Teldat H1 Rail

Rugged wireless routers for advanced broadband services on trains

Enable secure broadband connectivity in trains to provide multimedia managed services, including security, telemetry, passenger Internet access, and more.

The Teldat H1 Rail series router is an integrated rugged communications platform that enables highly available, reliable and secure broadband cellular connectivity aboard trains. This router combines a robust mechanical design, adequate for its installation in 19-inch racks aboard moving trains, with a versatile broadband wireless (wireless WAN and Wi-Fi) and wired (Ethernet) communications port layout. The router is powered by Teldat's Internetworking Software (CIT), offering a robust enterprise-class IP protocol stack for the efficient implementation of multiple managed VPN services on a mobile access. The Teldat H1 Rail router installed base can be centrally managed by Teldat's network management platform (TeldaGES), or seamlessly integrated into existing IT network management systems.

Product Highlights

- Multiple 3G/4G broadband radio interfaces for true high speed connectivity to on-board applications
- Multiple SIM support for automatic failsafe backup through an alternative cellular broadband network
- Robust mechanical and electrical design, optimized for unattended train cabinet installations
- Embedded Wi-Fi 802.11n interface, with configurable operation mode (Access Point or Client)
- 4-port Ethernet switch expands a professional LAN network for serving the on-board devices, such as security cameras, on-board computers, etc.
- Standalone GPS with state of the art features
- Hardware-based data encryption for the highest performance in multi-VPN transmission
- Teldat Internetworking Software (CIT): complete suite of IP networking protocols, security VPN and firewall features, professional router management tools, etc.
- Centralized router management through TeldaGES or third party platforms
- EN 50155 and other train-related certifications

Key Features

Reliable LTE wireless-WAN broadband performance

- Cellular interfaces provide uninterrupted connectivity and application continuity when travelling through poor coverage areas. On longer trains, more than one H1 Rail can be deployed along the train, thereby providing higher bandwidth, better redundancy and spatial separation of the antennas for uninterrupted communication. Short areas without coverage (eg. tunnels) may not affect the whole train length at a time, so communication is maintained with spaced-out equipment.
- Automatic selection of the best available connection, based on parameters such as network availability, signal reception level, quality of service, etc.
  - ✓ Passive link supervision: the signal coverage, the technology availability, the IP transmission service status and the transmission activity are permanently controlled
  - ✓ Poll-based link supervision: not only failures but also degradations on the 4G communication are detected, notified and corrected. The router controls error rate, link latency and jitter to guarantee utmost performance on the streaming transmission (i.e. real-time IP-CCTV image transmission or voice)

- Tight integration of internal cellular modules for shock and vibration resilience, improved radio transmission and reception, protection against theft, advanced monitoring for troubleshooting, etc.
- Up to two antennas per radio interface, maximize coverage at any location
- WWAN+ proprietary optimization of network protocols for improved communication over cellular links.

Multipurpose embedded Wi-Fi

- Embedded WLAN interface with configurable or location based client / access point modes
- Train-proof Wi-Fi: multiple antennas for better transmission, flexible frequency operation (2,4 and 5 GHz), extended temperature range, reduced component aging, surge circuit protection, power efficiency, etc.
- State of the art Wi-Fi security guarantees communication privacy and confidentiality
- Multiple service coexistence based on independent SSIDs and Quality of Service
- Intelligent roaming management based on signal level
- If additional Wi-Fi Access Points are needed, Teldat also provides the W2002T-n acess point. Each one of these access points integrates two Wi-Fi radio modules

Mechanical and hardware design optimized for train installation

- Anti-shock and anti-vibration protection, and high temperature dissipation
- Fed using standard train voltage (110VDC) with a robust connector
- Support of train-related certifications, such as EN 50155

Fully Managed Ethernet Switch Ports

- Full VLAN support, per-VLAN QoS, per-port Ethernet diagnostics and SNMP management allow for the implementation of efficient and secured LAN networks on board

Enterprise Class Internetworking Intelligence

- Dynamic routing protocols allow the implementation of scalable corporate VPN networks
- Multiple service support, based on advanced QoS: hierarchical traffic analysis, labeling and prioritization, guarantees bandwidth to critical applications when sharing limited resources
- IP forwarding policy based on the real time status of the transmission link (packet loss, delay, jitter, etc.)
- Multiple virtual router instances, for simultaneous but independent service to different departments over the same platform

Key Advantages over simple connectivity solutions

- Supports multiple embedded access links (using one or multiple H1 Rail routers distributed along the train), to guarantee service continuity
- Efficiently uses links to transmit various applications, based on application criticality, required bandwidth, nominal and available bandwidth …
- Allows for shared but isolated access to train resources

Meets mobile access security imperatives

- Best in class performance in Mobile VPNs
  - ✓ Advanced IPSec features such as digital certificates, extended authentication, reverse-route injection, etc.
  - ✓ Multiple simultaneous secured tunnels for application continuity
  - ✓ IP filtering, MAC filtering and stateful firewall protect the router against attacks
  - ✓ DMVPN to simplify large deployments
- Crypto-processor incorporated for wire-speed data encryption

