NEOX NETWORKS
NEXT GENERATION NETWORK VISIBILITY

NEOXPacketRaven Hybrid 100Base-FX Multimode 100Mbps Fiber TAPs
with Data Diode Function

QUICK USER GUIDE

Hybrid Fiber TAPs with media conversion and signal regeneration are decoupling elements for passive, secure and reliable tapping of network data in optical networks. These TAPs are looped into the fiber-optic line to be monitored and route out the entire data traffic while maintaining data integrity, without interruption and without packet loss.

Using conventional SPAN ports, also known as mirror ports, on the other hand, can distort the result, as this copying process works in store-and-forward mode and, for example, discards FCS/CRC faulty packets on OSI layer 2 instead of providing these Ethernet frames to the security or monitoring tool.

Our Network TAPs do not have a MAC or IP address, but work entirely on OSI Layer 1 and cannot be traced in the network without special and expensive measuring equipment. Hackers and attackers therefore have no chance. As the integrity of the outgoing data remains unaltered due to this tapping method, our Network TAPs are increasingly used in the areas of network forensics, security and monitoring.

Furthermore, our Hybrid 100Base-FX TAPs behave passively on the network side, which means that there is no interruption of network traffic in the event of a power failure.
In order to ensure the highest possible reliability on the monitoring side, our Hybrid Fiber TAPs are equipped with redundant power supplies, but can also be additionally operated or secured with 12-48V DC voltage.

In addidtion, our TAPs work like a data diode and the monitoring ports are physically isolated from the network ports, which prevents access to the network via the monitoring ports on the hardware side for security reasons. Therefore, our Hybrid Fiber TAPs guarantee a reliable network analysis or security investigation without compromise.

Our models of the portable PacketRaven Network TAPs product family were designed as portable TAPs, but can also be installed in a 19" mounting frame in data centers using a mounting kit or on a DIN rail using a DIN rail clip.

These active hybrid Fiber TAPs support a network speed of 100Mbps (100Base-FX).

With PacketRaven Network TAPs you get permanent network access without risk and provide e.g. your monitoring tools with 100% reliable network data - without introducing a single point of failure.

- Full Network Transparency
- No Impairment of Data Traffic
- 100% Network Data
- Invisible for Attackers
- No Network Access via Monitoring Port
- Flexible to Use
- Plug-n-Play
- Failure Protection on Power Loss
- Redundant Power Supply
- Various Split Ratios
- Fast and Precise
- Support Jumbo Frames
- Made in Germany

HIGHLIGHTS

- Safe, rock-solid FPGA-based design
- 100% feedback-free due to galvanic isolation (Data Diode Function)
- Support for up to 16k Jumbo frames
- Mirrors 100% of data traffic including FCS/CRC erroneous packets that may be discarded by SPANs
- Plug-n-Play - operating mode change via DIP switch
- No interruption of network traffic in case of TAP power failure
- Power supply via 2 redundant AC/DC power supplies (5V) possible and/or 12-48V DC voltage
- Various mounting options available
- Designed, assembled, certified and tested in Germany

FRONT VIEW - CONNECTIONS & LEDS

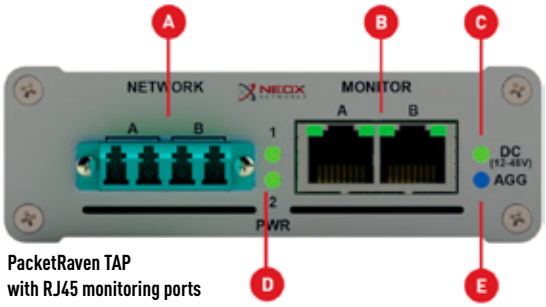
(A) LC Network ports A and B

(B) RJ45/SFP Monitoring ports A & B and Status LEDs
(see page 6)

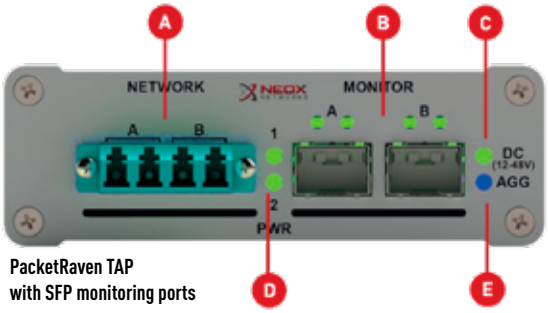
(C) 12-48V DC Power LED
If power is supplied via the 12-48V DC connection, this LED lights up.

