W Wolverine

Ethernet Extender with serial support
DDW-226

High Speed Ethernet extension over copper

The DDW-226 is an Industrial Ethernet SHDSL extender with support for redundant rings. The redundant protocol can be used either on the SHDSL interface or on the Ethernet interface. Our unique FRNT (Fast Recovery of Network Topology) technology is the fastest protocol on the market to re-configure a network in the event of any failure of a link or hardware. Also included in the DDW-226 is a RS-232 serial adapter and a 10-port Virtual Com port re-director software. The unit supports TCP client, TCP server and UDP protocol modes allowing it to be used in a wide variety of applications.

The DDW-226 allows the cables of existing serial networks to be reused to create an Ethernet network while still allowing the legacy serial device to function on the new network. The DDW-226 Ethernet Extender is the ideal solution for extending your Ethernet network over copper cables where in the past the only option would have been fibre. At shorter range the transfer rate will be as fast as 5.7 Mbit/s in both directions. Transmission distances up to 15 km are possible, however at a reduced data rate. The SHDSL transmission technology makes the DDW-226 perfect for the re-use of existing copper cable installations from older communications networks. The Ethernet Extender supports two SHDSL interfaces and can therefore be used to create a daisy chain or ring network.

The DDW-226 uses the Westermo WeOS operating system already employed in our range of RedFox industrial Routing Switches. Using WeOS provides the DDW-226 with all the advanced switching and routing functionality supported by the Redfox. These functions include VLAN support, Layer 3 switching, Static Routing, Firewall functions, IGMP Snooping, VPN support and SNMP V3.

Configuration and diagnostics

Configuration of the unit is kept to a minimum for ease of use. The units are preconfigured for daisy-chain application, which implies that a simple installation can be made with no software configuration at all. For further configuration a built in web interface is provided so that only a computer with a standard web browser is required alternatively the CLI can be used for advanced settings or fine tuning of the network.

There are also comprehensive web screen and CLI diagnostics for both the SHDSL transmission interfaces and Ethernet switch which makes it possible to view statistics and monitor diagnostic information.

The units also support SNMP allowing them to be managed as part of the overall network infrastructure.

