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General Availability

PowerFlow-2-10G

Industrial 10G Core Switch

- Flexible deployment scenarios using xSTP, ERPS and ultra-fast recovery with PF-ring and PF-chain
- L2 with security features
- Variety of input voltage and POE feeding options including POE+
- Ethernet switching
- Wide range of operating temperature

PowerFlow-2-10G are industrial grade Ethernet switches equipped with 4 10G SFP+ ports and various combinations of UNI ports. The devices have fanless design with redundant, isolated power supplies and can be mounted in 19-inch standard EIA racks. PowerFlow-2-10G offers various L2 Ethernet functions (IGMP, VLAN, QoS, ACL, Security, IPv6 for management, bandwidth control, and port mirroring) and also supports PF-Ring redundancy protocol. The switches can be centrally managed by RADview.

MARKET SEGMENTS AND APPLICATIONS

PowerFlow-2-10G are deployed in power utilities, railways, traffic controllers, and safe city applications that require advanced Layer-2 functionality. Many PowerFlow-2-10G applications are PoE-intensive or aggregate multiple 1 Gb rings. PowerFlow-2-10G systems are fully compliant with the 50121-4 requirement for railways. The switches provide a variety of redundant functions to increase the reliability and deployment flexibility of the communications system, including a variety of Ethernet functions, such as xSTP, G.8032 and ultra-fast recovery using PS-ring and PF-chain unique features. Dual DC (dual AC or combination) power supplies address a wide range of installation scenarios.

INTEROPERABILITY

PowerFlow-2-10G devices are compatible with PowerFlow-2 and SecFlow-2 (RSTP, ERPS).

ETHERNET

PowerFlow-2-10G support IEEE802.1q, IEEE802.1d and relevant parts of IEEE802.3.

RESILIENCY

Ethernet Ring Protection

PowerFlow-2-10G support STP, RSTP, MSTP, ITU-T G.8032v1, G.8032v2 Ethernet Ring Protection Switching (ERPS), and PF-Ring for redundant cabling.

PowerFlow-2-10G provide 14 ring instances, with each ring supporting the PF-Ring, PF-Chain or Sub-Ring type for flexible networking applications.

With a recovery time of <10 ms for up to 250 units, PF-Ring can be used to establish Redundant Ethernet Rings.

LAG

The full Gigabit capability supports Link Aggregation (Dynamic IEEE 802.3ad LACP) for up to 14 trunk groups (maximum 8 ports per group) providing increased bandwidth, high performance, and quick transfer of large amounts of video, voice and data across a network.

RAD

Your Network's Edge®

PowerFlow-2-10G

Industrial 10G Core Switch

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TIMING AND SYNCHRONIZATION

PowerFlow-2-10G support IEEE1588 PTPv2 for precise time synchronization, allowing each port can operate in Transparent Clock mode.

