RELYUM

Technologies beyond connect

RELYUM

Technologies beyond connect

Contents

The number and heterogeneity of mission critical scenarios is growing dramatically. Electric, Industrial, Transport and Aerospace sectors demand platforms to ensure secure and high-availability operations. Moreover, the emerging challenges of the unstoppable OT/IT convergence require intelligent equipment able to take benefit from "Technologies beyond connect".

Relyum is born to provide innovative solutions for networking, synchronization and cybersecurity in critical systems. This goal is achieved through industrial products which integrate time-aware reliable communications, embedded computing, sensor data acquisition and security capabilities in the same device.

As an example, this catalog presents solutions to merge time-aware PRP and HSR networks, to analyze traffic in reliable Ethernet networks or to build "Plug&Work" distributed Edge computing infrastructure for Industry. The modularity of these platforms allows multiple configurations. Relyum is the designer and manufacturer of all its equipments. Therefore, it is open to supply ad-hoc equipments and solutions for new scenarios.

We hope that Relyum may support you in your future projects, and do not hesitate to tell us about your needs or ask for any information you require.

Key Technologies

Zero–Delay Recovery Time Networks

Nowadays, high–availability networks for critical systems is a must. From the technical point of view, the most advanced solutions ensure non–packet-loss in case of single network failure and "Plug & Work" operation. Additionally, customers demand interoperable and standardized solutions in order to avoid a proprietary vendor approach. In this sense, the International Electrotechnical Commission (IEC) has worked intensively to define High–Availability Ethernet based solutions. The two protocols that ensure zero–delay recovery time in case of a network failure are: High–availability Seamless Redundancy (HSR, IEC 62439–3–Clause 5) and Parallel Redundancy Protocol (PRP, IEC 62439–3–Clause 4).

HSR provides redundancy by sending packets in both directions through a ring network. A simple HSR network consists in Doubly Attached Bridging Nodes, each having two Ethernet ports. A HSR node sends the same frame over both ports.

A HSR capable destination node receives in fault–free state, two identical frames over both ports respectively within a certain interval. The first received is accepted while the duplicated is discarded. In case of an interruption in the ring, the frame will always be received through the other port.

HSR offers high–availability and very short reaction time. In addition, the switching rules defined in the standard allow a simple way to calculate the delay in the communications for the Worst Case scenario, enabling the use of this protocol in applications that demand real–time.

PRP redundancy is implemented in the nodes rather than in the network. Especially adapted nodes (Dual Attached Nodes – DANs) are connected to two independent Ethernet networks (LAN A and LAN B) and send the same frames over both networks.

In a fault–free state, destination nodes consume the first received frame and discard the duplicated one. In case of a fault in one of the networks, the frames will still be transmitted and received through the other.

Non–PRP nodes can be attached to a single network, thus they communicate only with nodes attached to this network or connected to both networks through a Redbox.

HSR network topology
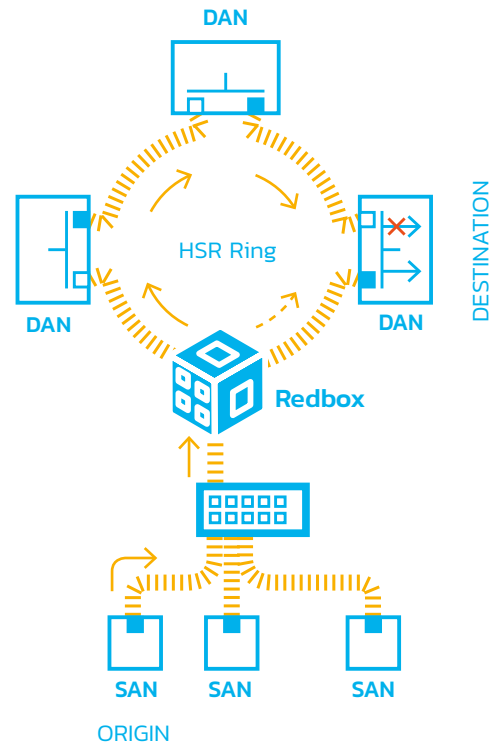

PRP network topology
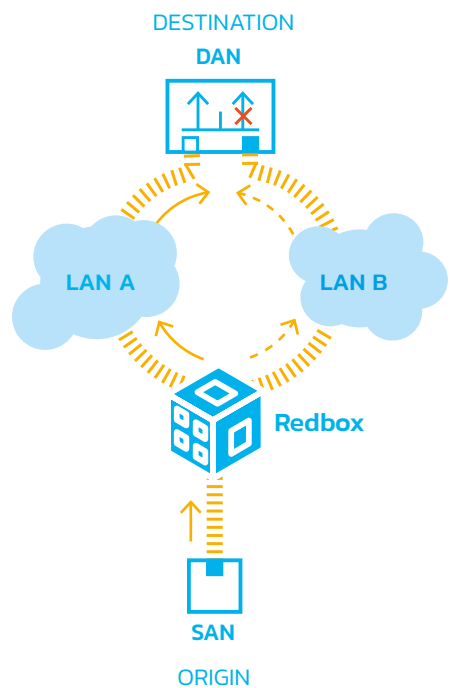
Sub-Microsecond Synchronization using Ethernet Networks

It is feasible implementing similar accuracy level of synchronization that provides a GPS receiver, in a device connected to an Ethernet network. The technology required to benefit from this innovation is based on Precise Time Protocol (PTP). PTP is defined in the IEEE 1588-2008 and IEC 61588:2009 standards.

