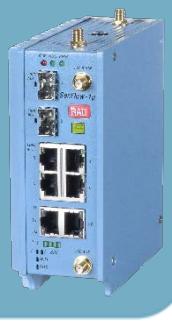
Product page >

Data Sheet

General Availability

SecFlow-1p

Industrial IoT Gateway



- Ruggedized IOT gateway, SCADA protocol gateway for IEC-101, IEC-104, Modbus-RTU/TCP*
- Edge computing by hosting 3rd party container software for customized applications
- Zero Touch provisioning
- Terminal server
- One or two embedded cellular modems (optional second cellular modem, Wi-Fi access point and client, or LoRaWAN)
- Two SIM cards for maximum link resiliency
- Serial tunneling to TCP/IP, including DNP3
- Dry contacts
- GPS for location reporting
- Zone-based stateful firewall

SecFlow®-1p, a member of RAD's SecFlow suite of ruggedized Ethernet products, is an industrial IoT gateway. Besides its communication capabilities, it is an open platform for hosting third-party software.

SecFlow®-1p features a security hardened operating system, optimized to provide maximum performance with small SW footprint.

With its maximum configuration, SecFlow-1p features four GbE copper ports and two GbE SFP ports, two serial ports (single RS-232 port or one RS-232 plus one RS-485/2W), a built-in Wi-Fi modem, a GPS receiver for location indication and a cellular modem with two SIM cards or two modems for maximum link resiliency.

SecFlow-1p is equipped with serial interfaces for connectivity to legacy equipment. As a gateway, it converts legacy serial protocols to modern IP-based protocols, enabling seamless communication from IP SCADA to both old and new RTUs. This provides a single-box solution for multi-service applications and smooth migration to all-IP networks.

When equipped with LoRaWAN radio, SecFlow-1p aggregates multiple low-power low-bandwidth sensors/meters deployed over a wide area. This provides an ideal solution for rural and other non-dense areas saving CAPEX and OPEX.

SecFlow

SecFlow-1p features DIN-rail mounting, IP30 protection level, and wide operating temperature range (-40°C to 65°C) without fans. Powering options include an embedded, isolated DC power supply, to meet the harsh environmental requirements.

MARKET SEGMENTS AND APPLICATIONS

SecFlow-1p addresses the Industrial IoT market, with applications such as:

- Secure and resilient SCADA transport
- IIoT asset management
- Advanced resilient satellite communication
- Smart grid monitoring for power utilities
- Water resources management
- Smart meter concentration

SINGLE/DUAL LTE MODEMS AND GPS

SecFlow-1p features flexible configuration for one LTE modem with two SIM cards, or two embedded LTE modems, for maximum resiliency. GPS for location reporting is also supported.

5G wireless technology employed by SecFlow-1p is designed to provide higher peak data speeds of multiple Gbps, ultra-low latency, more reliability, massive network capacity, increased availability, higher performance and improved power efficiency.

** This feature will be released in a future version.*

RAD

Your Network's Edge®

SecFlow-1p

Industrial IoT Gateway

Data Sheet

RESILIENCY

A link redundancy mechanism allows tracking connectivity to specific IP addresses using fault propagation and IP monitoring capabilities.

ROUTING

SecFlow-1p features static routing, OSPF and BGP.

VPN SERVICES

The device features a VPN gateway with two operation modes:

- Inter-site connectivity using 30 IPsec tunnels
- Remote user access using SSH

Inter-site VPN-based encrypted link ensures L3 transparent connection of the Ethernet networks sites.

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

CONTAINERS – NEXT LEVEL OF FLEXIBILITY

SecFlow-1p can host containerized edge applications, supporting any 3rd party containers, which extend its original functionality to a new level for Industrial IoT solutions.

Containers can easily be installed and managed via the Docker CLI.

MANAGEMENT AND SECURITY

Management

SecFlow-1p can be managed via Web, CLI, or by NETCONF.

