

The Serial Revolution: Establishing Global Access to Serial Ports

Overview

In the process of updating a variety of computer systems and hardware configurations, the plant manager of a Midwest manufacturer needed a centralized network that would connect three buildings within three quarters of a mile, plus a couple more several miles away.

With a wide array of legacy equipment, primarily utilizing serial connections, the need presented a rather complex challenge, especially since serial connections are limited in terms of distance and networking.

The scenario is not uncommon. In fact, as computer software and hardware technologies advance, a massive connectivity gap is growing between perfectly good legacy systems and advanced Data Acquisition (DAQ), Programmable Logic Controllers (PLC), Industrial Computers and other critical systems.

Here are the challenges serial technology faces:

- Limits on linking remote equipment or networks,
- The number of potential connections is lower,
- Monitoring and control of remote equipment is more difficult,
- Upgrading software and firmware must be handled locally, and
- Various types of networks can't talk to each other.

With recent advances, it's now simple, fast and inexpensive to connect any number or type of serial equipment to an Ethernet network. The solution is utilizing Ethernet Serial Servers to make connections, manage traffic, and extending data signals to anywhere in the world.

History of Serial Communications

Serial ports were first used in 1960, and the first versions of RS-232 approved in 1969. The standards were intended for communications equipment such as phone modems, and serial interfaces were called COM ports.

Current maximum serial port speeds are 20 kilobits/second (Kbps) for RS-232 and 300 megabits/ second (Mbps) for RS-422/485. Distance limits are typically 50 ft. for RS-232 and 4,000 ft. for RS-422/485,

The integration of legacy serial equipment into modern Industrial Networks presents some unique challenges; among these are reliability, connectivity, and limited range. These issues can be easily resolved.

RS-232, RS-422 and RS-485 are still used in many applications, so why stop?



though repeaters may extend this. The top number of devices for a serial LAN is 32; more can be connected with repeaters, up to the address limit (usually 256) of the devices used.

For years, advances in serial technology developed along with the equipment being connected. There are still many uses for serial devices, and the huge inventory of equipment, cables and software proves its success. Without question, serial connectivity remains the standard in a wide variety of industrial, commercial and medical applications.

Even so, external serial ports are no longer standard on PCs. And serial technology is no longer a prime focus of development and progress. Herein lies the technology gap that is effectively bridged by Ethernet Serial Servers.

History of Ethernet LANs

In November of 1969 the U.S. Dept. of Defense sponsored a trial linking computers at UCLA and Stanford. It was the first effective joining of computers using different operating systems using the same communications protocols. This was accomplished over standard phone lines and with data speeds of 50 Kbps. It was the first true network operating system, and the predecessor of the Internet and Ethernet.

More computers were added, and eventually other networks developed and were linked. Research improved the technology. In 1974, basic principles of what was called the Ethernet were proposed and by 1976 the first Ethernet was deployed, running at a speed of only 3 Mbps.

In the 1990's, the Ethernet became the most frequently used of all local area networking (LAN) types, due to its speed, cost, versatility, dependability and ability to connect a variety of other network systems and equipment.

While the speed at which Ethernet can transfer data continues to increase, these blazing speeds have relatively little impact on moving serial originated data, where speeds are typically gauged in kilobits, not megabits.

Introduction to Ethernet Serial Servers.

Recently developed Serial-to-Ethernet technology makes it possible to connect serial devices using the Ethernet as a bridge. The cabling,

While speed gets public attention for Ethernet, benefits for industrial applications can be summed up in three words: connectivity, distance, stability.

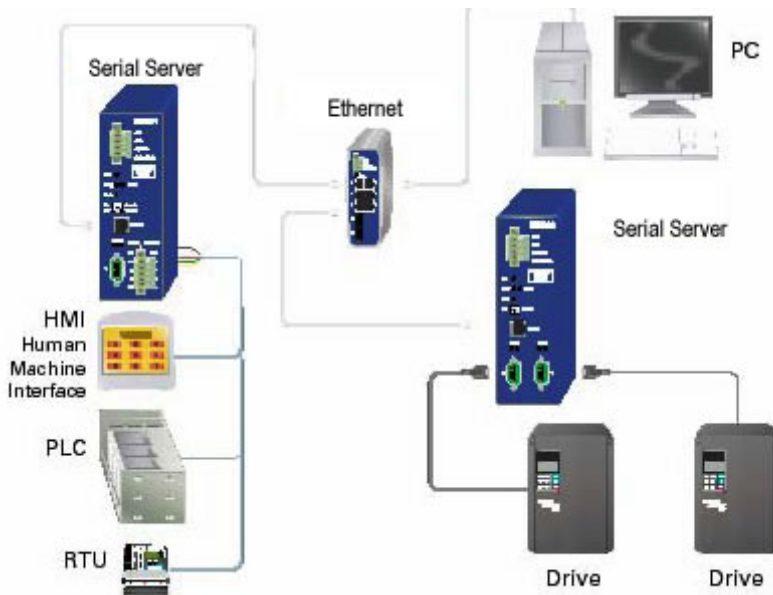


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hardware and software that accomplishes this is called Ethernet Serial Servers (or just Serial Servers for short).

