eX-SM110 Managed Fast Ethernet Extenders

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Managed Long Range LAN Extender

- Extends 10/100Base-TX Ethernet up to 10,000 feet (3 KM) over 2-wire 24 AWG twisted pair.
- High-Speed – up to 200+ mbps aggregate bandwidth
- Transparent operation for all Ethernet protocols including 802.1Q VLAN packets and IP video compression schemes.
- Advanced features - Link Pass-Through, Interlink Fault Feedback, Auto-MDIX and Loopback
- Manage via SNMP, CLI - Telnet/SSH, Internet browser, or PerleVIEW Centralized Management Package

10/100 Ethernet Extenders allow you to extend Ethernet services beyond the general IEEE 802.3 limits of 328ft / 100m using **any existing copper wiring** previously used in alarm circuits, E1/T1 circuits, RS-232, RS-422, RS-485, CCTV and CATV applications. For environments where the **10/100 LAN is being extended** and **network security is critical**, Perle offers **Managed Fast Ethernet Extenders** that support all authentication, authorization and accounting (AAA) security services used in corporate networks, including TACACS+, RADIUS, LDAP, Kerberos, NIS and RSA. To further protect ID's and passwords from someone 'snooping' on the network, Perle Managed Ethernet Extenders provide secure management sessions by supporting **SSH, SNMPv3, Telnet and HTTPS**. These types of features are used when managing your corporate firewalls, switches and routers. This is why Perle makes them available in the **eX-SM110 Managed Ethernet Extender**.

These simple and effective point to point Ethernet Copper Extenders are perfect for commercial buildings, residential units, hospitality environments and remote offices … **anywhere you need the ability to securely configure, monitor and manage long range Ethernet communication links** between separated LANs or LAN devices (i.e. PCs, digital sensors, VoIP phones, WiFi Access Points, IP cameras and more). For high density applications check out the eX-CM110 Managed Fast Ethernet Extender Modules.

You will also appreciate how easy it is to set up the **eX-SM110** with an intuitive Web Manager GUI and multiple methods of access. And, with support for IPv6, Perle Managed Ethernet Extenders provide organizations with investment protection to meet this rapidly growing standard.

10/100 Ethernet Extenders are also available as unmanaged standalone models with support for Commercial Temperature ranges and Extended Temperature ranges.

eX-SM110 Managed Fast Ethernet Extender Features

Perle's advanced features such as Link Pass-Through, Interlink Fault Feedback, and Loopback allow Network administrators to "see everything" for more **efficient troubleshooting and less on-site maintenance**. These cost and time saving features, along with a **lifetime warranty and free**

worldwide technical support, make **Perle eX-SM110 Managed Ethernet Extenders** the smart choice for IT professionals.

Extend Ethernet over twisted pair	Extend an Ethernet link over category 5e, 6 and 7 cabling up to 10,000 feet (3 km).
Extend Ethernet over Coaxial cable	Extend an Ethernet link over 75 ohm coaxial cable.
High-Speed Performance	Utilizes second generation VDSL2 technology (ITU-T Recommendation G.993.) . When operating under “Profile 30a”, Perle Ethernet extenders can provide an aggregate VDSL line rate capability of over 200 mbps. Actual distance and performance may vary depending on the type / gauge and condition of the wire used.
Plug and Play operation	Perle Ethernet Extenders will automatically configure your VDSL interlink connection. The CO/CPE peer association will be determined automatically by the Ethernet Extender. No need to set CO / CPE VDSL pairing. Once a connection is made, both ends will automatically adjust relevant VDSL parameters to optimize the level of bandwidth possible across the copper link.
Link Pass-Through	With Link Pass-Through the state of the 10/100Base-TX Ethernet connection is “passed through” the VDSL link to the 10/100Base-TX Ethernet connection on its remote peer. A managed switch on the remote end can then report the state (link up or link down) to its network management system so that any errors can be detected and recovered early. Competitive Ethernet extenders without this feature will never detect or report any error conditions.
Interlink Fault Feedback	Similar to the Link Pass-Through feature, a loss of VDSL Interlink will drop the 10/100 Ethernet ports on each end until the link recovers.
Auto-Negotiation	The Ethernet Extender supports auto negotiation on the 10/100Base-TX interface.
Auto-MDIX	Auto-MDIX (Automatic Medium-Dependent Interface crossover) detects the signaling on the 10/100 Ethernet RJ45 interface and determines the type of cable connected (straight-through or crossover) and automatically adopts a compatible pinout.
Fixed Speed and Duplex	Some Ethernet equipment require a fixed speed and duplex be used or cannot auto-negotiate. By disabling Auto-Negotiation on the Ethernet Extender, a fixed speed of 10 or 100 mbps as well as Full or half Duplex can be configured through DIP switches.
VLAN	Transparent to tagged VLAN (802.1Q) packets.
Transparent to IP Video compression protocols	Fully transparent to such IP video compression schemes such as MPEG-4, H.264 and MJPEG.
VDSL Configuration	• Enable/Disable port • Set Port Name – Up to 8 characters • Set Role : Auto (Default) ,Local (CO), Remote (CPE) • Set Rate/Reach : High-Speed (default) , Long-Range • Set Symmetry : Asymmetric, Symmetric (default) • Set Low Bandwidth Alarm – SNMP trap • Select VDSL profile • Select Signal to Noise Ratio • Select upstream/downstream data rate

