

# IOLAN Electric Utility Terminal Server



[perle.com/products/electric-utility-terminal-server.shtml](http://perle.com/products/electric-utility-terminal-server.shtml)

- 8, 16 and 32 serial ports on RJ45 - software selectable RS232/422/485
- Advanced security features for NERC CIP critical cyberasset substation compliance
- Substation hardened for harsh electrical utility and industrial applications
- Universal high voltage power supply: nominal 125v DC / 250v DC or 115v AC / 230v AC
- Dual Feed low voltage power supply: nominal 24v DC /48v DC
- Dual 10/100/1000 Ethernet with Redundant Path Technology
- Built-in failsafe alarm relay



Electrical utility engineers and project managers that require a cost effective serial-to-Ethernet solution to help meet NERC-CIP compliance for the protection of critical cyberassets in substations must consider the **IOLAN SDS HV/LDC Terminal Server**. In addition to the most extensive security features available, these IOLAN's are designed to meet harsh environments associated with Power Substations with attributes such as support for substation AC and DC voltage ranges, extended operating temperatures and meeting emission, immunity and safety approvals associated with substation IT equipment.

## Ideal for

- Electrical utility engineers and Project Managers requiring a high performance serial to Ethernet interface for serial RS232 or RS485 based devices such as SCADA based RTUs and protection relays.
- Environments that require a serial terminal server with unique environmental, form factor, or power inputs in harsh environments
- Substation Automation projects where using secured communications in remote connections is required.

## Why IOLAN SDS HV/LDC Terminal Servers are the preferred choice:

- NERC CIP compliance features (EPCIP EU COM(2006)786);
  - TACACS+, RADIUS for centralized authentication, authorization and accounting
  - Support for alternate TACACS+ and RADIUS hosts
  - Two factor strong authentication such as RSA's SecureID
  - HTTPS, SSL/TLS, SSH ( AES, 3DES ) session encryption
  - Keystroke and data logging
  - Provides the ability to display a customizable "Appropriate Use" login banner upon user access
  - Secure dial-up
  - Enable only the serial ports you need

- Meets IEC 61850-3 and IEEE 1613 ( IEEE C37 90 ) electrical substation EMI standards
- FIPS 140-2 – Cryptographic modules meet US Government NIST compliancy
- Universal High voltage: 88-300v DC or 85-265v AC – dual power models
- Dual Feed low voltage: 18 - 72v DC models
- Cisco RJ45 serial port pinout design enables connection to Cisco/Sun console ports using common serial “rolled” CAT5 cabling
- Encapsulate ModBus and DNP protocols over IP
- Modbus TCP to Modbus RTU/ASCII gateway
- High performance 400 Mhz, 750 MIPS, 32 bit processor with integrated hardware encryption processor for the best throughput on the market
- Next Generation IP support (IPv6 ) for investment protection and network compatibility
- TrueSerial™ packet technology – the most authentic serial connections across Ethernet ensures serial protocol integrity
- Primary/Backup host functionality enables automatic connections to alternate hosts should the primary TCP connection go down
- EasyPort Web – Access equipment serial console ports by using your java-enabled Internet browser
- TruePort – Perle’s com/tty redirector for serial based applications operates on Windows, Vista, Linux, Solaris, SCO and Unix
- Java-free browser access to remote serial console ports via Telnet and SSH
- Lifetime warranty – best investment protection available

#### **Serial Port Access**

Connect directly using Telnet / SSH by port and IP address

Connect with EasyPort menu by Telnet / SSH

Use an internet browser to access with HTTP or secure HTTPS via EasyPort Web menu

Java-free browser access to remote serial console ports via Telnet and SSH

Ports can be assigned a specific IP address ( aliasing )

Multisession capability enables multiple users to access ports simultaneously

Multihost access enables multiple hosts/servers to share serial ports

#### **Accessibility**

In-band ( Ethernet ) and out-of-band ( dial-up modem ) support

Dynamic DNS enables users to find a console server from anywhere on the Internet

Domain name control through DHCP option 81

IPV6 and IPV4 addressing support

#### **Availability**

Primary/Backup host functionality enables automatic connections to alternate host(s)

