

# Train Backbone Node

KONUENDO NETWORKING



**VDS Rail**  
The onboard networking company



The TBN device is used when many trains must be connected together. TBN has been specially designed to meet the requirements specified by IEC standards for the train ethernet backbone network.

Double switched backbone lines protected by a bypass relay ensure high levels of fault tolerance also in the case of a power failure. A couple of TBN can be used together using an active/passive redundant configuration to obtain the maximum level of protection. A routed port is available to connect the backbone to the consist network. IEC Train inauguration procedure is fully supported.

Routing and address translation rules for multiple consist networks interconnections are automatically defined during train inauguration. On the consist side, the TTCMP<sup>®</sup> protocol provides automatic main configuration and continuous monitoring giving the customer a way to reduce commissioning and maintenance costs.

Designed to operate in harsh environmental conditions typical of rolling stock applications, the TBN can be powered from 24 Vdc to 110 Vdc nominal voltage.

Fully EN 50155 compliant, it provides the highest level of reliability and robustness required by the railway industry.

## Technical Specifications

### Management

- Device bypass for maximum reliability
- Extended RMON counters
- Fallback firmware image for maximum reliability
- IPv4 protocol supported
- Inband (SSH) and out-of-band (console) CLI interface for device management
- Inband and out-of-band firmware upgrade
- Proprietary Train Topology and Configuration Management Protocol (TTCMP<sup>®</sup>)
- RADIUS authentication
- Simple Network Management Protocol (SNMP) v1/v2c/v3

### Layer 2 details

- 5 FE or GbE Ethernet ports (4 switched, 1 routed)
- Wire-speed switching
- Auto MDI/MDIX,
- 4 output hardware queues for each port
- Up to 8192 MAC addresses
- 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 4096 802.1Q VLANs

### Layer 3 details

- Support for IPv4 protocol
- Integrated DNS and DHCP servers
- R- NAT (railway 1:1 NAT)
- Router Redundancy Protocol
- Static routing
- Dynamic routing following train inauguration
- Train wide standard multicast routing

## Technical Specifications

### PHYSICAL DATA

<b>System status indicators:</b>	8 LEDs
<b>Fast Ethernet connectors:</b>	M12, female, 4-ways, D-coding
<b>Gigabit Ethernet connectors:</b>	M12, female, 8-ways, X-coding
<b>Power supply connector:</b>	M12, male, 4-ways, A-coding
<b>Maintenance ports connectors:</b>	M12, female, 5-ways, A-coding M12, female, 5-ways, B-coding
<b>Power supply voltage range (isolated):</b>	
24 Vdc nominal	14,4 Vdc ÷ 40 Vdc, according to EN-50155
96/110 Vdc nominal	66 Vdc ÷ 165 Vdc, according to EN-50155
<b>Power supply current:</b>	0,6 A max @ 24 Vdc 0,2 A max @ 110 Vdc
<b>Power supply class:</b>	S2, according to EN-50155
<b>Power consumption (without PoE):</b>	
24 Vdc version	15 W max
110 Vdc version	22 W max
<b>Overall dimensions:</b>	
24 Vdc version	207 x 184 x 51 mm
96/110 Vdc version	207 x 184 x 73 mm
<b>Weight:</b>	
24 Vdc version	2,0 Kg
96/110 Vdc version	2,5 Kg
<b>Operating temperature:</b>	
Standard	-25 ÷ +55 °C (+70 °C for 10 min. according with EN-50155 class T1)
Optional	-25 ÷ +70 °C (+85 °C for 10 min. according with EN-50155 class T3)
Optional	-40 ÷ +70 °C (+85 °C for 10 min. according with EN-50155 class TX)
<b>Relative humidity (non condensing):</b>	0 ÷ 95 %
<b>Storage temperature:</b>	-40 ÷ +85 °C
<b>Degree of protection:</b>	
Standard	IP40
Optional	IP54, IP65

### APPROVALS / COMPLIANCE

EN 50155	Railway Applications (Electronic equipment used on rolling stock)
EN 5012132	Electromagnetic compatibility rolling stock apparatus
IEC 61000-4-2 (2008-12)	Electrostatic discharge immunity test
IEC 61000-4-3 (2006-02)	Radiated, radiofrequency, electromagnetic field immunity test 3
IEC 61000-4-4 (2004-07)	Electrical fast transient/burst immunity test
IEC 61000-4-5 (2005-11)	Surge immunity test
IEC 61000-4-6 (2008-10)	Immunity to conducted disturbances, induced by radiofrequency fields

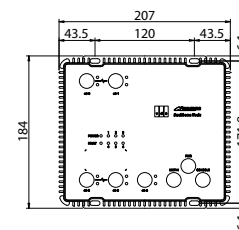
IEC 60068-2-1	Environmental testing - Part 21: Tests - Test A: Cold
IEC 60068-2-2	Environmental testing - Part 22: Tests - Test B: Dry heat
EN 61373	Shock & Vibration

### INTERNETWORKING STANDARDS

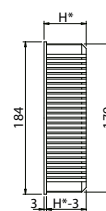
IEEE 802.3u	Fast Ethernet 802.3ab – Gigabit Ethernet
IEEE 802.1Q	Tagged VLANs
IEEE 802.1D	Spanning Tree Protocol
IEEE 802.1w	Rapid Spanning Tree protocol
IEEE 802.1X	Port-based network access control
IEEE 802.1AB	Link Layer Discovery Protocol (LLDP)
IEEE 802.3ad	Link Aggregation Protocol (LACP)

### Wall Mounting

Dimensions only for reference



FRONT VIEW



SIDE VIEW



TOP VIEW

H\*: see overall dimensions specification

### Products codes

Code	PSU	FE ports	Bypass
BN-4002-303740	37,5 Vdc	5	2
BN-4002-302440	24 Vdc	5	2
BN-4042-309640	96 Vdc	5	2
BN-4042-311040	110 Vdc	5	2