RADview supports fault management, task management and web shortcuts.

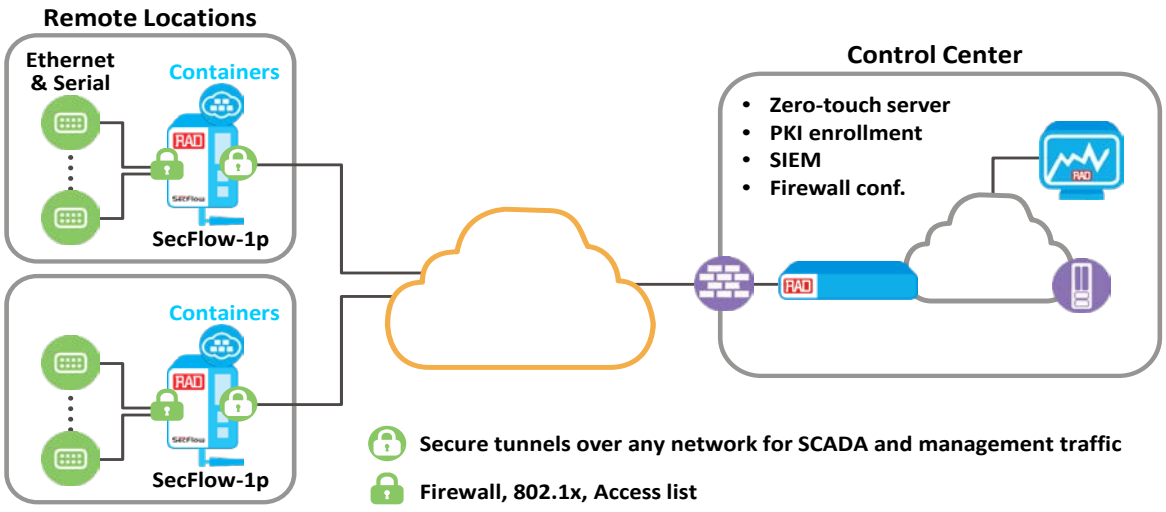
Embedded Advanced Security

For meeting the evolving security needs of distributed environments, SecFlow-1p includes embedded security features and options, such as stateful, zone-based firewall, and threat protection.

ZERO TOUCH PROVISIONING

For easy and safe mass-deployment, RAD offers Zero Touch provisioning thus reducing OPEX and providing a simple way to securely deploy thousands of elements in the network.

SecFlow-1p also supports a variety of access protocols including SFTP.



Secure Industrial IoT with Edge Computing

SecFlow-1p

Industrial IoT Gateway

Specifications

MEMORY AND STORAGE

DRAM	1 Gb, 2 Gb
Flash Storage	8 Gb, 32 Gb

INTERFACES

GNSS	GPS – American (default)
	Galileo – European
	Female SMA antenna connector
Ethernet	2 x 10/100/1000BASE-T ports
	2 x 1000FX, 4 x 10/100/1000BASE-T ports
Cellular	5G, LTE modem with dual SIM
	Female SMA antenna connector
SD Card	Max size: 32 Gb
Serial	1 RS-232 interface
	2 RS-232 interfaces (non-isolated or isolated)
	1 RS-232, 1 RS-485 interfaces (non-isolated or isolated)
	Connector: RJ-45
Wi-Fi	802.11b/g/n/ac dual band
	RP-SMA antenna connector

CELLULAR AND GPS

Cellular Authentication	PAP, CHAP
Firmware Upgrade	FOTA (Firmware upgrade Over the Air)
GPS	Location reporting
LTE	Dual LTE modems
	Dual SIM
	Single SIM
	eSIM support: removable SIM with eUICC
	Cellular bands – see Table 1
Multi APN	Supported for L450A/L450B
Operation Modes	PPP, IP
SIM Card	Mini SIM, 25 mm x 15 mm (0.98 in x 0.59 in)
	Form factor: 2 FF
Transmission Modes	Diversity
	MIMO

