

LINK

Lava I/O News

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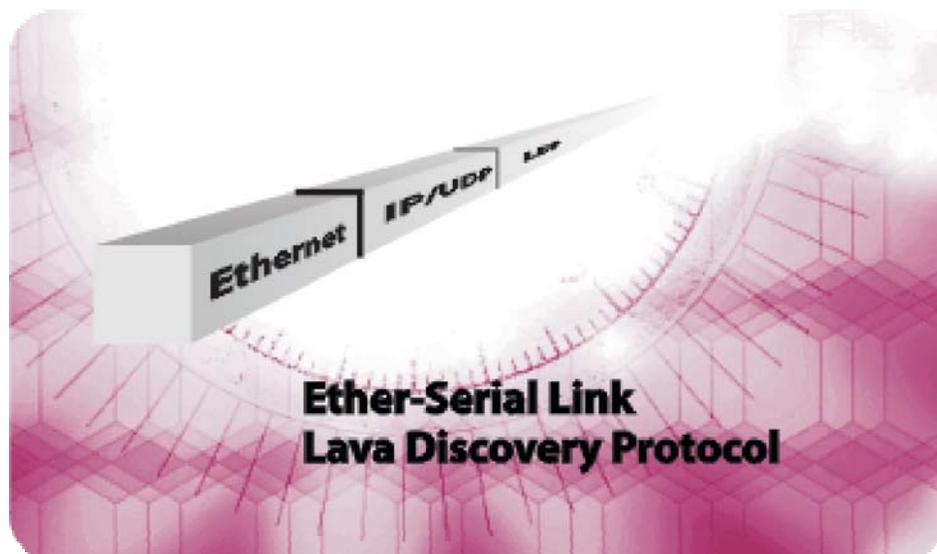


Ether-Serial Nitty Gritty

Inside the Ether-Serial Link

Last month's issue of LINK introduced the Lava Ether-Serial Link family — Lava's 1, 2, and 4-port remote serial port devices for Ethernet networks. Lava Ether-Serial Links provide a convenient, simple, and cost-effective way of deploying serial ports across Ethernet networks. Why continue to use dedicated PCs as serial port servers? Lava Ether-Serial Links can eliminate them, leading to considerable cost savings and increased reliability. Programs that communicate using the serial ports on a PC can also directly access and control the serial ports of a Lava Ether-Serial Link. Specialized networking software or program re-design is not required. Serial ports— once limited by the 50-foot cable requirements of RS-232 serial communications — can now be deployed at any distance: even over the Internet. This issue of LINK continues our look at the Lava Ether-Serial Link family, this time from a more technical standpoint. Understanding the technology and design of Lava's Ether-Serial Link family makes it clear why these devices are the "best of breed" among serial-to-Ethernet technologies.

Lava's Ether-Serial Link technology is, for most users, the most versatile and hassle-free means of sending serial communications over an Ethernet network. Lava's elegant design eliminates the obstacles to network serial technology. Other network serial products require at least one of: familiarity with Ethernet/Internet communications protocols, networking programming experience, knowledge of client/server technology and procedures, or close familiarity with TCP/IP. The Lava Ether-Serial Link makes none of these demands on installers or users. It has been designed from the ground up to be the most intuitive and easy-to-use product of its type on the market.



This simplicity comes naturally to Lava. We specialize in engineering serial ports for computers, particularly in the Windows Plug and Play and the PCI bus worlds. While many network serial products are rooted in Ethernet, Lava takes a different approach. The serial ports in the Lava Ether-Serial Link family are designed from the outset to be *serial ports*.

**Lava's
Ether-Serial
Concept:
The
Ethernet Bus**

You might ask: what's the difference? An Ethernet interface to a serial port — isn't that the same as a remote serial port accessible over Ethernet? The answer is no, and the difference is not purely semantic. While it's true that once implemented, both technologies will do the same thing, it's also true you can hammer nails with a screwdriver. The point is that the serial ports in a Lava Ether-Serial Link are true COM ports. They appear in Windows Device Manager as COM ports, just like the internal COM ports in your PC now. ANY software that needs to

communicate with a COM port can communicate with the COM ports of a Lava Ether-Serial Link. This means, for instance, even software running in a DOS window in Windows. Few if any other serial-to-Ethernet devices can make that claim.

