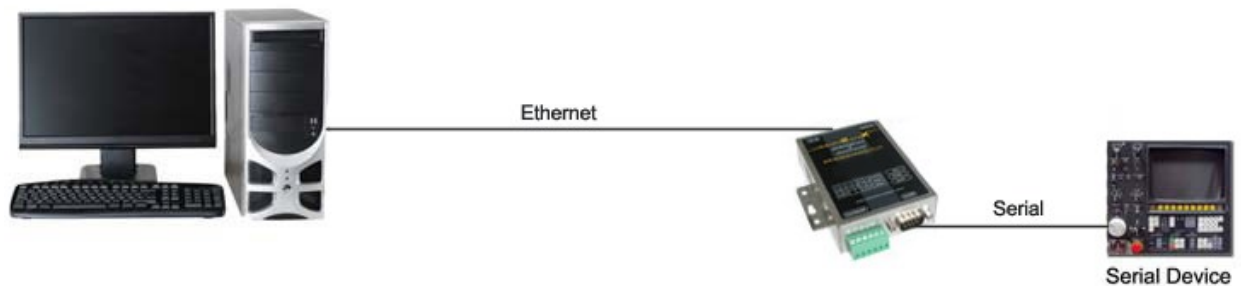**November 20, 2013**

Serial Device Servers & Industrial Ethernet Gateways

What are their applications?

Picture this scenario: You are a maintenance engineer at a plastic injection molding factory. Machine #12 has been installed with a camera vision system for part specification conformance monitoring. As expected, the communication interface of the vision camera is serial. The Plant Manager has requested that you devise a way to allow him to monitor the vision camera's operation from his office computer, and ideally anywhere Internet is available. How can you accomplish this task?

Now ponder this second scenario: You are a field service engineer for a solar EPC (Engineer/Procure/Construct) firm. The City of Nonexistentville has hired your firm to design/install a 0.5 MW photovoltaic (PV) panel system that will sit atop the town's City Hall. The City's electrical system supervisor wants to have real-time access to the PV system inverter when she's away from the City Hall. How can you fill this need?

Both requirements, from the scenarios mentioned above, can be remedied with a Serial Device Server.

What exactly is a serial device server (SDS)?
View the points below for a quick consideration:
- Plainly speaking, an SDS is a communication <u>interface converter</u> (serial to Ethernet)
- SDSs convert RS-232, 485, and 422 data into IP "packets" (and vice-versa) for transport over the network
- SDSs are also referred to by "terminal server" or "serial over TCP/IP server"

- "Server" is used to describe this device due to it being assigned an IP address in a network

