NEOX**PacketRaven 10M/100M/1000M M12 TAPs**

FULL NETWORK VISIBILITY FROM 10M TO 1G | FPGA CHIPSET
DATA DIODE FUNCTION | REDUNDANT POWER SUPPLY

PACKETRAVEN
WATCH YOUR NETWORK!

CRITIS APPROVED

IEC62443 APPROVED

SecurITy made in Germany
Trust Seal www.teletrust.de/itsmig

NEOX NETWORKS' PacketRaven M12 Network TAPs are FPGA-based, active decoupling elements for the safe and reliable tapping of network data in harsh environments. These TAPs are looped into the copper-based network line to be monitored and route out all data traffic while maintaining data integrity, without interruption and without packet loss.

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

Furthermore, these M12 TAPs work like a Data Diode and the monitoring ports are physically isolated from the network ports accordingly. For security reasons, this prevents access to the network via the monitoring ports on the hardware side. Therefore, our Network TAPs guarantee a reliable and reaction-free network analysis or security investigation without compromise.

PacketRaven M12 TAPs also behave according to the same fail-safe principle as our RJ45-based Network TAPs. By means of fail-safe, the TAP behaves like a cable bridge in the event of a power failure or arbitrary deactivation and ensures that the active network connection is not interrupted or at least continues to function without the TAP. Thus, the active line is not negatively affected.

To ensure the highest possible reliability on the monitoring side, our M12 TAPs have redundant power supplies, but can also be additionally or exclusively operated or secured with 12-48V DC voltage and/or via a PoE power supply.

These models in the 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.

Our portable M12 TAPs support network speeds of 10Mbps, 100Mbps and 1Gbps (10Base-T, 100Base-Tx and 1000Base-T).

These TAPs are also available in a specially hardened version (Hardened TAPs) for high-security areas according to IEC 62443. They have firmware secured and encrypted by SecureBoot, security seals against unnoticed opening, security screws against unwanted opening and are optionally preconfigured.

With PacketRaven Network TAPs you get permanent network access without risk and provide e.g. your monitoring tools with 100% reliable network data, including FCS/CRC of faulty packets, 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
- PoE+ Power over Ethernet
- Redundant Power Supply
- Fast and Precise
- Support Jumbo Frames
- Hardened models available
- Made in Germany

HIGHLIGHTS
Secure, rock-solid FPGA-based design
10Base-T, 100Base-Tx, 1000Base-T, 10/100/1000 BaseT - supported network speeds of 10M, 100M and 1G
Specially hardened IEC62443 models available for CRITIS applications
Alternative to SPAN ports - mirrors 100% of traffic including FCS/CRC erroneous packets that may be discarded by SPANs
Invisible in the network, no IP address, no MAC address, cannot be hacked
100% non-reactive due to galvanic isolation (Data Diode Function)
Guaranteed no packet loss
Power supply via redundant AC/DC power supply units or DC voltage
Supports PoE 802.3af passthrough and power supply via PoE
Supports failsafe mode for fail-safe in case of power failure
Supports Breakout, Aggregation and Regeneration modes
Supports up to 16k Jumbo Frames
Plug-n-Play, no complex configuration required - easy configuration via DIP switches
Various mounting options available
Designed, assembled, certified and tested in Germany

ADVANTAGES OF M12 CONNECTORS

The M12 connector is a circular connector that is often used in industrial automation, sensor and control applications and especially harsh environments.

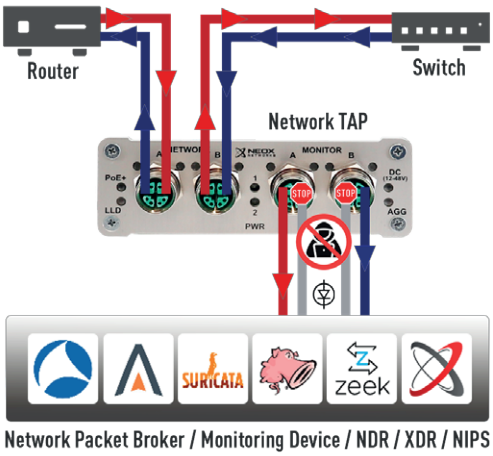
Some of the advantages of the M12 connector are:

