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Lava I/O News

LAVA

LavaPorts: The Lava 16650 UART Line-up

"LavaPorts" are the speed demons in the Lava serial product line. LavaPort serial accelerators differ from other Lava serial boards because they are populated with 16650 UART serial chips. This chip provides four times the speed of the standard serial ports supplied on most motherboards.

Who wants this serial port speed? Basically, anyone who finds serial data rates are a bottleneck in their systems. More specifically, a LavaPort pays speed dividends for peripherals that are capable of sending data across the port at speeds faster than 115.2 kbps, which is the maximum data rate supported by serial ports using a 16550 UART.

In particular, a LavaPort serial port board will benefit users of specialized high-speed serial devices such as some types of medical imaging equipment, users of ISDN modems, and users of other types of high-speed modems when the modem is using data compression.

What is so special about a 16650 UART serial port?

Readers of the July 2002 LINK will already have some sense of the advantages that the 16650 UART offers over earlier UARTs. To recap, the 16650 UART is faster and better buffered than the standard serial port on motherboards these days, the 16550 UART.

How much faster? The 16650 UART is four times faster than the 16550, and supports speeds up to 460.8 kbps. This is essential for some types of hardware, including ISDN modems. It is also a very good idea for those wishing to get full speed from the newer types of modems on the market.
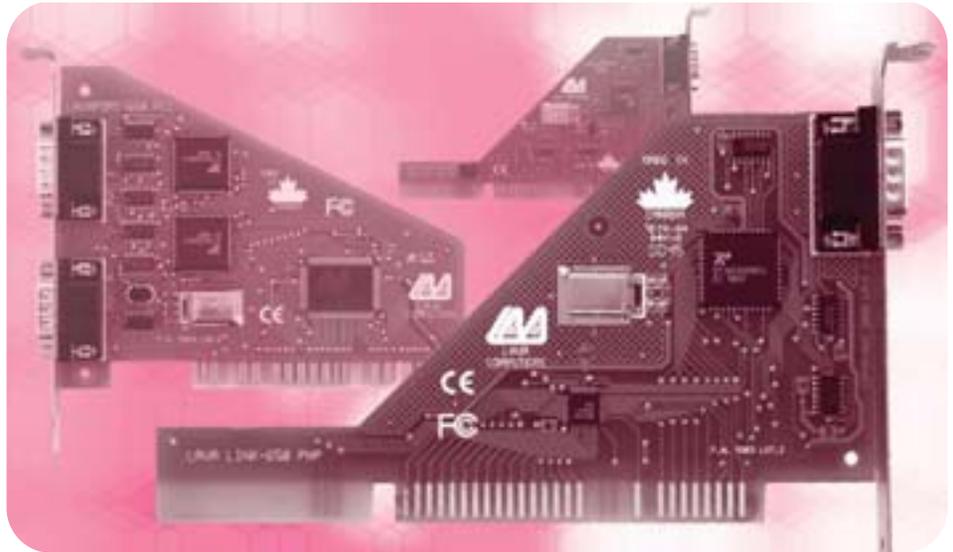
How much better buffered? The 16650 UART has 32-byte FIFO buffers, while the 16550 UART has 16-byte buffers. FIFO buffers allow data to be briefly gathered in the serial port in small batches, to prevent either the serial port incessantly interrupting the operations of the system's CPU and so slowing the whole system, or conversely, to prevent the serial port from losing bytes of data that are in transit through the port if they have not cleared the port before new data arrives.

As well, some 16650 chips have additional capabilities such as wireless infrared decoders (IrDA) and power-saving sleep modes.
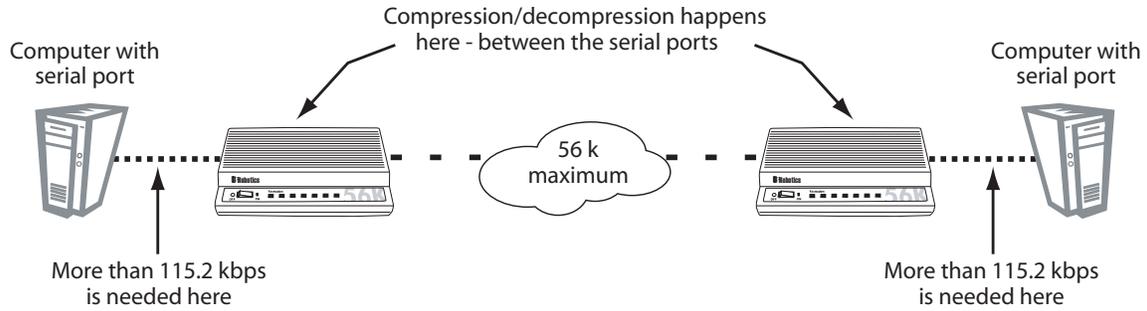
Modem Data Compression: A Hidden Bottleneck

So you're using a V.90 or V.92 modem, and you know its maximum data rate is 56 kbps. Why would you want a serial port faster than that? The answer is that data compression done by the modem increases the potential data rate between the serial port and the modem.