The following diagram* shows where, at the edge (field) level of a network, a SDS can be implemented:
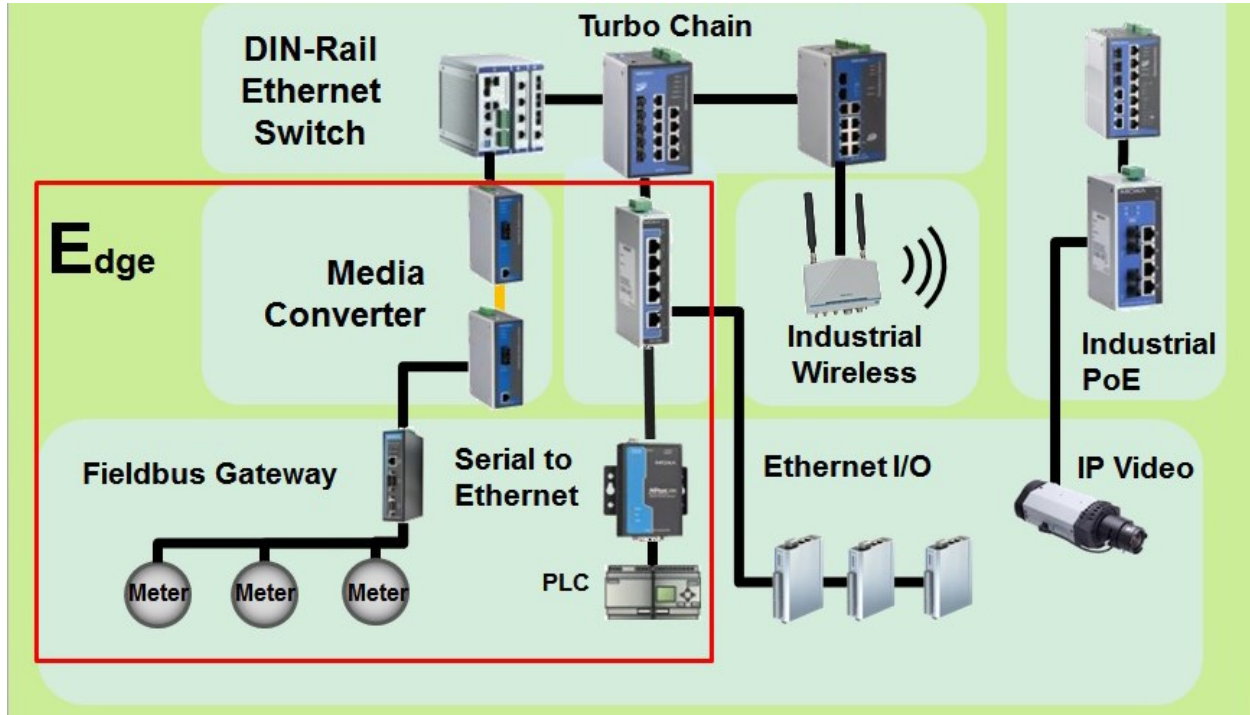

Note the bottom right corner of the squared (in red) section of the diagram. Connected to the PLC is an SDS. The Ethernet side of the SDS (opposite of PLC side) is connected to an Ethernet switch. We can now appreciate, from a hardware perspective, a serial device server's placement in an automation network. Once installed, the pertinent enhancements take effect, that is, converting the field device's serial data to faster, accessible, and ever-present Ethernet.

Serial to Ethernet Converters come in the following variations:

- 1 port, 2 port, multi-port models (for simultaneous, dual/various serial field device interface conversion)
- Industrial models (higher temperature specifications and superior quality)
- Wireless models (meaning the Ethernet "packets" are sent wirelessly via a local Wi-Fi network

Now about a couple more diagrams to drive home how an SDS can be implemented in different applications:
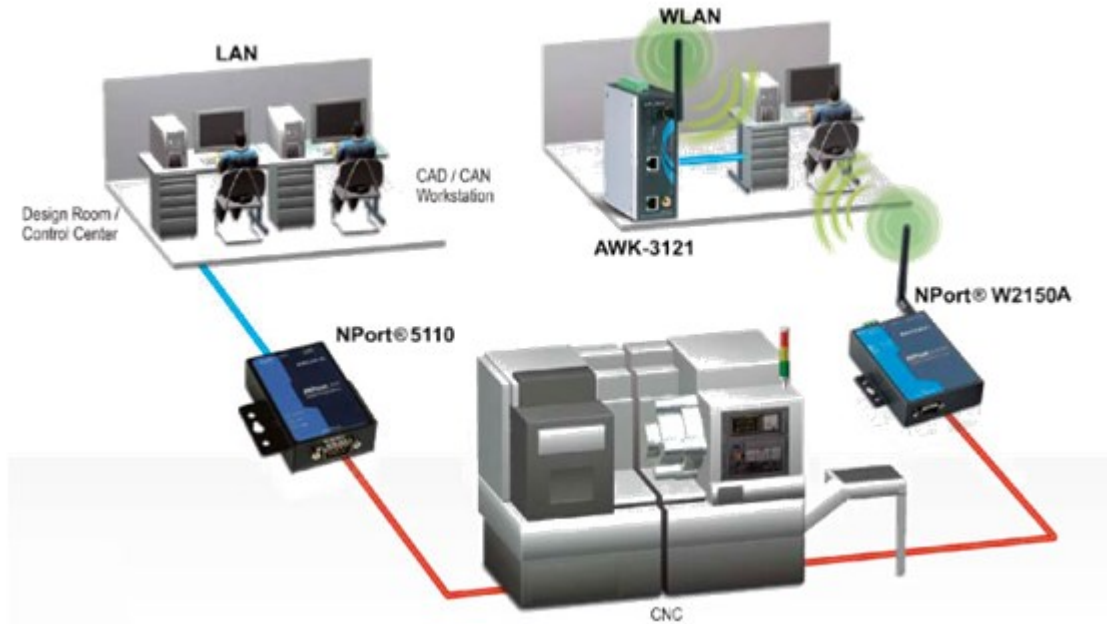
In this diagram we can note a SDS serving as the "middle-man" between this factory's CNC machine, located on the production floor, and the plant's control/operations monitoring office, which may/may not be at the same facility. What's more, if we look at the SDS on the right side of the CNC we can perceive an implementation of a wireless SDS connected to a wireless Internet access point.