And another thing — we at Lava see the Ethernet in the same way we see the PCI bus: not just as a transport medium for data transmission, but as a tool to make hardware easier to use. For this reason, Lava Ether-Serial Links use the Ethernet in much the same way as serial port expansion cards use the Plug and Play capabilities of the PCI bus. (Don't forget: Lava makes a lot of serial PCI products — we know what we're doing.) PCs running the Lava Discovery Protocol — recognized and responded to by all Lava Ether-Serial Links — will be able to automatically detect Ether-Serial Links on their Ethernet subnet. With proper permissions, they will then be able to configure and use those serial ports, with no manual input of network parameters or device settings.

The Lava Discovery Protocol & the Ether-Serial Link Driver Explained

Understanding the power of simplicity

Ether-Serial Links carry data over the Ethernet using standard Ethernet packets, and TCP/IP. In addition, Lava Ether-Serial Links use another type of communication — the Lava Discovery Protocol — to exchange instructions and management information with PCs. This protocol, in combination with the Ether-Serial driver, makes Lava Ether-Serial Links so powerful yet easy to use.

The Lava Ether-Serial Driver

The Lava Discovery Protocol is installed as a part of the driver that handles communications between Ether-Serial Link ports and programs running on a computer. You can imagine those programs to be terminal software, POS software, industrial control software, or any other software that communicates with a serial port. Everything between the software that is accessing a serial port and the Lava Ether-Serial port itself is completely transparently handled by the Lava driver. Your operating system simply sees your PC as having additional serial ports, and those ports operate identically to any other serial port.

The Lava Discovery Protocol has a number of functions: it can find (discover) Lava Ether-Serial Links operating on a user's network segment, it is a means through which a user can set or alter the operating parameters such as an Ether-Serial Link's network settings or serial port line settings, and it is the protocol through which new Ether-Serial Links are installed on a network.

The structure of the Lava Discovery Protocol also provides "device permanence" for Ether-Serial Link configurations. Once it has been installed, a Lava Ether-Serial Link will maintain or re-acquire its operating parameters through a power on / power off cycle. Similarly, a PC will retain its "installed" Ether-Serial Link ports after rebooting.

Establishing Communications

Lava Ether-Serial Link communications use a Lava-defined Ethernet packet structure to communicate between host PCs and Lava Ether-Serial Links. Initial contact with a Lava Ether-Serial Link is made when a PC broadcasts a message to MAC addresses that are recognized Lava MAC addresses. This broadcast will invoke a response from any Lava Ether-Serial Link that is in the broadcast domain and that is accepting broadcasts from the PC issuing the broadcast. Just as with a PCI device, an Ether-Serial Link has a Lava Device Vendor ID and a Device ID. In its response to the initial broadcast, the Ether-Serial Link will include these identifiers, and communications between the Ether-Serial Link and the PC can be established.

The Lava Discovery Protocol Datagram

A Lava Discovery Protocol datagram is an Ethernet packet that can contain such information as the identities of the sender and recipient of the datagram, an instruction

(what the datagram sender "asks" the datagram recipient to "do"), the human-readable name of the Ether-Serial Link (such as "Shipping Room #1"), security key information, the MAC address of the Ether-Serial Link, and any data required for the current transaction (such as data required to execute an instruction contained in the datagram).

The Lava Discovery Protocol instructions include commands to discover Ether-Serial Links on a network segment; commands to request and submit detailed device information from an Ether-Serial Link; and commands to upgrade an Ether-Serial Link's firmware, manage security, reboot or reset Ether-Serial Links, and so forth. Using the Lava Discovery Protocol, an Ether-Serial Link can provide detailed information about its network parameters; its current port settings; its hardware profile including its production date, PCB revision, MAC address, CPU type, UART type, NIC type, jumper settings, and memory information; its firmware version; and so on.