Quality of Service	• Bandwidth Allocation via rate limiting • IEEE 802.1P tagged frame priority control • IEEE 802.1P priority tag remapping • IP TOS (Type of Service) priority for IPV4 Diffserv or IPV6 traffic class frames • Congestion Service Policy through WQF (Weighted Fair Queuing) or Strict Priority Queuing (default)
VLAN Tagging	• Default – Transparent to VLAN frames • Enable discarding of tagged frames • Enable discarding of untagged frames • Untag – Removes any existing tag • Insert Tag – Insert (if original frame is untagged) or replace (if original frame is tagged) the VLAN ID and priority with the configured default VLAN ID and priority tag. • Insert Double tag (Q in Q) – Append an additional tag using the configured default VLAN ID and priority.
Unknown Multicast Frame filtering	When enabled, Multicast frames with an unknown destination address are not allowed to egress the port.
Unknown Unicast Frame filtering	When enabled, Unicast frames with an unknown destination address are not allowed to egress the port.
Unidirectional Ethernet	When enabled, provides the ability to restrict port to one-way traffic flow. Used in applications such as unidirectional video broadcasting as well as providing security for Ethernet connections in accessible public areas.
Configuration Mode selection	Select whether to use the on-board DIP switches or the management software for mode selection.
Auto-MDIX	Can manually set Auto or MDIX on the copper port via on-board strap or via the management software. Auto-MDIX (automatic medium-dependent interface crossover) detects the signaling on the UTP interface to determine the type of cable connected (straight-through or crossover) and automatically configures the connection when enabled. With Auto-MDIX enabled, either a straight-through or crossover type cable can be used to connect the Ethernet Extender to the device on the other end of the cable.
Converter Information	• User configurable Ethernet Extender name • User configurable VDSL-Interlink port name • User configurable copper port name • Hardware revision number • Firmware version number
DIP switch settings	View hardware DIP switch settings.
10BaseT Extended Distance	Normal/extended – default Normal. By configuring as “extended”, the 10baseT receiver sensitivity is increased providing the possibility of a 10BaseT connection greater than 100m.
Copper Port Status	• Port Enabled (Yes/No) • Link Status (Up/Down) • Auto Negotiation Settings (Disabled, Complete or In Progress) • Resolved as crossover MDI or MDIX type

VDSL Port Status	• Port Name
	• Connector Type
	• Link State
	  ◦ Idle
	  ◦ Handshake
	  ◦ Training
	  ◦ Up
	• Loopback status
	• Remote Loopback (loopback status of VDSL peer)
	• Role : Local (CO) , Remote (CPE)
	• Current VDSL Profile

Control	• Reset • Reset to factory default • Reset Statistical counters • Update firmware • Loopback mode. (On/Off) • Upload/download configuration
Detailed port statistics	To assist in troubleshooting links, an extensive list of ingress and egress counters for both copper and VDSL ports are available. These statistics can be viewed locally via the management module or from a central SNMP NMS on the network.
Pause (IEEE 802.3xy)	Pause signaling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed. The Ethernet Extender supports pause negotiation on the 10/100Base-TX copper connection.
Remote Loopback	The Ethernet Extender is capable of performing a loopback on the copper VDSL Interlink port.

eX-SM110 Advanced Management Features

Enterprise and carrier-grade security is available through the support of strong authentication systems such as TACACS+, RADIUS and LDAP. Secure in-band access is assured via SNMPv3, SSH CLI and secure HTTPS Internet browser.