LORAWAN

LoRaWAN Module	EU868, RU864, US915, AS923 (1-4), AU915, KR920, IN865 bands
	SX1303 baseband processor
	8 x 8 channels LoRa packet detectors
	8 x SF5-SF12 LoRa demodulators, 8 x SF5-SF10 LoRa demodulators
	LoRaWAN Class A, B, C
	Packet forwarder

SecFlow-1p

Industrial IoT Gateway

Table 1. Integrated Cellular Modems

LTE Ordering Code	Modem Category and Frequency Bands
L1	**CAT 4 EMEA/Korea/Thailand** LTE FDD: B1, B3, B5, B7, B8, B20 LTE TDD: B38, B40, B41 WCDMA: B1, B5, B8 GSM: B3, B8
L3	**CAT 4 Australia/New Zealand/Taiwan/Brazil** LTE FDD: B1, B2, B3, B4, B5, B7, B8, B28 LTE TDD: B40 WCDMA: B1, B2, B5, B8 GSM: B2, B3, B5, B8
L4	**CAT 4 North America, Verizon wireless + AT&T LTE** LTE FDD: B2, B4, B5, B12, B13, B14, B66, B71 WCDMA: B2, B4, B5
L4P	**CAT 4 North American private networks (Anterix & CBRS) + Public networks** LTE TDD: B48 LTE FDD: Anterix B8 LTE FDD: B2, B4, B5, B12, B13, B14, B26, B66
L4T	**CAT 4 North America TAA (ready for PoC)** LTE: B1, B2, B4, B5, B12, B13, B14, B25, B26, B66, B71
L450A	**CAT 4 450 MHz for private LTE networks** LTE-FDD: B3, B7, B20, B31, B72
L450B	**CAT 4 450 MHz for private LTE networks** LTE-FDD: B3, B20, B87
L5	**CAT 4 Japan** LTE FDD: B1, B3, B8, B18, B19, B26 LTE TDD: B41 WCDMA: B1, B6, B8, B19
5G	**5G NR sub-6 with Global support** FR1 (sub-6GHz): n1, n2, n3, n5, n28, n41, n48, n66, n71, n77, n78, n79 LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B46, B48, B66, B71

WI-FI

2.4/5 GHz

Mode	Access Point, Client
Radio Mode	802.11a/b/g/n/ac
Security	WPA2-AES
Users	8 concurrent

HaLow

Radio Mode	802.11ah Wi-Fi HaLow
Bands	902.0 ~ 928.0 MHz
Bandwidth	1/2/4 MHz
Security	OPEN, WPA2-PSK (AES), WPA3-OWE, WPA3-SAE
	OFDM modulation with AES-CCMP encryption
Users	Max. 22 concurrent
Mode	Access point
	Station mode
	Simultaneous GATT server & client
Data Rate	Up to 4 Mbps
Range	Up to 1 km
Tx Power Gain	+23 dBm
Max Input Level	-10 dBm

MANAGEMENT

Console Port	Ethernet port with the highest port number (4 or 6, according to the device ordered), RJ-45 connector ***Note**: Console cable is not included and must be ordered separately (see Optional Accessories)*
Configuration	Web-based interface using HTTPS
	CLI with password-protected access
DHCP Server	IPv4, IP subnet pools support 256 addresses
Protocols	NETCONF server (v1.0/v1.1)/ YANG
	SNMP v2/v3
	SSH v2, HTTPS server, TFTP/SFTP
Users	User roles and privileges

