

Integrated Ethernet Train Backbone Node

14 ports 4xFE+2xGbE+8xFE - PoE+ - Gen2



VDS Rail
The onboard networking company



*Preliminary image, for reference only

The **Fast Ethernet Integrated Train Backbone Node (ETBN)** (Gen 2) is used when **two or more trains' networks need to be connected** together. The Integrated Train Backbone Node has been specially designed to meet the requirements specified by IEC 61375 for the **Ethernet Train Backbone (ETB)** network.

The ETBN is **IEC 62443-4-2 certified**, ensuring robust cybersecurity.

The Integrated ETBN is a perfect combination of an **IEC 61375 standard Train Backbone Node** implementation with a **multi-port Ethernet Consist Switch**. Due to this mix of backbone and consist ports, it provides an integrated and cost sensitive solution.

The Integrated Train Backbone Node has **four (4) 100BASE-TX switched ports for Train Backbone Network** implementation and **two (2) 1000BASE-T + eight (8) 100BASE-TX switched ports for the Consist Network** implementation.

Two (2) pairs of Backbone ports are equipped with **bypass function**, one (1) pair of Consist ports can be optionally equipped with bypass function.

Eight (8) Fast Ethernet Consist ports can be optionally equipped with **PoE+ capability**.

IEC 61375 Train inauguration procedure is fully supported as well as ETBN control interface for **TRDP devices**. Routing and address translation rules for multiple consist networks interconnections are automatically defined during train inauguration. Other interfaces (SNMP, REST) are also available in order to provide a wider range of potential implementations.

The TTCMP® services provide **automatic device configuration** and **continuous monitoring** giving the customer a way to reduce commissioning and maintenance costs.

Specifically designed to operate in harsh environmental conditions typical of Rolling-Stock applications and fully EN 50155 compliant, the Integrated ETBN provides the highest level of reliability and robustness required by the railway industry.

Technical specifications

- M12 circular connectors for Ethernet ports
- M12 circular connector for power supply port

Backbone Level

- Four (4) 10/100BASE-T(X) Ethernet ports
- Two (2) hardware bypasses for maximum reliability

Consist Level

- Two (2) 10/100/1000BASE-T(X) Ethernet ports
- Eight (8) 10/100BASE-T(X) Ethernet ports with optional PoE+ capability
- One (1) hardware bypasses for maximum reliability (option)

Highlights

- IEC 61375 standard Train Backbone Node + multi-port Ethernet Consist Switch
- IEC 61375-2-5 TTDP (Train Topology Discovery Protocol)
- IEC 61375-2-3 TCN Communication Profile
- TRDP (Train Real Time Data Protocol)
- 14 Ethernet ports
 - 4xFE switched ports for ETB implementation
 - 2xGbE+8xFE switched ports for ECN implementation
- Layer 2 managed switch with Layer 3 services - ECN level
- Rolling-Stock Applications - EN 50155 compliant
- IEC 62443-4-2 certified
- Designed for harsh environmental conditions
- Wide operational temperature up to $-40^{\circ}\text{C} \div +70^{\circ}\text{C}$
- Wide operating voltage range $24 \div 110 \text{ VDC}$
- Up to IP65 rated
- Power over Ethernet PoE+
- Hardware bypasses for maximum reliability
- TTCMP Network Toolkit
 - Fast network design
 - First set-up and commissioning simplification
 - Maintenance optimization

Management

- Extended RMON counters
- RADIUS authentication
- 802.1X port authentication
- SNMP v1, v2c, v3 device management
- Fall-back firmware image for maximum reliability
- IPv4 protocol supported
- In-band (SSH) and out-of-band (console) CLI interface for device management
- In-band and out-of-band firmware upgrade
- Train Topology and Configuration Management Protocol (TTCMP®) technology to support project-based device configuration management, including network discovery and auto-configuration

Layer 3 features

- Integrated DNS Server
- Standard IEC 61375 TTDP Train Topology Discovery Protocol
- Network Address Translation (SNAT, DNAT) and R-NAT (railway 1:1 NAT)
- Router Redundancy Protocol
- Static IPv4 unicast and multicast routing
- Dynamic inter-consist routing following train inauguration

Layer 2 features

- Wire speed switching
- Auto MDI/MDIX
- Eight (8) output hardware queues for each port
- Up to 8192 MAC address table
- DSCP/802.1p Class of Service
- Ingress/egress rate limiting
- Link Layer Discovery Protocol (LLDP 802.1ab)
- Strict priority or weighted (WRR) scheduler
- Up to 4094 802.1Q VLANs
- Spanning tree (STP 802.1D) and Rapid Spanning Tree (RSTP 802.1w)
- Link aggregation protocol (LACP 802.3ad)
- DHCP option 82 handling
- Advanced and flexible per-port DHCP server
- IGMP versions 1, 2 and 3 snooping