(D) 2 Power LEDs for AC/DC 5V
It is possible to connect up to 2 power supply units to ensure power supply redundancy.

(E) Aggregation mode LED *(see page 6)*
If the Aggregation mode is activated instead of the standard Breakout mode, this LED lights up.



PacketRaven TAP with RJ45 monitoring ports

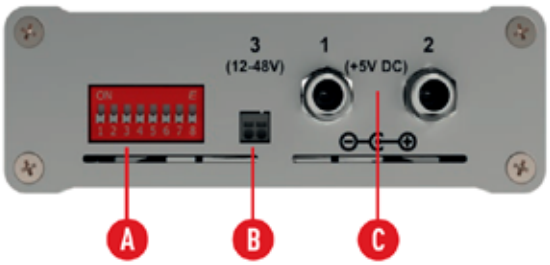


PacketRaven TAP with SFP monitoring ports

BACK VIEW

(A) DIP switch for setting the operating mode and the monitoring port speed *(see page 7)*

(B) Connection for 12-48V DC voltage
The polarity at the DC connection does not matter, as the TAP automatically detects the live line and passes the power supply to the TAP accordingly in the required form!



(C) Redundant connections for 2 AC/DC power supplies (5V)
For reasons of compatibility and EMC protection, our TAPS may only be operated with the supplied power supplies certified together with the TAP. If the TAP is nevertheless operated with power supplies other than those supplied, any warranty claim granted for the TAP will be voided!

MOUNTING OPTIONS

TAPs with rack mount frame bracket or DIN rail clip can of course also be used in mobile applications!

1. Mobile Use

Portable models - these models have no special mounting options and are primarily designed for mobile use.

PacketRaven Network TAP for mobile use

Handy & portable

2. Server Rack Mounting

To install our portable TAPs in a server rack, you need our server rack mounting frame with item number **PRP-1U3-V2**, as well as a rack-mount frame mounting kit (item number **PRP-1U3-CLIP**) for the TAP.
The server rack mounting frame PRP-1U3-V2 provides space for up to 3 portable PacketRaven Network TAPs. Both components are available as accessories.

After removing the rackmount kit brackets of the TAP, if any, **DO NOT screw** the screws **without brackets** into the enclosure, otherwise sensitive parts could be damaged!

Server rack mounting frame PRP-1U3-V2
for up to 3 PacketRaven portable Network TAPs

TAP with rack mounting kit for
server rack mounting frame PRP-1U3-V2

3. DIN Rail Mounting

As a further alternative, we also offer a top-hat rail clip for our TAPs for mounting on a TS35/7.5 DIN top-hat rail. This clip can be rotated by 180° so that the connections of the TAP can be aligned according to the respective requirements. This DIN rail clip, available as an accessory, has the item number **PRP-DIN-CLIP**.

After removing the DIN rails clip, if any, **DO NOT screw** the screws into the TAP housing without the clip, otherwise sensitive parts could be damaged!

TS35/7.5 DIN rail

Network TAP
with DIN rail clip

ADVANCED FUNCTIONS OF **HARDENED TAPS**

Preconfigured

Secure Boot

Security Seal

Safety Screws

Our Network TAPs with RJ45 monitoring output work like a data diode and thus physically isolate the monitoring ports from the network ports. This ensures that, for security reasons, access to the network via the monitoring ports is prevented on the hardware side.

PacketRaven Network TAPs are therefore already in the standard version among the network components through which an attack vector is excluded.

For high-security areas according to IEC 62443 and critical infrastructures (CRITIS), however, even this is sometimes not sufficient, which is why NEOX Networks now also offers a specially hardened version of its TAPs.