Harsh industrial environment

The units are well prepared for use in harsh industrial environments. Total galvanic isolation and transient protection are standard for all interfaces. The line interfaces are also equipped with extensive protection against over-currents and voltage suppression.
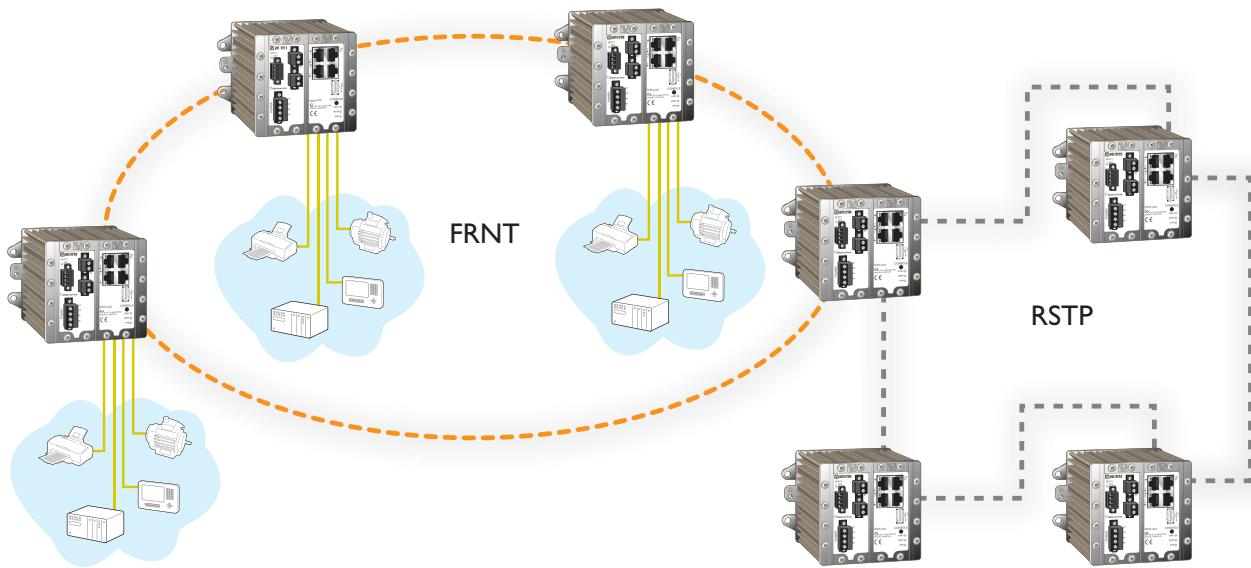
The DIN mounted metal case of the unit makes it robust and allows for the surrounding air temperature to be between –40 to 70°C. To allow for uninterrupted communication the units are supplied with redundant power inputs that can be powered from two separate supplies and handle an operating voltage range of 16 – 60 VDC.
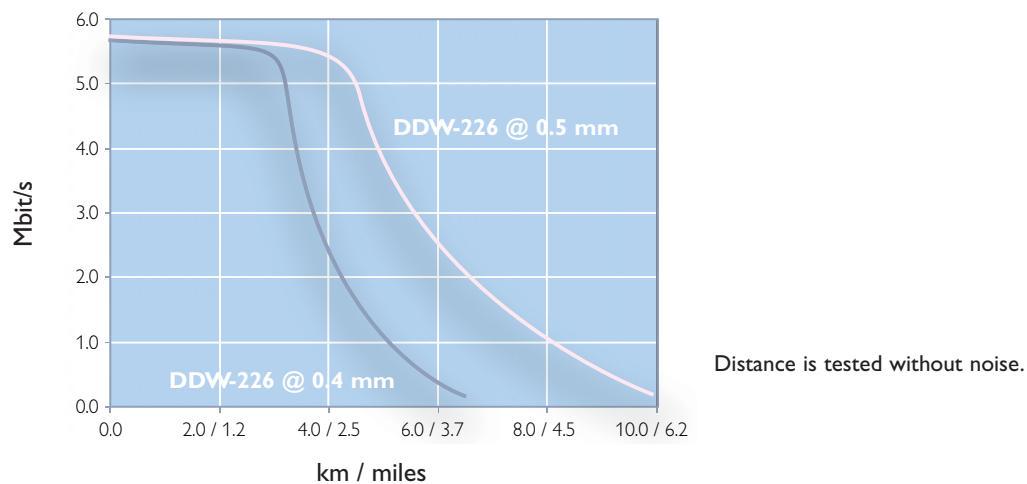
Approvals

The construction of the units has gone through extensive testing and approvals both by Westermo and accredited test houses. The DDW-226 has approvals for industrial and railway use as well as in explosive environments.

Application

FRNT

RSTP

Speed versus distance

DDW-226 @ 0.5 mm

DDW-226 @ 0.4 mm

Distance is tested without noise.