PTP protocol is able to synchronize networked clocks with accuracy down to the nanosecond range. It is based on the Packet Locked Loop (PLL) approach. Like any active synchronized circuit, the IEEE 1588 clock is a servo implemented with a closed-loop algorithm. The final aim of these calculations is providing an accurate 64 bit timer in all the synchronized devices. This timer can be used for Data timestamping and for distributed control and even for Operating System synchronization purposes.
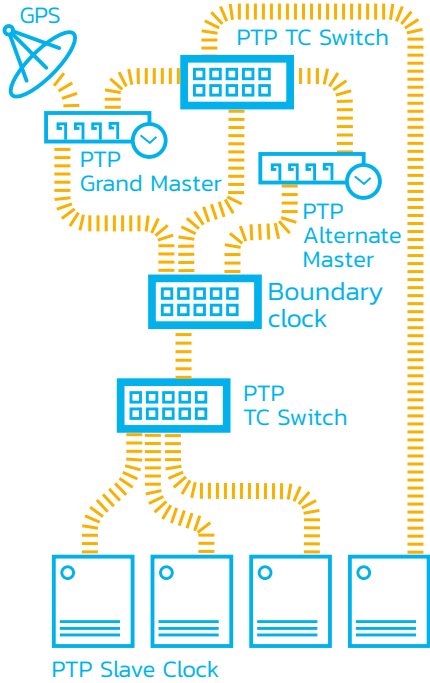
## Time Sensitive Networking merges Factory and Enterprise Networks

Industrial Internet of Things (IIoT) offers smart infrastructure and hyper-connected devices with sensing, processing and networking capabilities. These systems will generate incredible amounts of Data, sharing the same network. Thus, it is necessary to ensure that the real-time and critical-mission messages are transferred within strict bounds of latency and reliability regardless of other network traffic.

Deterministic Ethernet solutions, like TSN, deliver streams with guaranteed bandwidth and deterministic latency. There are many features involved in the multiple standards currently under development.

Time Sensitive Networking (TSN) is the name of the IEEE 802.1 Task Group responsible for standards at Data Link Layer. This group provides the specifications that will allow time-synchronized and low latency streaming services through IEEE 802 networks.
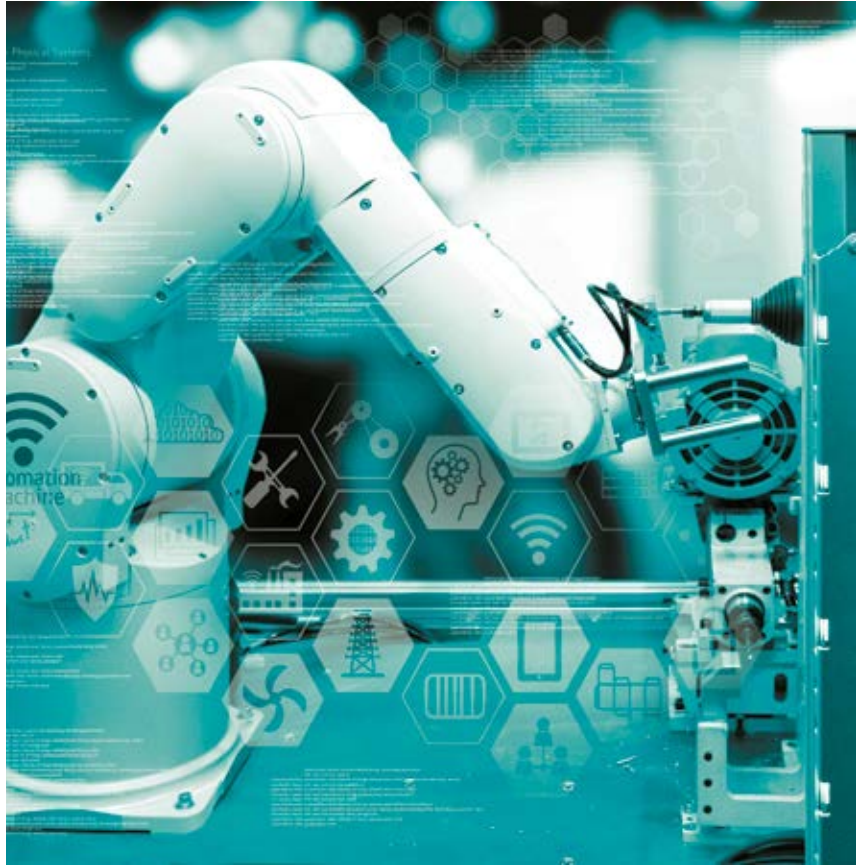
TSN is evolving and it is targeting different sectors, like Automotive, Industry, Broadcasting and Aerospace. Therefore, it is expected switching implementations that combine a subset of the available standards and features. This flexibility can be achieved through reconfigurable logic (FPGAs), HDL IPs and embedded software.

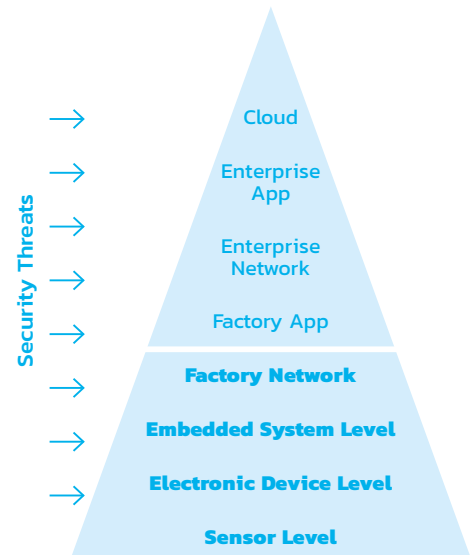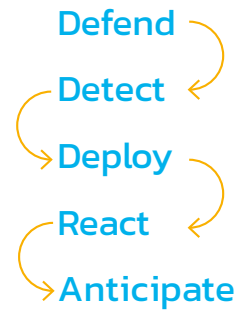*PTP infrastructure*

TSN network topology
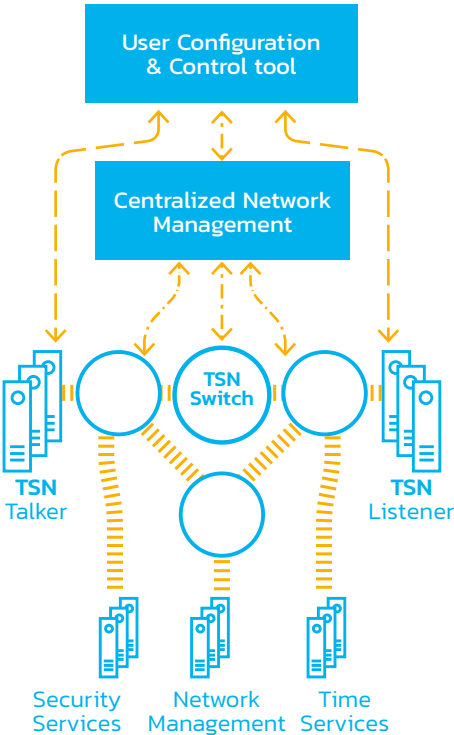
Cybersecurity for Critical Systems

Cybersecurity is a huge challenge for industrial and for critical systems in general. A multi-layered approach is mandatory to cover the security threats that may arise at sensor, integrated circuit, embedded device, network, application, enterprise and cloud levels. Therefore, the number of agents and technologies involved is large and heterogeneous.