Enterprise-Grade Management

- Router management engine adapted for mission-critical applications.
- The router configuration resides on a single human-readable, editable, text configuration file
- Comprehensive cellular interface event logging system (signal strength, serving cell, etc.), to facilitate remote troubleshooting on moving trains
- SNMP and Teldat MIB support for all the router interfaces, protocols and advanced functionalities
- Integrated into the Teldat Management System (Teldages) and into existing third party network management platforms
- Teldages platform is a centralized graphical interface for efficient fleet communications management: network health, statistics, alarms, advanced real time access to router status and configuration, massive configuration and software upgrades, comprehensive inventory, etc.
- Remote firmware and configuration upgraded through FTP and TFTP

Technical Specifications: Hardware

Interfaces & Connectors
4 x Fast-Ethernet 10/100 Mbps (M12)
Wireless-WAN interfaces LTE/HSPA+/HSPA
1 x Wi-Fi interface
1 x Standalone GPS (Optional)
LTE antenna ports (N type)
2 x Wi-Fi antenna ports (N type)
GPS active antenna port (FME)
1 x Auxiliary serial port, (DB-9F)
3 x status LEDs
Internal SIM trays
Embedded crypto-processor

Power Supply
110 VDC (allows 77 to 137,5 VDC)
M12 male power connector
Power consumption: 20W
Programmable time delay for device shut down
Full protection against power-on / power-off transients: inverse polarity, surges, spikes, etc.

GPS
Embedded standalone GPS (Optional)
48 channels
Ultra high sensitivity
Fastest time to first fix
WAAS support
NMEA protocol
Local and remote data delivery
Position logging
Active antenna

Cellular Interfaces
LTE/HSPA+/HSPA/EDGE/GPRS/GSM interfaces on different frequencies available.
For other interfaces (LTE Band 14, Wi-MAX, 4.9 GHz, etc.), contact your local dealer

Wi-Fi Interface
1 x IEEE 802.11a/b/g/n 2x2
High power transmission on both 2.4/5GHz
Low noise amplifiers for improved sensitivity
Two connectors for external antennas

4 port Fast-Ethernet switch
Ethernet V2 / IEEE 802.3
10/100-BaseT automatic detection
Half/full duplex automatic negotiation
MDI / MDI-X crossover detection
Managed Switch: EtherLike MIB (RFC 2665), SNMP-REPEATER-MIB (RFC 2108), MAU-MIB (RFC 2668)
2 status LEDs per port

Auxiliary serial port
Asynchronous RS-232 serial

Environmental specifications
Operating Temperature: -25°C to +70 °C
Designed to meet industry standards for foreign object and water ingress
Shock and vibration proof
Relative Humidity: 5% to 95%

Dimensions and weight
Length x Width x Height: 240 x 483 x 45 mm (1U)
Approximate weight: 3.3 kg.

Technical Specifications: Software Features

Cellular interface specific functionalities

Simultaneous operation of embedded modems
Flexible support of 4G and 3G technologies
Automatic handover
Policy routing based on different criteria
- Signal level
- Network quality probing: delay, jitter, packet loss
- Radio technology (LTE, HSPA+, EVDO, UMTS, GPRS, LTE B14)
- Time schedules

Passive interface failure detection (analyzing received traffic)
Active interface failure detection (network probing poll)
Diversity antenna
Dual SIM
OTA WWAN module firmware upgrade
SMS management commands: reset device, reset cellular interface, connect/disconnect cellular data link, etc.
Comprehensive RF real-time monitoring for troubleshooting
WWAN+ (Advanced management of network protocols for improved communication over cellular networks)

Wi-Fi specific functionalities

802.11 a, b, g, n
Client mode or access point mode
High transmission power
High reception sensibility
Manual or automatic channel selection
Manual or automatic selectable speed
Multiple SSID
Security:
- 802.11i, WPA, WPA2
- EAP, EAPOL
- Authentication (open, shared, WPA)
- Encryption (AES, TKIP, WEP)

Quality of Service (QoS) AIFS, CWmin, CWmax
ESSID
MAC Filtering
Location based mode selection

Ethernet switch specific functionalities

VLAN support with 802.1q
Routing per VLAN
IEEE 802.1x pot based network acces control
LLC(802.2), ARP
Manageable Switch
Real time events for troubleshooting
Quality of service, IEEE 802.1p CoS ("Class of Service")
Multiple bridge domains
Simultaneous bridging & routing
Source Routing, MAC filtering and NetBIOS
IEEE 802.1w
Bridge over PPP (BCP) and GRE.
Bridge over PPP (BCP)
STP "Spanning Tree Protocol" (IEEE 802.1d)
RSTP "Rapid Convergence Spanning Tree Protocol"(IEEE 802.1w)
PVST ("Per VLAN Spanning Tree Protocol")