- **Durability**: M12 connectors are designed for use in harsh environments and are therefore suitable for applications where the connector is exposed to vibration, dust and extreme temperatures.
- **Compact size:** M12 connectors have a small diameter of 12 mm and require only slightly more space than an RJ45 connector, for example.
- **EMI/RFI protection:** M12 connectors have 360-degree shielding that helps protect against electromagnetic and radio frequency interference. This is important in applications where electrical interference may occur.
- **Easy to install:** M12 connectors have a quick-connect design that allows for easy installation and removal of the connector, which is especially useful in applications where the connector needs to be removed and replaced frequently.
- **Versatility:** M12 connectors are available in different codings (A-coded, D-coded, X-coded, etc.), which are used to distinguish between the different types of signals that the connector can transmit (e.g. power, data, etc.). X-coding is used for Ethernet communication and is widely used in industrial automation and control systems as it enables fast and reliable data transmission up to 10Gbit. Our PacketRaven M12 TAPs also have X-coded connectors.

Overall, the M12 connector is a robust, compact and very versatile connector that is well suited for use in (harsh) industrial automation and control systems.

Especially in the field of Ethernet communication, it is a reliable and fast solution for data transmission.

DATA DIODE FUNCTION



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

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

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

By adding this further layer of security, you protect your production network and network infrastructure from compromise and possible cyber attacks

POE - POWER OVER ETHERNET FUNCTIONS

The TAP supports both passive PoE and active PoE for looping through the power supply to a PoE-capable device:

- PoE/PoE+ pass-through according to IEEE802.af - the maximum power consumption that an end device can draw via the TAP is 12.95W
- Power supply of the TAP via PoE according to IEEE802.af (active/passive)

TAP power supply via PoE

To connect the TAP to a PoE port according to IEEE802.af, please observe the following installation steps:

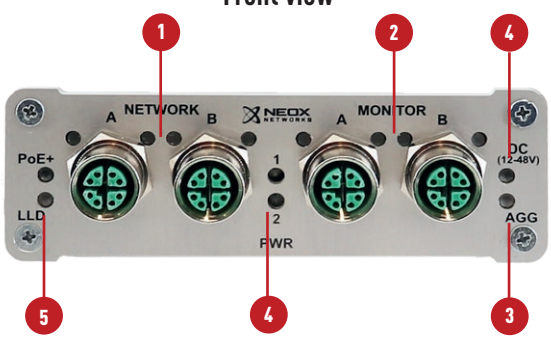
1. First connect the TAP to the PSE (Power Sourcing Equipment) device and make sure that the PoE+ LED lights up.
2. As soon as it lights up, the PSE and the TAP have negotiated the power supply and you can now connect your PoE end device to the TAP.

This sequence must be followed so that the TAP can properly establish the power supply via a PSE device using IEEE802.af. All other power supply inputs on the TAP can still be used; the PoE power supply increases the redundancy in this case.

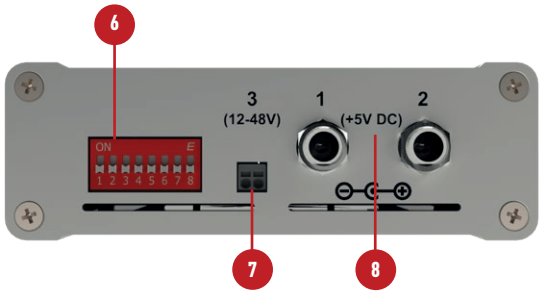
INTERFACES

1	M12 (X-coded) Network ports A & B and status LEDs	5	Power over Ethernet (PoE Plus) and Link Loss Detection (LLD) LEDs
2	M12 (X-coded) Monitoring ports A & B and status LEDs	6	DIP switch for LLD on/off, TAP mode and speed
3	Aggregation LEDs	7	Connection for 12-48V DC voltage
4	DC power LEDs (2x for AC/DC (5V), 1x for 12-48V DC)	8	Redundant connections for 2 AC/DC power supplies (5V)

Front view



Back view



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

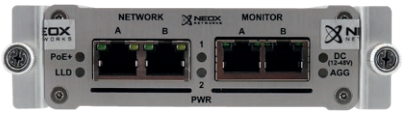
2. Server Rack Mounting

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 rackmount 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.