Protection maturity level

Defend
Detect
Deploy
React
Anticipate

Security Threats

Cloud
Enterprise App
Enterprise Network
Factory App
Factory Network
Embedded System Level
Electronic Device Level
Sensor Level

Any critical system requires a threat analysis and as a result, a combination of security solutions would need to be applied to protect the different layers involved. An embedded platform focused on critical systems should follow the "cybersecurity-by-design" approach in order to ensure that the most adequate security solution is applied in each layer of the equipment.

Additionally, due to the requirement of real-time operation that need to be secured, the most advanced technologies are providing "on-the-fly" security mechanisms that apply the state-of-the-art cipher suites, while ensuring the reaction time for control operation. As an example, the Electric sector is pioneer defining a standard for securing the most stringent real-time traffic used in the sector (IEC 62351-6) which can benefit from these innovations.

Edge Computing for Smart Factories

Industry 4.0 and IIoT give the opportunity to the companies to lock and understand the true value of Data. This evolution involves merging very different technologies and computing approaches. As an example, in heterogeneous plants where Data integration and sensor fusion is needed to correlate continuous monitoring with production information, it is essential to be agile enough to add preprocess and normalize the information for its consumption by third party applications running in the IT world. In the OT world, information is provided by Edge devices (PLCs, CNCs, sensors) from different vendors and is presented in different formats and measures.
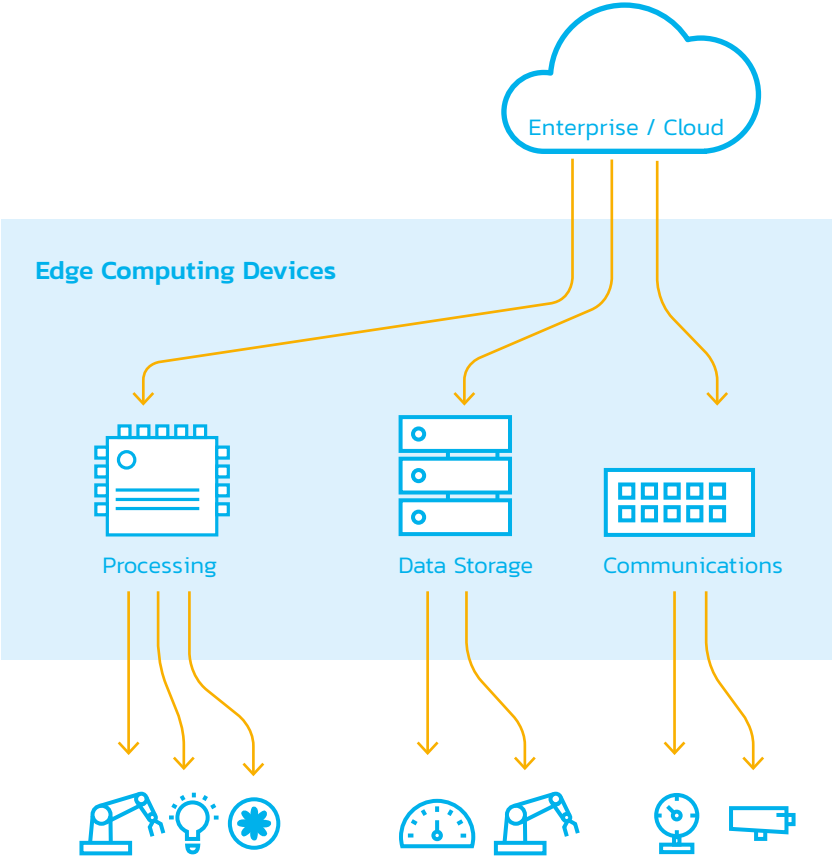
Thus, Edge computing is required for preprocessing the Data, to allow its analysis in the Enterprise and Cloud side.

Therefore, the emerging scenario demands a combination of Edge, Enterprise and Cloud computing, taking into account the specific requirements of the Industry, like high–availability, real–time operation capability and security. The next generation devices and platforms that face this challenge need to be powerful from the computational point of view, and flexible enough for seamless integration of OT/IT worlds, allowing as an example software and liquid hardware microservices.

RELY-CPPS
Cyber-Physical Production System Platform

RELY-CPPS platform meets the needs of critical appli-
cations, in terms of reliability, availability and security.
It combines in the same device sensor data acquisi-
tion, high-availability networking and Edge computing
capabilities.

The RELY-CPPS family simplifies connectivity in the Edge
by combining sensor data acquisition and networking
in the same equipment. These devices implement a
flexible multi-vendor input switchboard to support
communication with OT devices. Additionally, direct
connection with digital and analog sensors can be
included in the platform. The connectivity with the IT
world is carried out by IT and IoT protocols like OPC-UA
and MQTT. This flexibility in the output switchboard
reduces significantly the workload for integration with
Enterprise and Cloud-based applications

Key features

Communications

> 4 x SFP cages for 10/100/1000Base-TX Ethernet copper or 100Base-FX/1000Base-X fiber to support heterogeneous networking protocols
> 1 x 10/100/1000Base-TX Ethernet copper port
> "Plug&Work" nodes through time-aware high-availability networking (HSR/PRP) for flexible layouts
> Deterministic Ethernet and TSN Ready

Other interfaces

> 1 x RS485 port
> 2 x USB type A ports
> 1 x HDMI output
> 1 x Alarm output (potential-free relay output 250VAC max.)
> 1 x Pulse-Per-Second (PPS) SMA output

Multi-vendor I/O protocols

> Input Switchboard: Modbus TCP/RTU, Profibus, Siemens S7, MTConnect, etc.
> Output Switchboard: Modbus TCP, MQTT, OPC-UA, DDS, IT TCP/IP based services, etc.

