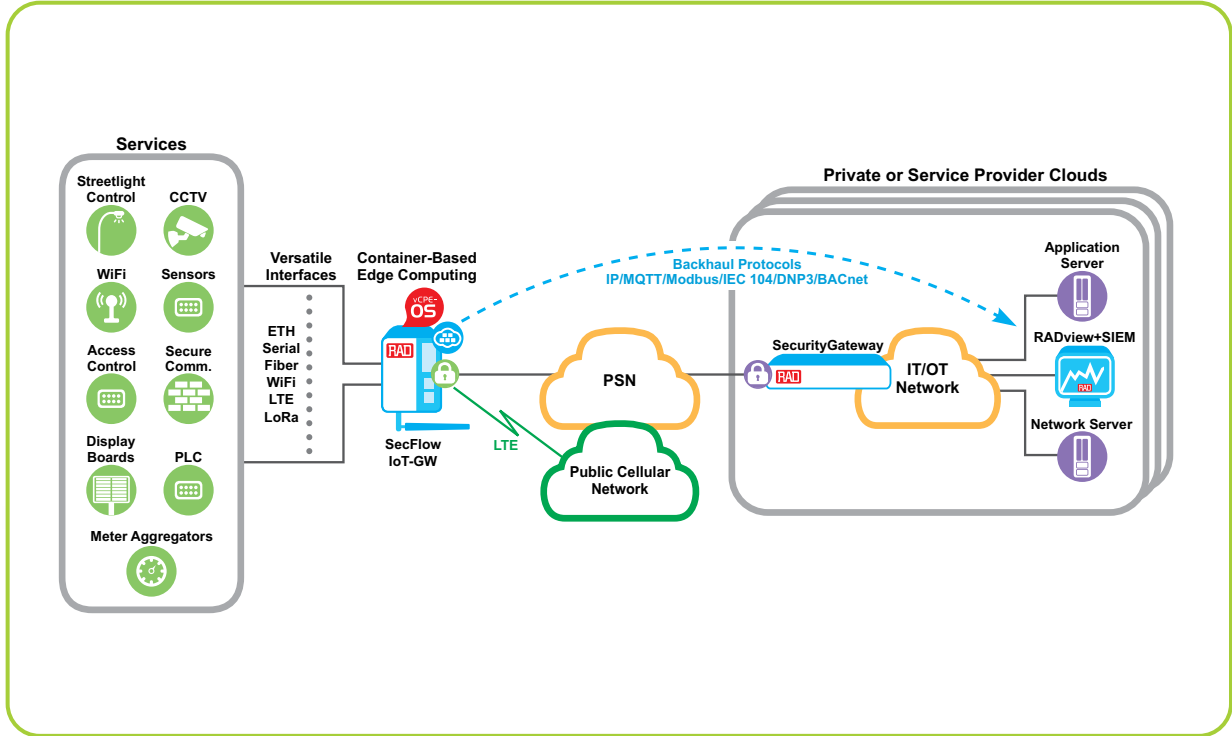
Cloud Gateway
SD-CloudAccess Hub

vCPE-OS
Open Carrier-Class Operating System

RADview
Management and Domain Orchestration

Industrial IoT Backhaul with Edge Computing

Your Benefits:

- Offer competitive IoT services for monitoring and automation devices, Smart City projects, etc.
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices
- Zero-touch provisioning, enhanced cyber security (IPsec, PKI, FW, IDS/IPS, SIEM)
- Seamless communications over fiber optics, radio links and 2G/3G/LTE cellular links
- Secure remote access for end-user device management
- Integrated IEC 61131-3 RTU/PLC
- Integrated PLC functionality and LoRaWAN gateway reduces the number of devices in the network
- Transparent delivery of SCADA, protocol conversion and terminal server
- Complies with IEC 61850-3 and IEEE 1613 environmental standards

SecFlow
Industrial IoT Gateway with Edge Computing

vCPE-OS
Open Carrier-Class Operating System

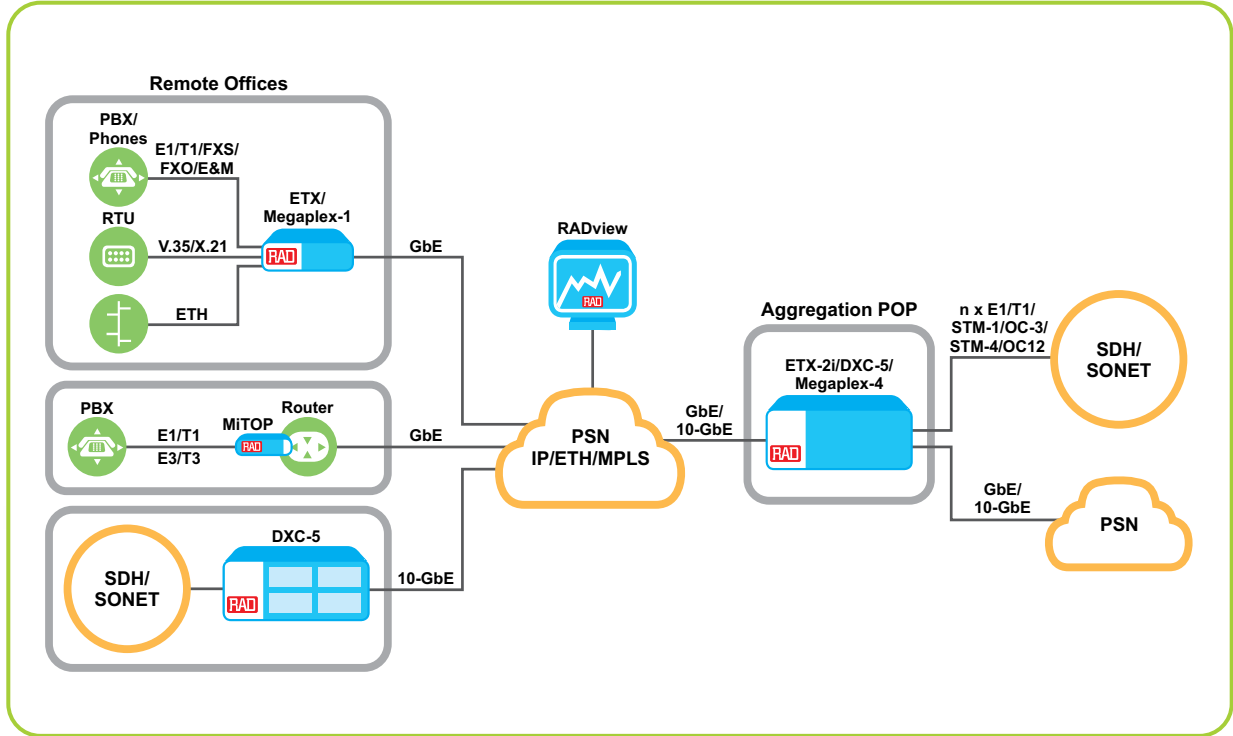**SecurityGateway**
VPN Aggregator, Router and Firewall

