Field Networking 101

The combination of intelligent field devices, digital bus networks, and various open communications protocols is producing extraordinary results at process plants around the world.

Just as our ability to retrieve, share, and analyze data has increased tremendously by use of the Internet and PC network technology in our homes and at our desk-tops, so has our ability to control and manage our process plants improved. Digital connectivity in process manufacturing plants provides an infrastructure for the flow of real-time data from the process level, making it available throughout our enterprise networks. This data is being used at all levels of the enterprise to provide increased process monitoring and control, inventory and materials planning, advanced diagnostics, maintenance planning, and asset management. These digital networks are generally referred to as a "fieldbus network."

Today's advanced and scalable process control systems allow for multiple fieldbus networks to be deployed simultaneously using one engineering tool. This provides for a high degree of flexibility in control options and allows users to install the required devices and bus functionality for a specific control task. Proper selection and deployment of fieldbus networks are providing unprecedented results in process plants worldwide.

Features and Benefits of Fieldbus Networks

Fieldbus networks provide an array of features and benefits that make them an excellent choice in nearly all process control environments.

Compared to conventional technology, fieldbus networks deliver the following benefits:

Reduced field wiring costs
- Two wires from the control room to many devices

Reduced commissioning costs
- Less time and personnel needed to perform I/O wiring checkouts
- No time spent calibrating intermediate signals (such as 4-20mA signals)
- Digital values are delivered directly from field devices, increasing accuracy

Reduced engineering/operating costs
- Much smaller space required for panels, I/O racks, and connectivity boxes
- Fewer I/O cards and termination panels for control system equipment
- Lower power consumption by control system hardware

Reduced maintenance costs
- Diagnostics are predictive and delivered directly to the control and maintenance systems

Interoperability of different manufacturers
- Open architectures provide much easier and faster integration of a multiple vendor control strategy

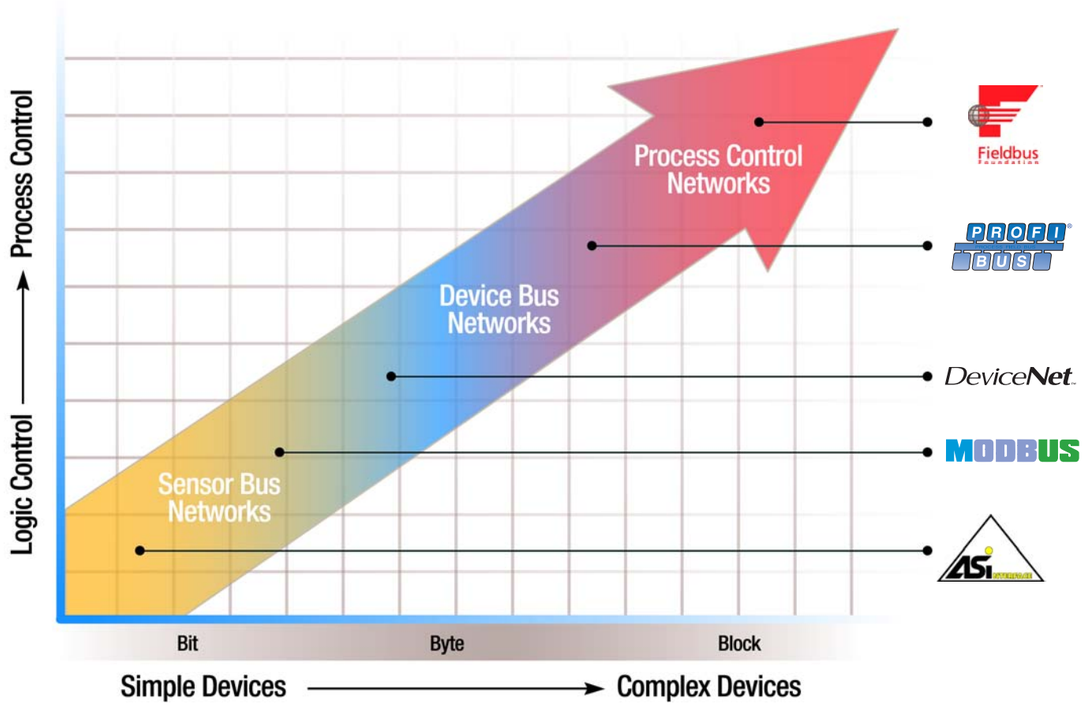
More production uptime
- Initial commissioning and startup is much easier and faster than with conventional systems
- Maintenance and shutdown periods can be planned and minimized, increasing productivity

Bus Network Overview

	Ease of Use	Richness of Info.	Intrinsically Safe	Device Cost	Installed Cost*	Operating Cost
FOUNDATION Fieldbus	High	High	Yes	High	High	Low
Profibus–PA	Medium	High	Yes	High	High	Low
Profibus–DP	Medium	Medium	No	Medium	Medium	Medium
DeviceNet	Medium	Medium	No	Medium	Medium	Medium
Modbus	Medium	Low	No	Medium	Medium	High
AS-Interface	High	Low	No	Low	Medium	High

* Total system, field device, and wiring costs in a Zone 2 (Class I, Div 2) hazardous area.

TYPES OF FIELDBUS NETWORKS*



Sensor Bus Networks

At the lowest level of process automation, the Sensor Bus is a low-cost way to extend the benefits of networking to simpler devices and still be able to connect with higher-level protocols using gateways.

Sensor busses focus solely on discrete devices and offer little connectivity for analog inputs.

AS-i (Actuator Sensor Interface) is the most common Sensor Bus worldwide.

Field devices typically connected to Sensor Bus Networks include on/off valves, limit switches, solenoid valves, and pressure, temperature, level, and flow switches.

Device Bus Networks

Moving up a level in complexity, device busses provide for control of complex discrete devices and equipment power. Device Bus Networks are typically used for connectivity in areas with a high density of discrete devices, variable speed drives, and motor control centers.

The most commonly used Device Bus Networks include DeviceNet and Profibus-DP.

DeviceNet is used extensively in factory automation and is also proving useful in process automation.

Field devices typically connected to Device Bus Networks include on/off valves, motor control centers, variable frequency drives, and numerous discrete sensors and actuators.

Process Control Networks

Process Control Networks are the most advanced fieldbus networks in use today. They provide connectivity of sophisticated process measuring and control equipment. While more complex in functionality, today's process control networks can be easily deployed for new or existing process equipment, and today's engineering tools allow for correct, efficient design. The advanced characteristics of the host interfaces and devices make connectivity, addressing, and commissioning much simpler than conventional devices.

FOUNDATION Fieldbus is emerging as a leader at this level, with strong market share in North America and increasing share throughout the world. Profibus PA is also a viable alternative, with particularly good acceptance in Europe.

Field devices typically connected to Process Control Networks include control valves, temperature and pressure transmitters, level measurement equipment, flow meters, process analytical instruments, and on/off valves where appropriate.

Did You Know?

TopWorx has experience and expertise in a variety of bus protocols, including AS-Interface, FOUNDATION Fieldbus, DeviceNet, Profibus and Modbus.

* Modified version of a graph by Automation Research Corporation