Security features

> Secure boot
> Support of software and firmware encryption, authentication and signature
> System Level audited security (OS & Applications)
> Security sensors to mitigate advanced attacks
> Ethernet port isolated from switching infrastructure to implement security oriented services (Firewall, NAT, VPN, etc.)
> Support for internal Mirroring Port with deep packet inspection capability
> IEEE 802.1X access control for port based and MAC based authentication, MAC-Port binding and authentication for login security
> Optional SIEM agent for IDS

Edge computing

> Powerful computing capabilities based on Xilinx All programmable SoC
> Multi-core CPU with Docker and Sandboxing support for SW applications and microservices over Linux OS
> Last generation FPGA to support intensive and low latency computing through hardware processing modules
> DDR3/4 RAM Memory
> On-the-field upgradable

Rugged device

> Fanless design
> Full metal enclosure
> Redundant Power Supply: 6VDC to 30 VDC
> Operating temperature: -40°C to +70°C
> Storage temperature: -40°C to +85°C
> Optional mounting: DIN rail
> Specifically manufactured for industrial environments

Configuration & Management

> Dedicated Ethernet service port
> SNMPv3, SSH
> Web-based HTML5-GUI access/configuration:
  » Accessible through HTTP(S)
  » Configuration profiles and Firmware updates
  » Real-time network monitoring

Expansion Modules

RELY-CPPS is a flexible platform with a high number of available configurations to offer the most suitable device for each customer. This flexibility is achieved through a wide range of optional pluggable modules, which cover the most diverse applications of the Energy and Industrial sectors.

Sensor Module

The Sensor Module has been designed to provide in a single board a wide range of input and output signals commonly used in the Industry, in order to interact with the environment. The inputs and outputs available in this module are:

> 3 x Digital inputs: Isolated 0-24 VDC
> 1 x Analog input: 4-20 mA
> 1 x Potential-free relay output 250 VAC max
> 1 x Three-wire RTD (PT100) temperature sensor interface
> 1 x Thermocouple Type K sensor interface
> 1 x Integrated electronic piezoelectric (IEPE) accelerometer input
> 1 x RS422 (optional)
> 1 x RS485 + 1 x RS232 (optional)

To extend the capacity of input/output switchboard, it is possible to connect a second Sensor Module to one of the non-used slots.

High Speed Data Acquisition Module

The High Speed Data Acquisition Module covers the requirements of demanding applications where high sensitivity and high speed are needed. The main features of this modules are:

> 4 x 24 bit ADC input channels
> Selectable analog input: +/- 10 VDC or 4-20 mA
> 30 kSps sampling rate
> Independent power isolation for each channel

Data Logger Module

Many Industrial applications require the storage of large data volumes locally. For example, there are many remote premises without or with limited access to Internet. Additionally, complex applications and services running in the Edge may demand extra massive storage disk.

In such cases, RELY-CPPS can be supplied with the Data Logger Module, which includes an industrial temperature grade 256GB SSD Disk. To extend the capacity of RELY-CPPS up to 500GB, it is possible to connect a second Data Logger Module to one of the non-used slots of the equipment.

Wireless Module

The optional Wireless Module offers a seamless integration of RF communication media within the networking and computational infrastructure of RELY-CPPS. The communication standards supported by this module are:

> WIFI 802.11 b/g/n
> Bluetooth® v4.0 (backwards compatible with Bluetooth® v2.0, v2.1 and v3.0)

RELY-RB
Time-aware Redbox Switch

Critical systems demand time–aware high–availability networking. Moreover, the complexity of the modern network infrastructures in these premises overcomes the traditional concept of "managed" device. RELY-RB is a new concept of intelligent device that integrates advanced field–proven technology for non–packet–loss redundant Ethernet, sub–microsecond synchronization and cybersecurity. This device is able to merge the whole LAN with redundant networks, to interconnect PRP and HSR networks and to extend HSR rings via QuadBox operation.

RELY–RB

RELY–RB+

RELY–RB+2

Key features

Communications

- › Multiple PTP Tri–speed Ethernet ports (type and number depending on the model)
- › Zero–Packet–Loss redundancy modes:
    - » IEC 62439–3 v3 Clause 5 "High–availability Seamless Redundancy (HSR)"
        - – Supported modes: H, N, T, U, X, HSR–SAN, PRP–HSR, HSR–HSR
    - » IEC 62439–3 v3 Clause 4 "Parallel Redundancy Protocol (PRP)"
        - – Supported modes: Duplicate discard, duplicate accept, transparent reception, PRP–HSR
- › Optional Redundancy modes:
    - » IEC 62439–2 Clause 5 "Media Redundancy Protocol (MRP)"
    - » "Device Livel Ring (DLR)" for Ethernet IP
    - » RSTP IEEE802.1w
- › VLAN support
- › Ethernet type based or IEEE 802.1P Traffic prioritization
- › Cut–through and Store&Forward switching capability

Synchronization

- › IEEE 1588–2008 PTPv2
- › Operation modes: Transparent Clock, Ordinary Clock, Boundary Clock
- › Profiles: Default, Power, IEC 61850–9–3, AS
- › Optional IRIGb Master/Slave bridge
- › IEEE 1588 Stateless Transparent Clock P2P (Peer–to–Peer) mode to support IEEE 1588 PRP/HSR redundant networks merging

Other interfaces
(not available in all models)

- › 1 x RS485 port
- › 2 x USB type A ports
- › 1 x HDMI output
- › 1 x Alarm output (potential–free relay output 250VAC max.)
- › 1 x Pulse–Per–Second (PPS) SMA output

Communication interfaces

RELY–RB family comprises three different models, based on the number and type of communication interfaces available in the equipment.