And before we move on to Ethernet Gateways and their applications, let's see one final SDS diagram:
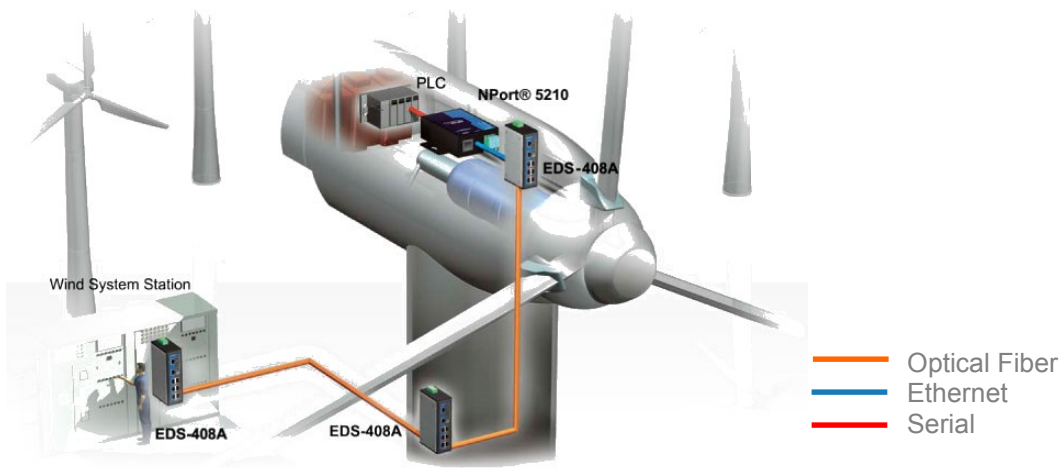
In this diagram the serial device server is playing it's typical role, that is, converting the PLC's serial data into Ethernet. The newly converted Ethernet "packets" are now routed to an Ethernet switch. Fiber optic cable serves as the data transfer medium that takes the PLC's data to the wind farm's control/operations monitoring center.

Now, what if your machine's control system needs to continuously interface with a power meter, UPS, and/or other instrumentation in order to send exhaustive process data to the facility's operations center? But the catch is that your field devices' communication protocols are a mix of Modbus RTU and Modbus TCP? Well there is no need to fret as Ethernet Gateways can come to the rescue!

What exactly are Ethernet Gateways?

See the points below for a quick summary:

- Simply stated an Ethernet Gateway is an industrial communications protocol "translator"
- Alluding back to the machine's control system and other components with distinct protocols mentioned above, an Ethernet Gateway can be connected as shown below for effective communication between the devices:

