



## General Description

XPort® AR™ is a programmable, embedded processor module that enables manufacturers to quickly and easily build Ethernet networking and web server capabilities into devices and machines, enabling them to be easily connected and integrated into an enterprise data network.

Powered by Lantronix 120Mhz DSTni™ processor and running Lantronix new security hardened Evolution OS™, XPort AR is the first embedded device networking solution to incorporate standards-compliant XML and RSS information transport protocols. In addition it supports enterprise class SSL/SSH security protocols for secure data transfer and web services.

## Evolution Architecture

APPLICATIONS	TUNNELING	COMMAND & CONTROL	3rd PARTY
APPLICATIONS SUPPORT	WEB MANAGER	XML	RSS
	FILE SYSTEM	GPIO MANAGER	SMTP Email
SECURITY	SSH	SSL	PAP
	SHA-1	MD5	3DES
	AES	RC4	PACKET FILTER
NETWORK	HTTP	CGI	DNS
	UDP	TCP	ICMP
	IP	ARP	AUTO-IP
DRIVERS	MANUFACTURING TESTS	WATCH DOG	EEPROM
KERNEL	THREADING MODULE	BUFFER POOLS	SEMAPHORES
	PREEMPTIVE SCHEDULER	MEMORY (HEAP) MODULE	MUTUAL EXCLUSIONS

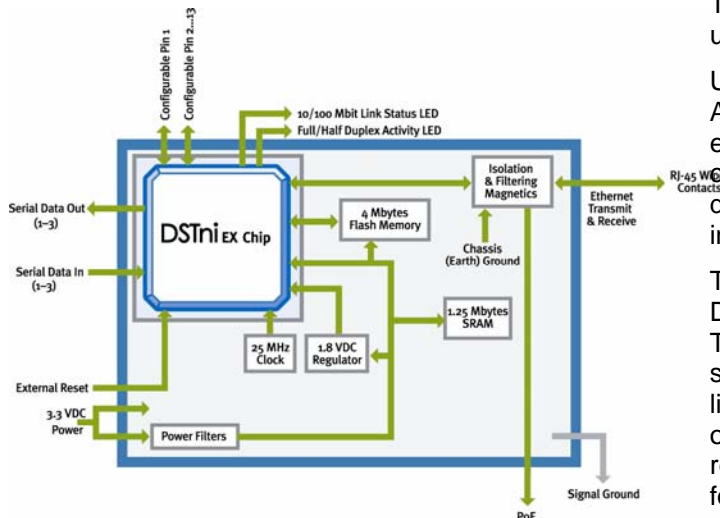
## Key Features

- Complete, integrated solution in an RJ45 form factor
- Auto sensing 10/100Mbit Ethernet with internal MAC/PHY
- 3 serial ports: 2 full, 1 console
- High-performance DSTni 120Mhz SoC with on-chip 256KB SRAM and 16KB ROM
- 11GPIO pins, 4MB Flash and 1.25MB SRAM
- IEEE 802.3af compliant pass-through PoE capability
- Security hardened Evolution OS operating system
- SSH2 /SSL v 3.0 encryption with DES, 3DES, RC4 or AES ciphers
- SHA-1 hashing
- Embedded CGI web server
- RSS and XML data transport protocols
- Stable, field proven TCP/IP protocol suite and web-based application framework
- Easy configuration through “Cisco® like” CLI, XML, Browser interface or Telnet
- Easy customization of HTML web pages and configuration screens
- E-mail with attachments to multiple users (SMTP client)
- EMI, EMC and safety tested and compliant

Where there’s a need for custom user interfaces and a desire to use common and familiar tools, the XPort AR can serve web pages to a web browser. The XPort AR becomes a conduit between the user and the device over the network or Internet.

Using either active or spare Ethernet pairs, XPort AR is fully compliant with IEEE 802.3af PoE to edge devices and is compatible with any standards compliant PoE Ethernet switch. PoE-enabled devices can dramatically lower overall material and installation costs.

The Windows-based configuration software, DeviceInstaller™, simplifies installation and setup. The XPort AR can also be set up locally through its serial port using de-facto industry standard “Cisco like” Command Line Interface (CLI), or remotely over a network using Telnet, XML configuration records or a web browser. Flash memory provides for maintenance-free nonvolatile storage of web



pages, and allows future system software upgrades.