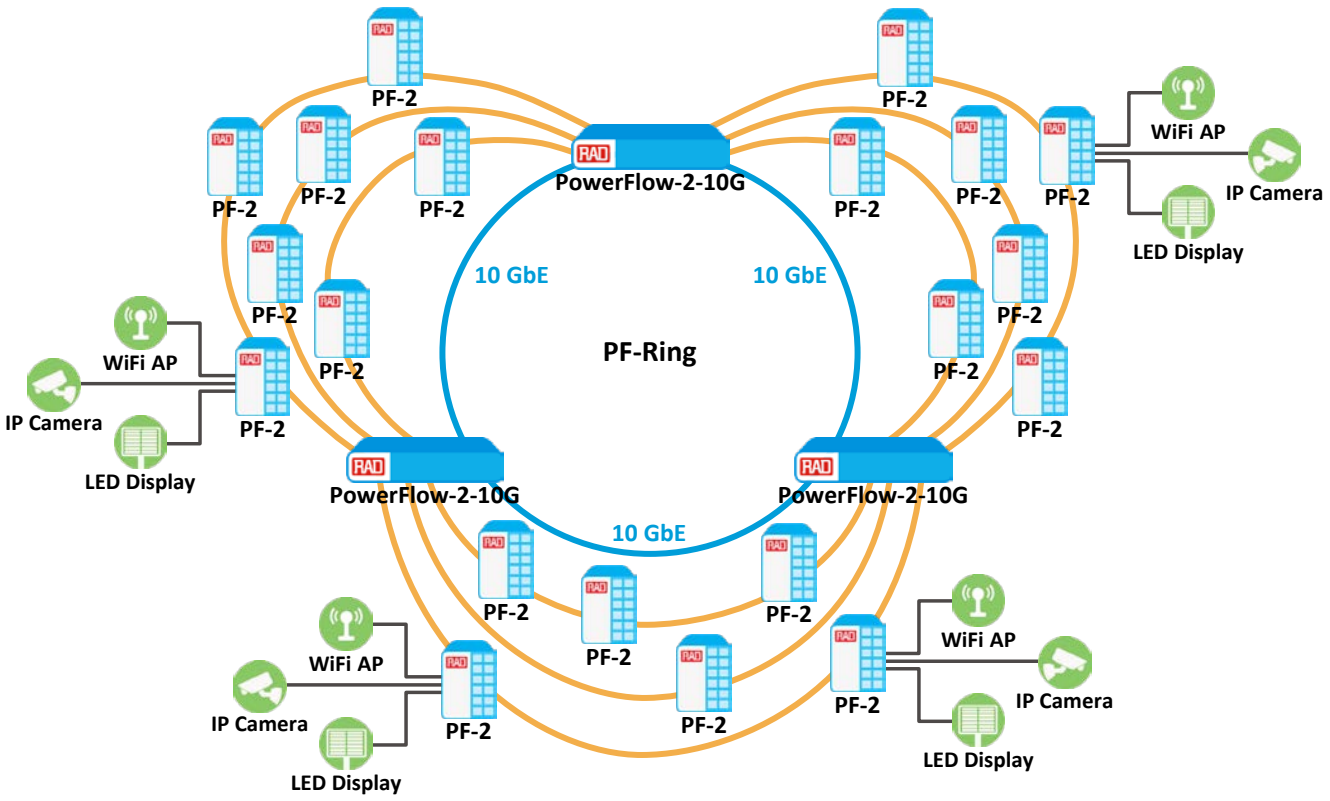
MONITORING AND DIAGNOSTICS

Diagnostic features include RMON (1, 2, 3, 9 groups), RMON II, RFC1213 MIB II, IP Source Guard, and Port Mirroring.

MANAGEMENT AND SECURITY

PowerFlow-2-10G can be managed via:

- CLI
- Web-based application
- SNMPv1, SNMPv2c, SNMPv3



10GbE Backbone Application

PowerFlow-2-10G

Industrial 10G Core Switch

Data Sheet

Specifications

CAPACITY

Switching Capacity	Up to 136 Gbps
Forwarding Rate	Up to 107.136 Mpps
Max. Frame Size	Jumbo Frame: 10K
MAC Address Table	32K
Memory Buffer	4 MB for packet buffer

ETHERNET INTERFACES

Ports	See Table 1
Power over Ethernet (PoE)	PoE+ (30W per port): 802.3at
VLAN	IEEE 802.1q VLAN, up to 4094 802.1Q VLAN VID
	IEEE 802.1ad Q-in-Q
	MAC-based VLAN, up to 256 entries
	IP subnet-based VLAN, up to 128 entries
	Protocol-based VLAN (Ethernet, SNAP, LLC), up to 128 entries
	VLAN translation, up to 256 entries
	MVR (Multiple VLAN Registration)
	GVRP (GARP VLAN Registration Protocol)

MANAGEMENT

Control Port	RS-232 interface, RJ-45 connector
Management Port	SFP model: dedicated MGMT port UTP model: any of the UTP ports (1-24)
Options	CLI with password-protected access
	Web-based
	SNMPv3

TIMING

Clients	NTP client
	SNTP client
IEEE1588 PTP V2	Transparent Clock

SECURITY

ACL	L2: MAC address SA/DA/VLAN
	L3: IP address SA/DA, subnet
	L4: TCP/UDP
TACACS+	Authentication, Authorization (all models), Accounting (/24SFP only)
RADIUS	Authentication, Accounting
SSL/SSH v2	Authentication
IEEE 802.1X	Port-based
	MAC-based

QUALITY OF SERVICE (QOS)

Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL (QoS Control List): Frame Type, Source/Destination MAC, VLAN ID, PCP, DEI
	QCE (QoS Control Entry): Protocol, Source IP, IP Fragment, DSCP, TCP/UDP port number
Bandwidth Control	Ingress: port-based
	Egress: • Port-based • Per queue/per port shaper
DiffServ Remarking	RF 2474
Storm Control	Unicast, broadcast, multicast
IGMP/MLD	IGMP snooping v1, v2, v3
	MLD snooping v1, v2
	Port filtering profile
	Throttling
	Fast leave
	Maximum multicast group: up to 1022 entries
	Query/static router port

RESILIENCY

ERPS v2	Recovery time <50 ms
	Single ring, Subring, and multiple ring network topology
	Up to 14 instances of PF-Ring. PF-Chain or Subring, with up to 250 nodes in a ring
Link Aggregation	Static (hash with SA, DA, IP, TCP/UDP port), up to 16 trunk groups
	Dynamic (IEEE 802.3ad LACP), up to 16 trunk groups
	Up to 8 ports per group

PowerFlow-2-10G

Industrial 10G Core Switch

DIAGNOSTICS

Alarm Relay	Relay outputs with current carrying capacity of 1A @24 VDC, 2-pin removable terminal block
DI Input (for DIN model only)	State 1: 17 to 30 VDC State 0: 0 to 15 VDC
Indicators	LED indicators for power and link activity
Logging	Syslog server
	Warning messages

GENERAL

Environment

Chassis	Rugged, metal
	IP30 protection
	Fanless
Storage Temperature	-40 to +85°C (-40 to 185°F)
Operating Temperature	-40 to +60°C (-40 to 140°F)
Humidity	5% to 95% (non-condensing)

Physical

See Table 2

Power

See Table 2

Table 1. PowerFlow-2-10G Product Options, Feature Comparison

Specification		ETR/48R/4SFPP/4SFP/24PH ACR/4SFPP/4SFP/24PH	ETR/48R/4SFPP/4SFP/24U	48R/4SFPP/4ETH/24SFP	ACR/4SFPP/4ETH/24SFP	ACDC/4SFPP/4ETH/24SFP	DIN/48R/4SFPP/16PH (DIN Rail)
Interfaces	10/100/1000 Base-T(x) RJ-45	24	24	4	4	4	16
	FE/GbE SFP	4	4	24	24	24	-
	1G/2.5G/10GBase-X SFP+	4	4	4	4	4	4
	PoE Interfaces	24	-	-	-	-	16
	Total	32	32	32	32	32	20
Management	CLI	+	+	+	+	+	+
	OS	eCos	eCos	Linux	Linux	Linux	eCos
	Web-based	+	+	+	+	+	+
	Modbus/TCP	+	+	-	-	-	+
	IPv6 Management	+	+	+	+	+	+
	IEEE 802.1ag CFM	+	+	+	+	+	+
	IEEE 802.3X	-	-	Flow control for full duplex			-
	SW & Config Upgrade	TFTP, HTTP	TFTP, HTTP	SFTP, TFTP, HTTP			TFTP, HTTP
	ITU-T Y.1731 Performance monitoring (PM)	+	+	+	+	+	+
	Advanced PoE Management	+	-	-	-	-	+

Table 2. Power, Physical, and Environmental Specifications – PowerFlow-2-10G Product Options

Specifications		PF-2-10G/ETR/48R /SFPP/4SFP/24PH PF-2-10G/ACR/ 4SFPP/4SFP/24PH	PF-2-10G/ETR/ 48R/4SFPP/ 4SFP/24U	PF-2-10G/48R/ 4SFPP/4ETH/ 24SFP	PF-2-10G/ACR/ 4SFPP/4ETH/ 24SFP	PF-2-10G/ACDC/ 4SFPP/4ETH/ 24SFP	PF-2-10G/DIN/ 48R/4SFPP/16PH (DIN Rail)
Power	Power Supply*	48R option: Dual redundant 48 VDC** ACR option: Dual redundant 110/220 VAC (85VAC~264 VAC)	Dual redundant 48 VDC	Dual redundant 48 VDC	Dual redundant wide range AC (100 – 240V)	1x48 VDC and Wide range AC (100– 240 V)	Dual redundant 48VDC (46~57VDC) **
	Power Consumption	30.4W	33W	<36W	<36W	<36W	28.5W
	PoE Power Budget	48R option: 400W ACR option: 150W	-	-	-	-	300W
	Total Power Consumption	33W without PoE load 48R option: 430W ACR option: 209W with 150W PoE load	33W	-	-	-	337W
Size	Height, cm (inch)	4.4 (1.73)	4.4 (1.73)	4.4 (1.73)	4.4 (1.73)	4.4 (1.73)	160 (6.3)
	Width, cm (inch)	44 (17.3)	44 (17.3)	44 (17.3)	44 (17.3)	44 (17.3)	77 (3.0)
	Depth, cm (inch)	48R option: 31.5 (12.4) ACR option: 33.0 (13.0)	31.5 (12.4)	28.0 (11.0)	28.0 (11.0)	28.0 (11.0)	155.6 (6.1)
	Weight, kg (lb)	48R option: 4.46 (9.8) ACR option: 5.2 (11.5)	4.26 (9.4)	3.72kg (8.2)	3.92kg (8.64)	3.82kg (8.42	2.065 (4.55)