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Technical Specifications

PHYSICAL DATA

System status indicators	8 LEDs
Fast Ethernet connectors	M12, female, 4-ways, D-coding
Gigabit Ethernet connectors	M12, female, 8-ways, X-coding
Power supply connector	M12, male, 4-ways, A-coding
Maintenance port connector	M12, female, 8-ways, A-coding
	Nominal voltage 24 ÷ 110 Vdc Range according to EN 50155
Power supply voltage (insulated)	Nominal voltage 24/32/48/64 Vdc Range according to IEEE Std 1476-2000 (R2008)
Interruption voltage supply class	S2, according to EN 50155
PoE class	0, 1, 2, 3 and 4, (max 30W per port), according to IEEE 802.3at Type-2
PoE budget (option)	60 W derating of 1 W/ °C @ > 55 °C
Total power consumption	
noPoE version	22 W max
PoE version	100 W max
Overall dimensions (W x H x D)	207 x 184 x 51 mm (without connectors)
Weight (max.)	
noPoE version	2.2 Kg +/- 5%
PoE version	2.3 Kg +/- 5%
Operating temperature	
Standard	-25 °C ÷ +70 °C (+85 °C for 10 min. according to EN 50155 class OT3 with extended operating temperature ST1)
Optional	-40 °C ÷ +70 °C (+85 °C for 10 min. according to EN 50155 class OT4 with extended operating temperature ST1)
Relative humidity (non-condensing)	0 % ÷ 95 %
Storage temperature	-40 °C ÷ +85 °C
	RAL 7016 (frame)
Color codes	Pantone 425C (front panel) Pantone 426C (front panel)
Degree of protection	
Standard	IP40
Optional	IP65
Mechanical enclosure	Passivated aluminium

APPROVALS / COMPLIANCE

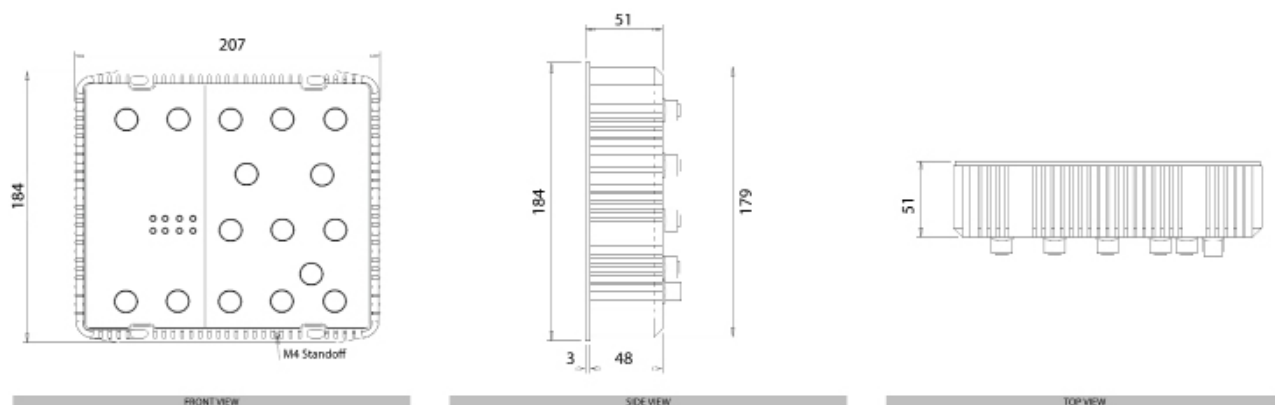
EN 50155	Railway Applications (Electronic equipment used on rolling stock)
IEC 61375	Electronic railway equipment - Train communication network (TCN)
EN 50121-3-2	Electromagnetic compatibility rolling stock apparatus
IEC 60068-2-1	Environmental testing: Tests - Test Ad: Cold
IEC 60068-2-2	Environmental testing: Tests - Test Bd: Dry heat
EN 60068-2-30	Environmental testing: Tests - Test Db Variant 2 - Damp heat
EN 61373	Shock & Vibration - Category 1 class B
EN 50124-1	Insulation coordination
EN 45545-2	Fire & Smoke
IEC 62443-4-2	Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components

Available from FW version: 5.0.0

INTERNET WORKING STANDARDS

IEEE 802.3	Fast Ethernet (10/100BASE-T(X)) Gigabit Ethernet (10/100/1000BASE-T(X))
IEEE 802.1Q	Tagged VLANs
IEEE 802.1D	Spanning Tree Protocol
IEEE 802.1w	Rapid Spanning Tree protocol
IEEE 802.1X	Port-based network access control
IEEE 802.1AB	Link Layer Discovery Protocol (LLDP)
IEEE 802.3ad	Link Aggregation Protocol (LACP)
RFC 2328	OSPF v2
RFC 2453	RIP v2
RFC 3768	RRRP v2
RFC 5798	RRRP v3

Wall Mounting



Ordering codes

Part Number **NODC14xlxx**

Description **NC-IT14-2G12F-xxxx-xB-IPxx-Tx-xx**



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