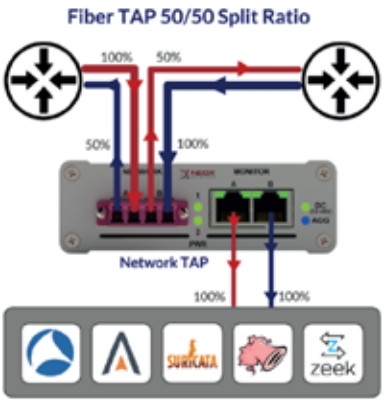
If desired, these TAPs can be delivered pre-configured and then do not allow any subsequent configuration changes.
In addition, they are secured against unwanted or unnoticed opening by special screws and security seals.

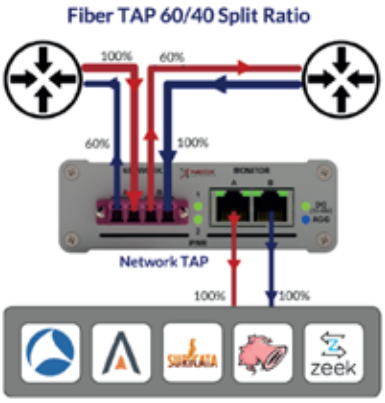
And to round it all off, these TAPs also have a specially secured and encrypted firmware. Secureboot checks each time the TAP is started whether the firmware to be executed has a valid signature and an authorised public key. If this is not the case, the TAP cannot be put into operation.

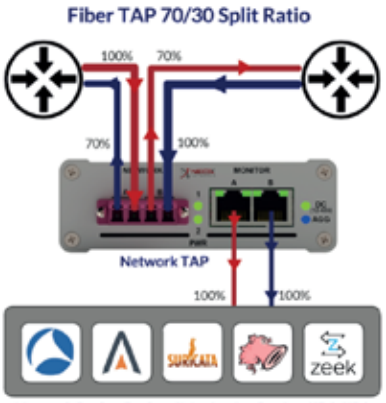
SPLIT RATIOS / LIGHT EXTRACTION

To extract traffic copy from an optical fiber link, a portion of the available signal power must be strategically separated. This process is guided by the split ratio., which represents the proportion of the signal power that remains devoted to the primary fiber link, compared to the fraction that is redirected towards the monitoring ports of the TAPs. The proficient management of this split ratio is vital to maintain optimal network performance while ensuring robust network monitoring capabilities.

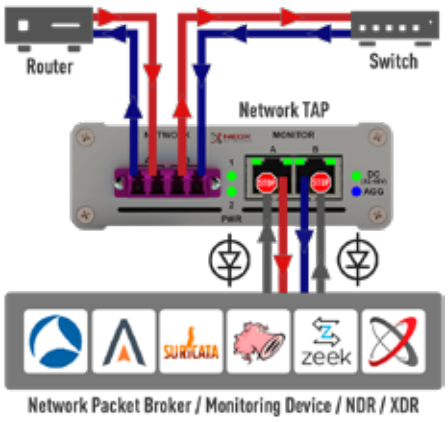
A predetermined split ratio, such as 70/30, denotes that 70% of the optical signal power is reserved for the network link, with the remaining 30% being diverted to the monitoring ports. Contrary to this, TAPs equipped with RJ45/copper or SFP-based monitoring outputs utilize Optical-Electrical-Optical (OEO) conversion - a process that translates the optical signal into a newly born electrical signal. This process ensures that the monitoring port is provided with the full, undiminished signal strength.







DATA DIODE FUNCTION



Data Diodes ensure unidirectional communication and ensure that data traffic can only flow in one direction.

Unidirectional network devices are typically used to provide information security or protection of critical digital systems, such as industrial control systems or production networks from cyber-attacks.

Our TAPs work like a diode and, for security reasons, do not allow access to the network via the monitoring ports.

By adding this further security layer, it is thus not possible to compromise the network connection and the productive network.

INDIVIDUALLY CONFIGURED AVAILABLE

Due to the FPGA chipset on which our active TAPs are based, it is possible to programme these models according to customer-specific requirements.
For example, TAPs with fixed operating mode and/or fixed speed, time stamping of outgoing packets, and much more.

