

Com Grouping & UDP Multicast

Advanced Operational Modes for Serial to Ethernet Device Servers

Serial to Ethernet Technology

Serial communications (RS232/422/485) have traditionally been used in industrial automation to connect various instruments such as sensors, data loggers to standalone monitoring stations like computers. The limitations of serial communications, such as distance, accessibility, the amount of data transferred at any one time and speed has led to a demand for a more flexible means of communicating.

Since the early 90's Ethernet networks have become more prominent in the industrial marketplace, due to its ability to provide fast, secure and flexible networks. With this shift to Ethernet, a requirement for protocol conversion between serial (RS232/422/485) and Ethernet TCP/IP emerged, and serial to Ethernet device servers appeared to bridge this gap. Serial device servers allowed users to retain all of their legacy serial equipment and interface directly with a future-proofed Ethernet network.

Advanced Operational Modes of Serial to Ethernet Device Servers

Serial to Ethernet device servers allow for flexible deployment through many operational modes. It is commonplace for such devices to support compatibility with a personal computer through software drivers, allowing users to transparently access a serial interface over an Ethernet network. This is achieved by mapping the IP address and port number to a local COM port on the host computer or server, acting as a virtual COM port. It is also usual for device servers to support operational modes that rely on TCP/IP socket programming concepts such as TCP server TCP client and UDP server/client mode, where users can deploy many different arrangements of networks without the need for a personal computer with an operating system and appropriate drivers.

As new incarnations of device server appear in the market, new advances have been developed to increase functionality, increase reliability and reduce deployment difficulties. Advanced operational modes have been developed to increase the possibilities in which clients and hosts can send and receive data. Moxa's new NPort 5100A and 5200A Series have innovated two new operational modes, named COM grouping and UDP Multicast.

COM Grouping

COM Grouping has been designed to simulate the behaviour of an RS-485 multi-drop network over Ethernet. Commands on an RS-485 networks are addressed by an ID, typically one byte long, when a command is sent from a host on a network, all nodes on that network will receive the command but only the serial devices with a the corresponding ID will actually

process and respond, all other serial devices on the network will ignore the command, this process can be conceived as a way of grouping the required clients. COM Grouping allows you to achieve this behaviour over an Ethernet network; previously when a device server is configured in Virtual COM mode, a host PC could not address more than one client at a time, the COM grouping feature enables users to do this by grouping together multiple virtual COM ports. This can be extended to create groups of up to 32 servers and multiple groups.

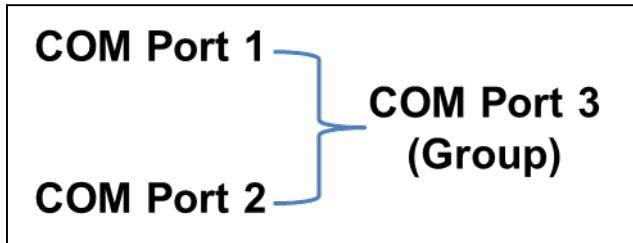


Figure 1: COM Grouping allows users to group together Virtual COM Ports using software on a host PC.

Application of COM Grouping

The NPort's COM Grouping function allows you to create a Group of COM ports in order to direct data to several physical serial ports on NPort device servers. With COM Grouping, you will be able to control multiple physical serial ports simultaneously by operating only one virtual COM port.

In this simple display application two groups of device server have been configured, COM4 has three single port device servers grouped together allowing for three serial devices to be connected, COM5 has one dual port device server connecting two serial devices.

Figure 2 represents how three serial devices grouped as a COM port can be controlled simultaneously via one virtual COM port (COM4) on the host PC. In this way a message can be sent to all serial devices in that group only.

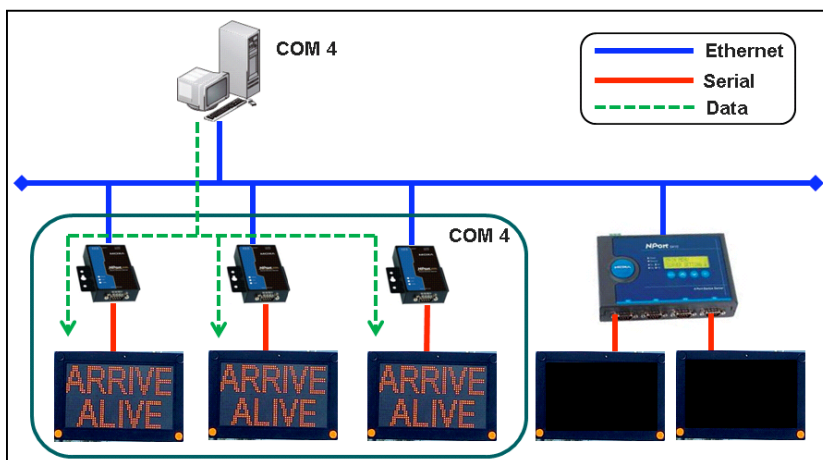


Figure 2: Using COM Grouping, a single message can be sent to multiple serial displays over an Ethernet network.

Figure 3 represents how if another group is controlled (COM5) then all other COM ports will not be addressed just as you would expect with single serial devices connected on each COM port.