#### **Security**

SSH v1 and v2

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PCI DSS Compliance: TLS v1.2, TLS v1.1, TLS v1.0, SSL v3.0, SSL v2.0

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SSL Server and SSL client mode capability

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SSL Peer authentication

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IPSec VPN : NAT Traversal, ESP authentication protocol

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SSH ciphers: AES-CTR, AES-GCM and ChaCha20-poly1305

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SSL encryption: AES-GCM, key exchange ECDH-ECDSA, HMAC SHA256, SHA384

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Encryption: AES (256/192/128), 3DES, DES, Blowfish, CAST128, ARCFOUR(RC4), ARCTWO(RC2)

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Hashing Algorithms: MD5, SHA-1, RIPEMD160, SHA1-96, and MD5-96

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Key exchange: RSA, EDH-RSA, EDH-DSS, ADH

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X.509 Certificate verification: RSA, DSA

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Certificate authority (CA) list

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Local database

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RADIUS Authentication, Authorization and Accounting

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TACACS+ Authentication, Authorization and Accounting

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LDAP, NIS, Kerberos Authentication

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RSA SecureID-agent or via RADIUS Authentication

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SNMP v3 Authentication and Encryption support

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IP Address filtering

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Disable unused daemons

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Active Directory via LDAP

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### **Terminal Server**

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Telnet

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SSH v1 and v2

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Rlogin

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Auto session login

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LPD, RCP printer

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MOTD - Message of the day

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### **Serial machine to Ethernet**

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Tunnel raw serial data across Ethernet - clear or encrypted

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Raw serial data over TCP/IP

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Raw serial data over UDP

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Serial data control of packetized data

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Share serial ports with multiple hosts/servers

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Virtual modem simulates a modem connection - assign IP address by AT phone number

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Virtual modem data can be sent over the Ethernet link with or without SSL encryption

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TruePort com/tty redirector for serial based applications on Windows, Linux, Solaris, SCO, HP UX, NCR UNIX and AIX. For a complete list of all the latest drivers click here

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TrueSerial packet technology provides the most authentic serial connections across Ethernet ensuring serial protocol integrity

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RFC 2217 standard for transport of serial data and RS232 control signals

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Customizable or fixed serial baud rates

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Plug-ins allow customer or Perle provided plug-ins for special applications

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Software Development Kit ( SDK ) available

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Serial encapsulation of industrial protocols such as ModBus, DNP3 and IEC-870-5-101

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ModBus TCP gateway enables serial Modbus ASCII/RTU device connection to ModBus TCP

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Data logging will store serial data received when no active TCP session and forward to network peer once session re-established - 32K bytes circular per port

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### **Console Management**

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Sun / Oracle Solaris Break Safe

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Local port buffer viewing - 256K bytes per port

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External port buffering via NFS, encrypted NFS and Syslog

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Event notification

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Manage AC power of external equipment using Perle RPS power management products

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Clustering - central console server enables access ports across multiple console servers

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Windows Server 2003/2008 EMS - SAC support GUI access to text-based Special Administrative Console

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Ping watchdog probes enable customers to power cycle equipment with attached Perle RPS power switches in the event of an unresponsive networking gear

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### **Remote Access**

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Dial, direct serial	PPP, PAP/CHAP, SLIP
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HTTP tunneling enables firewall-safe access to remote serial devices across the internet

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Automatic DNS Update	Utilize DHCP Opt 81 to set IOLAN domain name for easy name management and with Dynamic DNS support , users on the Internet can access the device server by name without having to know its IP address. See <u>Automatic DNS update</u> support for details
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<u>IPSEC VPN client/servers</u>	Microsoft L2TP/IPSEC VPN client ( native to Windows XP)
	Microsoft IPSEC VPN Client ( native to Windows Vista )