### **Protocol Support**

The XPort uses Internet Protocol (IP) for network communications and Transmission Control Protocol (TCP) to assure that no data is lost or duplicated, and that everything sent arrives correctly at the target.

Other supported protocols are listed below:

- ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP and SNMP for network communications.
- TCP, UDP, and Telnet for connections to the serial port.
- XML configuration records, “Cisco like” CLI for configuration
- IP for addressing, routing, and data block handling over the network.
- User Datagram Protocol (UDP) for typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection.
- RSS for transmitting changes to configuration logs, or with the use of the Evolution OS SDK (licensed separately), transmitting data feeds from device to the user

\* For a complete discussion of protocol support, see the XPort AR user manual.

### **Hardware & Software Description**

The XPort AR is a complete solution (hardware and software) for web-enabling edge devices with a serial interface. Packed into an RJ45 connector about the size of a thumb, this powerful device server comes with a 10BASE-T/100BASE-TX Ethernet connection (without need for an external PHY chip), a reliable and proven operating system stored in flash memory, an embedded web server, a full TCP/IP protocol stack, and standards-based (AES) encryption.

The XPort AR software runs on a DSTni-EX controller which has 256 KB of SRAM, 16 KB of boot ROM, and a MAC with integrated 10/100BASE-TX PHY. The XPort AR communicates to the edge device through a 3.3V serial interface and eleven general-purpose programmable I/O pins. 4MB of Flash memory is included for storing firmware and web pages. The XPort AR runs on 3.3V, and has a built-in voltage supervisory circuit that will trigger a reset if the supply voltage drops to unreliable levels (2.7V). A built-in 1.8V regulator drives the processing core of the EX controller.

An RJ45 Ethernet cable connects directly into an XPort AR. Ethernet magnetics, status LEDs, and shielding are built in. The XPort AR was designed to meet class B emissions levels, which makes the electromechanical integration very simple.

The XPort AR incorporates a feature-rich software platform that combines a compact, hardened, real-time operating system (RTOS) kernel with a full Layer 3 TCP/IP networking stack and a CGI-based dynamic web server.

Capabilities include an extensive suite of enterprise-grade, open standards-based security such as SSL 3.0 and SSH2 encryption protocols, supporting a variety of cipher and hashing algorithms including 3DES, AES and SHA-1. These capabilities ensure the machine network does not become a source of vulnerability. The XPort AR also provides state-of-the-art programmable technologies including XML (Extensible Markup Language) and RSS (Really Simple Syndication) feeds for configuration and information transport

The built-in Flash file system features multiple directories, long file names, wear leveling and is accessible via FTP, TFTP, Telnet, CLI, Web Manager or Email. It can store web pages, configuration personalities, user data or logs.

The XPort AR Web Manager is CGI based and allows access to all configurable parameters and statistics. Customized “branding” is possible using built-in CSS templates that enable control of colors and fonts.

### PCB Interface

The XPort AR has 26 electrical pins. There are 20 pins that form two rows of ten. These 20 pins form the standard interface between the XPort AR and the circuit in which it is installed. These include dedicated serial, as well as 13 programmable I/O pins (Configurable Pins, or CPs). The other group of six pins is for PoE.

The standard signals are 3.3V CMOS logic level but are 5V tolerant. These signals are typically connected to internal devices, such as a relays, sensors, or UARTs. For prototype and evaluation work or applications where an external RS-232 interface is required, RS-232 transceivers are available on the XPort AR evaluation board. Optionally, disconnect them using the jumpers provided if they are not needed.

### Ethernet Interface

The 10/100 Ethernet magnetics, network status LEDs, and RJ45 connector are integrated into the XPort.