Processing performance

- › Xilinx Zynq FPGA with embedded dual–core ARM9 processor
- › 1GB DDR3 RAM Memory
- › Linux Operating System

Security features

- › Optional support for IEC 62351–6 wire–speed cryptography
- › Security infrastructure for IEC 62351–9 Key Exchange facilities
- › AES 256, HMAC and RSA hardware engines for software and firmware encryption, authentication and signature
- › Secure boot
- › System Level audited security (OS & Applications)
- › Integrated anti–tampering, accelerometers and power consumption measurement sensors to mitigate advanced security attacks
- › Ethernet port isolated from switching infrastructure to implement security oriented services (NAT, Firewall, VPN, etc.)
- › IEEE 802.1X access control for port based and MAC based authentication, MAC–Port binding and authentication for login security
- › Optional internal mirroring port with deep packet inspection capability
- › Optional integrated SIEM agent for IDS and Syslogv5 TLS support for distributed SIEMs approach

Rugged devices

- › IEC 61850–3 / IEEE 1613
- › Fanless design
- › Full metal enclosure
- › Redundant Power Supply: 6VDC to 30 VDC
- › Operating temperature: –40°C to +70°C
- › Storage temperature: –40°C to +85°C
- › Optional mounting: DIN rail

Configuration and Management

- › SNMPv3, SSH
- › Web–based HTML5–GUI access/configuration:
    - » Accessible through HTTP(S)
    - » Configuration profiles and Firmware updates
    - » Real–time network monitoring

RELY–RB	RELY–RB+	RELY–RB+2
1 x 10/100/1000Base–TX Ethernet copper port (Console/Service/Security) 4 x SFP cages for 10/100/1000Base–TX Ethernet copper or 100Base–FX/1000–Base–X fiber	1 x 10/100/1000Base–TX Ethernet copper port (Console/Service/Security) 6 x 10/100/1000Base–TX Ethernet copper port	1 x 10/100/1000Base–TX Ethernet copper port (Console/Service/Security) 6 x 10/100/1000Base–TX Ethernet copper port 2 x SFP cages for 10/100/1000Base–TX Ethernet copper or 100Base–FX/1000–Base–X fiber

RELY-REC
Time-aware Network Recorder

In critical systems, it is essential being able to analyze the network communications at frame level for testing and forensic purposes. Furthermore, the validity of this analysis will be constrained by the capability of the infrastructure to correlate the frames with a common time reference. For that purpose, Relyum has developed RELY-REC, a device that is able to inspect, timestamp and record regular Ethernet and high-availability Ethernet traffic, using the same PTP timing reference than the network under analysis.

As an example, due to the critical nature of communications in Electric sector, RELY-REC is an all-in-one solution specifically designed to analyze the traffic in the modern IEC 61850 Digital Substations where the use of combined HSR, PRP and PTP has generated a new challenge for the operators. This device is synchronized with a IEEE 1588-2008 PTPv2 infrastructure, that may be the same shared by the other equipment of the substation.

Key features

Communications

> 2 x SFP cages for 10/100/1000Base–TX Ethernet copper or 100Base–FX/1000Base–X fiber per TAP connection
> 1 x SFP cages for 10/100/1000Base–TX Ethernet copper or 100Base–FX/1000Base–X fiber for PTP Master connection (alternative PTP Source)
> 1 x 10/100/1000Base–TX Ethernet copper port for Console management and for non–stop remote access to recorded data
> IEC 62439–3 v3 Clause 5 "High–availability Seamless Redundancy (HSR)"
> IEC 62439–3 v3 Clause 4 "Parallel Redundancy Protocol (PRP)"
> 10/100/1Gb Ethernet

Synchronization

> IEEE 1588–2008 PTPv2
> Operation modes: Transparent Clock, Ordinary Clock
> Profiles: Default, Power, IEC 61850–9–3, AS
> Optional PTP sources for timestamping reference:
    » Traffic TAPs
    » Dedicated port for external PTP Master
    » Internal reference

Other interfaces

> 1 x RS485 port
> 2 x USB type A ports
> 1 x HDMI output
> 1 x Alarm output (potential–free relay output 250VAC max.)
> 1 x Pulse–Per–Second (PPS) SMA output

Processing capabilities

> Simultaneous read/write data operation supported
> Industrial temperature grade high capacity SSD disk per TAP link
> Log Data Files configurable and standard format (PCAP)
> SFTP/SMB supported for remote access to Log Data Files

Rugged devices

> Fanless design
> Full metal enclosure
> Redundant Power Supply: 6VDC to 30 VDC
> Operating temperature: –40°C to +70°C
> Storage temperature: –40°C to +85°C
> Optional mounting: DIN rail