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**.

TS35/7.5 DIN rail

Network TAP
with DIN rail clip

FAIL-SAFE IN THE EVENT OF POWER LOSS

If the TAP is de-energised, either due to a failure or an arbitrary disconnection of the power supply, the current network connection is interrupted for a very short moment.
The reason for this is that the installed relays are no longer part of the originally negotiated link in the de-energised state. This phase of the switchover causes a short loss of the link, but the duration of this switchover is defined exclusively by the connected end devices, the TAP has no influence on this!
The connected terminals now renegotiate their connection and our TAP automatically switches to the FAIL-SAFE state, in which it automatically behaves like a cable bridge and bridges the network line.

This state remains until the TAP (and thus also the relays) are supplied with power again. After another very short switchover of the link negotiation, the connected terminals can now negotiate their link with the TAP again and the data exchanged via it is duplicated again.

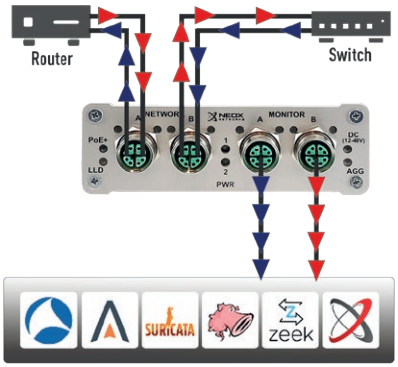
AVAILABLE TAP MODES

- **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.
  For example, if the TAP is configured for 100Base-Tx, then both monitoring ports will also communicate accordingly on 100Base-Tx.

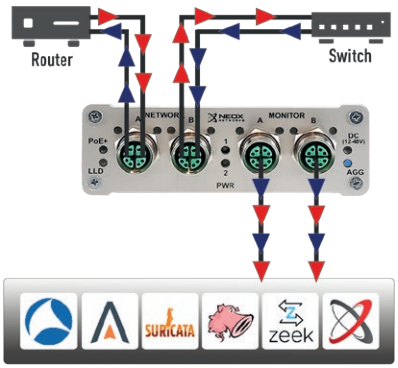
- **Aggregation:** In this mode, the data streams are bundled and output aggregated on both of the monitoring ports. This allows you to evaluate the network data of a full duplex line simultaneously with a single network interface on your analyser. Due to the aggregation in hardware (FPGA), faulty packet sequences during recording are a thing of the past in this mode. For example, it is possible to analyse the entire data traffic aggregated in 100Base-Tx lines without loss.
  The monitoring ports will always start up the link with 1000Base-T, no matter what is negotiated on the network side.

- **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.

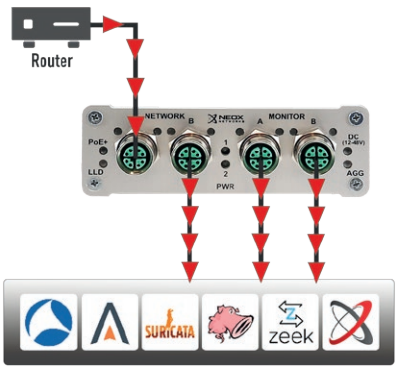
Breakout Mode



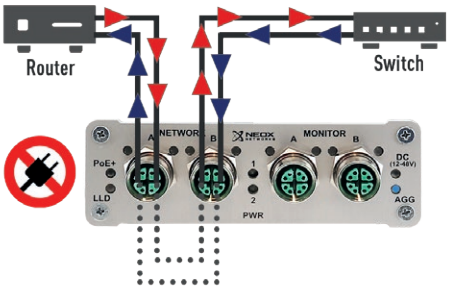
Aggregation Mode



Regeneration Mode



Fail-Safe Mode



Fail-Safe: Since Network TAPs are usually installed in critical network lines, it must be ensured that TAPs do not negatively influence the line.