PLC

Ethernet
Modbus TCP

Gateway

Serial
Modbus RTU

Power
Meter
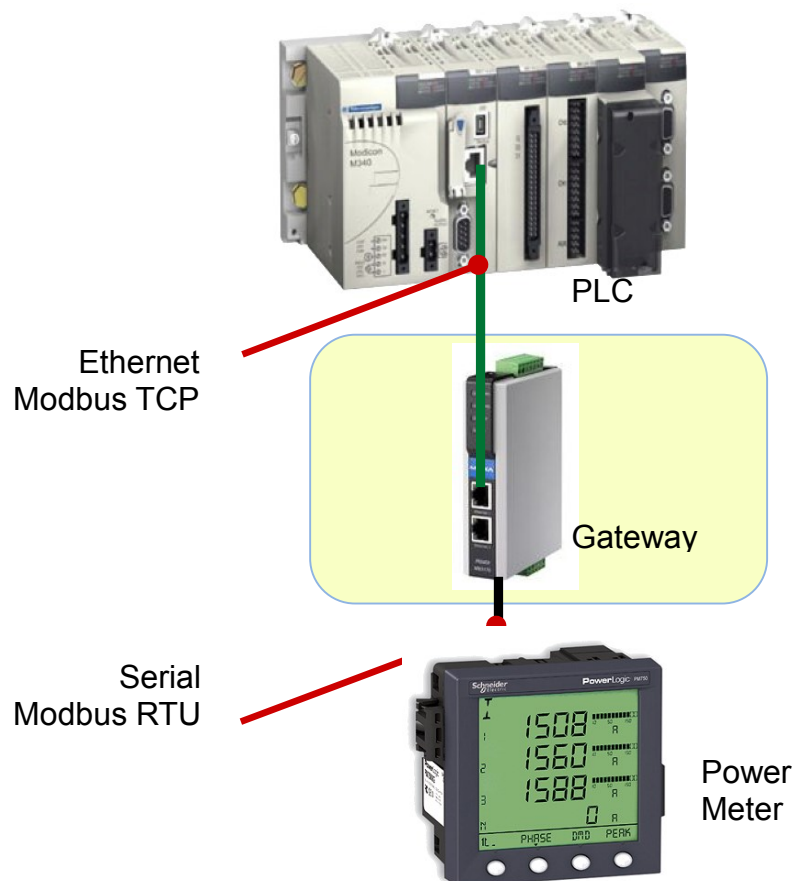
Industrial Ethernet Gateways promote benefits such as preserving existing equipment, linking modern automation equipment with dated equipment, and aiding in transitioning field devices to an Ethernet network.

But how are Ethernet Gateways implemented?

The diagram below illustrates a typical gateway application:

Ethernet　　　　　　　Modbus TCP

Modbus RTU
RS-232

Modbus RTU
RS-485

Power Meters　　　　UPS
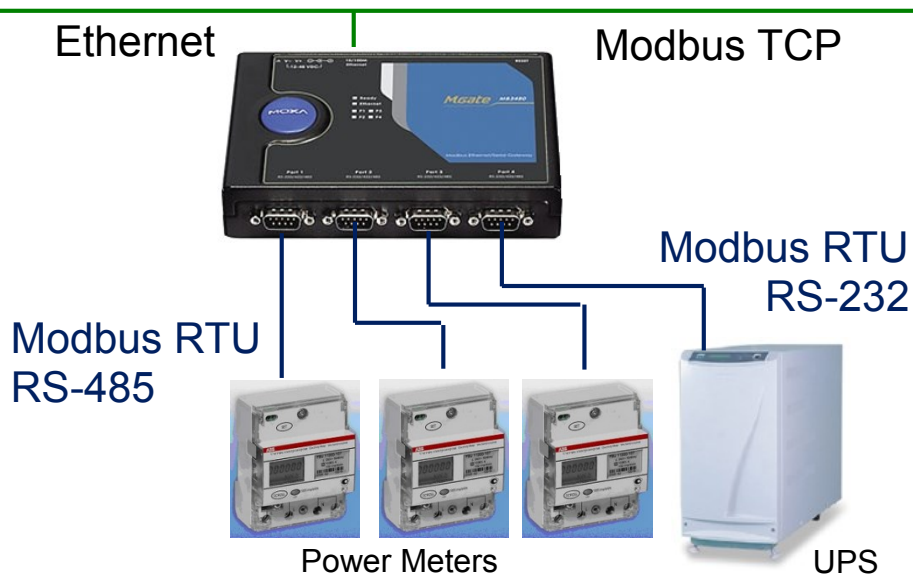
Observe how Modbus RTU RS-485 and Modbus RTU RS-232 field devices are interfaced to an Ethernet Gateway. The gateway in turn translates the differing protocols and and sends it off as Ethernet "packets." It's good to have in mind that gateways are available with various serial port slots, making them ideal for several protocol distinct field devices, located in the same area, to be connected.