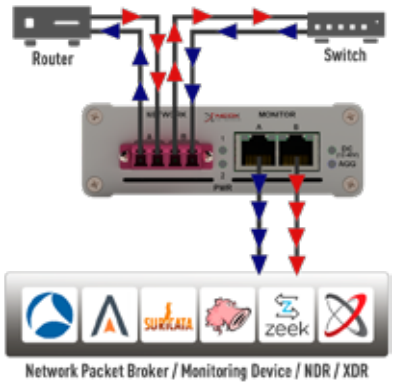
CONNECTION RELIABILITY IN CASE OF POWER LOSS

With all our active Hybrid Network TAPs it is guaranteed that a loss of the TAP power supply will not lead to a failure of the active network line.
Only the devices connected to the monitoring port may no longer be supplied with data.

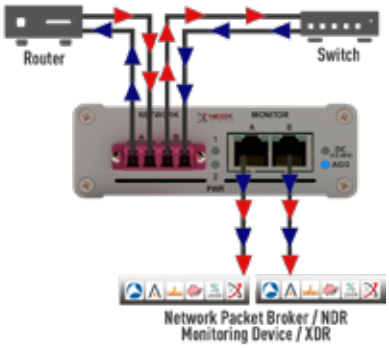
AVAILABLE **OPERATING MODES**

Breakout: In this operational mode each direction in the TAP respectively the send (Tx) and receive (Rx) signals are sent to the monitoring ports separately.
The network ports are fix set to 100Mbps and support any optical signal according to the ethernet standard 100Base-FX.
In Breakout mode the speed of the monitoring ports will be 100Base-TX for all TAPs with RJ45 interfaces or 100Base-FX for all TAPs with SFP interfaces.
The monitoring speed can not be modified and will be at the same speed as the network port to preserve the inter frame gap, the integrity and timing of the packets with less interference to the analysis system connected to the monitoring ports.

Breakout Mode



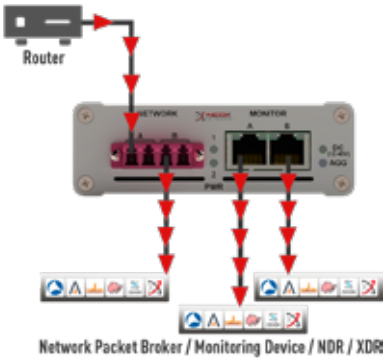
Aggregation Mode

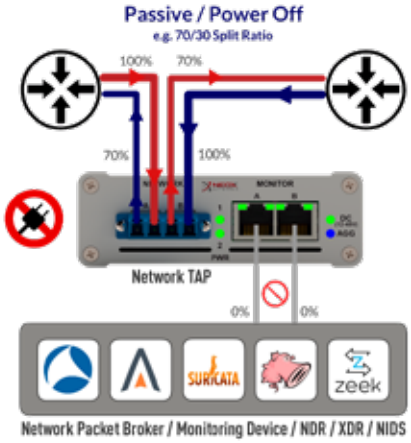


Aggregation: In this mode, the data streams (Tx) and (Rx) are bundled (combined) and output aggregated on both of the monitoring ports.
The speed of the monitoring ports can be modified with the DIP switches and either 100M or 1000M both are supported.
Please make note that in 100M mode you can encounter packet drops if the overall traffic received by the TAP exceeds 100Mbps. It's highly recommended to use the TAP in 1G mode when operating in aggregation mode.

Regeneration: Regeneration is used to capture 100% full duplex traffic that can be sent to multiple monitoring devices (up to 3 in this case) for analysis of your network.
In this mode, as with Breakout mode, the network speed settings are synchronised and the setting on the DIP switch is applied to all ports.

Regeneration Mode





Passiv/Power-Off: If the power supply fails, the active network connection is not interrupted!

Only the devices connected to the monitoring port are no longer supplied with data.

MEANING OF THE LEDS

Depending on the configuration of the TAP speed *(see page 7)*, the LEDs light up in different combinations.

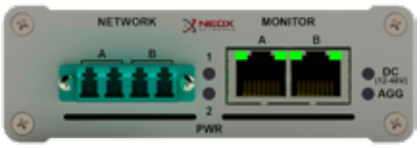
This Fiber TAP always offers 100M in Breakout mode. If you use the Aggregation mode, on the other hand, 100M or 1000M are available on the monitoring port.

As soon as the TAP displays the desired or configured operational mode via the LEDs, proper operation of the TAP is ensured.