By means of fail-safe, the TAP behaves like a cable bridge in the event of a failure or arbitrary deactivation and ensures that the active network connection is only briefly interrupted or at least continues to function without the TAP function and thus does not negatively affect the active line.

More on the subject of „fail-safe" can be found on page 4. under „Fail-safe in the event of power loss".

ADVANCED FUNCTIONS OF THE HARDENED TAPS

Preconfigured

SecureBoot

Security Seal

Special Screws

Our Network TAPs with M12 monitoring ports 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 and freedom from repercussions is guaranteed.

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.

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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.

MILITARY-GRADE

The standards that apply to military-grade electronic components and devices are among the most stringent available for electronic products.

If you are interested in M12 Military-Grade Network TAPs, please contact us.

TECHNICAL SPECIFICATIONS

NETWORK TAP	
Dimensions:	10.60 cm x 3.50 cm x 16.40 cm
Weight:	520 g
Consumption:	max. 3 Watt at 5V/0,6A
Operating temperature:	0° to 55°C
Storage temperature:	-40° to 70°C
Relative humidity in operation:	20% to 80%, non-condensing
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 TAP*

POWER SUPPLIES**	
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 Connector	- Screwable hollow plug - 5.5 mm outer diameter - 2.1 mm inner diameter

*** Optional power supply units available for connection via C13-C14 cable (see accessories)*

TAP MODELS

PRP-M12-1Gx

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					
ITEM NO.	STANDARD	NETWORK	INTERFACE NET.	INTERFACE MON.	OPERATING MODES
PRP-M12-1GA	10/100/1000Base-T	10M/100M/1G	M12 (X-coded)	M12 (X-coded)	Aggregation, Breakout, Regeneration
PRP-M12-1GB	10/100/1000Base-T	10M/100M/1G	M12 (X-coded)	M12 (X-coded)	Breakout

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HARDENED MODELS					
ITEM NO.	**STANDARD**	**NETWORK**	**INTERFACE NET.**	**INTERFACE MON.**	**OPERATING MODES**
PRP-M12-1GA-S	10/100/1000Base-T	10M/100M/1G	M12 (X-coded)	M12 (X-coded)	Aggregation, Breakout, Regeneration
PRP-M12-1GAO-S	10/100/1000Base-T	10M/100M/1G	M12 (X-coded)	M12 (X-coded)	Aggregation
PRP-M12-1GBO-S	10/100/1000Base-T	10M/100M/1G	M12 (X-coded)	M12 (X-coded)	Breakout

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

POWER SUPPLIES & ACCESSORIES	
ITEM NO.	**DESCRIPTION**
PRP-PS-INT	PSU with EU, UK, and US plug head
PRP-PS-*-A	Plug head *EU, *UK or *US
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)
PRP-PS-C14-25W	Power supply unit with C14 socket - connected to PSU via C13-C14 cable

PRP-PS-INT

PRP-PS-C14-25W

ITEM NO.	RJ45/M12 CABLES
NX-M12-RJ45-1M	**RJ45 to M12** cable, IP20, flammability class: FT2, Cat.5e, 1m
NX-M12-RJ45-2M	**RJ45 to M12** cable, IP20, flammability class: FT2, Cat.5e, 2m
NX-M12-RJ45-3M	**RJ45 to M12** cable, IP20, flammability class: FT2, Cat.5e, 3m
NX-M12-RJ45-5M	**RJ45 to M12** cable, IP20, flammability class: FT2, Cat.5e, 5m

ITEM NO.	M12/M12 CABLES
NX-M12-M12-1M	**M12 to M12** cable, IP67, flammability class: FT2, Cat.6a, 1m
NX-M12-M12-2M	**M12 to M12** cable, IP67, flammability class: FT2, Cat.6a, 2m
NX-M12-M12-3M	**M12 to M12** cable, IP67, flammability class: FT2, Cat.6a, 3m
NX-M12-M12-5M	**M12 to M12** cable, IP67, flammability class: FT2, Cat.6a, 5m

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