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Cisco routers with IPSEC VPN feature set

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Perle IOLAN SDS/STS and SCS models

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OA&M ( Operations, Administration and Management )	
	SNMP V3 - read and write, Perle MIB
	Syslog
	Perle Device Manager - Windows based utility for large scale deployments
	Configurable default configuration
	<u>Installation Wizard</u>
	Set a Personalized Factory Default for your IOLANs

Protocols	
	IPv6, IPv4, TCP/IP, Reverse SSH, SSH, SSL, IPSec/IPv4, IPSec/IPv6, L2TP/IPSec, CIDR, RIPv2/MD5, ARP, RARP, UDP, UDP Multicast, ICMP, BOOTP, DHCP, TFTP, SFTP, SNTP, Telnet, raw, reverse Telnet, LPD, RCP, DNS, Dynamic DNS, WINS, HTTP, HTTPS, SMTP, SNMPV3, PPP, PAP/CHAP, SLIP, CSLIP, RFC2217, MSCHAP


## Hardware Specifications - IOLAN SDSC Electric Utility Terminal Servers

	SDS8C HV	SDS8C DHV	SDS16C HV	SDS16C DHV	SDS32C HV	SDS32C DHV
Processor	MPC8349E, 400 Mhz, 750 MIPS					
Memory						
RAM MB	64	64	64	64	128	128
Flash MB	16	16	16	16	16	16
Interface Ports						
Number of Serial Ports	8	8	16	16	32	32
Serial Port Interface	Software selectable RS232 / RS485 / RS422 DTE on RJ45 - RS485: full and half duplex					
Sun / Solaris	Sun / Oracle 'Solaris' Safe - no "break signal" sent during power cycle causing costly server re-boots or downtime					
Serial Port Speeds	50bps to 230Kbps with customizable baud rate support					
Data Bits	5,6,7,8, 9-bit protocol support					
Parity	Odd, Even, Mark, Space, None					
Flow Control	Hardware, Software, Both, None					
Local Console Port	RS232 on RJ45 with DB9 adapter ( provided )					
Network	Dual 10/100/1000-base TX Ethernet RJ45					
	Software selectable Ethernet speed 10/100/1000, Auto					
	Software selectable Half/Full/Auto duplex					
Failsafe Alarm Relay	3A@24v DC. Normally open contacts closed by IOLAN when active and opened upon alarm condition or power failure					

Power						
Power Supply	Terminal Block with screw terminals accommodating a #6 ring terminal for each power source. Protective cover provided					
Nominal Input Voltage	125V DC / 250V DC or 100V AC / 240V AC					
Input Voltage Range	88-300V DC or 85-265V AC					
AC Input Frequency	47-63Hz					
Current Consumption @ 125v DC (Amps)	0.06	0.07	0.08	0.08	0.13	0.13
Current Consumption @ 250v DC (Amps)	0.04	0.04	0.05	0.05	0.07	0.07
Current Consumption @ 115v AC (Amps)	0.13	0.15	0.07	0.2	0.26	0.28
Current Consumption @ 230v AC (Amps)	0.09	0.11	0.12	0.14	0.16	0.19
Typical Power Consumption (Watts)	9	10	12	12.5	17	17.5
Chassis Ground	Grounding screw for a #10 ring terminal					
Indicators						
LEDs	Power					
	System Ready					
	Network Link activity					
	Serial: Transmit and Receive data per port					
Environmental Specifications						
Heat Output ( BTU/HR )	30.7	34.12	40.9	42.7	58	59.7
MTBF ( Hours )*	144,323	126,121	117,779	105,368	89,711	82,325
Operating Temperature	-40C ambient for 16 hours and +70C ambient for 16 hours without use of fans					
Storage Temperature	-40C to 85C, -40F to 185F					
Humidity	5 to 95% (non condensing) for both storage and operation.					
Case	SECC Zinc plated sheet metal (1 mm)					
Ingress Protection Rating	IP30					
Mounting	1U - 19" rack, front and rear mounting hardware included. DIN Rail mounting kit optional					
Product Weight and Dimensions						
Weight	3.20 kg	3.38 kg	3.22 kg	3.40 kg	3.40 kg	3.58 kg
Dimensions	1U Rack form factor - 26.4 x 43.4 x 4.4 (cm), 10.38 x 17.1 x 1.75 (in)					
Packaging						

