One Gateway That Can Do It All

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Traditional Fieldbus Communication Applications

The term "Fieldbus" refers to a collection of communication protocols that were introduced to replace 4 to 20 mA analog signals. Fieldbus protocols include DF1, PROFIBUS, and Modbus for serial, and EtherNet/IP, PROFINET, and Modbus TCP for Ethernet. In this paper we concentrate on DF1 and EtherNet/IP, and how to convert between these protocols using a new generation of DF1 and EtherNet/IP communication gateways.

DF1 Communication: The DF1 protocol operates over serial lines, and can be used to create a complex communication system between HMI/SCADA terminals and factory PLCs.
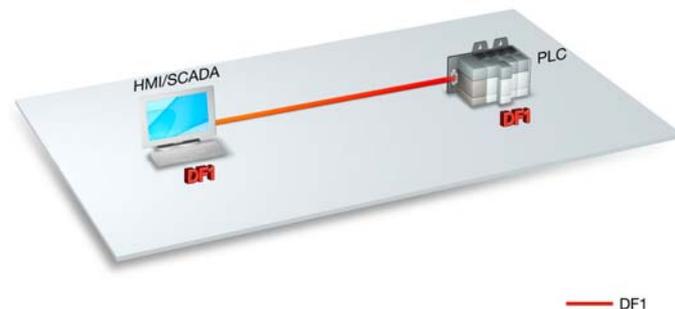
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EtherNet/IP Communication: The EtherNet/IP protocol operates over Ethernet, and can be used to create a complex communication system between HMI/SCADA terminals and factory PLCs.


As shown in the above figures, when using either a pure DF1 system or pure EtherNet/IP system, the HMI/SCADA terminals connect directly to the PLCs.

What Solutions Are Being Used Now?

With the increased demand for highly integrated systems and the need to extend the transmission distance of existing systems, it is often necessary to use a variety of different devices and communication interfaces to meet time-to-market requirements. In fact, Fieldbus gateways were introduced because of the need to convert between two different protocols, and to create highly integrated systems with extended transmission distances.

Example 1: An EtherNet/IP PLC needs to use the DF1 protocol to communicate with an HMI/SCADA system through a gateway.

DF1
EtherNet/IP
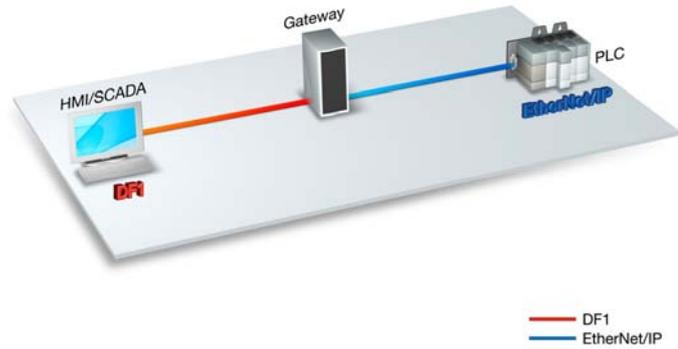
Example 2: A DF1 PLC needs to use the EtherNet/IP protocol to communicate with an HMI/SCADA system through a gateway.

DF1
EtherNet/IP
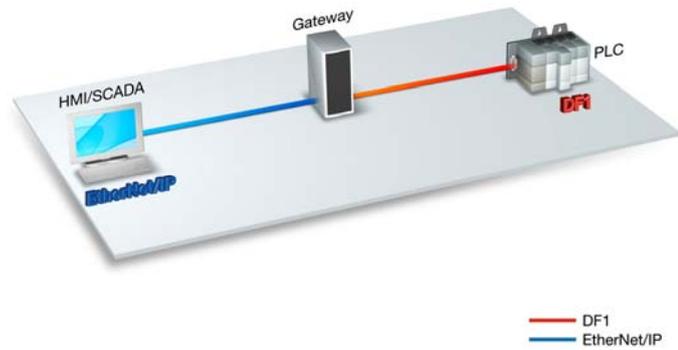
Example 3: We would like to extend the transmission distance between an HMI/SCADA system and PLC, which use the DF1 protocol to communicate. In this case, two gateways can be used to convert between two different protocols, and to extend the transmission distance.

DF1
EtherNet/IP
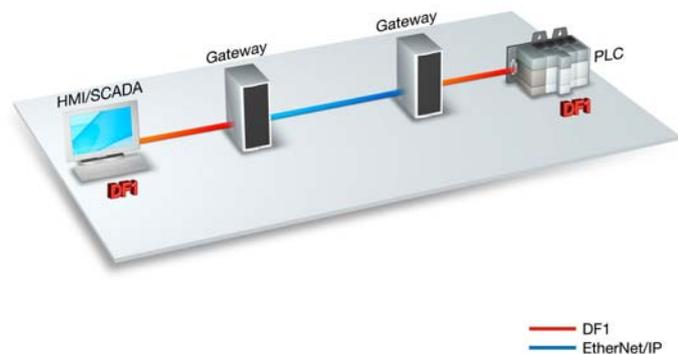
HMI/SCADA systems achieve seamless operation by controlling multiple devices and PLCs, which is one of the reasons why process automation applications often require two or more gateways to create a complete system.
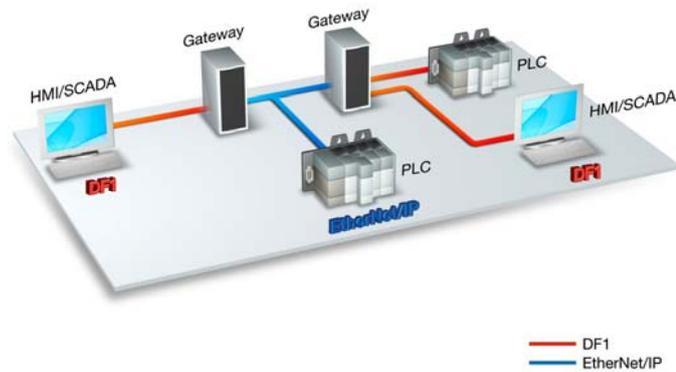

