

SecFlow[®]-2

Ruggedized SCADA-Aware Ethernet Switch/Router



- Compact ruggedized Ethernet switch/router intended for deployment in harsh industrial environments with up to 16×10/100BaseT and 2×100/1000BaseFX ports with optional PoE
- Advanced security package, including SCADA-aware firewall, IEEE 802.1X port-based Network Access Control, L-2/3/4 ACL for incoming traffic and L-2/3 VPN with IPsec
- Integrated RS-232 serial interface with protocol gateway and tunneling functionality for easy migration of legacy services to IP
- Ethernet switching, IP routing with integrated VPN and link protection per ITU-T G.8032 with optional cellular 2G/3G modem uplink for maximum service continuation
- IEC61850 certified
- Wide range of AC or DC power input options

SecFlow-2 is a ruggedized Ethernet switch/router with a unique built-in packet processing SCADA-aware engine to fit the mission-critical industrial applications.

SecFlow-2 supports two Gigabit Ethernet ports, up to 16 Fast Ethernet ports, and serial ports for legacy services. The switch is designed for installation under harsh environmental conditions. It features DIN-rail mount, IP30 protection level, wide temperature operating range (-40°C to +75°C) without fans, EMI immunity (IEC61850-3, IEEE1613 and EN50121-4) etc.

MULTI-SERVICE GATEWAY

SecFlow-2 utilizes Ethernet ports for new IEC 61850 compliance IEDs for automation and tele-protection applications in substations. Additionally, SecFlow-2 is equipped with the serial interfaces for connectivity of legacy RTUs with the new IP-based IEDs. SecFlow-2 gateway converts legacy IEC-101 protocol to IP-based IEC-104, and Modbus RTU to Modbus TCP, enabling seamless communication from the IP SCADA to both the old and new RTUs. This provides a single box solution for multi-service applications and smooth migration to all-IP networks.

MARKET SEGMENTS AND APPLICATIONS

SecFlow-2 addresses the following markets:

- Utility installations (electricity, water, gas and oil)
- Intelligent transportation (highway, railway)
- Manufacturing facilities (chemical, food industry)
- Military and defense applications (HLS, safe city).

SCADA-AWARE FIREWALL

SecFlow-2 supports an integrated firewall per port, providing a network-based distributed security designed especially for SCADA applications (IEC 104, Modbus TCP, and DNP3 DCP). The device monitors SCADA commands, using deep packet inspection, to validate if they fit the intended application purpose. Additionally, the device features a VPN gateway with two operation modes:

- Inter-site connectivity, using IPsec tunnels
- Remote user access, using SSH.

Inter-site VPN, based on GRE tunnels over an IPsec encrypted link, ensures L2/L3 transparent connection of the Ethernet networks sites.

SecFlow

For remote access, the switch uses an SSH-encrypted tunnel, with user authentication and specific access authorizations.

ETHERNET QUALITY OF SERVICE

Flexible QoS techniques ensure differentiated service delivery end-to-end.

SecFlow-2 utilizes the following traffic management methods: strict priority, Weighted Round Robin (WRR), ingress policing and egress traffic shaping.

OAM

SecFlow-2 provides these types of Ethernet OAM:

- Single-segment (link) OAM according to IEEE 802.3-2005 (formerly 802.3ah) for remote management and fault indication
- End-to-end connectivity OAM based on IEEE 802.1ag to monitor Ethernet services proactively and guarantee that customers receive the contracted SLA
- End-to-end service and performance monitoring based on ITU-T Y.1731. Fault monitoring and end-to-end performance measurement.