Mbit/s

km / miles

Interfaces

DSL connection
Up to 5.696 Mbit/s

LED indicators

LED indicators

IO

Ethernet interface
10/100 Mbit/s

Earth connect

USB

Console port

Power

RS-232

LED indicators
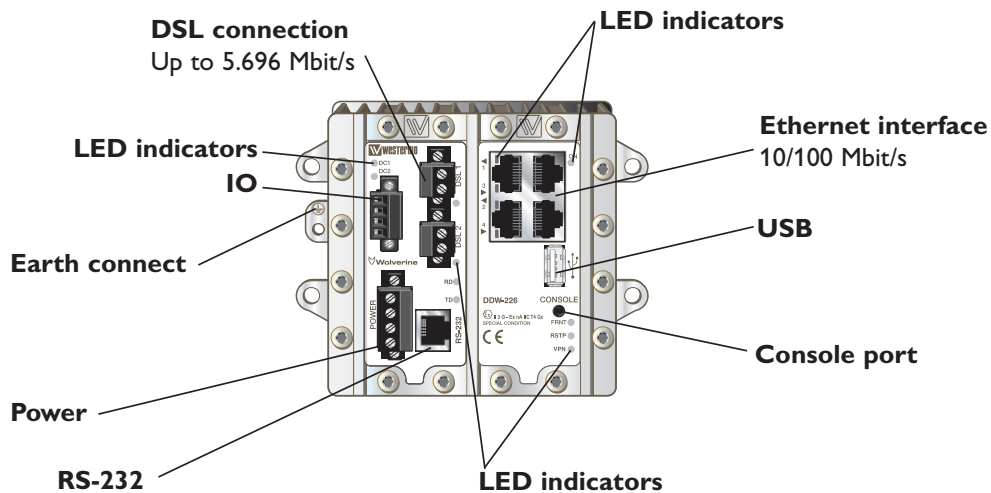
Technical Data

Power	
Rated voltage	20 to 48 VDC
Operating voltage	16 to 60 VDC
Rated current	330 mA @ 20 VDC 150 mA @ 48 VDC
Rated frequency	DC
Inrush current, I²t	1.5 A²s
Startup current*	400 mA
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm² (AWG 24 – 12)
Shielded cable	Not required

* If external supply is used it must meet specified inrush current.

Console	
Electrical specification	TTL-level
Data rate	115.2 kbit/s
Data format	8 data bits, none parity, 1 stop bit, no flow control
Circuit type	SELV
Isolation to	All other except USB
Galvanic connection to	USB
Connection	2.5 mm jack, use Westermo cable 1211-2027

USB	
Electrical specification	USB 2.0 host interface
Data rate	Up to 12 Mbit/s (full-speed mode)
Circuit type	SELV
Maximum supply current	500 mA
Isolation to	All other except Console
Galvanic connection to	Console
Connection	USB receptacle connector type A
Conductive housing	Yes

I/O / Relay output	
Connect resistance	30 Ω
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm² (AWG 24 – 12)
Maximum voltage/current	60 VDC / 80 mA

I/O / Digital input	
Voltage levels	Logic one >12V, Logic zero <1V
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm² (AWG 24 – 12)

Ethernet TX	
Electrical specification	IEEE std 802.3. 2005 Edition
Data rate	10 Mbit/s or 100 Mbit/s, manual or auto
Duplex	Full or half, manual or auto
Circuit type	TNV-1
Transmission range	Up to 150 m (492 ft) with CAT5e cable or better
Isolation to	All other
Connection	RJ-45 auto MDI/MDI-X
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails.*
Conductive housing	Yes
Number of ports	4

* To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary or the cable is longer than 30 m and inside 10 m boundary to the rails and connected to this port.

SHDSL	
Electrical specification	ITU-T G.991.2 Annex B
Data rate	192 kbit/s to 5696 kbit/s
Protocol	EFM according to IEEE 802.3-2005
Transmission range	According to ITU-T G.991.2 depending on line quality
Isolation to	All other
Connection	Detachable screw terminal
Connector size	$0.2 - 2.5$ mm^2 (AWG 24 – 12)
Shielded cable	Not required
Number of ports	2

RS-232	
Electrical specification	EIA RS-232
Data rate	300 bit/s – 115.2 kbit/s
Data format	7 or 8 data bits, odd/even/none parity, 1 or 2 stop bits
Protocol	Transparent, optimised by packing algorithm
Circuit type	SELV
Transmission range	15 m / 49 ft
Isolation to	Power, DSL, Ethernet
Galvanic connection to	USB, Console
Connection	RJ-45
Shielded cable	Not required
Conductive housing	Yes