In addition to a Windows-based management interface for Ether-Serial Links, many of the capabilities of the Lava Discovery Protocol are presented in HTML pages served by an embedded web server in the Ether-Serial Link. This powerful and easy-to-use interface is available anywhere a TCP/IP connection to the Ether-Serial Link exists.



Parallel-PCI 3.3V

We bet you didn't know... ... what makes the Lava Parallel-PCI 3.3 Volt the best 3.3 volt parallel board on the market.

It's this: The Lava Parallel-PCI, apart from being the direct descendant of the original and standard-setting Lava Parallel-PCI, has voltage outputs that fully conform to the Centronics standard and IEEE 1284 specification. Other 3.3 volt parallel port adapter cards do not. This will be of particular importance to users who expect their parallel interface to work properly with a parallel port dongle, or with cables that approach the maximum length allowed by the specification.

The Rock-Solid Link Communications Reliability and Security with the Lava Ether-Serial Link

Ether-Serial Links from Lava are highly reliable and secure. In terms of reliability, data exchanges between the PC and the Lava Ether-Serial Link are sent through the network over TCP/IP. The TCP protocol, by design, provides reliability for the data transfer. In addition, Ether-Serial Link data uses a second, Lava-developed, data transport protocol, within the TCP/IP wrapper that adds a second degree of assurance of data integrity. As a second, specialized layer it also adds an informal degree of security, although that is not its purpose. (In fact, this transport protocol is intended to add the capability to carry data by on its own, without the need for TCP, should a specific requirement for this capability arise.) Finally, data integrity is also handled by the nature of serial connection itself, with its attendant error checking, flow control, handshaking, and buffering.

Configuration and control commands are handled by the Lava Discovery Protocol described on the previous page. This protocol has a 24-byte security key that secures access to Lava Ether-Serial Links, preventing unauthorized access. By design, Lava Discovery Protocol commands expect acknowledgments, guaranteeing their integrity and successful execution, despite the fact that they use UDP — a protocol that does not expect acknowledgments of the successful receipt of data — as their transport protocol.

At the Application Level, any required encryption or special data handling procedures may be easily implemented. In addition, standard Internet-compatible security procedures can be introduced on the network side as required.



Padlock image ©2000 BT Internet.com

Retail Systems® 2003

Conference & Exposition



Lava at Retail Systems 2003 Chicago

Lava featured the Ether-Serial Link family at this year's Retail Systems 2003 show in Chicago. POS and retail systems builders and users were very interested in Lava's Ether-Serial Links. One-, two-, and four-port RS-232 products were on display, and the Ether-Serial Link Quad Port was shown in a live demo, demonstrating connectivity to a receipt printer, a bar code scanner, and a pole display: typical POS devices.

Visitors to the booth were impressed by a number of benefits that the Ether-Serial Link offered. Those benefits basically boil down to convenience and cost savings, and the Ether-Serial Link offers both. POS users were most interested that the Ether-Serial Link would work perfectly with any existing software, making for painless migration. For POS users and those deploying POS systems this was essential. Other POS customers were interested that the Ether-Serial Link provides more convenient cabling (one Ethernet cable can replace four serial cables), flexible deployment of POS peripherals, and increased distance for serial connections. Cost savings, as always, had strong appeal. Ether-Serial Links can reduce costs in a number of ways: they can reduce cable costs, eliminate the need to dedicate a full PC to supporting a serial device, and cut long-distance phone costs. Lava's Ether-Serial Links also have the best pricing in serial-to-Ethernet device market.

Profile

Northwest Computer Accessories, founded in 1987, is one of the premier computer accessory wholesalers on the west coast. A family owned business, they relate to both the individual dealer and the large corporation. With over 2,000 computer products in their warehouse, including a broad range of Lava products, they offer a selection that is unmatched in the accessory marketplace. Their range of products, combined with their friendly, knowledgeable, and courteous staff, make buying from NWCA a pleasant experience. This feeling is something NWCA believes is just as important as their low prices.