SecFlow-2

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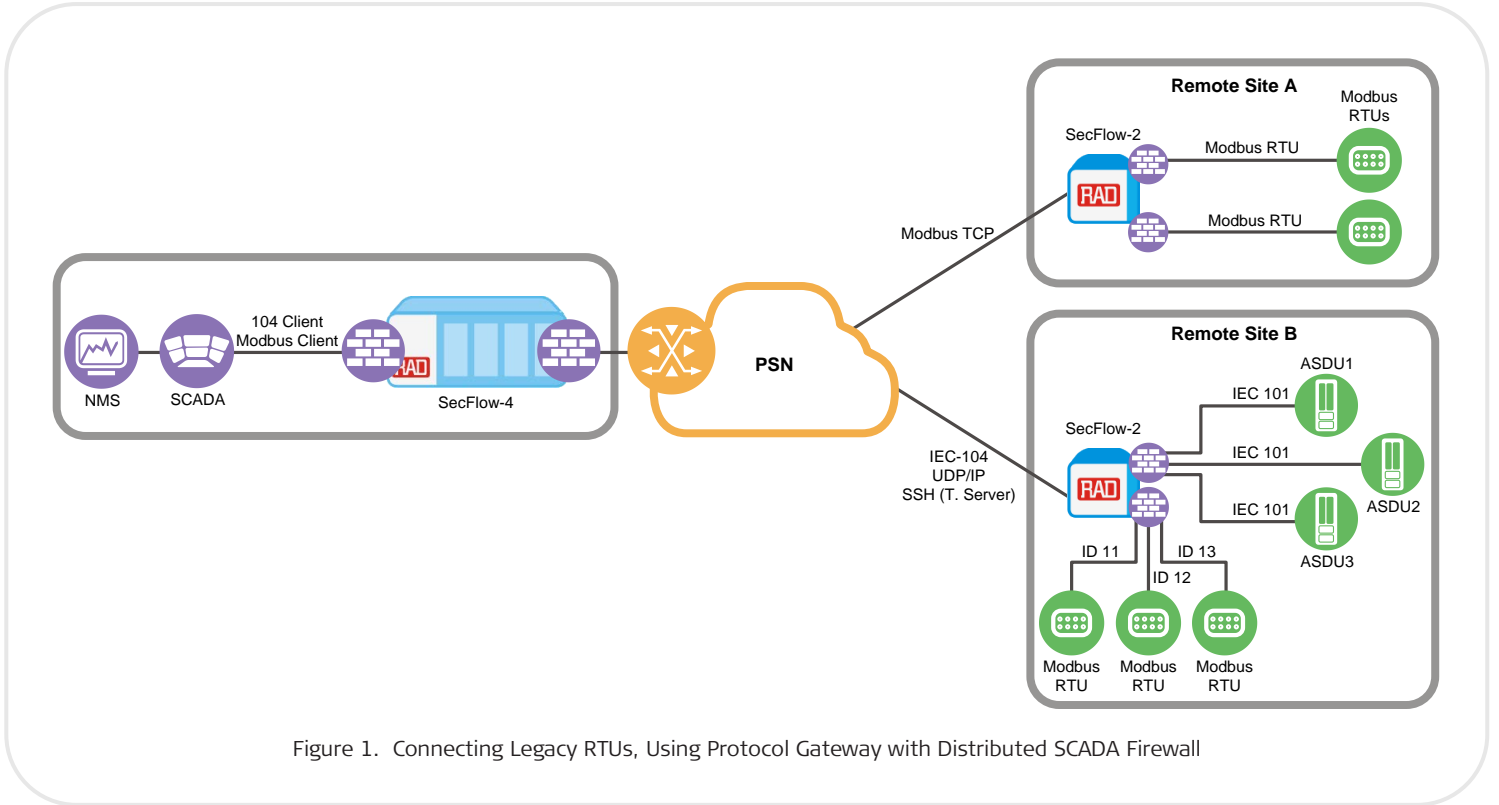


Figure 1. Connecting Legacy RTUs, Using Protocol Gateway with Distributed SCADA Firewall