RADview
Management and Domain Orchestration

TDM Migration

Your Benefits:

- Maintain legacy TDM services over new packet network to keep revenue flow and customer loyalty
- Enable alternative providers to add leased lines to their service portfolio to attract new customers

- Support heterogenic First Mile footprint requiring CPE support for DSL/EFM, Ethernet, GPON connections, and flexibility in PWE termination options: Customer site-to-customer site, customer site-to-POP/network, POP-to-POP

- Allow a single transport network for IP/Ethernet and TDM services to simplify operations and lower TCO

ETX-2/ETX-2i
IP and Carrier Ethernet Demarcation
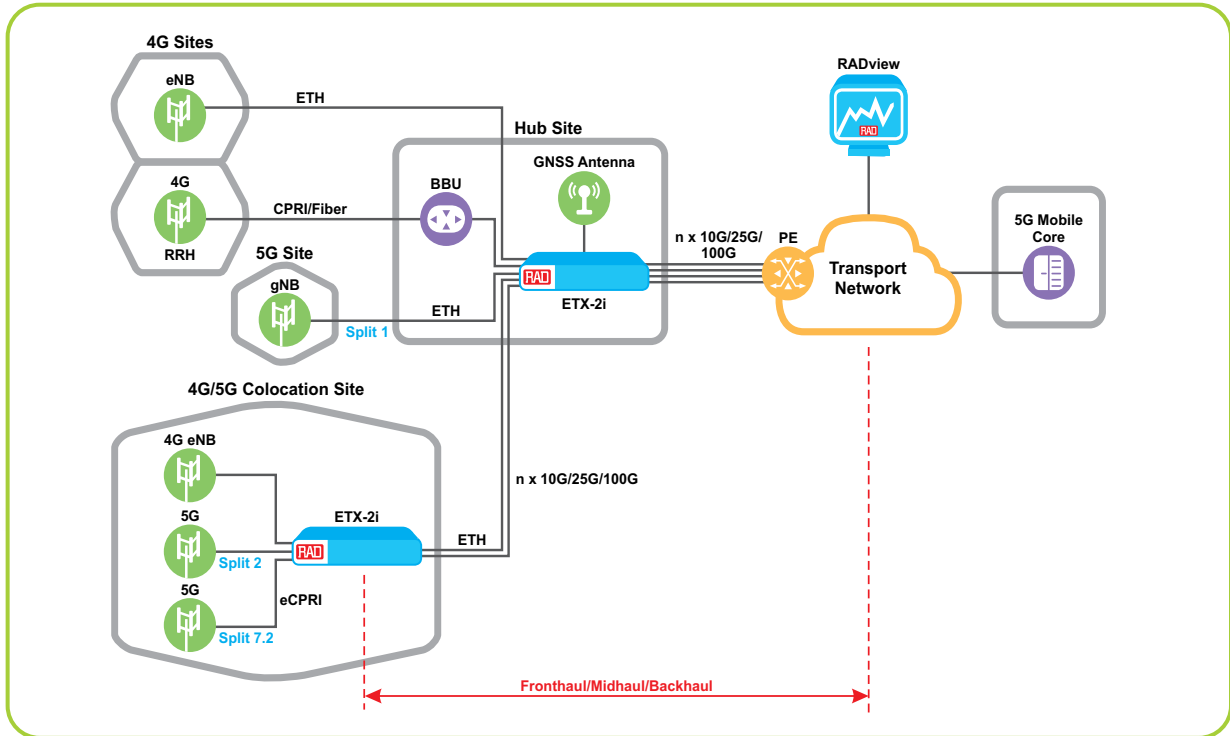
ETX-5
Ethernet Service Aggregation Platform

MiTOP-E1/T1, E3/T3
Smart SFP-Format TDM Pseudowire Gateways

RADview
Management and Domain Orchestration

4G/5G Mobile xHaul

Your Benefits:

- Fast rollouts of 5G deployments with in-field future upgrades to meet new requirements
- CSG for multiple 5G RAN splits and colocated 4G/5G sites
- Highly efficient 4G/5G aggregation: 10G, 25G and 100G

- Fixed-mobile convergence: Colocated mobile and fixed broadband sites
- Multi-CoS Carrier Ethernet/IP backhaul with service management and OAM-based diagnostics
- 1588 PTP (GM, BC, TC) with integrated GNSS receiver, Sync-E for timing synchronization

- L2, L3-based fronthaul/midhaul/ backhaul performance monitoring for multiple network slices and for network sharing
- Small form factor to meet space and power supply restrictions
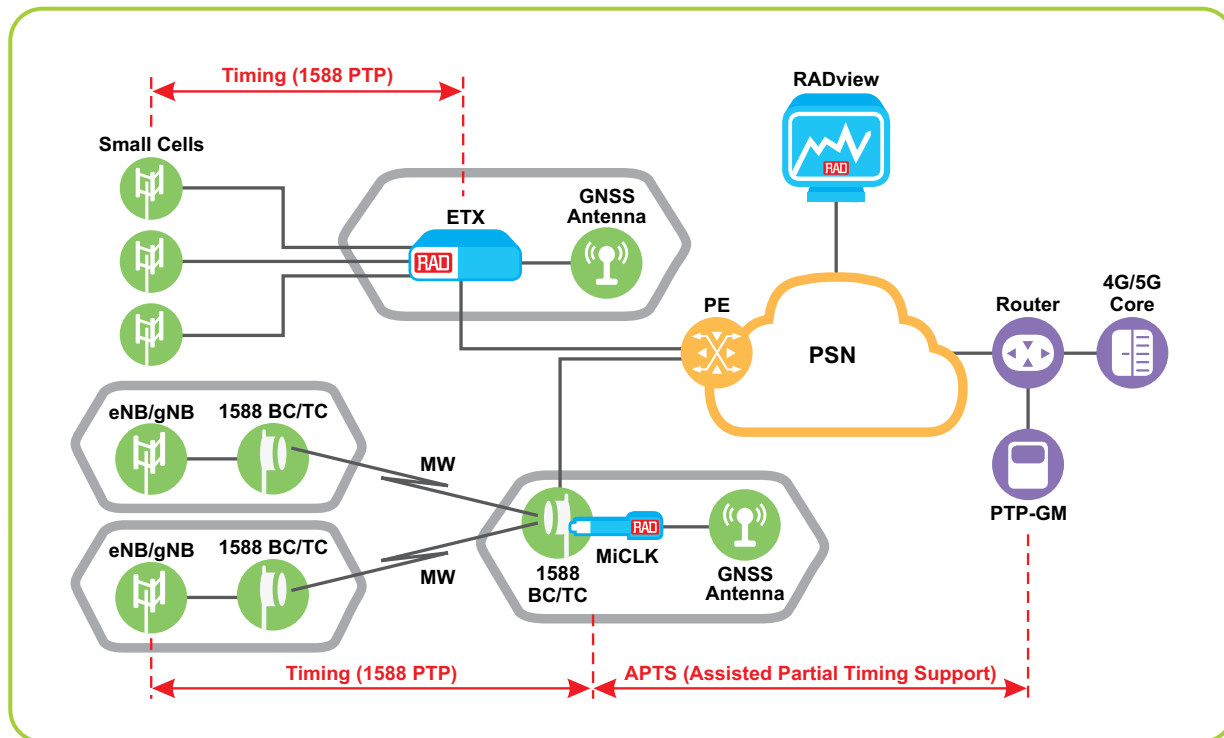
ETX-2/ETX-2i
IP and Carrier Ethernet
Cell Site Gateways up to 100G