**Table 1 - Ethernet Interface Signals**

Signal Name	DIR	Contact	Primary Function	Note
TX+	Out	1	Differential Ethernet Transmit Data +	Magnetics center tap provides signal POE12
TX-	Out	2	Differential Ethernet Transmit Data -	
RX+	In	3	Differential Ethernet Receive Data +	Magnetics center tap provides signal POE36
RX-	In	6	Differential Ethernet Receive Data -	
Not Used		4	(Terminated)	Pins 4 and 5 are tied together, terminated and form POE45
Not Used		5	(Terminated)	
Not Used		7	(Terminated)	Pins 7 and 8 are tied together, terminated and form POE78
Not Used		8	(Terminated)	
CHSGND		Shield	Chassis Ground	

**Table 2 - PCB Interface Signals**

Signal Name	XPort™ A R Pin #	Primary Functions
<b>GND</b>	<b>4</b>	Signal Ground
<b>VCC</b>	<b>5</b>	+3.3V Power In
<b>Reset</b>	<b>8</b>	External Reset In
<b>TXDA</b>	<b>9</b>	Serial Data Out, Channel 1
<b>RXDA</b>	<b>12</b>	Serial Data In, Channel 1
<b>CP01</b>	<b>13</b>	Programmable I/O or RTSA flow control
<b>CP02</b>	<b>16</b>	Programmable I/O or DTRA flow control
<b>CP03</b>	<b>17</b>	Programmable I/O or CTSA flow control
<b>CP04</b>	<b>3</b>	Programmable I/O or DSRA flow control
<b>CP05</b>	<b>7</b>	Programmable I/O or DCDA flow control
<b>CP06/ TXDB</b>	<b>2</b>	Programmable I/O or Serial Data Out Channel 2
<b>CP07/ RXDB</b>	<b>10</b>	Programmable I/O or Serial Data In Channel 2
<b>CP08</b>	<b>1</b>	Programmable I/O or RTSB flow control
<b>CP09</b>	<b>6</b>	Programmable I/O or DTRB flow control
<b>CP10</b>	<b>20</b>	Programmable I/O or CTSB flow control
<b>CP11</b>	<b>19</b>	Programmable I/O or DSRB/DCDB flow control
<b>CP12</b>	<b>11</b>	Programmable I/O
<b>CP13</b>	<b>14</b>	Programmable I/O
<b>Reserved</b>	<b>15</b>	Reserved
<b>Reserved</b>	<b>18</b>	Reserved

### PoE Pins

XPort AR is PoE-ready; it allows a fully-compliant PoE circuit to be implemented that uses the Ethernet signals entering the XPort AR's RJ-45 jack. When the XPort AR's RJ-45 jack is connected to a PoE compliant switch, pins 21, 22, 25, and 26 pass through the necessary Ethernet signals to allow a PoE powered-device circuit to negotiate and receive power from the switch.

**Table 3 PoE Interface Signals**

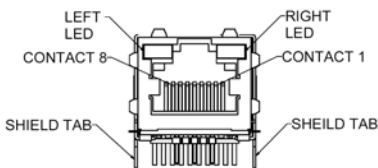
Signal Name	XPortAR Pin #	Primary Functions
POE12	22	Center tap from 1 & 2
POE36	25	Center tap from 3 & 6
POE45	21	Ethernet pins 4 & 5
POE78	26	Ethernet pins 7 & 8
CHSGND	23	Chassis Ground
CHSGND	24	Chassis Ground

*Note: The four shield tabs are also Chassis Ground. Separate Chassis Ground appropriately from the Signal Ground and route so as to safely dissipate electrostatic discharge.*

### LEDs

The XPort AR contains the following LEDs:

- ◆ Link (bi-color, left LED)
- ◆ Activity (bi-color, right LED)



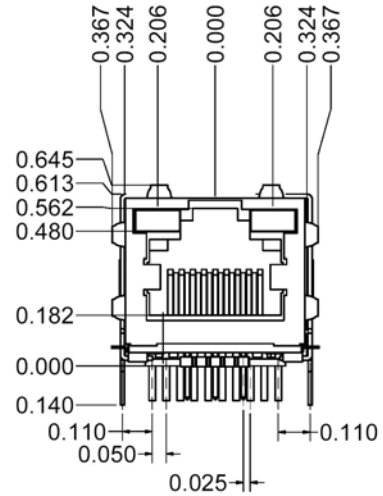
**Table 4 XPort AR LED Functions**

Link LED Left Side		Activity LED Right Side	
Color	Meaning	Color	Meaning
Off	No Link	Off	No Activity
Amber	10 Mbps	Amber	Half Duplex
Green	100 Mbps	Green	Full Duplex