Configuration and Management

> Dedicated Ethernet service port
> SNMPv3, SSH
> Web–based HTML5–GUI access/configuration:
    » Accessible through HTTP(S)
    » Configuration profiles and Firmware updates
    » Real–time network monitoring
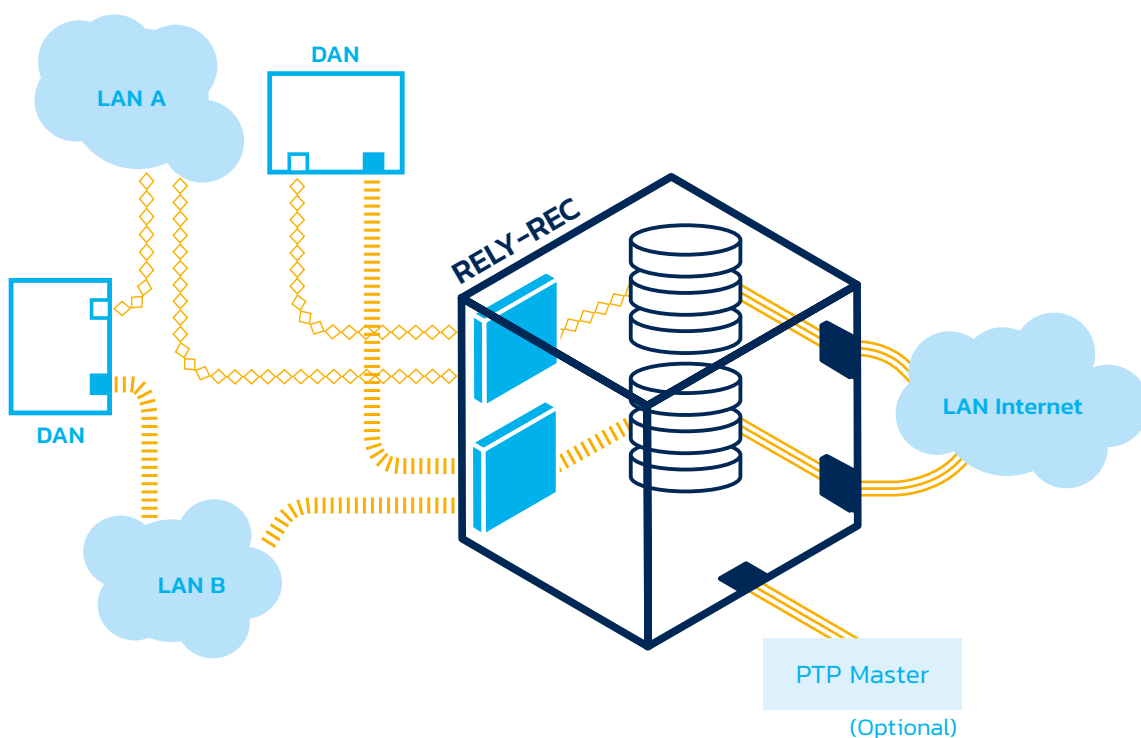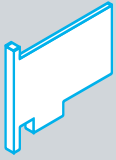
RELY-PCIe
Time-aware Redbox-DAN-Switch PCIe Platform

PCI Express (PCIe) is the most extended high-speed serial computer expansion bus. It is the de-facto standard for expansion boards in PC computers and it is gaining acceptance in Industrial PCs and even in SCADA systems. RELY-PCIe is a smart pluggable board that comprises in the same device hardware and software resources to implement specialized networking, synchronization and security oriented services.

This device can be used in different applications as detailed below:

> **PCIe Switch**, providing 3+1 (PCIe) Gigabit Ethernet ports
> **PCIe Redbox-DAN**, operating as an HSR/PRP node of a high-availability network and connecting an Ethernet network segment with an HSR/PRP network

These key features makes RELY-PCIe platform the most reliable and multipurpose networking device for critical environments.
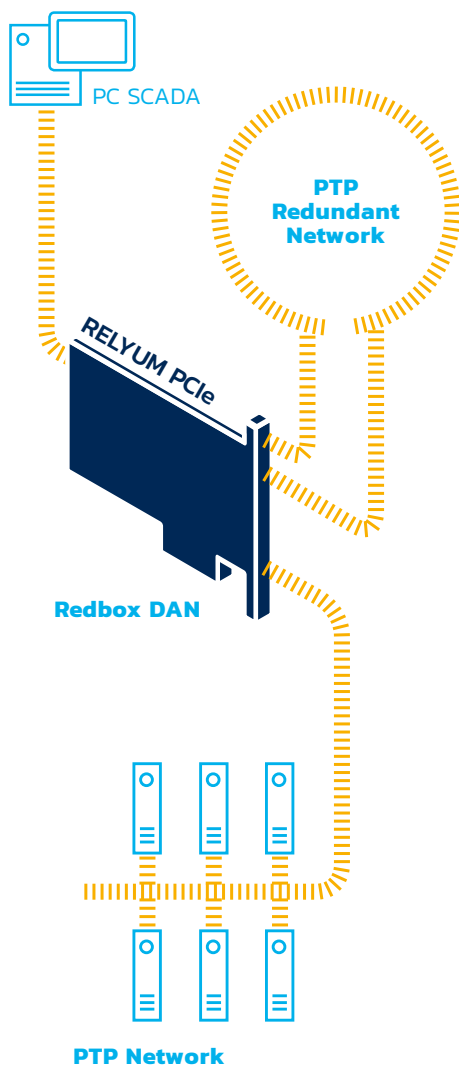
Key Features

Communications

> Autonomous management of Supervision Frames and IEEE 1588-2008 PTPv2 support
> Cut-through operation for the HSR ring to minimize the latency in the ring
> Store&forward for PRP and Ethernet operation
> 2x HSR/PRP/Ethernet ports
> 1x Ethernet port
> Media options (SFP cages):
>> 10/100/1000Base-T
>> 1000Base-X
>> 100Base-FX
> Zero-Packet-Loss redundancy modes:
>> IEC 62439-3 v3 Clause 5 "High-availability Seamless Redundancy (HSR)"
>>> Supported modes: H, N, T, U, X, HSR-SAN, PRP-HSR, HSR-HSR
>> IEC 62439-3 v3 Clause 4 "Parallel Redundancy Protocol (PRP)"
>>> Supported modes: Duplicate discard, duplicate accept, transparent reception, PRP-HSR
> Optional Redundancy modes:
>> IEC 62439-2 Clause 5 "Media Redundancy Protocol (MRP)"
>> "Device Livel Ring (DLR)" for Ethernet IP
>> RSTP IEEE802.1w
> VLAN support
> Ethernet type based or IEEE 802.1P Traffic prioritization
> 1 PPS output
> PCIex1
> Seamless integration on old Legacy PCI Systems through optional adapter

Software features

> Ethernet network drivers available for most OS (Linux, Windows, WxWorks, etc.)
> IEEE 1588-2008 PTPv2 Ordinary Clock and Boundary Clock support
> Profiles: Default, Power, IEC 61850-9-3, AS

Processing performance

> On-board FPGA for high-speed network switching and PTP timestamping
> Multi-core CPU unit to support autonomous software applications

Configuration & Management

> On-board integrated Web Server to provide HTML5-GUI configuration access:
>> Accessible through HTTP(S)
>> Configuration profiles and Firmware updates
>> Real-time network monitoring