RADview
Management and
Domain Orchestration

Timing Synchronization for Mobile Networks

Your Benefits:

- Addressing stringent timing requirements (frequency/phase) for LTE/LTE-A/5G macro and small cells with a fully featured PTP Grandmaster:
  - ETX-2 in a local POP/hub
  - MiCLK unique SFP plugged into an aggregation switch

- Cost efficiency by bringing PTP Grandmaster closer to the cell site
- Built-in GNSS receiver
- Full network coverage, even in underground and indoor installations
- No need to install GNSS antenna on every cell site; avoid spoofing and jamming

- Fits existing installed base – no need for CapEx investments in retrofitting network with 1588 BC/TC support across the entire path
- Robust GNSS (GPS/GLONASS) backup – time holdover for 72 hours, using Sync-E or 1588 frequency references from the network (Assisted Partial Timing Support)
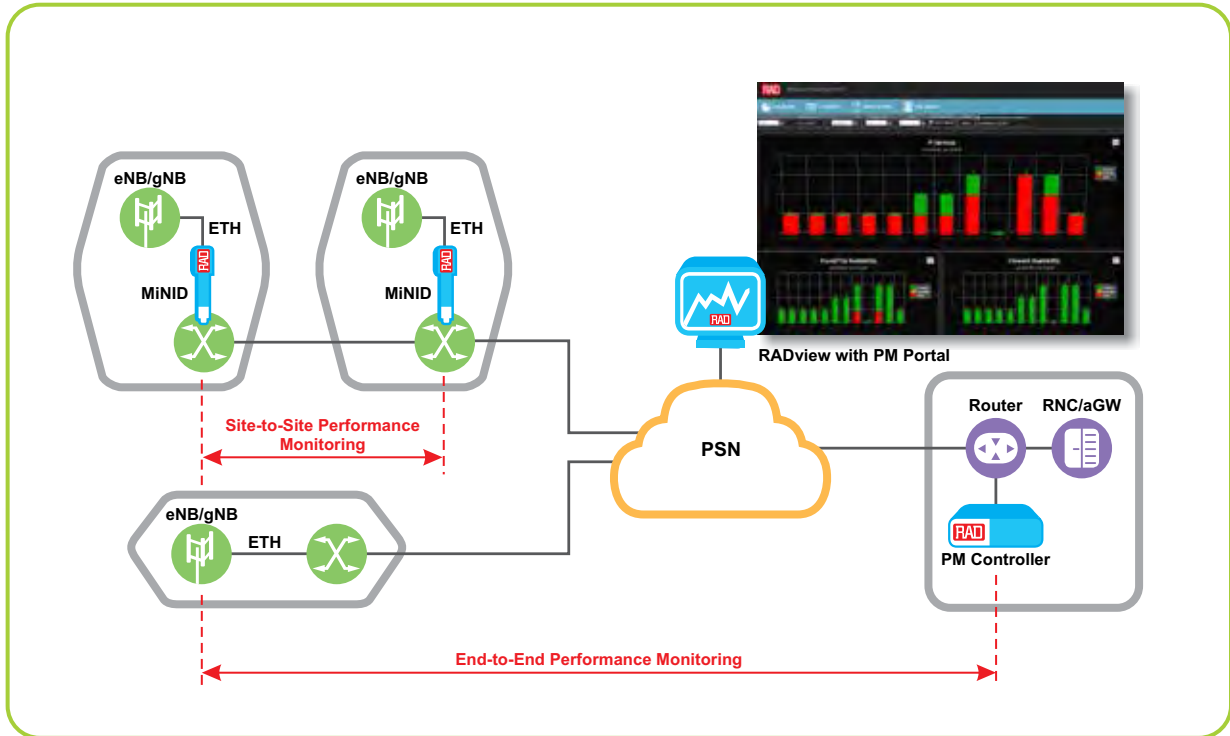

ETX-2/ETX-2i
IP and Carrier Ethernet Demarcation

MiCLK
1588 Grandmaster on an SFP

RADview
Management and Domain Orchestration

Wholesale Networking

Virtualization
by RAD
See Pages 5-7

Your Benefits:

- Provide wholesale Carrier Ethernet transport services to multiple service providers with complete visibility and controlled service hand-off between multiple networks
- Demarcation for business and mobile services, and broadband access node (e.g., DSLAM) backhaul over the same transport network

- Provide SLA-based backhaul all the way to the end-customer site, cell site or POP
- MEF-certified Carrier Ethernet 3.0 E-Access support with single-CoS and/or multiple-CoS EVC/OVC for standards-based carrier-to-carrier connectivity

- Seamless connection between networks with 1-GbE, 10-GbE and 100G E-NNI interfaces with optional redundancy
- Enhance wholesale offering with VNF-based, managed, value-added services

ETX-2
IP and Carrier Ethernet Demarcation

ETX-2i-100G
100G EAD

MiNID
Miniature Programmable Network Interface Device

RADview
Management and Domain Orchestration

Critical Infrastructure

Industrial IoT with edge computing and cyber-secure operational WAN, using RAD's Service Assured Networking solutions.