Shipping Dimensions	59 x 36 x 9 (cm), 23 x 14 x 3.5 (in)
Shipping Weight	4.00 kg    4.18 kg    4.20 kg    4.20 kg    4.20 kg    4.38 kg
<b>Regulatory Approvals</b>	
Emissions	<p>Power Line conducted: IEC 61850-3 Sec 5.8, IEC 61000-6-4, CISPR 16-2-3, CISPR 22, FCC Part 15, Subpart B, Class B</p> <p>Telecom Line conducted: IEC 61000-6-4, CISPR 22</p> <p>Radiated: IEC 61850-3 Sec 5.8, IEC 61000-6-4, CISPR 16-2-3, CISPR 22, FCC Part 15, Subpart B, Class B</p> <p>IEC61000-3-2 Harmonic Current Emissions</p> <p>IEC61000-3-3 Flicker emissions</p>
EMC Interface Immunity	<p>IEC 61850-3 ( substations ) IEEE 1613 ( substations ) (C37.90.x ) Applies to all ports, signal and power connections</p> <p>ESD: IEC61000-4-2, 8Kv Contact / 15Kv Air</p> <p>Radiated RFI: IEC61000-4-3, 20 V/m ( 80M-1G )</p> <p>Fast Transients / Burst: IEC61000-4-4, 4Kv Mains , I/O</p> <p>Surge : IEC61000-4-5 4Kv AC line to Gnd, 2Kv AC Line to Line, 2Kv DC line to Gnd, 1 Kv DC Line to Line, RS232 = balanced, ethernet = unbalanced</p> <p>Conducted RF: IEC61000-4-6, 10 Vrms</p> <p>Magnetic Field: IEC61000-4-8, 100 A/m, 1000 A/m (1 sec)</p> <p>Dips and Interrupts: IEC61000-4-11, Criteria A/B/C</p> <p>Oscillatory: EN61000-4-12, 2.5Kv common and differential mode</p> <p>Low Frequency conducted: EN61000-4-16, 30V 60s, 300V 1s, 15Hz-150KHz @ level 3</p>
Standard Safety Certifications	<p>IEC 60950-1, First Edition (2001-10) and EN60950-1:2001, CB scheme.</p> <p>CAN/CSA-C22.2 No. 60950-1-03 and ANSI/UL 60950-1, First Edition April 1st 2003 (Recognized Component)</p>
Other	<p><u>Reach, RoHS and WEEE Compliant</u></p> <p>CCATS - G168387</p> <p>ECCN - 5A992</p> <p>HTSUS Number: 8471.80.1000</p> <p>Perle Lifetime Warranty</p>
<b>Serial Connector Pinout</b>	

## IOLAN DTE

	IOLAN RJ45 Socket	Direction	RS232	RS422	RS485 Full Duplex	RS485 Half Duplex
RJ45 Socket 	1	→	RTS	TXD+	TXD+	Data+
	2	→	DTR			
	3	→	TXD	TXD-	TXD-	Data-
	4	---	GND	GND	GND	GND
	5	---	GND	GND	GND	GND
	6	←	RXD	RXD+	RXD+	
	7	←	DSR			
	8	←	CTS	RXD-	RXD-	

