KONUENDO NETWORKING

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 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**
- **Designed for harsh environmental conditions**
- **Wide operational temperature up to -40°C ÷ +70°C**
- **Wide operating voltage range 24 ÷ 110 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 semplification**
  - **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**
Power supply voltage (insulated)	**Nominal voltage 24 ÷ 110 Vdc Range according to EN 50155 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**
Color codes	**RAL 7016 (frame) Pantone 425C (front panel) Pantone 426C (front panel)**
Degree of protection	
Standard	**IP40**
Optional	**IP65**
Mechanical enclosure	**Passivated aluminium**

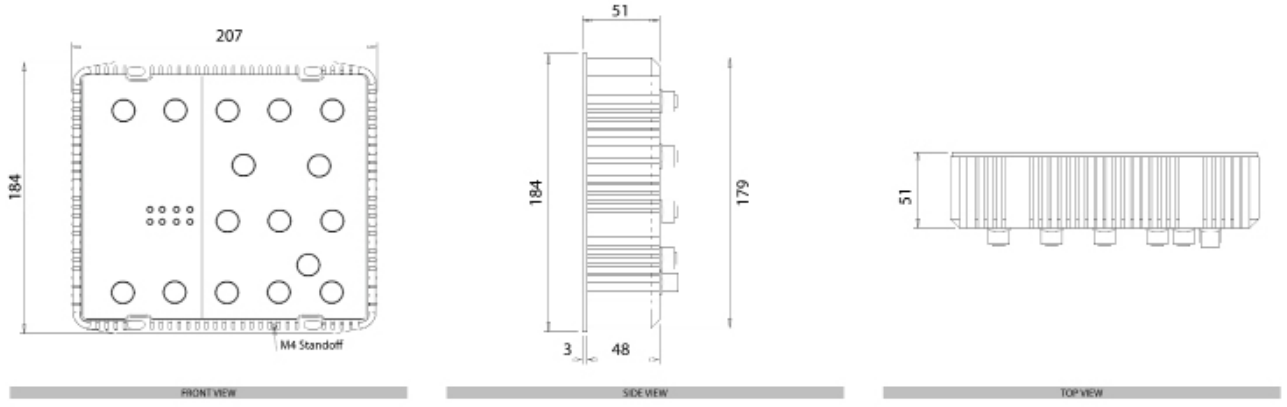
APPROVALS / COMPLIANCE

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**

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	**VRRP v2**
RFC 5798	**VRRP v3**
802.1AS, 802.1Qat, 802.1Qav and 802.1Qbv	**Time Sensitive Networking (TSN)**

Wall Mounting



Ordering codes

Part Number **NODC14xIxx**

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

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