It may sound like a paradox, but even when a serial port's UART can move data faster than the data travels across a data line (usually a phone line), the serial port may still be a bottleneck. The diagram below shows why: if you are receiving data that has been compressed by another modem, your modem will take that data and decompress it *before* it comes to your computer's serial port. The rate of data flow from your modem to your serial port will therefore be greater than the rate of data flow across the phone line. Remember: the speed rating ascribed to a modem is a measure of the rate of data flow *between modems*, not between the modem and the serial port.

How much does modem data compression contribute to serial port bottlenecks? The question is difficult to answer because of the number of variables, but as modem compression technology improves, data moves from the serial port to the modem much faster, relative to the data moving from modem to modem.
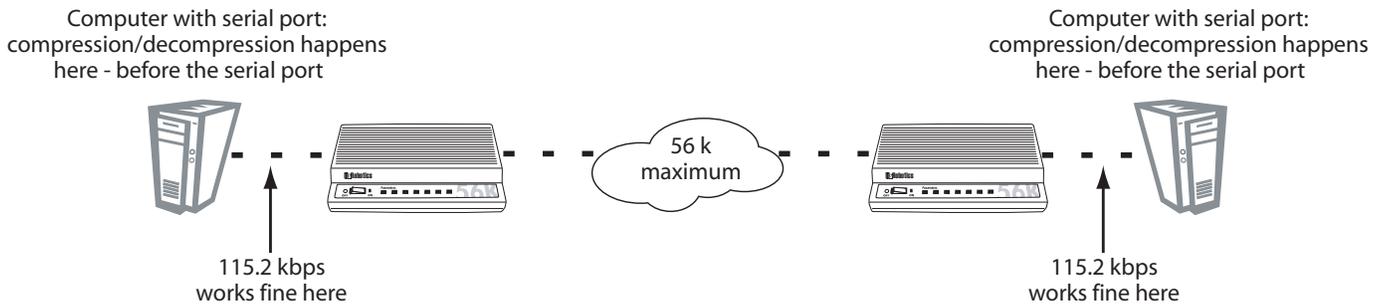
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Modem Compression

Computer with
serial port

Compression/decompression happens
here - between the serial ports

Computer with
serial port

56 k
maximum

More than 115.2 kbps
is needed here

More than 115.2 kbps
is needed here

Currently, most modems are using either V.42bis or V.44 compression schemes. The compression offered by these on-the-fly schemes will vary greatly depending on the nature of the data being sent: text files (including HTML files) generally compress very well; typical web graphic file formats such as PNG, GIF, and JPEG compress little or not at all, as they are already compressed. But some web browsers can also display BMP graphics, and these may be used as web graphics although they are bandwidth-intensive. E-mail can benefit from compression, and files attached to e-mails can sometimes also benefit.

Modem compression does have its limitations, however. Software compression schemes such as ZIP, ARC, LZH, and Stuffit that run inside the computer provide better compression than modems: they have access to the computer's memory—a much larger amount of memory than a modem has available when compressing data. Consequently, software compression can evaluate much larger blocks of memory at a step. Software compression is also a batch process, and a file can therefore undergo more than one compression pass. On the other hand, modem compression is much more convenient, as files do not need to be compressed manually before they are sent.

Software Compression

Computer with serial port:
compression/decompression happens
here - before the serial port

Computer with serial port:
compression/decompression happens
here - before the serial port

56 k
maximum

115.2 kbps
works fine here

115.2 kbps
works fine here

Modem compression is generally estimated to reduce "compound files"—those composed of a mixture of text, HTML, and graphics—by a factor of about four, and sometimes more: enough that a serial port may in fact pose a bottleneck. As modem speeds increase and compression schemes become more effective, this trend to serial port bottlenecks will increase.

Because modems compress data, you need to set your serial port speed higher than the modem's rated speed to avoid creating a bottleneck. The higher your modem's compression ratio, the higher the serial port setting you should use. V.44 compression gives the highest compression, followed by V.42bis, then V.32bis. A 56k V.90 modem using V.42bis compression will run unrestricted virtually all the time with a serial port setting of 230.4 kbps. But, if your serial port has a 16550 UART, your port's maximum speed will be 115.2 kbps: a LavaPort could make a difference. With V.44 compression, which modem chipset manufacturers estimate improves compression by 26% over V.42bis compression, the need for serial port acceleration gets greater still.