SNMP	• Full read/write capabilities via central SNMP servers and PerleVIEW • Send SNMP traps (up to 4 servers) • SNMPv3, V2C and V1 • SNMPv3 – encryption and authentication for both management and trap support • RFC1213 MIB II • Proprietary MIB provided
Telnet / SSH CLI access	In-band command line access via Telnet or SSH application.
Internet Browser access	• Fast and intuitive graphical web interface for use with common internet browsers such Internet Explorer, Mozilla Firefox and Safari • HTTP or secure HTTPS • PerleVIEW Centralized Management Package
Console port CLI access	Out-of-band command line access via Cisco compatible RJ45 serial console port using common “rolled” CAT5 cable. Console port can be enabled (default) or disabled.
Concurrent management sessions	Run multiple management sessions simultaneously for multiple users.
Inactivity timeout	Protect secure management sessions by setting an inactivity timeout value.

Alert event reporting	Alert level events are stored in the local event log and sent as: • SNMP traps to up to 4 servers • SYSLOG messages to a SYSLOG server • Email to user defined email address
Advanced IP feature set	• IPV4 and IPV6 address support • DHCP • DNS • Dynamic DNS • NTP • TFTP • Telnet • SSH V2 and V1 • HTTP • HTTPS
Advanced Management User Authentication with primary and secondary server support	• TACACS+ • RADIUS • LDAP • Active Directory via LDAP • RSA Secure ID-agent or via RADIUS authentication • Kerberos • NIS
Advanced Management User Authorization and Accounting	• TACACS+ • RADIUS
Encryption	• AES (256/192/128), 3DES, DES, Blowfish, CAST128, ARCFOUR(RC4), ARCTWO(RC2) • Hashing Algorithms: MD5, SHA-1, RIPEMD160, SHA1-96, and MD5-96 • Key exchange: RSA, EDH-RSA, EDH-DSS, ADH • X.509 Certificate verification: RSA, DSA
Access Control List	An access control list can be created which can filter out only those workstations that are authorized to access the management resources. Filter on IP and/or Ethernet MAC addresses.
Network Services Filter	Enable only those network services on the management module that are allowed on your network (Telnet, SSH, HTTP, HTTPS, SNMP).
Firmware download	Update the latest level firmware via TFTP or PerleVIEW.

Management Module Indicators / reset

Power	Blinking green during startup cycle Steady green: module has power and is ready Red : error
ALM	Red alarm indicator activated when an alert event occurs
LKC	Green indicator indicating an active Ethernet link. Blinking indicates RX and TX of data
100/1000	Green - 1000 Mbps link Yellow - 100 Mbps link Off - 10 Mbps or no Link
Reset button	Recessed pinhole button resets module

Ethernet

Port	1 port RJ45 – 10/100 Base-TX - Shielded
Auto-MDIX	Auto-MDIX enables proper operation with either straight-through or crossover cabling
Distance	Distance up to 100 meters (328 feet) as per IEEE 802.3
Maximum Frame Size	1522 bytes

VDSL – Interlink

RJ45, BNC, Terminal Block	TIP and RING are polarity insensitive. Surge suppression of 400 volts between TIP and RING Choice of RJ45, BNC or terminal block models for VDSL link connector • RJ45 – RING pin 4, TIP pin 5 (TIA 568 A/B) • BNC – Coaxial 50 and 75 ohm cable with BNC connector • Terminal Block – 2 position screw connectors for use with twisted pair telephone cabling
Cabling	Ethernet Extenders must be connected in pairs using unconditioned wire between 19 (0.9 mm) and 26 AWG (0.44 mm). Circuits that run through signal equalization equipment are not permitted.
VDSL2 Line Rate/Reach	Actual distance and rates experienced will depend on condition and gauge of wire used. This Rate/Reach table applies to 24 AWG (0.5 MM) twisted pair wiring on RJ45 (RJ) and terminal block (TB) models.

High Speed Asymmetric

Reach (Distance)		VDSL Rate (Mbps)	
feet	meters	Downstream	Upstream
500	152	101	92
1000	305	101	63
1500	457	90	38
2000	610	62	24
2500	762	55	10
3000	914	42	5
3500	1000	35	3

High Speed Symmetric

Reach (Distance)		VDSL Rate (Mbps)	
feet	meters	Downstream	Upstream
500	152	101	101
1000	305	85	101
1500	457	62	47
2000	610	60	29
2500	762	44	14
3000	914	30	7
3500	1000	29	4