SecFlow-1p

Industrial IoT Gateway

SECURITY

Trusted Platform Module	Secure boot
	TPM2.0
Access Lists	Standard and extended
Authentication	Locally, RADIUS, TACACS+ (also for authorization and accounting)
	Port-based: 802.1X on Ethernet and Wi-Fi
	Multi-factor authentication (MFA)
	One-time password (OTP)
Features	Login lockout
Firewall	Zone-based, stateful ACL rules
Public Keys	Public Key Infrastructure with X.509 certification for Zero Touch
	TLS 1.2/1.3
	Certificates with SCEP or EST CA server
Session	Monitoring and limiting
IoT	Terminal server
	SCADA protocol gateway*
	Serial tunneling, IEC 101 to IEC 104*

OAM

SLA Monitoring	ICMP echo, UDP echo
ZTP	On-net
	Off-net (over unsecured network) performs secure “call home” using Public Key Infrastructure (X.509)

ZONE-BASED FIREWALL

Type	Stateless
	Stateful
IPv4 and IPv6 NAT	SNAT, DNAT REDIRECT NAPT/NAT
Configuration	via Web GUI, SSH and SNMP
Rules	Interfaces are assigned to zones, for which a set of rules is configured
	IPv4 and IPv6
	Limit maximum number of simultaneous connections
	Limit rules by traffic (kilobyte per second/packet per second)
	Rule hits reported to local LINUX Syslog*
DoS Prevention	Blocklist
	Defend from IP sweep

IP ADDRESSING AND ROUTING

Addressing	IPv4 and IPv6
DHCP	Client, server, relay
	IP helper addresses
DNS	Server
NAT	Static/dynamic
	NAPT/NAT
Routing Protocols	OSPF v2, BGP v4
	VRRP
	IP-BFD for fast route propagation*
Routing Technologies	Static
	Policy-based
	VRF (10), router Interfaces (32)

RESILIENCY

Link Redundancy	Tracking connectivity to specific IP addresses using fault propagation and IP monitoring
ERPS	Ethernet Ring Protection Switching

DIAGNOSTICS

Features	Traceroute, ping
	Syslog
	Port mirroring
	Alarm and event logs
IoT	Setting dry contacts based on pre-defined events, generating syslog and device log event
	SNMP traps on events
Dry Contacts	2 In, 2 Out (default)
	3 In, 1 Out (special ordering option)
LEDs	Including alarm indication and cellular RSSI level

TIMING

Date and Time	Local time setting
Protocol	SNTPv4

** This feature will be released in a future version.*

SecFlow-1p

Industrial IoT Gateway

IP QUALITY OF SERVICE

Classification	Port-based, IP-based, DSCP
Egress Queues	8 queues per port
Queuing	Class-based, SPQ, WFQ
Scheduling	Strict Priority/WRR
Traffic Class Actions	CoS mapping (queues)
	Marking, remarking (DSCP)
Traffic Processing	Shaping

IP VPNS

IPsec	Up to 30 tunnels
DH Groups	1 (768-bit modulus) 2 (1024-bit modulus) 5 (1536-bit modulus) 14 (2048-bit modulus) 19 (256-bit elliptic curve) 20 (384-bit elliptic curve)
ESP Algorithms	AES CTR 128, 256 and 192, AES GCM 128 and 256, ChaCha20-Poly1305
IKE Algorithms	ECDH-SHA2 NISTP 521, 384 and 256, Curve25519-SHA256, DH-Group18-SHA512, DH-Group17-SHA512, DH-Group16-SHA512, DH-Group15-SHA512, DH-Group14-SHA256, DH-GEX-SHA256
IKE Hashing Algorithms	SHA2-256-128-HMAC, SHA2-512-256-HMAC
Protocols	Policy- and route-based IPsec, GRE
	GREoIPsec
	IKEv1, IKEv2
	DMVPN client, DMVPN phase 3
	L3 IPsec VPN
	PPPoE supporting Broadband or LTE access
Technologies	NAT traversal
	Interoperability with SCEP server 2012 and higher

EDGE COMPUTING (CONTAINERS)

Containers	Docker

INTEGRATED ROUTING AND BRIDGING (IRB)