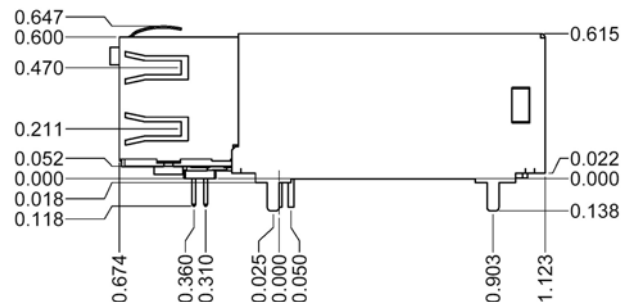
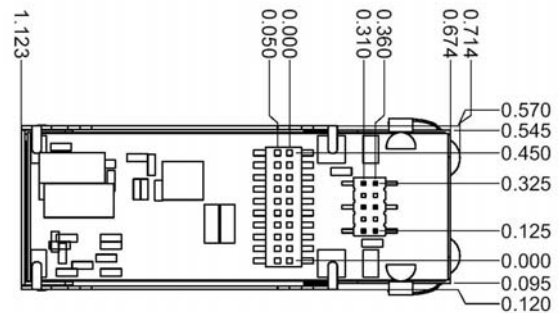
### Dimensions

The XPort dimensions are shown in the following drawings:

**Figure 1 Front View**



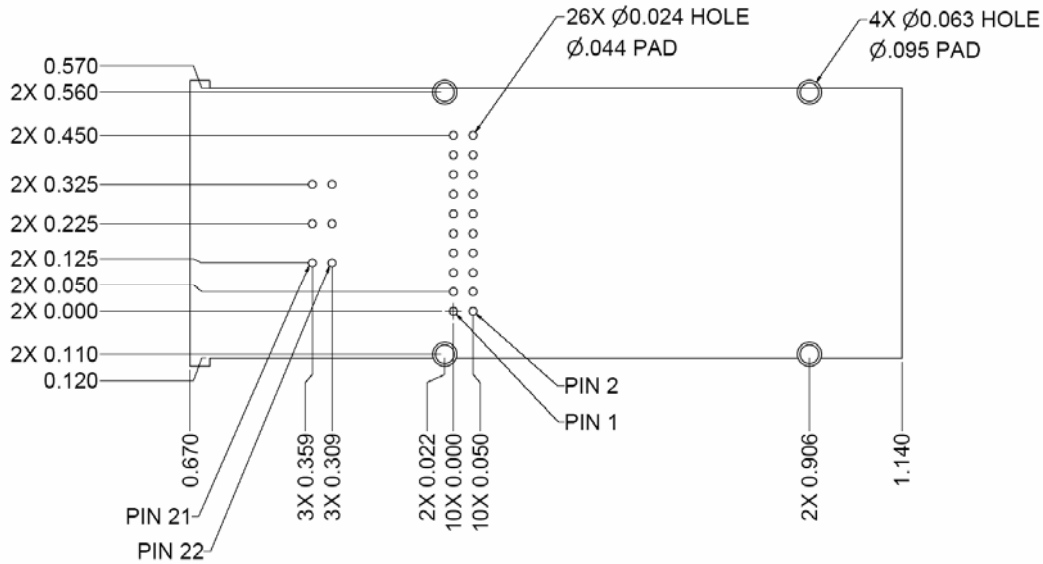
**Figure 2 Bottom View**



**Recommended PC Board Layout**

The hole pattern and mounting dimensions for the XPort AR are shown in Figure 4. For proper heat dissipation, it is recommended that the PCB have approximately one square inch of copper attached to the shield tabs. The shield tabs are an important source of heat sinking for the device.