Protocols and Functionality

Ethernet Technologies	IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseTX and 100Base FX IEEE 802.3ab for 1000BaseT IEEE 802.3z for 1000BaseX
SHDSL technologies	ITU-T G.991.2 (SHDSL) IEEE 802.3ah (EFM)
Resiliency and High Availability	Fast Reconfiguration of Network Topology (FRNT) FRNT Link Health Protocol (FLHP) IEEE 802.1D Spanning Tree Protocol (STP) IEEE 802.1w Rapid STP (RSTP)
Layer-2 Switching	IEEE 802.1Q Static VLAN and VLAN Tagging IEEE 802.3x Flow Control IGMPv2/v3 snooping AVT Dynamic VLAN (Westermo Adaptive VLAN Trunking) Management VLAN (Westermo Management Interface concept)
Layer-2 QoS	IEEE 802.1p Class of Service Flexible classification VLAN tag, VLAN ID, IP DSCP/ToS, Port ID)
IP Routing, Firewall and VPN	Static IP routing Dynamic IP routing • OSPFv2 • RIPv1/v2 VRRP Firewall, NAT, Port Forwarding IPSec VPN
Manageability	Management tools • Web interface (HTTP and HTTPS) • Command Line Interface (CLI) via console port and SSHv2 • Westermo IPConfig tool • SNMPv1/v2c/v3 • Flexible management of configuration and log files • Secure Copy (SCP) for remote file upload and download • Local file management via HTTP, FTP, TFTP and SCP • Load/save files from/to USB memory stick Syslog (log files and remote syslog server) Digital I/O Port Monitoring SNTP (NTP client) DHCP client DHCP server DDNS
SNMP MIB support	RFC1213 MIB-2 RFC2863 Interface MIB (ifXTable) RFC2819 RMON MIB (etherStatsTable) RFC4188 Bridge MIB RFC4318 RSTP MIB RFC4363 Q-BRIDGE MIB (dot1qVlan and dot1qVlanStaticTable) RFC4836 MAU MIB (dot3IfMauBasicGroup and dot3IfMauAutoNegGroup) RFC4133 Entity MIB (entityPhysical) RFC3433 Entity Sensor MIB RFC4319 HDSL2/SHDSL MIB (hdsl2ShdslSpanConfTable, hdsl2ShdslSpanStatusTable, hdsl2ShdslInventoryTable and hdsl2ShdslSpanConfProfileTable). Read-only support. WESTERMO PRIVATE MIB

Type tests and environmental conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	10 V/m 80% AM (1 kHz), 80 – 1000 MHz 20 V/m 80% AM (1 kHz), 800 – 1000 MHz 10 V/m 80% AM (1 kHz), 1400 – 2100 MHz 5 V/m 80% AM (1 kHz), 2100 – 2500 MHz 1 V/m 80% AM (1 kHz), 2500 – 2700 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports unbalanced	± 2 kV line to earth, ± 2 kV line to line
		Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 1 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	300 A/m
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz line to earth
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz line to line
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 & 100 ms, interruption 10 ms, 30% reduction 10 ms, 60% reduction +20% above & −20% below rated voltage
Radiated emission	EN 55022	Enclosure	Class A and Class B
	EN 55016-2-3	Enclosure	Class A and Class B
	FCC part 15	Enclosure	Class A and Class B
Conducted emission	EN 55022	DC power ports	Class A and Class B
Dielectric strength	EN 60950	Signal port to other isolated ports	1500 Vrms 50 Hz 1 min
		Power port to other isolated ports	1500 Vrms 50 Hz 1 min
Temperature		Operating	−40 to +70°C
		Storage & Transport	−40 to +85°C
		Maximum surface temperature	135°C (temperature class T4)
Humidity		Operating	5 to 95% relative humidity
		Storage & Transport	5 to 95% relative humidity
Altitude		Operating	2 000 m / 70 kPa
Reliability prediction (MTBF)	MIL-HDBK-217F	Operating	700 000 hours @ 25°C
Service life		Operating	10 year
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Enclosure	UL 94	Aluminium/Zink	Flammability class V-0
Dimension W x H x D			134 x 105 x 122 mm
Weight			1.5 kg
Degree of protection	IEC 529	Enclosure	IP 40
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail or wall-mouonted

Approvals

CE
Ex PENDING
FM APPROVED PENDING