Many of the Fieldbus systems that engineers deal with on a daily basis are extremely complex, so developing and using complex systems is certainly not the issue. However, if we can reduce the complexity and at the same time create a more cost-effective system, why don't we do that?

There is a Better Solution

Until recently, some applications have required using two or more gateways to control both DF1 PLCs and EtherNet/IP PLCs. The question that many engineers must have asked themselves is, "can we accomplish the same thing but with only one gateway, without changing the existing equipment?" The answer is "yes," with Moxa's new ProCOM utility.

Unlike "Ethernet-based virtual COM port" techniques that map directly to physical gateway serial ports, the revolutionary new MOXA ProCOM solution generates a virtual serial channel and uses a routing table to pass Ethernet data through the gateway. The gateway uses the address provided by the DF1 protocol to correctly transmit data to the DF1 PLC or EtherNet/IP PLC. ProCOM is an addressable communication concept that is superior to just transferring data directly by a fixed channel.
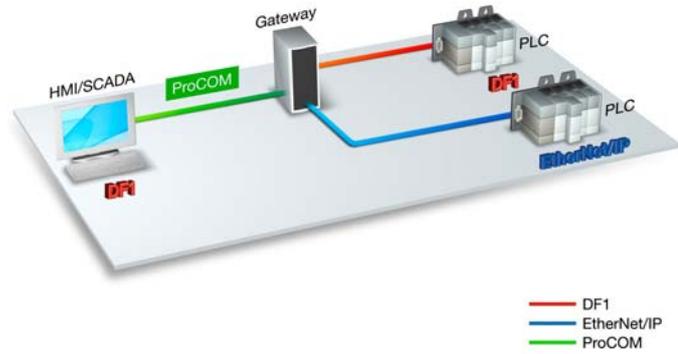
Usually, when an EtherNet/IP device needs to connect to another DF1 device an additional gateway is required. This is because the EtherNet/IP protocol does not provide a DST (destination node for the message), which is why the DF1 protocol has more flexibility. A better solution is a gateway that provides multiple IPs for mapping multiple serial ports to EtherNet/IP devices.
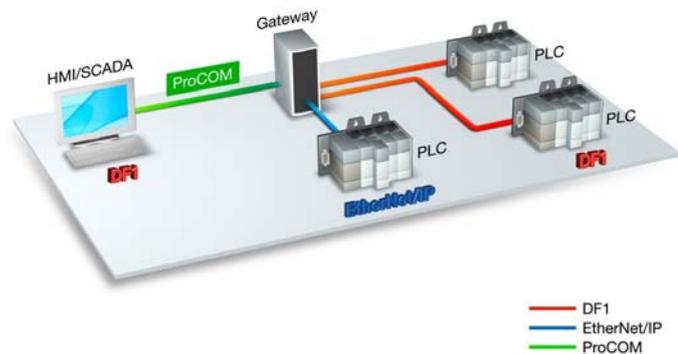
Moxa's new intelligent gateway allows users to optimize network performance, even as communication networks get bigger and more complex. The time needed to upgrade a network is greatly reduced, particularly since existing wiring and device configuration does not need to be changed. After adding your new gateway, carry out some basic configuration, plug in your devices, and you're on your way.
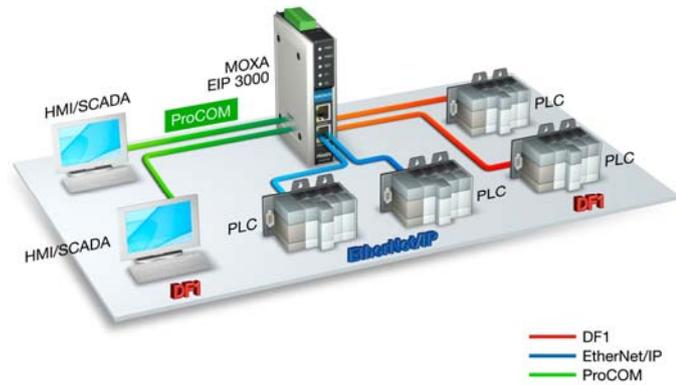
Summary

The question that motivated the development of Moxa's new MGate EIP3000 EtherNet/IP to DF1 Gateway is, "How can we leverage our customers' existing systems, including devices, wiring, topology, and configuration, to provide an integrated solution in the most optimal way?" With the new generation MGate EIP3000 EtherNet/IP to DF1 Gateway, user's can upgrade existing systems to create truly integrated networks, but without needing to purchase a large number of different gateways, without rewiring their networks, and without reconfiguring existing devices.