Bridges	Max 4
Bridge Ports	Max 32
MAC Addresses per Bridge	Max 512
Operation Mode	VLAN-aware VLAN-unaware
	Static or dynamic MAC addresses

GENERAL

Compliance	EMC: EN 55032, EN 55035, EN 50121-4*, ETSI EN 301 489-1, ETSI EN 301 908-1, CFR 47 FCC, VCCI-CISPR 32, AS/NZS CISPR 32
	EU: CE
	FCC and TUV for North America
	Safety: UL 62368-1, IEC/EN 62368-1
	Industry standards: IEC 61850-3, IEEE 1613**
	Hazardous locations (Hazloc) standards: UL 121201, CSA C22.2 (Class I & II – Div 2) & (Class III - Div 1 & 2) For use in Class I, Division 2 Groups A, B, C, D) Temp. Class T4**
	US Carrier: PTCRB, AT&T, Verizon*, T-Mobile

** Please contact the PLM for a certified platform

Environment

Storage Temperature	-40 to 85°C (-40 to 185°F)
Operating Temperature	DIN rail: -40 to 65°C (-40 to 149°F)
Humidity	Up to 90%

Physical

Height mm (in)	138 (5.43)
Width	53.3 (2.1)
Depth	123.3 (4.85)
Weight	0.88 kg (1.94 lb)

Power

DC	12-48 VDC (10-60 VDC)
	Non-isolated
WDC	24-48 VDC (20-60 VDC)
	12-24-48 VDC (10-60 VDC)*
	Isolated
12V	12- 24 VDC (11-30 VDC)
	Isolated
EXT AC Power Supply	90–240VAC
Power Consumption	< **5W**
	Idle: 3.0W**
	Typical: 3.6W**
	Maximum: 4.5W**
	**On a platform with one LTE modem

** This feature will be released in a future version.*

Ordering

The information below represents examples of supported configurations. For additional configuration options, please contact your local RAD partner.

SF-1P/E1/DC/4U2S/2RS/L450A/2R
SF-1P/E1/DC/4U2S/2RS/2R
SF-1P/E1/DC/4U2S/2RS/L1/G/2R
SF-1P/E1/DC/4U2S/2RS/L1/G/L1/2R
SF-1P/E1/DC/4U2S/2RS/L3/G/2R
SF-1P/E1/DC/4U2S/2RS/LRA/2R
SF-1P/E1/DC/4U2S/2RSM/5G/2R
SF-1P/E1/DC/4U2S/2RSM/5G/G/LRB/2R
SF-1P/E1/DC/4U2S/2RSM/5G/LRA/2R
SF-1P/E1/DC/4U2S/2RSM/L1/G/LRA/2
SF-1P/E1/DC/4U2S/2RSM/L1/G/WF/2R
SF-1P/E1/DC/4U2S/2RSM/L3/G/2R
SF-1P/E1/DC/4U2S/2RSM/L3/G/L3/2R
SF-1P/E1/DC/4U2S/2RSM/L4/G/LRA/2R
SF-1P/E1/WDC/4U2S/2RMI/L4/RG/2R

ORDERING OPTIONS

Some options are not supported by all models. Some option combinations are invalid or may require a minimum order. To determine the BOM for your application, please contact your local RAD partner.

Cellular Ports	L1	LTE modem for Europe
	L3	LTE modem for Oceania and Latin America
	L4	LTE modem for North America, Verizon wireless + AT&T
	L5	LTE modem for Japan
	L450A	LTE modem 450MHz for private LTE networks, LTE-FDD: B3/7/20/31/72
	L450B	LTE modem 450MHz for private LTE networks, LTE-FDD: B3/20/87
	L4P	LTE modem for North American private networks (Anterix & CBRS) + Public networks
	5G	5G modem with SA and NSA global support with fallback to LTE or 3G L4T (Ready for PoC)

Notes:

- *In options with dual modems, both modems are of the same type (L1, L3, L4, L4P, L450A or L450B).*
- *The cellular modem is supplied with two matching antennas (see Supplied Accessories).*