PC SCADA

PTP
Redundant
Network
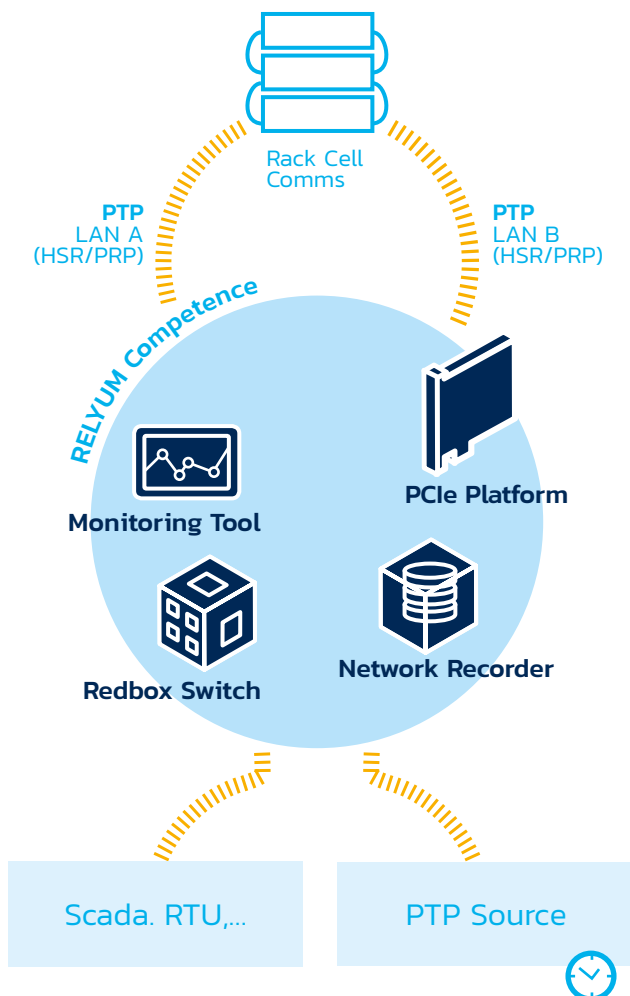
RELYUM PCIe

Redbox DAN

PTP Network

Case Studies

## Next Generation IEC 61850 Digital Substation

Relyum products are key enablers for the time–aware high–availability reliable Ethernet network implemen–tations in the next generation Digital Substations and Smart Grids. The role of each equipment in this context is:

- **RELY–RB Time-aware Redbox Switch** combines HSR/PRP redundant Ethernet links with regular Ethernet ones in a single equipment. This approach solves the need of switching PTP traffic and providing access to high–availability topologies to the regular Ethernet nodes or LANs.
- **RELY–REC Time-aware Network Recorder** includes means for continuous network monitoring and further debugging. This equipment integrates advanced technologies to support combined PTP and HSR/PRP GbE topologies.
- **RELY–PCIe Time-aware Redbox–DAN–Switch PCIe Platform** allows direct access to time–aware high–availability networks to legacy PC systems (PCIe or PCI). Moreover, this board removes the need for additional Redbox equipment to connect other non–redundant nodes (Single Attached Nodes – SANs) thanks to the third port which implements low–latency switching to the redundant ones.

Rack Cell Comms

PTP LAN A (HSR/PRP)

PTP LAN B (HSR/PRP)

RELYUM Competence

Monitoring Tool

PCIe Platform

Redbox Switch

Network Recorder

Scada. RTU,...

PTP Source

"Plug&Work" CPPS rings for Smart Factories

Industrial customers have seen Relyum platforms as a valuable key to unlock the data from their processes and machines in order to achieve higher productivity and to enhance final product quality. Nowadays, Relyum platforms are present in Smart Factories and also they are used to be directly integrated in Smart Machines.
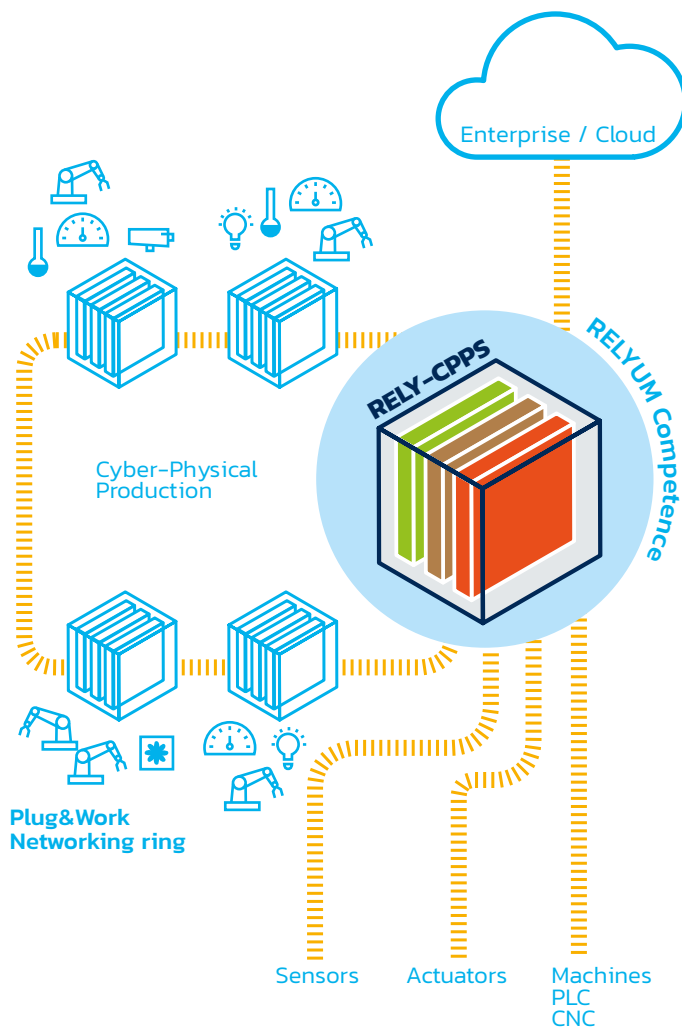
The Relyum competence in the Smart Factory scenario is providing sensor fusion, Edge computing capability and seamless OT/IT integration. As an example, the fiber optic GbE HSR rings implemented in some factories with Relyum devices are interconnecting with a true "Plug&Work" solution each heterogeneous production area. The key platform in this context is RELY–CPPS.