**Figure 4 PCB Layout**



## XPort AR Technical Data

Category	Description
CPU	Lantronix DSTni-EX 186 CPU operating at 120Mhz
Memory	<ul style="list-style-type: none"> <li>• 256KB on-chip, zero wait state SRAM</li> <li>• 1 MB 70ns SRAM</li> <li>• 4 MB 70ns Flash</li> </ul>
Reset Circuit	Internal 350ms ( $\pm 200$ ms) reset pulse. Triggered by power-on, power drop-out or external reset input. Power drop-out reset triggered at 2.93V (range: 2.79-3.00V)
Serial Interface	CMOS (Asynchronous) 3.3V-level signals Rate is software selectable: 300 bps up to 230,000 bps (depending on the software)
Serial Line Formats	Data bits: 7 or 8 Stop bits: 1 or 2 Parity: odd, even, none
Modem Control	RTS, DTR, CTS, DSR, DCD
Flow Control	XON/XOFF (software), CTS/RTS (hardware), None
Programmable I/O	13 PIOs (software selectable), sink minimum of 4.4mA, source minimum of 6.4mA
Network Interface	RJ45 Ethernet 10Base-T or 100Base-TX (auto-sensing)
Compliance	Ethernet: Version 2.0/IEEE 802.3 (electrical) Ethernet II frame type IEEE 802.3af (when PoE-enabled)
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, and HTTP
LEDs	10Base-T and 100Base-TX Link Full/half duplex activity
Management	Internal web server, SNMP, Serial login, Telnet login, XML
Email	SMTP client: can send email to multiple users, can attach files to email Configurable Pins (CPs) can trigger emails
Security	SSL v3, SSH2, Rijndael 256-bit encryption, password protection, IP address filtering, locking features, hardened OS and stack
Internal Web Server	Servers static and dynamic CGI-based pages Storage capacity: 1.3 MB using industry standard file system
Material	Metal shell, thermoplastic case
Weight	20g (0.7 oz.)
Temperature	Operating range: -40°C to +85°C (-40°F to 185°F) Storage range: -40°C to +85°C (-40°F to 185°F)
Shock/Vibration	Non-operational shock: 500 g's Non-operational vibration: 20 g's
Warranty	Two year limited warranty
Included Software	Windows™ -based DeviceInstaller configuration software and Windows™-based Com Port Redirector

### DC Characteristics for Serial, PIO, and Power Interface

Symbol	Parameter	Min	Nominal	Max	Units
Vcc	Supply voltage (typical 3.3) (+/-5%)	3.14	3.3	3.46	V
VIL	Low Level Input Voltage	0		0.8	V
VIH	High Level Input Voltage	2.0		5.5	V
VOL	Low Level Output Voltage			0.4	V
VOH	High Level Output Voltage	2.4			V
II	Input Leakage Current			1	μA
ICC	Supply Current		310	400	mA



## Development Kit

### Introduction

An XPort AR Development kit is available to provide a simple, quick, and cost-effective way to evaluate the XPort AR. Use this kit to integrate the XPort AR into your product design, and give your newly networked product a test drive.

### Contents of the Development Kit

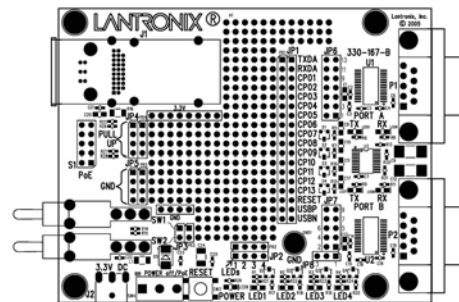
The evaluation kit contains the following items:

- ◆ XPort AR Evaluation Board
- ◆ XPort AR Device Server
- ◆ +3.3VDC Universal Power Supply
- ◆ CAT5e UTP RJ45M/M Ethernet cable ◆
- ◆ .025" square-post jumper wires
- ◆ RS-232 cable, DB-9, F/F
- ◆ CD with software utilities and documentation

### Features of the Evaluation Board

- ◆ LEDs
- ◆ Test Switches
- ◆ Prototyping Area
- ◆ RS-232 Serial Ports
- ◆ Reset Switch
- ◆ Headers
- ◆ Disconnect Jumpers
- ◆ PoE Socket
- ◆ Ground Turret
- ◆ Power Input Connector

### Evaluation Board Block Diagram



**Ordering Information**

XPort AR	XP3002000-01	Standard Extended Temperature XPort AR non-RoHS	Min. order: 50 units
XPort AR SMPL	XP300200S-01	XPort AR Sample with encryption Extended temperature RoHS	One XPort AR enclosed
XPort AR Kit	XP300200K-01	XPort AR Development Kit	
Evolution OS Software Developer Kit	EVSDK-01	Evolution OS Software Developer Kit	Delivered electronically after execution of license agreement
Paradigm Compiler Kit	PARADIGM-KIT	Paradigm C++ Integrated Development Environment for Lantronix XPort AR and Evolution OS	One shrink wrap software package



For details contact your local Lantronix representative, or Lantronix directly at:

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