Certification	RG	IEC 61850-3 and IEEE-1613 compliant
Dry Contacts	Default	2 input + 2 output
	3DI	3 input + 1 output
Ethernet Ports	2U	2 x UTP ports
	4U2S	4 x 10/100/1000BASE-T and 2 x SFP ports
GNSS	G	Integrated GPS

Note: *The GPS modem is supplied with one antenna (see* Supplied Accessories*).*

LoRaWAN Modem	LRA	LoRaWAN modem with 8 channels and frequency scheme selectable for US915, AU915, AS923-(1-4), or KR920
	LRB	LoRaWAN modem with 8 channels and frequency scheme selectable for EU868, IN865, or RU864

***Note*:** *The LoRaWAN modem is supplied with one antenna matching the frequency ordered.*

Power Supply	DC	12/24/48V input voltage (10–60 VDC), non-isolated
	WDC	24/48 input voltage (20–60 VDC), isolated
	12V	12/24 input voltage (11–30 VDC), isolated
RAM	Default	1G RAM
	2R	2G RAM
Serial Ports	1RS	1 RS-232 interface
	2RS	2 RS-232 interfaces
	2RSM	1 RS-232, 1 RS-485 interfaces
	2RSI	2 RS-232 interfaces, isolated
	2RMI	1 RS-232, 1 RS-485 interfaces, isolated
Wi-Fi Interface	WF	Wi-Fi 2.4 GHz/5 GHz
	WH	Wi-Fi 900 MHz HaLow

Note: *The WiFi modem is supplied with two matching antennas (see Supplied Accessories).*

SecFlow-1p

Industrial IoT Gateway

Data Sheet

SUPPLIED ACCESSORIES

SF-ANT-GPS-PAS-3DBI-MAG/3M
GPS passive antenna, 3m, for options with integrated GPS

SF-ANT-LTE699-4DBI-SMA
LTE antenna, 4dBi, for options with LTEx modems

SF-ANT-WIFI-DUALBAND-3DBI-SMA
WiFi dual band antenna, 3 dBi, for options with WiFi modem

SF-ANT-LoRA-3DBI-SMA
LoRaWAN antenna, 3 dBi, for options with LoRaWAN modem

Note: *The LoRaWAN modem is supplied with one antenna matching the frequency ordered: EU868, AU915, US915, AS923 (1-4), RU864, KR920, IN865*

SF-1P-CONN/TB
TB connectors for the DC power and dry contacts

OPTIONAL ACCESSORIES

For an AC power supply, order a DC option +one of the two power supplies below.

SF-AC-12VDC-20W-EX

External AC to 12 VDC 20W power supply

SF-AC-12VDC-16W-JP

External AC power supply for Japanese market

SF-AC-12VDC-20W

External DIN Rail AC to 12 VDC 20W power supply

CBL-ETH/STP/STR/1M
Console port cable

CBL-RJ45/D9/F/6FT
Serial RS-232 data port cable

CBL-SF-RJ45-RS485
Serial RS-485 data port cable

RM-DIN-SINGLE
Adaptor for mounting a single device in a 19-inch/23-inch DIN rail

RM-DIN-19
Adaptor for mounting a single/multiple devices in a 19-inch DIN rail

SF-ANT-LTE700-7DBI-MGNT

Outdoor magnetic base antenna for SecFlow-1p LTE options and for LoRaWAN 868 and 915 MHz, 7 dBi

SF-ANT4G-2M
LTE screw antenna, 2m (6.5 ft) cable, 3 dBi, 699-960 MHz/ 1710-2170 MHz/2500-2690 MHz

SF-ANT4G-5M
LTE screw antenna, 5m (16.4 ft) cable, 3 dBi, 699-960 MHz /1710-2170 MHz/2500-2690 MHz

SF-ANT-GPS-PAS-3DBI-MAG/3M
GPS passive antenna, 3m

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