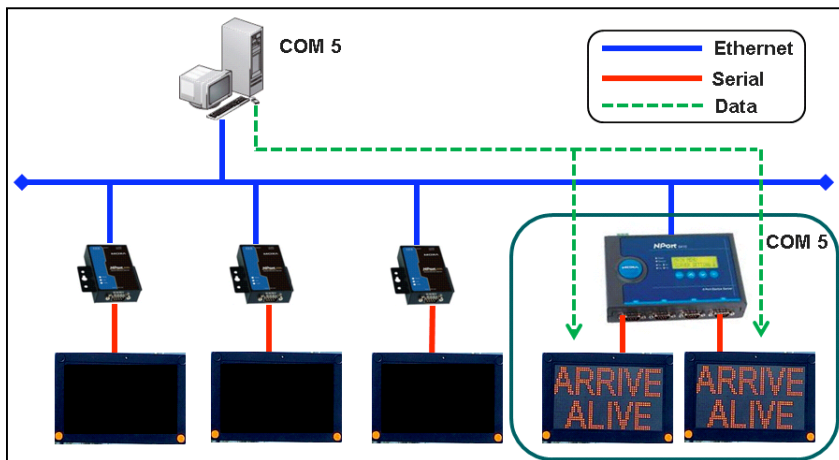


Figure 3: The COM Grouping function allows for up to 32 different sets of COM Port groups.

In this way a simple networks can be organised to simulate the serial RS-485 multi-drop behaviour over an Ethernet network.

UDP Multicast

A multicast can be defined as the delivery of a message or information from a source to multiple destinations simultaneously. In IP (Internet Protocol) applications, multicast messaging is a technique for one-to-many communication over an IP infrastructure in a network.

Previously, for a device server to broadcast to multiple hosts, a UDP (User Datagram Protocol) broadcast message would have to be sent, this would be received by all clients on the network, effectively flooding the network with the message; this meant complicated networks would have to be deployed in order to separate UDP broadcasts into groups. With UDP Multicast a packet can be sent by one host to multiple hosts, it achieves this by addressing only to hosts that belong to its corresponding multicast group.

Application of UDP Multicast

UDP multicast allows engineers to design very flexible networks because of how logical groups of devices can be addressed at any one time, this allows for structural deployment of a network which can easily be altered and expanded

Figure 4 represents a simple railway application where each carriage is populated with a PLC controlling the carriage doors and air conditioning for the carriage. Each PLC has a serial interface, the serial data is sent and received to its corresponding group over Ethernet by a device server configured to UDP Multicast.

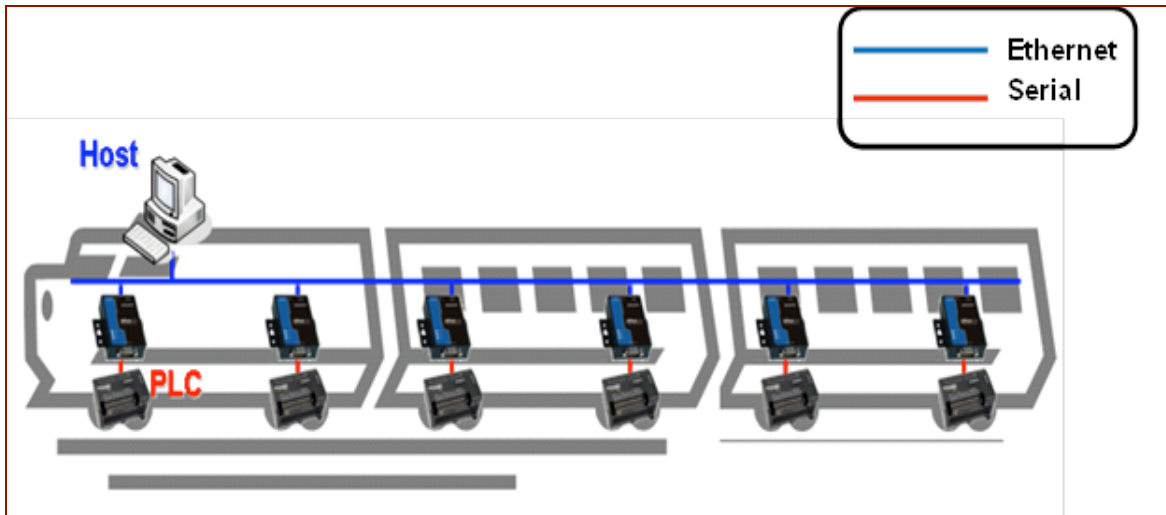


Figure 4: UDP Multicast allows for structural grouping of serial devices, allowing logical distribution of hosts on a network and efficient UDP multicast datagrams to transport information to corresponding group members.

Each carriage is configured to receive information from its multicast group only, separating the LAN traffic in a structured way. In the afore mentioned application, UDP Multicast makes the network easier to manage when adding multiple carriages.

Summary

Advanced operational modes of serial to Ethernet device servers, such as COM Grouping and UDP Multicast, offer ease of deployment and flexible operation for many different applications. As well as the applications discussed in this document, these features can benefit many types of systems found in applications such as factory and process automation, BMS, security, ATM, POS, Kiosk and many different types of control systems. Moxa have pioneered with their range of NPort device server to support these operational modes. See Table 1 for a comprehensive list of supported devices.

Name	Description	Serial Protocol	Operating Temp.
NPort 5110A	1 port device server	RS-232	0~60°C
NPort 5130A	1 port device server	RS-422/485	0~60°C
NPort 5150A	1 port device server	RS-232/422/485	0~60°C
NPort 5210A	2 port device server	RS-232	0~60°C
NPort 5230A	2 port device server	RS-422/485	0~60°C
NPort 5250A	2 port device server	RS-232/422/485	0~60°C
NPort 5110A-T	1 port device server	RS-232	-40~75°
NPort 5130A-T	1 port device server	RS-422/485	-40~75°C
NPort 5150A-T	1 port device server	RS-232/422/485	-40~75°C
NPort 5210A-T	2 port device server	RS-232	-40~75°C
NPort 5230A-T	2 port device server	RS-422/485	-40~75°C
NPort 5250A-T	2 port device server	RS-232/422/485	-40~75°C

Table 1: A comprehensive list of Moxa device servers which support COM Grouping & UDP Multicast