LC/RJ45 TAP:

Breakout/Regeneration mode

100Base-TX
Monitoring port with 100M



Aggregation mode

100Base-TX
1000Base-T
Monitoring port with 100M or 1000M

During commissioning:
The green LEDs highlighted in the respective graphic light up permanently for a few seconds during the booting of the TAP

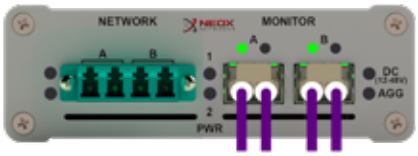
In operation:
The previously permanently lit LEDs flash when network traffic is present.

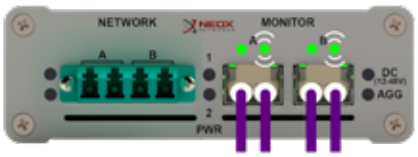
LC/SFP TAP:

The examples below use an SFP transceiver with LC ports, but of course an SFP transceiver with copper/RJ45 ports can also be used!

Breakout/Regeneration mode

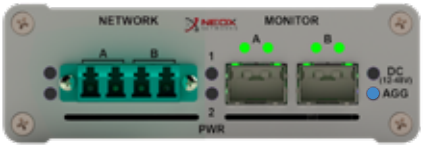
100Base-FX - Monitoring port with 100M



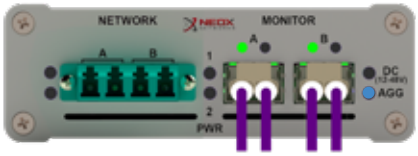


Aggregation mode

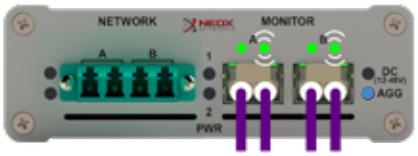
100Base-FX / 1000Base-T / 1000Base-SX / 1000Base-LX - Monitoring port with 100M or 1000M



During commissioning:
The green LEDs highlighted in the respective graphic light up permanently for a few seconds during the booting of the TAP

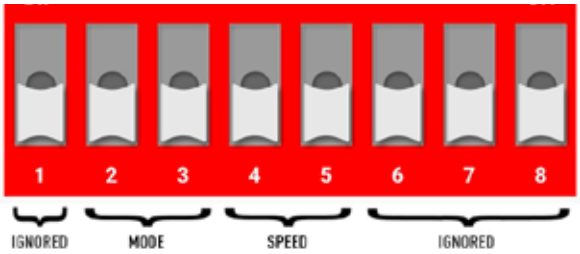


In operation - without network traffic:
Link present on all ports; left SFP port LED lights up permanently in each case



In operation - with network traffic:
Link and traffic present on all ports;
left SFP port LED lights up continuously and right SFP port LED flashes in each case

CONFIGURATION BY MEANS OF DIP SWITCHES



As shown in the figure to the right, switches 2 and 3 are used to select the operating mode and switches 4 and 5 are used to set the monitoring port speed in aggregation mode (100M or 1G).

The switches numbered 1, 6, 7 and 8 are ignored and left for future use.

The desired configuration should be set before plugging in the power cable. If an invalid configuration has been selected, all LEDs on the unit light up and the relay switches are not activated. In this case, switch off the unit and check the DIP switches.

When changing the configuration by means of DIP switches, it is always necessary to perform a restart by disconnecting the power supply so that the new settings are activated!

In case of a restart, however, there is no interruption of the network traffic!

I. Operating mode configuration

When selecting the operating mode ***(switches 2 & 3)***, the configuration is as follows:

- **Aggregation**: In this mode, the data streams are bundled and output aggregated on both of the monitoring ports. This allows you to evaluate the network data of a full duplex line simultaneously with a single network interface on your analyzer. Due to the aggregation in hardware (FPGA), faulty packet sequences during recording are a thing of the past in this mode. For example, you can analyse the entire data traffic aggregated in 100Base-TX lines without loss.
  The RJ45 monitoring ports will spin up the link at 100Base-TX or 1000Base-T, depending on which monitoring port speed has been selected.
  The SFP Monitoring port will support 100Base-FX or any type of 1000Base Ethernet standard.
  Switch value 01