Long Reach Symmetric

Reach (Distance)		VDSL Rate (Mbps)	
feet	meters	Downstream	Upstream
500	152	53	44
1000	305	53	43
2500	762	39	18
4000	1219	25	4
5500	1676	17	1.9
7000	2134	8	2.3
7500	2286	7	2.2
8000	2438	5	2.2

Long Reach Asymmetric

Reach (Distance)		VDSL Rate (Mbps)	
feet	meters	Downstream	Upstream
500	152	78	16
1000	305	78	16
2500	762	55	10
4000	1219	31	0.8
5500	1676	20	0.6
7000	2134	11	0.6
7500	2286	10	0.6
8000	2438	8	0.6

Indicators	
Power / TST	This green LED is turned on when power is applied to the Ethernet Extender. Otherwise it is off. The LED will blink when in Loopback test mode.
CO - Local	Ethernet Extender is operating in CO VDSL mode
CPE - remote	Ethernet Extender is operating in CPE VDSL mode
ILNK	Indicates Link Status and activity on the Interlink (VDSL) port
ETH	Indicates link status and activity on Ethernet port.
Switches – On-board PCB	
Rate/Reach	Two switches enable the user to select the right balance between speed and distance for their environment.

Signal to Noise Ratio	Selectable Signal to Noise Ratio (SNR) of 6dB or 9dB. The higher SNR number provides better impulse noise protection but lowers performance.
Auto-Negotiation (802.3u)	*Enabled (Default)* - The Ethernet Extender uses 802.3u Auto-negotiation on the 10/100Base-TX interface. It is set to advertise full duplex. *Disabled* - The Ethernet Extender sets the port according to the position of the speed and duplex switches.
Link Mode	*Standard (Default)* – The 10/100Base-TX link remains active independent of the state of the Ethernet link on its remote peer. *Link Pass-Through*- the state of the 10/100Base-TX Ethernet connection is “passed through” or propagated across the VDSL link to the 10/100Base-TX Ethernet link on its remote Ethernet Extender peer. This enables a managed switch to report the state of the remote device to its network management system.
Interlink Fault Feedback	*Enabled* - A loss of VDSL link will drop the 10/100 Ethernet port on each end until the link recovers *Disabled (Default)* – The state of the VDSL link is not propagated to the 10/100Base-TX port
Loopback	*Enabled* - The VDSL interlink will perform a loopback function, retransmitting all received Ethernet frames back to its peer. *Disabled (Default - Up)*
Set Ethernet Speed	When Auto-Negotiation switch is disabled, fixed speed can be set to 100 (Default) or 10
Set Ethernet Duplex	When Auto-Negotiation switch is disabled, Duplex can be set to Full (Default) or Half
Power	
Input Voltage	12 vDC (nominal)
Current	530ma @ 12 vDC
Power Consumption (Watts)	6.34
Power Connector	5.5mm x 9.5mm x 2.1mm barrel socket
AC Adapter	100-240v AC, regulated DC adapter included
Environmental Specifications	
Operating Temperature	0 C to 50 C (32 F to 122 F)
Storage Temperature	minimum range of -25 C to 70 C (-13 F to 158 F)
Operating Humidity	5% to 90% non-condensing
Storage Humidity	5% to 95% non-condensing
Operating Altitude	Up to 3,048 meters (10,000 feet)

Heat Output (BTU/HR)	21.63
MTBF (Hours)*	221,305 w/o adapter 156,656 w/ adapter

Packaging	
Shipping Weight	1.2 Kg, 2.6 lbs
Shipping Dimensions	200 x 300 x 70 mm, 7.9 x 11.8 x 2.8 inches

Regulatory Approvals	
Emissions	FCC Part 15 Class A, EN55022 Class A
	CISPR 32:2015/EN 55032:2015 (Class A)
	EN61000-3-2
Immunity	CISPR 24:2010/EN 55024:2010
Electrical Safety	UL 60950-1
	IEC 60950-1(ed 2); am1, am2
	EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013
	CE
Environmental	Reach, RoHS and WEEE Compliant
Other	ECCN: 5A991
	HTSUS Number: 8517.62.0050
	CCATS: G134373
	Perle Lifetime warranty

*Calculation model based on MIL-HDBK-217-FN2 @ 30 °C

Extend 10/100 Ethernet across Twisted Pair or Coaxial Wire

Manage your extended long range LAN with a Managed Standalone Ethernet Extender. Distances of up to 3 km(10,000 feet) can be achieved over twisted pair Cat 5,6 or 7 cable. The copper link on the managed standalone unit can provide vital information and status to network management tools such as SNMP.