NWCA's high standard of customer service and knowledgeable sales and purchasing staff keep them on the cutting edge of an ever-changing industry. NWCA's new real-time website is a powerful tool for accessing their broad range of products.



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PRODUCT SUMMARY

Ether-Serial Links

Ether-Serial Single Port	Single 9-pin RS-232 serial, RJ-45 Ethernet
Ether-Serial Dual Port	Dual 9-pin RS-232 serial, RJ-45 Ethernet
Ether-Serial Quad Port	Four-port 9-pin RS-232 serial, RJ-45 Ethernet

Serial Boards

PCI	SSerial-PCI	Single 9-pin serial, 16550 UART
	SSerial-PCI/LP	Single 25-pin serial, 16550 UART, low profile
	RS422 SS-PCI	Single 9-pin serial, 16550 UART, RS-422 pinouts
	DSerial-PCI	Dual 9-pin serial, 16550 UARTs
	DSerial-PCI/LP	Dual 9-pin serial, 16550 UARTs, low profile
	RS422 DS-PCI	Dual 9-pin serial, 16550 UARTs, RS-422 pinouts
	Quattro-PCI	Four-port 9-pin serial, 16550 UARTs
	RS422 Quattro-PCI	Four-port 9-pin serial, 16550 UARTs, RS-422 pinouts
	Octopus-550	Eight-port 9-pin serial, 16550 UARTs
	LavaPort-650	Single 9-pin serial, 16650 UART
	LavaPort-PCI	Dual 9-pin serial, 16650 UARTs
	LavaPort-Quad	Four-port 9-pin serial, 16650 UARTs
ISA	SSerial-550	Single 25-pin serial, Com 1-4, 16550 UART, IRQ 3/4/5/7
	DSerial-550	Dual 9-pin serial, Com 1-4, 16550 UARTs, IRQ 2/3/4/5/7/10/11/12/15
	RS422-550	Dual 9-pin serial, 16550 UARTs, RS-422 pinout
	LavaPort-ISA	Single 9-pin serial, Com 1-4, 16650 UART, IRQ 2/3/4/5/10/11/12/15
	LavaPort-PnP	Single 9-pin serial, 16650 UART, Plug and Play

Parallel Boards

PCI	Parallel-PCI	Single EPP parallel
	Parallel-PCI/LP	Single EPP parallel, low profile
	Dual Parallel-PCI	Dual EPP parallel
ISA	Parallel Bi-directional	Single bi-directional parallel port, LPT 1/2/3, IRQ 5/7
	Parallel-ECP/EPP	Single ECP/EPP parallel, LPT 1-6, IRQ 2/3/4/5/7/10/11/12

Combo Boards

PCI	SP-PCI	Single 9-pin serial, 16550 UART + single bi-directional parallel
	2SP-PCI	Dual serial (9 & 25-pin), 16550 UARTs + single EPP parallel
	LavaPort-Plus	Dual serial (9 & 25 pin), 16650 UARTs + single EPP parallel
ISA	2SP-550	Dual 9-pin serial, Com 1-4, 16550 UARTs + single bi-dir. parallel, LPT 1-2

USB 2.0 & 1.1 Devices

USB 2.0 Host Adapter	Dual USB 2.0 ports, 480 Mbps, fits in PCI slot
Kazan	Hard drive enclosure with USB 2.0-to-IDE interface
USB 1.1 Host Adapter	Dual USB 1.1 ports, 12 Mbps, fits in PCI slot
SPH-USB 1.1 Hub	Three powered USB 1.1 ports, parallel port, serial port, connects to USB

IEEE 1394 (FireWire®) Devices

IEEE 1394 FireHost	Dual IEEE 1394 ports, 400 Mbps, fits in PCI slot
FireDrive®	Hard drive enclosure with FireWire®-to-IDE interface
IEEE 1394/IDE Controller	FireWire®-to-IDE hard drive interface

Specialty Boards

PCI	8255-PIO	8255 PIO interface card
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