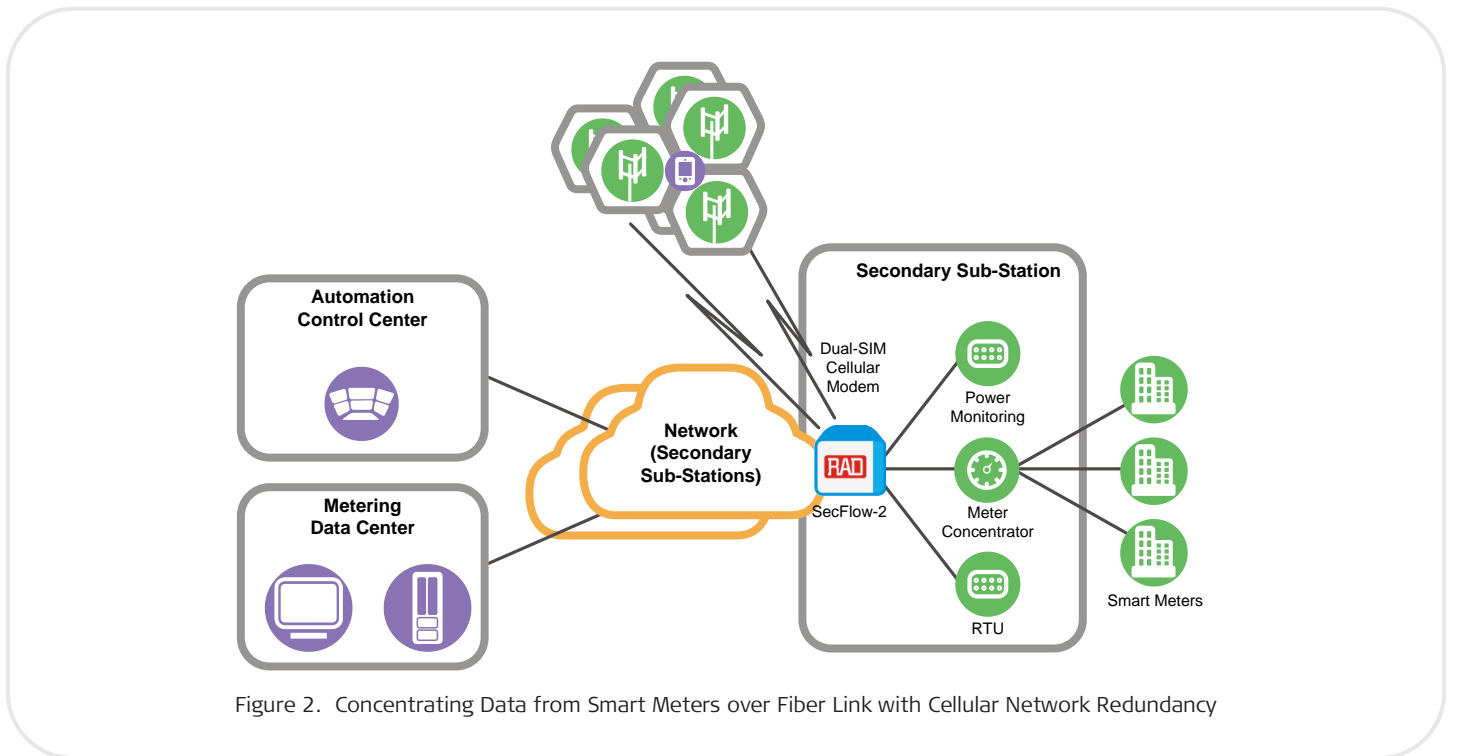


Figure 2. Concentrating Data from Smart Meters over Fiber Link with Cellular Network Redundancy

RESILIENCY

SecFlow-2 supports Ethernet rings according to the ITU-T G.8032 standard, for fast failure detection and switchover regardless of the scale of the network.

Traditional resiliency protocols, such as RSTP (Rapid Spanning Tree Protocol) and MSTP (Multiple Spanning Tree Protocol) per IEEE 802.1D, are also supported.

Link aggregation is performed according to IEEE 802.3ad with LACP allowing aggregation of point-to-point links operating at the same data rate. This enables the switches to take advantage of increased bandwidth.

INTEROPERABILITY

SecFlow-2 is compatible with SecFlow-1 and SecFlow-4. In addition, it operates with RAD's Airmux broadband wireless radios, providing PoE feeding to the Airmux outdoor units (see Ordering).

MANAGEMENT

The device can be managed via RADview, RAD's carrier-class NMS for Windows and Unix, and SecFlow Network Manager that provides end-to-end management for SecFlow devices.

SecFlow-2 also supports a variety of access protocols including CLI, Telnet, Web, SNMPv3, and TFTP.

Specifications**CAPACITY****Throughput**

Line rate L2/L3 switching throughput

Switching

Switching latency below 10 µsec

Max. Number of MAC Addresses

16K

Max. Number of VLANs

4K

Internal Memory

1 GB DRAM

ETHERNET

8 or 16×10/100BaseT ports (optional 8 PoE ports, 30W max per port)

2×100/1000BaseSX SFP ports

8×100BaseFX SFP ports (optional)

Max Frame Size

9 kB

SERIAL INTERFACE

Up to 4 × RS-232 ports

Transparent tunneling of serial streams

Protocol gateway – serial to Ethernet (IEC-60870-5-101, IEC-60870-5-104)

Terminal server

CELLULAR MODEM

Dual SIM GPRS/UMTS cellular modem

QUALITY OF SERVICE (QOS)