RAD provides Service Assured Networking (SAN) solutions that ensure seamless migration to packet switched communication networks and applications. We address all communication needs of the utilities, transportation and government sectors with always-on reliability and mission-critical protection. We offer best-of-breed reliability tools. Our SAN solutions are used for cyber-secure industrial IoT (IIoT) and operational WANs, fog/edge computing, TDM to packet migration, distance Teleprotection and distribution automation, as well as Smart/Safe City deployments.

Key SAN solutions include:

- Secure networking for digital transformation to allow fast, secure and economical deployment of thousands of new remote IIoT sites

- Multiservice, packet and PoE-intensive OT WANs, enabling easy migration from TDM to PSNs

- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links, and leased lines

- Extensive security suite includes SCADA-aware firewall, intrusion prevention, man-in-the-middle attack prevention, encryption, device connection control, event logger, and anomaly detection

⌖ | Utilities

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2 | Packet Operational WAN

Your Benefits:

- Supports Ethernet-based communications for mission-critical automation traffic within the substation and between SCADA control centers
- Multiple elements on each ring/sub-ring

- Complies with IEC 61850-3 and IEEE 1613 environmental standards
- Legacy communications using pseudowire emulation (PWE) with hitless PWE redundancy
- Optional PoE+

- Ring protection: Standard with G.8032 and proprietary with fast recovery time (<10 ms for PF_Ring™)
- Supports installation in harsh environments, IEEE 1613 and/or IEC 61850-3 (optional for specific devices)

Megaplex-4
Next-Generation Multiservice Networking Node

Megaplex-1
Multiservice Pseudowire Access Gateway

DXC-5
High Capacity Hybrid Cross Connect

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

PacketLight
Complete Solutions for WDM/OTN and Dark Fiber Applications

RADview
Management and Domain Orchestration

Utilities

3 | Industrial IoT Backhaul for Distribution Automation and Smart Metering

Your Benefits:

- A comprehensive and secure solution addressing communications to secondary substations, metering and distribution automation
- Integrated IEC 61131-3 RTU/PLC
- Integrated LoRaWAN gateway
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices
- Zero-touch provisioning, enhanced cyber security (IPsec, PKI, FW, IDS/IPS, SIEM)
- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links, and leased lines from a telecom service provider
- Secure remote access for end-user device management
- Transparent delivery of SCADA, protocol conversion and terminal server
- Complies with IEC 61850-3 and IEEE 1613 environmental standards
- Point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed sub-6 GHz bands

SecFlow
Industrial IoT Gateway with Programmable Logic Controller

SecurityGateway
VPN Aggregator, Router and Firewall

Ceragon/Airmux
Wireless Transport Platform

RADview
Management and Domain Orchestration

⊼ | Utilities

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4 Distance and Differential Protection Communications

Your Benefits:

- Single 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-directional, E&M, C37.94 — to extend differential Teleprotection

relay communication over any infrastructure

- Reduce CapEx and OpEx by using a single-box solution for all substation communication services, including voice, data, automation, and Teleprotection signals

- Redundancy hierarchy from the Teleprotection interface up to the communication link ensures 0 (zero) msec hardware protection
- Sub-2 msec end-to-end delay over PSN
- Tested interoperability with most Teleprotection contact relays from leading vendors (such as Alstom, ABB, Siemens, SEL, Schneider)
- Distance protection complies with IEC 60834

Megaplex-4
Next-Generation Multiservice Networking Node

Megaplex-1
Multiservice Pseudowire Access Gateway

RADview
Management and Domain Orchestration

Oil and Gas Utility Communications

Industrial IoT Backhaul for Oil & Gas Utility Communications

Your Benefits:

- A comprehensive and secure solution addressing communications for compressor stations, LACT and flow meters, etc.
- Integrated IEC 61131-3 RTU/PLC
- Integrated LoRaWAN gateway
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices
- Zero-touch provisioning, enhanced cyber security (IPsec, PKI, FW, IDS/IPS, SIEM)
- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links, and leased lines from a telecom service provider
- Secure remote access for end-user device management
- Transparent delivery of SCADA, protocol conversion and terminal server
- Complies with Class I div 2
- Point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed sub-6 GHz bands

SecFlow
Industrial IoT Gateway with Programmable Logic Controller

SecurityGateway
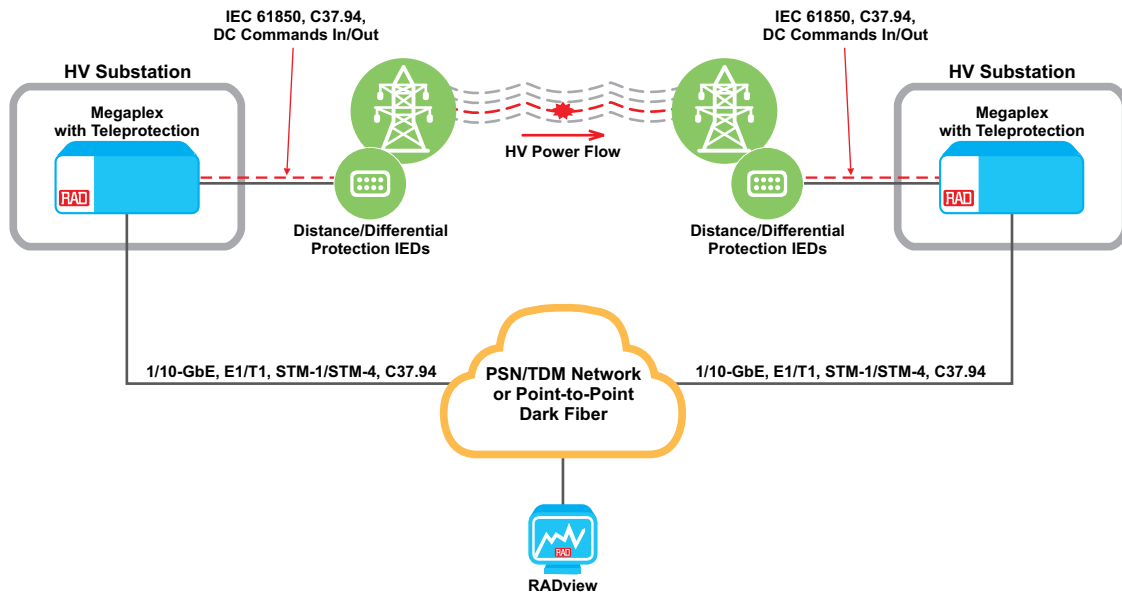VPN Aggregator, Router and Firewall