* Negative 48VDC voltage is not supported.
** For IEEE802.3at PoE+ applications 50~57V input is recommended

Ordering

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

PF-2-10G/ETR/48R/4SFPP/4SFP/24PH

PF-2-10G/ETR/48R/4SFPP/4SFP/24U

PF-2-10G/ACR/4SFPP/4SFP/24PH

PF-2-10G/48R/4SFPP/4ETH/24SFP

PF-2-10G/ACR/4SFPP/4ETH/24SFP

PF-2-10G/ACDC/4SFPP/4ETH/24SFP

PF-2-10G/DIN/48R/4SFPP/16PH

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 or any standard compliance-related information, please contact your local RAD partner.

Chassis	Default	19-inch chassis
	DIN	DIN Rail enclosure
Power Supply	48R	Dual redundant 48 VDC
	ACR	Dual redundant 110/220VAC (85VAC~264VAC)
	ACDC	48 VDC and wide-range AC
Ethernet Ports	4SFPP	Four 1G/2.5G/10G SFP+ ports
	4SFP	Four 100/1000Base-X SFP ports
	4ETH	Four 100/1000Base Combo (UTP/SFP) ports,
	24SFP	24 x 100/1000Base-X SFP ports
	24PH	24 10/100/1000 Base-T(X) ports, PoE+ (maximum 150W)
	24U	24 10/100/1000 Base-T(X) ports
	16PH	16 x 10/100/1000 PoE+ ports

SUPPLIED ACCESSORIES

PF-CBL-RJ45-DB9
Console cable RJ-45 to DB9

PF-2-TB
Terminal block for power input connector as per specific device

PF-2-10G-RM-KIT
Mounting kit for installing the unit into a 19-inch rack (all models except PF-2-10G/DIN/48R/4SFPP/16PH)

PF-2-DIN-RAIL-KIT-130x52mm
Mounting kit for installing a PF-2-10G/DIN/48R/4SFPP/16PH device on a DIN rail – 130 x 52mm with 8 screws, Phoenix contact

PowerFlow-2-10G

Industrial 10G Core Switch

OPTIONAL ACCESSORIES

External Power Supplies

SF-AC-48VDC-40W (to be used with non-POE options)
External DIN rail AC to 48 VDC power supply, 40W, -20 to 60°C (-4 to 140°F); 20W at 60°C (140°F) and above

SF-AC-48VDC-120W
External DIN rail AC to 48 VDC power supply, 120W, -20 to 60°C (-4 to 140°F); 60W at 65°C (149°F) and above

SF-24VDC-48VDC-240W
24 VDC to 48 VDC power supply, 240W, -40 to 50°C (-40 to 122°F); 120W at 65°C (149°F) and above

SF-AC power supplies share the load in applications where double SF-AC power supplies are used per PowerFlow-2 switch.

Mounting Kits

PF-2-WALL-MOUNT-KIT-76X75MMX2
Mounting kit for installing PF-2-10G/DIN/48R/4SFPP/16PH on a wall – 2 x 76 x 75 mm with 4 screws

RM-DIN-SINGLE
Mounting kit for installing a DIN rail device in a 19/23-inch rack

RM-DIN-19
Mounting kit for installing multiple DIN rail devices in a 19-inch rack

Transceivers

For the list of available transceivers, see the **Pluggable Transceivers data sheet** on www.rad.com

Note: *It is strongly recommended to order this device with* ***original*** *RAD SFPs* ***installed****. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.*

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