A "rolled" CAT5 cable will automatically perform DTE to DCE crossover

Optional Perle adapters for use with straight thru CAT5 cabling

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

## Hardware Specifications - IOLAN LDC Console Servers

	SDS8C LDC	SDS16C LDC	SDS32C LDC
Processor	MPC8349E, 400 Mhz, 750 MIPS		
Memory			
RAM MB	64	64	64
Flash MB	16	16	16
Interface Ports			
Number of Serial Ports	8	16	32
Serial Port Interface	Software selectable RS232 / RS485 / RS422 DTE on RJ45 - RS485: full and half duplex		
Sun / Solaris	Sun / Oracle 'Solaris' Safe - no "break signal" sent during power cycle causing costly server re-boots or downtime		
Serial Port Speeds	50bps to 230Kbps with customizable baud rate support		
Data Bits	5,6,7,8, 9-bit protocol support		
Parity	Odd, Even, Mark, Space, None		
Flow Control	Hardware, Software, Both, None		
Local Console Port	RS232 on RJ45 with DB9 adapter ( provided )		
Network	Dual 10/100/1000-base TX Ethernet RJ45		



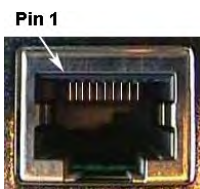
	Software selectable Ethernet speed 10/100/1000, Auto		
	Software selectable Half/Full/Auto duplex		
Failsafe Alarm Relay	3A@24v DC. Normally open contacts closed by IOLAN when active and opened upon alarm condition or power failure		
Power			
Power Supply	Plugable Terminal Blocks with screw terminals accommodating 28 - 12 AWG wire sizes		
Nominal Input Voltage	24v DC / 48v DC		
Input Voltage Range	18 - 72v DC		
Current Consumption @ 18v DC (Amps)	0.4	0.55	0.85
Current Consumption @ 24v DC (Amps)	0.3	0.4	0.65
Current Consumption @ 48v DC (Amps)	0.2	0.25	0.35
Current Consumption @ 72v DC (Amps)	0.15	0.18	0.25
Typical Power Consumption (Watts)	11	13	18
Chassis Ground	Grounding screw for a #10 ring terminal		
Indicators			
LEDs	Power		
	System Ready		
	Network Link activity		
	Serial: Transmit and Receive data per port		
Environmental Specifications			
Heat Output ( BTU/HR )	37.6	44.4	61.5
MTBF ( Hours )*	126,302	105,495	82,402
Operating Temperature	-40C ambient for 16 hours and +70C ambient for 16 hours without use of fans		
Storage Temperature	-40C to 85C, -40F to 185F		
Humidity	5 to 95% (non condensing) for both storage and operation.		
Case	SECC Zinc plated sheet metal (1 mm)		
Ingress Protection Rating	IP30		
Mounting	1U - 19" rack, front and rear mounting hardware included. DIN Rail mounting kit optional		
Product Weight and Dimensions			
Weight	3.16 kg	3.18 kg	3.36 kg

Dimensions	1U Rack form factor - 26.4 x 43.4 x 4.4 (cm), 10.38 x 17.1 x 1.75 (in)		
Packaging			
Shipping Weight	3.96 kg	3.98 kg	4.16 kg
Shipping Dimensions	59 x 36 x 9 (cm), 23 x 14 x 3.5 (in)		
Regulatory Approvals			
Network Equipment Building Systems ( NEBS )	SR-3580 NEBS Level 3		
	GR-1089-CORE : NEBS EMI and Safety		
	GR-1089-CORE per Verizon VZ.TPR.9205 and ATT-TP-76200		
	GR-63-CORE: NEBS Physical Protection		
	GR-63-CORE / ANSI T1.319 per Verizon VZ.TPR.9305 and ATT-TP-76200		
Emissions	Power Line conducted: IEC 61850-3 Sec 5.8		
	CISPR 32:2015/EN 55032:2015 (Class A)		
	Telecom Line conducted: IEC 61000-6-4		
	Radiated: IEC 61850-3 Sec 5.8		
	CISPR 24:2010/EN 55024:2010		
	EN61000-3-2 : 2010 Limits for Harmonic Current Emissions		
	EN61000-3-3 : 2010, Limits of Voltage Fluctuations and Flicker		
EMC Interface Immunity	IEC 61850-3 ( substations ) IEEE 1613 ( substations ) (C37.90.x ) Applies to all ports, signal and power connections		
	ESD: IEC61000-4-2, 8Kv Contact / 15Kv Air		
	Radiated RFI: IEC61000-4-3, 20 V/m ( 80M-1G )		
	Fast Transients / Burst: IEC61000-4-4, 4Kv Mains , I/O		
	Surge : IEC61000-4-5 4Kv AC line to Gnd, 2Kv AC Line to Line, 2Kv DC line to Gnd, 1 Kv DC Line to Line, RS232 = balanced, ethernet = unbalanced		
	Conducted RF: IEC61000-4-6, 10 Vrms		
	Magnetic Field: IEC61000-4-8, 100 A/m, 1000 A/m (1 sec)		
	Dips and Interrupts: IEC61000-4-11, Criteria A/B/C		
	Oscillatory: EN61000-4-12, 2.5Kv common and differential mode		
	Low Frequency conducted: EN61000-4-16, 30V 60s, 300V 1s,15Hz-150KHz @ level 3		
Standard Safety Certifications	IEC 60950-1(ed 2); am1, am2 and EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013		
	NEBS GR-1089-CORE ISSUE 4 ( Level 3, Type 2 and Type 4 )		