Ceragon/Airmux
Wireless Transport Platform

RADview
Management and Domain Orchestration

Water Utility Communications

1 Operational WAN for Water Utility Communications

Labels in diagram: Control Center, DWDM, PacketLight, PacketLight, IED, RTU, CCTV, FXS, Megaplex/DXC-5, IP/MPLS, Megaplex/DXC-5, SCADA, RADview, Airmux/Ceragon, Airmux/Ceragon, PowerFlow-2, PSN, RTU, RTU, SIP, CCTV, PowerFlow-2, PowerFlow-2

Your Benefits:

- Cyber-secure SCADA connectivity for water monitoring and automation devices, sensors, pumps, surface and groundwater availability tracking devices, etc.
- Supports all communication needs, including SCADA protocols, voice and new packet services (CCTV, VoIP, etc.)

- Multiservice aggregation for any transport network, including SDH/SONET, IP/MPLS, MPLS-TP, CE and OTN/DWDM
- Point-to-point and point-to-multipoint radio system supports up to 750 Mbps over sub-6 GHz bands,

with dedicated bandwidth allocation per site and service reach of up to 120 km (74.5 miles)
- Complies with environmental standards for outdoor installation in harsh conditions

Megaplex-4
Next-Generation Multiservice Networking Node

Ceragon/Airmux
Wireless Transport Platform

DXC-5
High Capacity Hybrid Cross Connect

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

PacketLight
Complete Solutions for WDM/OTN and Dark Fiber Applications

RADview
Management and Domain Orchestration

Utilities

2 Industrial IoT Backhaul for Water Utility Communications

RTUs/Sensors/Meters

SecFlow

6 x DI
6 x DO
6 x AI

Water Pipe

Sensor/Meters

Sensor/Meters

LoRa

Sensor/Meters

SecFlow

LTE

LTE

Public Cellular Network #1

PSN

Ceragon/Airmux

Public Cellular Network #2

LTE

Water Pipe

RTUs/Sensors/Meters

SecFlow

Ceragon/Airmux

ETH/Serial

Private Cloud or Customer's HQ

RADview+SIEM

SCADA

Security Servers

SecurityGateway

OT Network

Network Server

Dashboard

Your Benefits:

- A comprehensive and secure solution addressing communications for water monitoring and automation devices, sensors, pumps, etc.
- Integrated IEC 61131-3 RTU/PLC
- Integrated LoRaWAN gateway
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices
- Zero-touch provisioning, enhanced cyber security (IPsec, PKI, FW, IDS/IPS, SIEM)
- Seamless communications over fiber optics, radio links, 2G/3G/LTE, private cellular links, and leased lines from a telecom service provider
- Secure remote access for end-user device management
- Transparent delivery of SCADA, protocol conversion and terminal server
- Point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed sub-6 GHz bands

SecFlow
Industrial IoT Gateway
with Programmable Logic
Controller LoRaWAN Server
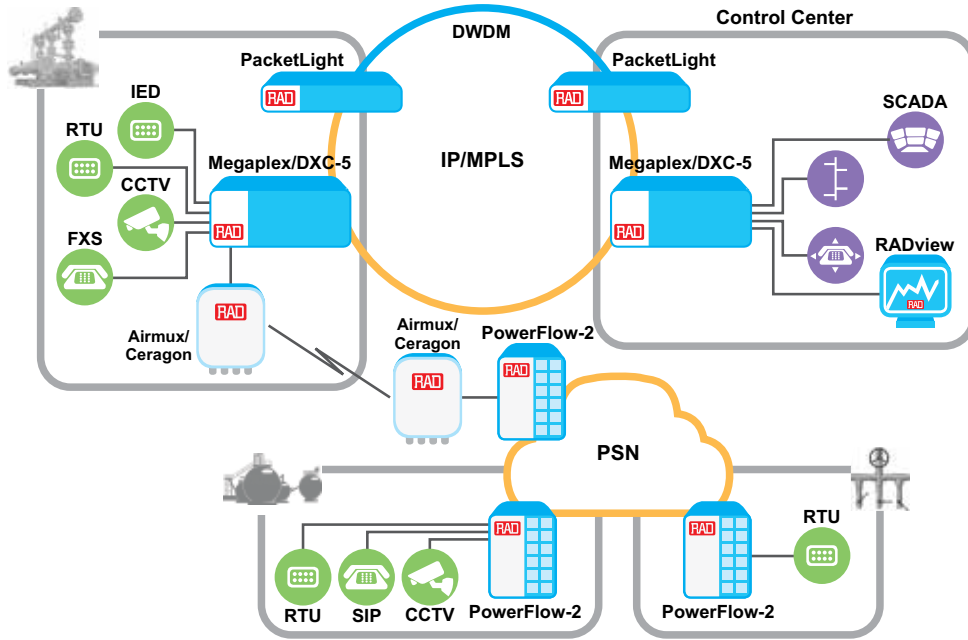
SecurityGateway
VPN Aggregator, Router
and Firewall

Ceragon/Airmux
Wireless Transport
Platform

RADview
Management and
Domain Orchestration

Highway Communications

Your Benefits:

- Backhaul high-definition video feeds, roadside display board and billing station data from remote facilities over fiber, high throughput microwave PtP and PtMP radio links, and 10-GbE rings

- Enable outdoor installations with industrial design and ruggedized enclosures
- Extensive PoE support including PoE++ and Airmux PoE

- 10-GbE carrier-grade Ethernet core rings with traffic management capabilities ensure reliable connectivity with appropriate quality of service for various applications

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

SecFlow
Ruggedized SCADA-Aware Ethernet Switch/Router

Ceragon/Airmux
Wireless Transport Platform

RADview
Management and Domain Orchestration

Train and Metro Communications

1 Operational WAN for Trains and Metros

Your Benefits:

- Ensure protected connectivity between stations and control room using multidrop and ring topologies
- Ethernet extension over fiber or copper (SHDSL) to enable service reach to remote M2M and video devices

- Support mission-critical railway applications, including automatic train supervision (ATS), centralized traffic control (CTC), SCADA, and multiparty hotlines, as well as passenger information systems (PISs)
- Support legacy TDM and Ethernet traffic delivery over SDH/SONET/IP/MPLS/MPLS-TP/CE/DWDM/OTN and/or carrier-grade fiber optic rings