- **RELY–CPPS** communicates with the PLC and CNC machines placed in each area, accessing to the production and internal status information. This equipment allocate up to 4 extension modules. In this context it is very useful the Sensor Module which provides sensor interfaces to capture additional valuable information like environmental data, vibration and power consumption status.

  This information is preprocessed in–site and it is sent to the Enterprise and Cloud services if required. It is very common sharing bidirectional data with the MES/ ERP systems and providing continuous monitoring information to external databases. It is feasible as well, integrating the unlocked data with machine learning solutions.

In the context of Smart Machines, RELY–CPPS platform is directly integrated in the machine by the OEM manufactures in origin or as a retrofiting. Thanks to this add, they can offer to their customers corrective and predictive maintenance and advanced connectivity capabilities integrated in the equipment.

- **RELY–CPPS** with **Data Logger Module** and **Sensor Module** is an ideal solution for direct integration in the Smart Machines. This local storage capability is useful in customers' scenarios where the network connectivity with Enterprise and Cloud services cannot be ensured.

Enterprise / Cloud

RELY–CPPS

RELYUM Competence

Cyber–Physical Production

Plug&Work Networking ring

Sensors   Actuators   Machines
                          PLC
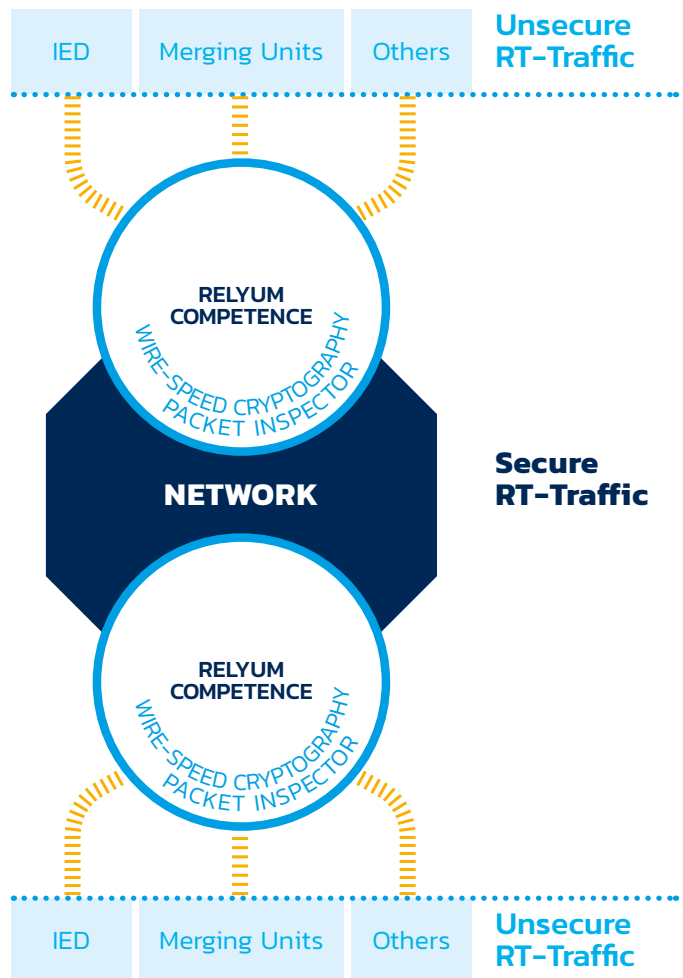   CNC

Securing Real-Time Traffic in the Smart Grid

Relyum platform can be used to secure field-bus traffic in critical systems. As an example, Relyum offers an innovative solution to face the new security challenges emerging in the context of IEC 61850 Smart Grids and substations.

In this standard, there are defined some of the most stringent real-time messages for control available in the Industry (GOOSE and SMV messages). Indeed, there is a specific standard developed to define how they could be secured (IEC 62351-6) and how the key exchange could be addressed (IEC 62351-9).The Technology beyond Connect embedded on Relyum offers a suitable solution to secure this traffic.

- **RELY-RB Time-aware Redbox Switch** with IEC 62351-6 includes FPGA based wire-speed cryptography to cipher, decipher and authenticate real-time traffic with low latency. It includes security features at different layers implementing defence, detection and reaction capabilities. It integrates specialized security chip to provide unique device identification. This feature ensures a robust chain of trust valuable for IEC 62351-9 operation. In addition, other embedded ICs allow physical security monitoring like real-time power consumption analysis or equipment manipulation. For detection and analysis purposes, RELY-RB supports customizable internal port mirroring capability linked to an embedded SIEM agent.

IED	Merging Units	Others	**Unsecure RT-Traffic**

RELYUM COMPETENCE
WIRE-SPEED CRYPTOGRAPHY
PACKET INSPECTOR

NETWORK

Secure RT-Traffic

RELYUM COMPETENCE
WIRE-SPEED CRYPTOGRAPHY
PACKET INSPECTOR

IED	Merging Units	Others	**Unsecure RT-Traffic**

Ordering information

MODEL	DESCRIPTION	ORDERING REF.
RELY-CPPS	Cyber-Physical Production System Platform	CPPS
	Sensor	-S
	High Speed Data Adquisition	-ADC
	Data Logger	-L
	Wireless	-W
RELY-RB	Time-aware Redbox Switch	RB
RELY-RB+	Time-aware Redbox Switch Plus	RB+
RELY-RB+2	Time-aware Redbox Switch Plus2	RB+2
RELY-REC	Time-aware Redbox Switch Recorder	REC
RELY-PCIe	Time-aware Redbox-DAN-Switch PCIe Platform	PCIe

Ordering information for RELY-CPPS Platform with expansion modules.

CPPS -1-2-3-4	
1	3
2	4

Coding for 1 and 2

[S] Sensor

[ADC] High-speed
Data Acquisition

[X] empty

Coding for 3 and 4

[L] Data Logger

[W] Wireless

[X] empty

The additional functional options available depend on the core image set for the selected device.

For more configuration information, please contact us or send an email to info@relyum.com.

RELYUM

Technologies beyond connect

www.relyum.com
info@relyum.com

RELYUM is a SoCe Partner