Quality of service (QoS)

Access lists, based on:

IP protocol stack

IP, ARP, Proxy ARP
Static IP Routing
RIP I, RIP II
BGPv4
OSPFv2
Policy Routing with rich selection criteria
Virtual router instances, w. Multi-VRF
DHCP client, server & relay
DynDNS Client
NAT/PAT/Port Mapping/NAT exceptions
PAT fire-walling
Mobile IP
Compatible with HSRP
VRRP – Virtual Redundancy Router Protocol
DNS client & proxy. DNS cache.
DNS dynamic updating
Bidirectional Forwarding Detection protocol (BFD)
NTP Client
Multiple addresses per interface
Loopback Interfaces
IPv6

Security and VPNs

IPSec client & server, compatible with third party IPSec peers
IPSec security services: ESP & AH
IPSec operation modes: tunnel & transport
Encryption: AES, DES, 3DES & RC4
Dedicated hardware crypto-processor
Authentication: SHA-1 & MD5
IKE Protocol
ISAKMP Configuration Methods. Oakley groups 1, 2, 5 & 15
Next Hop Resolution Protocol
Dynamic Multipoint IPSec VPNs (DMVPN)
Gateway Encryption Transport VPN (GET VON)
Radius Access Control
Tacacs Access Control
IPSec Server, compatible with Microsoft clients
L2TPv2: Client (LAC), Server (LNS), L2TP-CI, Pseudowire
Telnet, SSH & FTP console access user & password protected
User & permission levels
Advanced Firewall System (AFS)
- Statefull Firewall
- Advanced packet classification and marking
- URL & content filtering

Static and dynamic access controls
Reverse Route Injection (RRI)
Tunnel End-point Discovery Protocol (TED)
Event generation for SIEM interaction
Non-hackable operating system (not Linux or Windows)
NAT-Traversal
X.509v3, LDAP, PKIX, PEM, DER digital certificates
SCEP Protocol
IPSec PMTU Discovery
GRE & multi-GRE. GRE RC4 encryption
IPSec Stateful Failover

Management

Command line interface on aux serial port, telnet & SSH

- IP source and destination addresses
- Protocol
- Input interface / subinterface
- Output interface / subinterface
- Incoming DSCP, precedende, ToS field
- Port
- Value of CoS field
- Http URL
- Hex string or text in the packet
- Packet length
- Traffic encapsulated or de-encapsulated in IPsec
- NAT
- Session life time

Packet labeling (DiffServ) depending on above clasification criteria
Congestion control queing mechanisms:
- First In First Out, FIFO
- Low Latency Queing, LLQ
- Weighed Fair Queing, WFQ
- Class Based Weighed Fair Queing, CBWFQ

Traffic limiting in queues, with overflow to lesser priority queues
Policy routing based on network quality probes (delay, jitter, packet loss)
Policy routing based on priority, speed, time, location, cost, etc.
Controlled packet discard for TCP traffic congestion
Fragmentation in PPP & MPPP
Traffic shaping

PPP protocol for external modem & WAN link aggregation
PPP (RFC 1661), PAP/CHAP, IPCP
Dynamic assignment of IP addresses (own or peer)
PPP Multilink
Multi-Class Extension to Multi-Link PPP
PPPoE protocol
PPPoE over Ethernet
PPPoE Bridge + routing (PPPoE pass-through)
PPP Multilink over PPPoE
Re-negotiation based on PADT

Traffic balancing
Multi-path per IP packet (with static and dynamic routing)
Weighted balancing per TCP/IP session
Weighed to the speed ratio of the different lines
Multicast: IGMP, IGMP-proxy, MOSPF & PIM-SM

Editable text based configuration
Access/execution user levels (local or AAA based)
AAA secure access: RADIUS and TACACS+ authentication, authorization and accounting
SNMPv1/2/3: MIB-2, Teldat Private MIB
Comprehensive Event Logging System (+7000 events)
Network/link quality guarantee agent
Netflow V5 & V9
Syslog Client
Network Time Protocol (NTP)
DynDNS Client
FTP & TFTP software, BIOS & configuration updating
Integrated protocol analyzer compatible w. Ethereal/Wireshark
Radius access control and accounting
Interoperability with third party management platforms such as Openview, Tivoli, Netcool, InfoVista, etc.
Centralized remote management system, TeldaGES

IP PBX Survivability
SIP based Back to Back user agent (B2BUA)
Under loss of network connectivity:
- Calls between IP terminals connected over Wi-Fi or Ethernet
- Supervised and blind transfers
- Multiple terminal simultaneous ring
- Hunt groups
- Call groups
- Overflow
- Forward if busy, no answer or unconditional
- Locution on hold, streaming mode from file

Data compression
PPP compression
IPHC Compression
Van Jacobson & STAC LZS compression algorithms

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