Other	<u>Reach, RoHS and WEEE Compliant</u> Directive 2011/65/EU restriction of the use of certain hazardous substances in electrical and electronic equipment and meets the following standard:: EN 50581:2012
	CCATS - G168387
	ECCN - 5A992
	HTSUS Number: 8471.80.1000
	Perle Lifetime Warranty

#### Serial Connector Pinout

##### IOLAN DTE



RJ45 Socket

IOLAN RJ45 Socket	Direction	RS232	RS422	RS485 Full Duplex	RS485 Half Duplex
1	→	RTS	TXD+	TXD+	Data+
2	→	DTR			
3	→	TXD	TXD-	TXD-	Data-
4	---	GND	GND	GND	GND
5	---	GND	GND	GND	GND
6	←	RXD	RXD+	RXD+	
7	←	DSR			
8	←	CTS	RXD-	RXD-	

A "rolled" CAT5 cable will automatically perform DTE to DCE crossover

Optional Perle adapters for use with straight thru CAT5 cabling

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

#### TCP

##### Using RAW TCP Sockets

A raw TCP socket connection which can be initiated from the serial-Ethernet device or from the remote host/server. This can either be on a point to point or shared basis where a serial device can be shared amongst multiple devices. TCP sessions can be initiated either from the TCP server application or from the Perle IOLAN **serial-Ethernet** adapter.

#### UDP

##### Using Raw UDP Sockets

For use with UDP based applications, Perle IOLANs can convert serial equipment data for transport across UDP packets either on a point to point basis or shared across multiple devices.

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## Console Server

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### Console Management

For access to remote console ports on routers, switches, etc, Perle IOLAN's enable administrators secure access to these RS232 ports via inband Reverse Telnet / SSH or out of band with dial-up modems. Perle IOLAN models with integrated modems are available.

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## COM/TTY

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### Connect Serial-based Applications with a COM/TTY Port Driver

Serial ports can be connected to network servers or workstations running Perle's TruePort software operating as a virtual COM port. Sessions can be initiated either from the Perle IOLAN or from TruePort.

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## Tunneling

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### Serial Tunneling between two Serial Devices

Serial Tunneling enables you to establish a link across Ethernet to a serial port on another IOLAN. Both IOLAN serial ports must be configured for Serial Tunneling (typically one serial port is configured as a Tunnel Server and the other serial port as a Tunnel Client).

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## Virtual Modem

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### Virtual Modem (Ethernet Modem)

Enables the serial-Ethernet adapter to simulate a modem connection. When connected to the IOLAN and initiates a modem connection, the IOLAN starts up a TCP connection to another IOLAN serial-Ethernet adapter configured with a Virtual Modem serial port or to a host running a TCP application.