- Supports analog and digital data and voice devices, as well as Ethernet IEDs, with versatile rates from RS-232 up to STM-64/OC-192 or 10-GbE
- Point-to-point and point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed bands

Megaplex
Next-Generation Multiservice Networking Node

DXC-5
High Capacity Hybrid Cross Connect

ETX-203AX
Carrier Ethernet Demarcation Device

Ceragon/Airmux
Wireless Transport Platform

PacketLight
Complete Solutions for WDM/OTN and Dark Fiber Applications

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

RADview
Management and Domain Orchestration

2 Industrial IoT Backhaul for Trains and Metros

Automatic Crossing

SecFlow/PowerFlow-2

Field Devices

SecFlow

Station

SecFlow/PowerFlow-2 — Airmux

PSN

Public Cellular Network

Airmux Base Station

SecurityGateway

RADview

OT Network

Airmux

SCADA

Application Servers

VMS Server

Your Benefits:

- A comprehensive and secure solution addressing communications along railway tracks, wayside signaling, interlocking, and safety systems
- Integrated IEC 61131-3 RTU/PLC
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices
- Zero-touch provisioning, enhanced cyber security (IPsec, PKI, FW, IDS/IPS, SIEM)
- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links, and leased lines from a telecom service provider
- Secure remote access for end-user device management
- Transparent delivery of SCADA, protocol conversion and terminal server
- Complies with EN 50121-4
- Point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed sub-6 GHz bands

SecFlow
Industrial IoT Gateway with Edge Computing

SecurityGateway
VPN Aggregator, Router and Firewall

Ceragon/Airmux
Wireless Transport Platform

RADview
Management and Domain Orchestration

Air-Traffic Control Communications

1 Multiservice Operational WAN for Air-Traffic Control

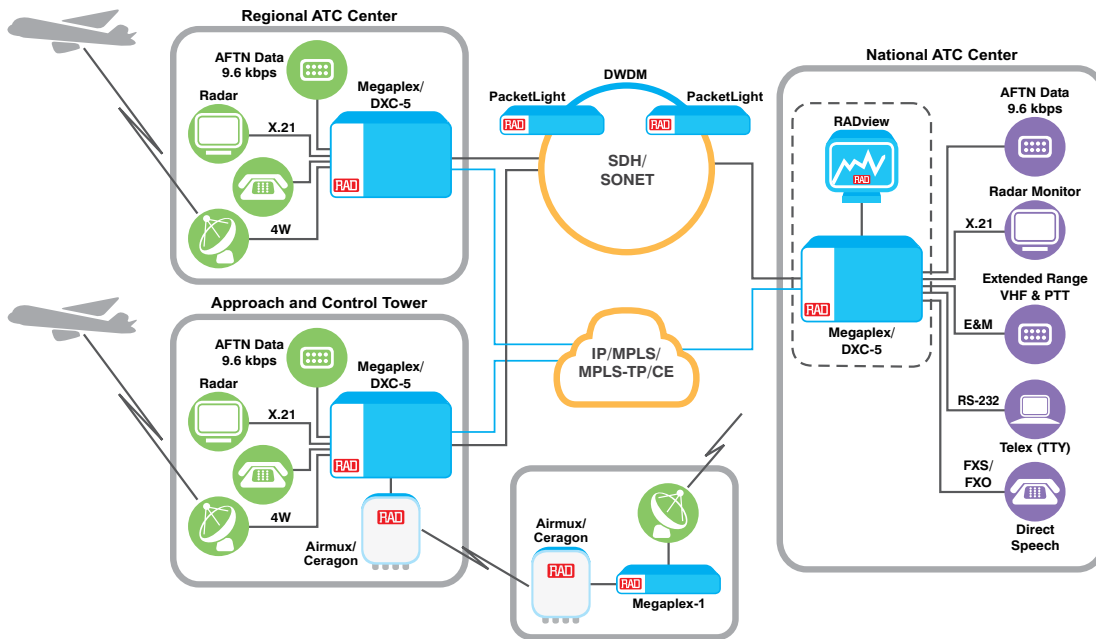**Regional ATC Center**
- AFTN Data 9.6 kbps
- Radar
- X.21
- 4W
- Megaplex/DXC-5

Approach and Control Tower
- AFTN Data 9.6 kbps
- Radar
- X.21
- 4W
- Megaplex/DXC-5
- Airmux/Ceragon

DWDM
PacketLight — PacketLight
SDH/SONET
IP/MPLS/MPLS-TP/CE
Airmux/Ceragon
Megaplex-1

National ATC Center
- RADview
- Megaplex/DXC-5
- AFTN Data 9.6 kbps
- Radar Monitor
- X.21
- Extended Range VHF & PTT
- E&M
- RS-232
- Telex (TTY)
- FXS/FXO
- Direct Speech

Your Benefits:

- Ensure reliable, uninterrupted communications between different traffic control centers with RAD's multiservice connectivity solutions over any transport network, including SDH/SONET, IP/MPLS, MPLS-TP, CE, OTN, DWDM

- Deliver direct speech (DS), Telex (TTY), radar data (RD), extended range VHF (ER), and VHF data link (VDL) traffic, together with other voice, fax and LAN services, using industry-standard interfaces