VLAN segregation per IEEE 802.1q

VLAN tagging according to L2-L4 headers

L2 multicast with guaranteed QoS

IGMP snooping for traffic optimization

LLDP

DHCP client

DHCP relay, option 82

ROUTER

Static routing, OSPF, RIPv2 routing, VRRP

MANAGEMENT**Control Port**

RS-232

USB Port

Local USB port for emergency boot

Management Options

Command-line interface with password protected access, authorization levels

Telnet/SSH, SNMPv1, SNMPv2, SNMPv3, RADview-EMS, iSIM, SFTP

RADIUS, TACACS+

Date/Time Synchronization

SNTP

SECURITY**Access Control**

Enable/disable port

Port access filter per MAC/IP addresses

Port-based authentication per IEEE 802.1x

Protection against DoS attacks

Service Validation

Egress filtering per VLAN

SCADA firewall per port ((IEC 104, Modbus TCP, and DNP3 DCP).

Industrial VPN Agent

Remote access using SSH tunnel

Layer 2 GRE Transparent Ethernet Bridging

Layer 3 mGRE DM-VPN

X.509 certified IPsec encryption:

- User policy for traffic type
- IKE, AES or 3DES encryption
- Dynamic key exchange

Remote Access Agent

Remote access using reverse SSH tunnel

Limited access authorizations per user

Local and remote user authentication and authorizations

Traffic activity log for trail audit

TIMING

PTP transparent clock per 1588v2

NTP v.2

RESILIENCY**Ethernet Ring**

Ethernet ring per ITU-T G.8032v2

Link Aggregation

LAG with LACP per IEEE 802.3ad

GENERAL**Physical**

Height: 148 mm (5.66in)

Width: 72 mm (8-port DC), 95 mm (16-port DC), 112 mm (4.4 in) (AC)

Depth: 123.0 mm (4.84 in)

Weight: 1.4 kg (3.0 lb)(8-port DC), 1.8 kg (3.9 lb)(16-port AC)

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Power

AC: 90–250 VAC

DC: 9–270 VDC

Power Consumption

15W (regular operation)

135W (120W for PoE, max 30W per port)

Environment

Temperature:

Operating: -40 to 75°C (-40 to 167°F)

Storage: -40 to +85°C (-40 to 185°F)

Humidity: 5 to 95%

Rugged enclosure – fanless, IP 30-rated

Substation automation per IEC 61850-3/IEEE1613 EMI

Vibration and shock resistance per EN50121-4

Ordering

RECOMMENDED CONFIGURATIONS

Secured SCADA-Aware Options

Ethernet features, gateway functionality, security, VPN, IPSec and routing package

SF2/S/AC/2GE8UTP/PoE

AC power supply, 2×GbE SFP ports, 8×10/100BaseT ports, PoE on 8 UTP ports

SF2/S/AC/2GE8UTP/PoE4AM

AC power supply, 2×GbE SFP ports, 8×10/100BaseT ports, PoE on 4 UTP ports for Airmux products

SF2/S/48VDC/2GE16UTP

48 VDC power supply, 2×GbE SFP ports, 16×10/100BaseT UTP ports

SF2/S/48VDC/2GE8UTP8SFP

48 VDC power supply, 2×GbE SFP ports, 8×10/100BaseT UTP ports, 8 ×100 FX SFP ports

SF2/S/48VDC/2GE8UTP

48 VDC power supply, 2×GbE SFP ports, 8×10/100BaseT UTP ports

SF2/S/48VDC/2GE8UTP/RS232/CEL

48 VDC power supply, 2×GbE SFP ports, 8×10/100BaseT UTP ports, 4×RS-232 ports, dual SIM GPRS/UMTS cellular modem

Basic Options

Ethernet features only

SF2/B/AC/2GE8UTP/PoE

AC power supply, 2×GbE SFP ports, 8×10/100BaseT ports, PoE on 8 UTP ports

SF2/B/48VDC/2GE8UTP/PoE

48 VDC power supply, 2×GbE SFP ports, 8×10/100BaseT ports, PoE on 8 UTP ports

Note: All SF2 items with 48 VDC power supply are available with 24 VDC or 12 VDC power supply

SUPPLIED ACCESSORIES

CBL-SF-RJ45-CONSOLE

Console port cable

OPTIONAL ACCESSORIES

CBL-RJ45/DB9/NULL

Serial port cable

SF-2/RM1

Kit for mounting up to two SecFlow-2 units into a 19-inch rack

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