- **Breakout**: Each Ethernet packet transmitted via the network line is mirrored separately in this mode while maintaining data integrity in the TAP. The send and receive directions are output separately on the two monitoring ports so that the network traffic can be analysed per data direction in this case. Another great advantage of the Breakout mode is the visibility of the network traffic even with a fully loaded network connection. In this mode, the set network speed is transferred to the monitoring ports.
  In this case with 100M (100Base-FX) on the network port - and 100M (100Base-TX) on the RJ45/copper monitoring port.
  The SFP Monitoring port will support 100M (100Base-FX).
  Switch value 00

- **Regeneration**: Regeneration is used to capture 100% full duplex traffic that can be sent to multiple monitoring devices (up to 3 in this case) for analysis of your network.
  In this mode, the network speed settings are synchronised as in Breakout mode and the setting on the DIP switch is applied to all ports.
  Switch value 10

II. Configuring the speed of the Monitoring Port

Only applicable in Aggregation mode!

The following constellation results for the speed selection *(switches 4 & 5)*:

Copper 100Base-TX (100Mbit)
SFP 100Base-FX (100Mbit):
Switch value 01

Copper 1000Base-T (1Gbit)
SFP 1000Base-T/SX/LX (1Gbit):
Switch value 10

TECHNICAL SPECIFICATIONS

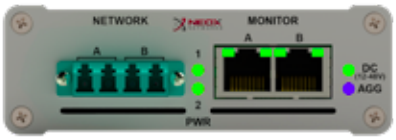
ATTENUATION VALUES				WAVELENGTH
SPLIT RATIO (OTHERS ON REQUEST)	50:50	60:40	70:30	
Multimode OM3, OM4, OM5	3.8 dB / 3.8 dB	2.8 dB / 4.8 dB	2.2 dB / 6.1 dB	1310nm

TAP	
Dimensions (W/H/D):	10.60 cm x 3.50 cm x 16.40 cm
Weight:	450g
Consumption:	max. 3 Watt at 5V/0.6A
Storage Temperature:	-40° to 70°C
Operating Temperature:	0° to 40°C
Rel. humidity in operation:	20% bis 80%, nicht kondensierend
Certifications:	CE, FCC, RoHS, WEEE, EN 55032 KL. A/B, EN 55035, EN 61000-3-2, EN 61000-3-3, EN 61000-6-2, EN 50121-4:2016*, EN 50129*

** Hardened TAPs*

POWER SUPPLY	
Input Voltage:	110V-240V AC 50-60Hz
Output Voltage:	5V DC
Output Current:	2A
Power:	max. 10 Watt
Power Plug:	with interchangeable plug head
5V Cable:	with ferrite ring
5V Plug:	- Screwable hollow plug - 5.5 mm outer diameter - 2.1 mm inner diameter

TAP MODELS



PRP-OM3FX-SLC-*

PRP-OM4FX-SLC-*

PRP-OM3FX-SLS-*

PRP-OM4FX-SLS-*

If you need a TAP with DIN rail mounting clip, please additionally order the mounting clip **PRP-DIN-CLIP**!
If you need a TAP with rackmount frame front panel, please order the **PRP-1U3-CLIP** front panel additionally!
(see „Mounting Options")!

STANDARD MODELS

All TAPs for fiber type OM4 are also OM3 compatible!

ITEM NO.	STANDARD	NET-WORK	FIBRE TYPE	WAVE-LENGTH	INTERFACE NET.	INTERFACE MON.	OPERATING MODES
PRP-OM3FX-SLC-*	100Base-FX	100Mbps	OM3	1310 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM3FX-SLS-*	100Base-FX	100Mbps	OM3	1310 nm	LC Multimode	SFP	Aggregation, Breakout, Regeneration
PRP-OM4FX-SLC-*	100Base-FX	100Mbps	OM4	1310 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM4FX-SLS-*	100Base-FX	100Mbps	OM4	1310 nm	LC Multimode	SFP	Aggregation, Breakout, Regeneration

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

HARDENED MODELS

All TAPs for fiber type OM4 are also OM3 compatible!