- Transport traffic over copper, fiber, microwave, or satellite links

- Distributed SCADA security suite with integrated firewall and encryption

- Optimized for subrate leased line transmission and backup to reduce OpEx

- Ruggedized platforms withstand the rigors of field operations

- Support fail-safe operations with ISDN, VSAT and Ethernet backup

Megaplex
Next-Generation Multiservice Networking Node

DXC-5
High Capacity Hybrid Cross Connect

Ceragon/Airmux
Wireless Transport Platform

PacketLight
Complete Solutions for WDM/OTN and Dark Fiber Applications

RADview
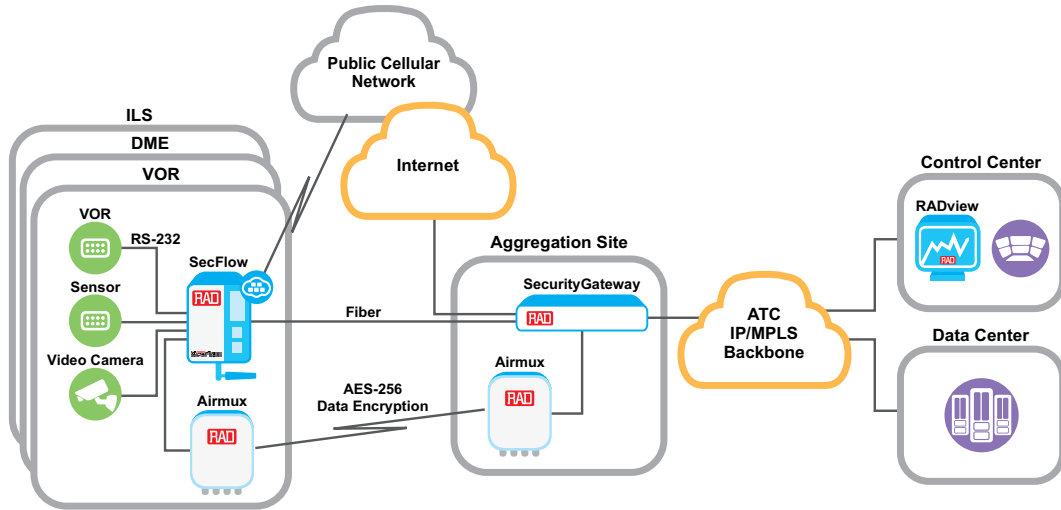Management and Domain Orchestration

🚃 | Transportation

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2 Industrial IoT Backhaul for Remote Unmanned Sites

Public Cellular Network

ILS
DME
VOR

VOR

VOR **RS-232**

Sensor

Video Camera

SecFlow

Airmux

Internet

Fiber

AES-256 Data Encryption

Aggregation Site

SecurityGateway

Airmux

ATC IP/MPLS Backbone

Control Center

RADview

Data Center

Your Benefits:

- Ensure management and monitoring for unmanned ATC sites (VOR, DME, ILS)
- Integrated IEC 61131-3 RTU/PLC
- SCADA capabilities, dry contacts and serial tunneling
- Extensive PoE support for CCTV camera applications

- Zero-touch provisioning, enhanced cyber security (stateful firewall, SCADA, IPS/IDS, SIEM)
- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links and leased lines
- Integrated IPsec encryption with automated PKI support

- Transport traffic over copper, fiber, microwave, or satellite links
- Point-to-point and point-to-multipoint radio connectivity for high capacity mission-critical traffic over licensed and unlicensed bands
- Secure remote access for end-user device management

SecFlow
Industrial IoT Gateway with Edge Computing

SecurityGateway
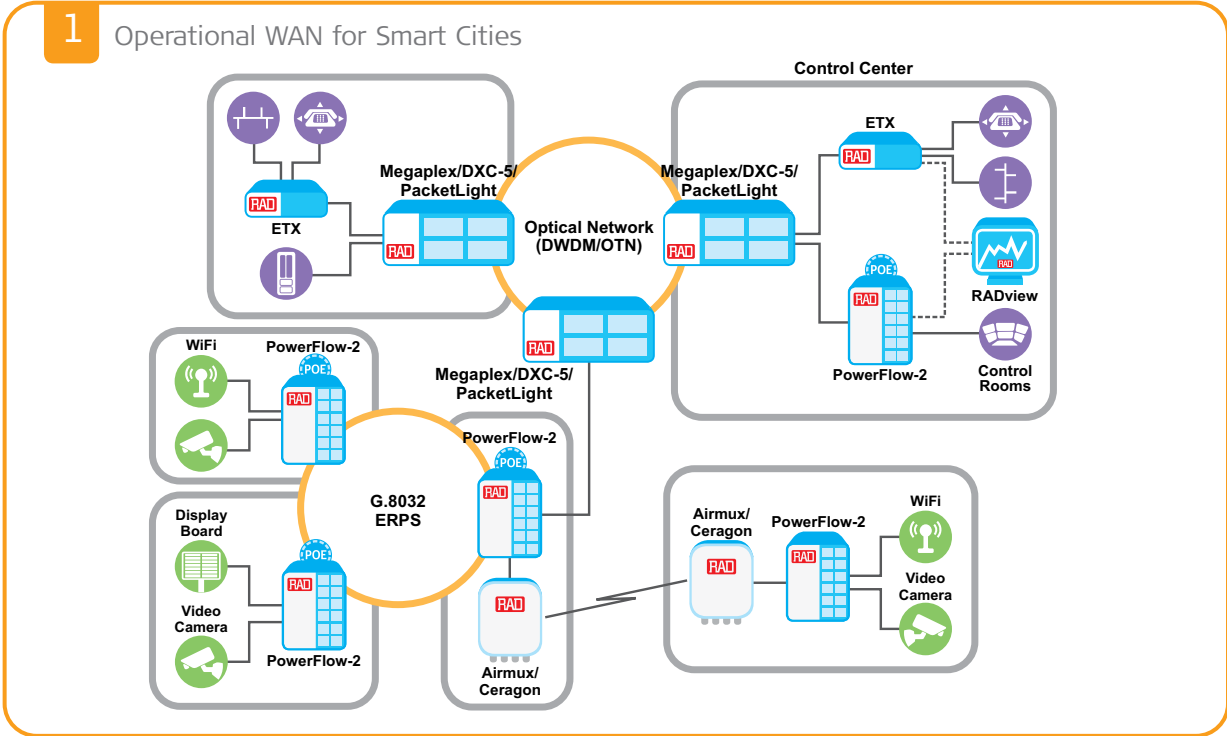VPN Aggregator, Router and Firewall

Ceragon/Airmux
Wireless Transport Platform

RADview
Management and Domain Orchestration

Smart City Communications

1 Operational WAN for Smart Cities

Control Center

ETX

Megaplex/DXC-5/PacketLight

Optical Network (DWDM/OTN)

Megaplex/DXC-5/PacketLight

ETX

RADview

PoE

PowerFlow-2

Control Rooms

WiFi

PowerFlow-2

PoE

Megaplex/DXC-5/PacketLight

PowerFlow-2

PoE

G.8032 ERPS

Display Board

Video Camera

PoE

PowerFlow-2

Airmux/Ceragon

PowerFlow-2

WiFi

Video Camera

Airmux/Ceragon

Your Benefits:

- Provides a comprehensive solution for all Smart City communications
- Connect security cameras, WiFi access points, display boards, meter concentrators, and other sensors in urban and rural areas over fiber optics and wireless radios

- Central management to provision and control the communications network
- Long-distance fiber optic private network backbone with OTN/DWDM multi-tunneling at rates of up to 100G
- Secure connectivity over public/private networks