COMDEX 2002
Visit our booth at COMDEX Fall 2002 in Las Vegas (Booth 10664 in the Canada Pavilion). We will be showing our new line of Ethernet-to-Serial device servers in 1, 2, 4, and 8 port versions. Watch for the November issue of LINK for more information on these products.

Serial Accelerator Summary

Lava makes six LavaPort boards in different configurations. There is a LavaPort to fit most needs: single, two, or four port, ISA or PCI. All the LavaPorts (except the LavaPort-Quad described below) have 16650 UARTs, making them capable of data transmission rates up to 460.8 kbps.

LavaPort-ISA

The LavaPort-ISA (originally called the Link-650) has a single 9-pin serial port. It can be jumper configured for COM 1-4, IRQ 2/3/4/5/10/11/12/15.

LavaPort-PnP

Like the LavaPort-ISA, the LavaPort-PnP is an ISA board with a single 9-pin serial port. On systems with Plug and Play support on the ISA bus, this board automatically configures its COM address and IRQ level, without the need to set jumper switches.

LavaPort-650

Like the other LavaPorts, the LavaPort-650 has integrated 32-byte FIFO buffers. It is a Plug and Play PCI single-port board and comes with Lava's "COM Port Redirect" and "Modem Speed Set" software utilities for easily configuring modems.

LavaPort-PCI

The LavaPort-PCI is the two-port version of the LavaPort-650. Its two ports use only one PCI bus IRQ. It is a versatile COM port accelerator ideally suited to most systems.

LavaPort-Plus

This is the combo card in the LavaPort family. Like the LavaPort-PCI, it has two PCI 16650 serial ports. As well, it has an implementation of the standard-setting Lava Parallel-PCI EPP port. A truly formidable combo card.
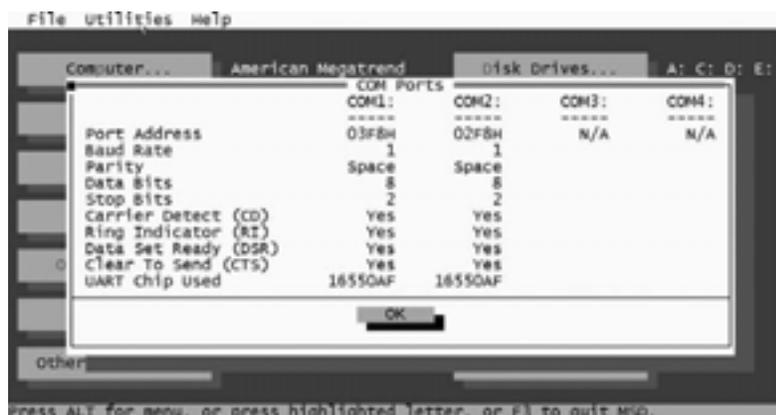
LavaPort-Quad

Here is the multi-port board in the LavaPort family. The LavaPort-Quad uses only one PCI IRQ for all of its ports, even when they are accessed simultaneously. This card is ideal for remote access servers. Unique among the LavaPorts, this board actually uses a 16554 UART for its four ports. An advantage of this UART is that its FIFO buffers are 64 bytes each, in contrast to the 32-byte FIFO buffers on the other LavaPorts.
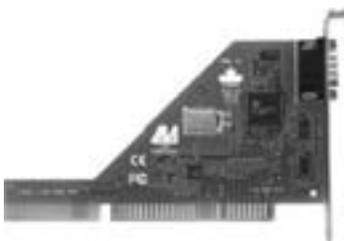
How will you know what type of serial ports are currently on a system?

PC systems can determine the UARTs of the serial ports by running Microsoft's ancient MSD.EXE (Microsoft Diagnostics) program. It is installed by default in DOS, but also resides on the Windows 95, 98, and ME installation CDs. Although an old DOS program, it is also still available for download from http://support.microsoft.com/default.aspx?scid=KB;EN-US;q122415&. However, be forewarned: MSD.EXE is not always reliable in the information it provides.

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PRODUCT SUMMARY

Serial Boards

PCI	SSerial-PCI	Single 9-pin serial, 16550 UART
	SSerial-PCI/LP	Single 25-pin serial, 16550 UART, low profile
	DSerial-PCI	Dual 9-pin serial, 16550 UARTs
	DSerial-PCI/LP	Dual 9-pin serial, 16550 UARTs, low profile
	Quattro-PCI	Four-port 9-pin serial, 16550 UARTs
	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, RS422 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

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