ITEM NO.	STANDARD	NET-WORK	FIBRE TYPE	WAVE-LENGTH	INTERFACE NET.	INTERFACE MON.	OPERATING MODES
PRP-OM3FX-SLC-*-**100MA**-S	100Base-FX	100M	OM3	1310 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM3FX-SLC-*-**100MAO**-S	100Base-FX	100M	OM3	1310 nm	LC Multimode	RJ45	Aggregation
PRP-OM3FX-SLC-*-**100MBO**-S	100Base-FX	100M	OM3	1310 nm	LC Multimode	RJ45	Breakout
PRP-OM4FX-SLC-*-**100MA**-S	100Base-FX	100M	OM4	1310 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM4FX-SLC-*-**100MAO**-S	100Base-FX	100M	OM4	1310 nm	LC Multimode	RJ45	Aggregation
PRP-OM4FX-SLC-*-**100MBO**-S	100Base-FX	100M	OM4	1310 nm	LC Multimode	RJ45	Breakout

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

ACCESSORIES

INSTALLATION & MOUNTING

ITEM NO.	DESCRIPTION
PRP-1U3-V2	Server rack mounting frame for 3 portable TAPs
PRP-1U3-BP-V2	Blank plate for mounting frame PRP-1U3-V2
PRP-1U3-CLIP	TAP rackmount frame bracket for server rack monuting frame PRP-1U3-V2
PRP-DIN-CLIP	TAP DIN rail mounting clip

PRP-DIN-CLIP

PRP-1U3-CLIP

PRP-1U3-V2

PRP-1U3-BP-V2

ITEM NO.	POWER SUPPLIES
PRP-PS-INT	PSU with EU, UK, and US plug head
PRP-PS-*-A	Plug head *EU, *UK or *US

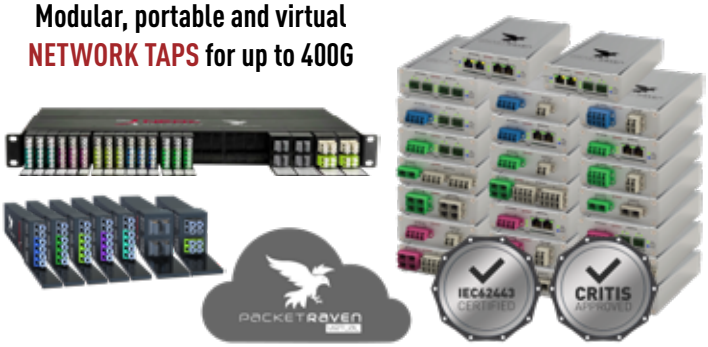
ITEM NO.	POWER SUPPLIES
PRP-PS-EU	Power supply unit with EU plug (head)
PRP-PS-UK	Power supply unit with UK plug (head)
PRP-PS-US	Power supply unit with US plug (head)

ITEM NO.	SFP TRANSCEIVER
NX-SFP-TX-1G	10/100/1000Base-T SFP transceiver, supports connection lengths of up to 100 m
NX-SFP-FX-100M	100Base-FX SFP transceiver, Multimode, 1310nm, supports connection lengths of up to 2 km
NX-SFP-SX-1G	1000Base-SX SFP transceiver, Multimode, 850nm, supports connection lengths of up to 550 m
NX-SFP-LX10-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 10 km
NX-SFP-LX20-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 20 km
NX-SFP-LX40-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 40 km
NX-SFP-ZX80-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 80 km
NX-SFP-ZX120-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 120 km
NX-SFP-ZX160-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 160 km

// NEOX**PacketSolutions**

PACKETRAVEN

Modular, portable and virtual NETWORK TAPS for up to 400G



PACKETHAWK

Inline BYPASS TAP for up to 100G

PACKETROO

DATA DIODE for Secure File Transfer

PACKETFALCON

Portable & Compact PACKET CAPTURE Solutions

PACKETGRIZZLY

Modular & Scalable NETWORK FORENSICS Solution

PACKETLION

High-End HD NETWORK PACKET BROKER for up to 400G

PACKETTIGER

Cost Efficient Next-Gen NETWORK PACKET BROKER

as Appliance or Virtual

Centralised NETWORK MANAGEMENT SYSTEM

PACKETWOLF

Advanced PACKET PROCESSING for up to 400G

NEOX NETWORKS
NEXT GENERATION NETWORK VISIBILITY

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