- Turnkey deployment solutions by RAD for Safe City and including communications, video surveillance and analytics systems, cameras, and sensors
- G.8032 Ethernet Ring Protection Switching (ERPS) and PoE support

Megaplex
Next-Generation Multiservice Networking Node

DXC-5
High Capacity Hybrid Cross Connect

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

Ceragon/Airmux
Wireless Transport Platform

PacketLight
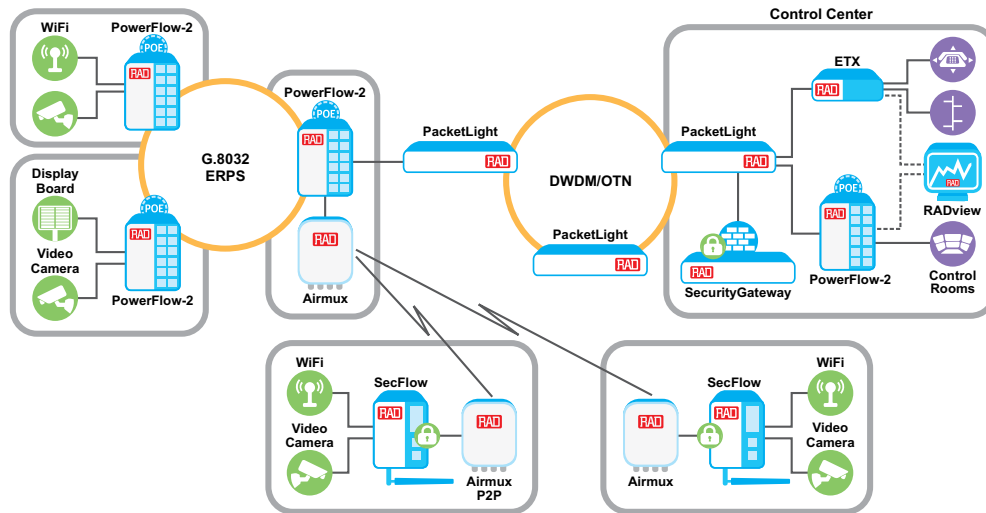Complete Solutions for WDM/OTN and Dark Fiber Applications

RADview
Management and Domain Orchestration

🏛 | Government

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2 Industrial IoT Backhaul for Smart Cities

Your Benefits:

- A comprehensive communications solution for CCTV cameras, WiFi access points, sensors, payment kiosks, etc.
- Integrated LoRaWAN gateway
- Ruggedized devices for outdoor installations
- Virtual environment for user-tailored applications allows customers to add new applications on top of SecFlow devices

- Seamless communications over fiber optics, radio links, 2G/3G/LTE cellular links, and leased lines
- Zero-touch provisioning with enhanced cyber security (Integrated IPsec, encryption, stateful firewall, SIEM)
- Secure remote access for end-user device management

- Transparent delivery of legacy traffic from serial-based devices
- Local video recording
- Point-to-multipoint radio connectivity supports high capacity mission-critical traffic over licensed and unlicensed sub-6 GHz bands

SecFlow-1v, SecFlow-1p
Industrial IoT Gateway with Edge Computing

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

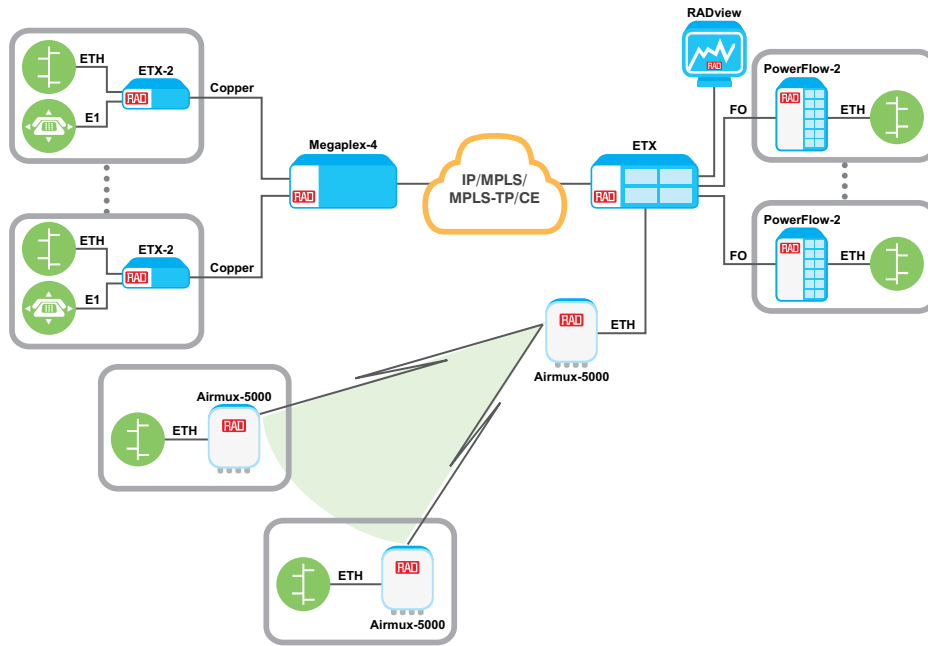**Ceragon/Airmux**
Wireless Transport Platform

RADview
Management and Domain Orchestration

First Responders and Military Communications

Multiservice Operational Network for Police and Military

Your Benefits:

- Connect a privately owned government/military/public network to remote sites using diverse infrastructure

- Support multiple services, including Ethernet, TDM and low speed data, using the same device

- Utilize existing SDH/SONET network or build a state-of-the-art IP/MPLS, MPLS-TP, CE backbone

Airmux-5000
Point-to-Multipoint Broadband Wireless Access

ETX-2/ETX-2i
IP and Carrier Ethernet Demarcation

PowerFlow
Managed Ruggedized Ethernet Switch with Power over Ethernet

RADview
Management and Domain Orchestration

www.rad.com

RAD Group

RAD is the anchor of the $1.5 billion RAD Group of companies, a world leader in communications solutions. A unique business philosophy distinguishes the RAD Group, which has incubated hundreds of Israeli start-ups since its inception. Each company in the RAD Group operates autonomously under a common strategic umbrella. This decentralized approach maximizes the advantages inherent in small business units, such as flexibility, entrepreneurial spirit and management focus. The companies coordinate strategy, sales channels and R&D efforts. Four RAD Group companies are currently traded on the Nasdaq Stock Market in the US, while the others are privately held by the group's founders and various venture capital firms.

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PUSHING THE EDGE OF
40 years
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