Quantum Automation is a distributor of the Moxa product line. Known for ruggedness and redundancy, Moxa serial device servers and Ethernet gateways can potentially be an ideal fit for your next application.

See the final page for listing of Moxa serial device server part numbers and their variations and enter for a chance to win a **$100 Amazon gift card.**

As always, feel free to reach out to Quantum Automation regarding your control and networking needs!

Part #	Description
NPort 5110	1 port device server, 10/100M Ethernet, RS-232, DB9 male, 15KV ESD, 12-48VDC, With adapter
NPort 5110-T	1 port device server, 10/100M Ethernet, RS-232, DB9 male, 15KV ESD, 12-48VDC, -40~75â„ƒ
NPort 5130	1 port device server, 10/100M Ethernet, RS-422/485, DB9 female, 15KV ESD 110V or 230V
NPort 5150	1 port device server, 10/100M Ethernet, RS-232/422/485, DB9 female, 15KV ESD 110V or 230V
NPort 5210	2 port device server, 10/100M Ethernet, RS-232, RJ45 8pin, 15KV ESD, 110V or 230V
NPort 5430	4 port device server, 10/100M Ethernet, RS-422/485, terminal block, 15KV ESD, 12-48 VDC
NPort 5610-8-DT	8-port desktop device server, 2 10/100M Ethernet, RS-232 DB9, 12-48VDC
NPort 5630-16	16 port device server, 10/100M Ethernet, RS-422/485, RJ-45 8pin, 15KV ESD, 100V or 240V
NPort 5650-16	16 port device server, 10/100M Ethernet, RS-232/422/485, RJ-45 8pin, 15KV ESD, 100V or 240V
NPort 5650-8	8 port device server, 10/100M Ethernet, RS-232/422/485, RJ-45 8pin, 15KV ESD, 100V or 240V
NPort 5650-8-DT	8-port desktop device server, 2 10/100M Ethernet, RS-232/422/485 DB9, 12-48VDC
NPort 5650I-8-DT	8-port desktop device server, 2 10/100M Ethernet, RS-232/422/485 DB9 Isolation, 12-48VDC
NPort 6150	1 port RS-232/422/485 secure device server, 12-48V, w/ adapter
NPort 6250	2 ports RS-232/422/485 secure device server, 12-48V, w/ adapter
NPort 6450	4 ports RS-232/422/485 secure device server, 12-48V, w/ adapter
NPort 6610-16	16 ports RS-232 secure device server, 100V~240VAC
NPort 6650-8	8 ports RS-232/422/485 secure device server, 100V~240VAC
NPort IA-5150	1-port RS-232/422/485 serial device server, 10/100MBaseT(X) (RJ45)
NPort IA-5150I	1-port RS-232/422/485 serial device server with 2 KV isolation, 10/100MBaseT(X) (RJ45)
NPort IA-5250	2-port RS-232/422/485 serial device server, 10/100MBaseT(X) (RJ45)
NPort W2150 Plus	1-port RS-232/422/485 Device Server with 802.11a/b/g WLAN, antenna
Part #	Description
UPort 1130	1 Port USB-to-Serial Adaptor, RS-422/485
UPort 2210	2 port USB-to-Serial Converter, RS-232
UPort 2410	4 port USB-to-Serial Converter, RS-232

Question: "Why are Serial Device Servers and Ethernet Gateways useful in industrial automation networks?

ANSWER THE QUESTION FOR A CHANCE TO WIN A $100 AMAZON GIFT CARD!

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*All following diagrams are courtesy of Moxa