Here is a simple layout of what might be accomplished when Ethernet is utilized in making connections:



Here are the benefits gained by using Serial Servers:

- Improved Access – Connect to serial devices over far greater distances.
- Cost Effective - Communicate with serial devices without changing existing software.
- Seamless Communications - Connectivity between serial devices over Ethernet is transparent to both the devices and the software.
- Utilize Existing Equipment – Ethernet enable COM Ports.
- Preserve Functional Legacy Networks - Connect serial networks as one or more subnetworks of the LAN.
- Conserve Manpower - Remotely access serial devices.
- Save Time - Update serial device software faster and easier using the Ethernet.

Serial to Ethernet: What To Look For

Not all means of bridging the Serial-to-Ethernet gap are equal. Here are a few things to look for and to consider:

- Hardware options – number of serial ports, desktop, panel and DIN-mount options.



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- Support for RS-232, RS-422 and RS-485.
- “Tunneling” so the Ethernet is invisible to serial devices.
- Operating modes – virtual COM port, TCP/IP and UDP/IP.
- Multiple TCP client connections.
- Access to Serial Server menu settings, plus Telnet and Console modes to configure the server, allow remote upgrades, system defaults restoration, and select serial port settings.
- A web server for management from any web browser.
- Options for any PC on the network to correct problems.
- Software which allows easy access to the Serial Server for configuration, upgrades and analysis of firmware, port and hardware status.
- Ability to automatically reconnect the TCP link when it is lost.
- IP30 rated enclosure in industrial environments.
- Slim profile, DIN rail or panel mount options.
- Wide operating temperature range.
- Virtual COM support for the PC
- Modbus TCP/IP Capability

Application examples

There is no apparent limit to Serial Server applications, but some are more common. Usual configurations include camera and light controls, building security, traffic management systems, retail and point of sale devices.

Industrial devices such as PLCs, drives, motor controls and process analyzers are regular targets. Accessing serial devices through landline, cellular and satellite communications is also possible.

In short, serial servers present virtually unlimited options and possibilities and free up industrial environments to expand, modernize, and restructure with ease.

Economic advantages

The ability to improve access to serial ports and networks through the Ethernet is a perfect example of money saved, while improving functionality.

For the Midwest manufacturing company, serial servers were able to limit redundancy, easily bridge the distances required, and centralize

**The ultimate benefits of
Serial Servers: they save
money, time and resources.**



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operations. All of this amounted to significant savings in time and money.

Consider a few more examples of how serial servers financially benefit the industrial arena:

- A coal mine needed to better monitor mine conditions and equipment. Serial servers easily and affordably brought information and control to one location using existing serial equipment.
- On the snowy slopes of Colorado, with a Serial Server on each end of existing Ethernet cables, a ski resort is able to centrally communicate with each ski lift's RS-485 port via using serial tunneling. This represents a significant cost savings over pulling (or burying) more cable.
- A large commercial airline revamped its computer terminals, but new computers lacked a serial port to talk with ticket printers. Adding Serial Servers avoided costly replacement of thousands of printers.

Summary

Serial Servers provide the ideal solution to the significant gap that is being created by new technologies. Challenges stemming from the need for longer data transfer lengths, centralized monitoring, global remote access, heightened security concerns, and an increased variety of connections are all seamlessly solved by utilizing serial servers.

If companies needlessly replace serial equipment and networks, they are throwing away money. The simple fact is, adding Ethernet Serial Servers to serial equipment can be an easy way to save money, improve productivity, and improve operations in a dozen different ways.

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B&B Electronics is a leading manufacturer of Serial Servers. We're proud of our innovations that promote the best combination of serial and Ethernet apps. We offer the Vlinx and other products used in a variety of Ethernet Serial Server and other data communications solutions.



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Free professional consulting with our Applications Engineers is available over the phone. A call to our team at 800-346-3119 (8-5 CST, M-F) can be the best way to determine what solutions will most effectively meet your serial needs.

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