Sensors Insights

by Mike Granby, *Guest Contributor*

Making the "Connected Factory" a Reality

The factory of the future will still have PLCs and HMI panels, but someone half a world away will likely be monitoring and controlling them. That person may be sitting at a desk watching over a global network of facilities or checking the latest production statistics from a smartphone. Either way, the vision of the "Connected Factory" is evolving from concept to reality, as the explosive growth in machine-to-machine (M2M) connections, mobile devices in the enterprise, and wireless data traffic shows.

Building new facilities or replacing all old equipment with the latest systems are rarely viable options for manufacturers trying to expand visibility and control over operations. More often, plant managers use industrially fluent communications devices and adapt the legacy sensors, RTUs, and communications protocols that have served them well for years to create modern reporting and control systems. Implementing this approach, however, is not simply a matter of connecting devices to Ethernet and wireless networks. The fundamentals must be right to ensure that facilities produce information that can be accessed, monitored, and controlled from anywhere.

To do this, manufacturers must:

- Get devices to speak the same language
- Get more devices to talk to each other
- Give them a better place to talk—new capabilities call for new network approaches

Organizations can achieve these goals by selectively introducing advanced products and technologies that enhance operations.

Speak the Same Language

By connecting systems and sharing work-in-process, machine status, and other information over a network, organizations can optimize production, materials, and maintenance systems in real time. To do this, however, the organization's engineers must ensure that the devices speak the same language. Unfortunately, legacy equipment often uses older protocols or even serial links that don't easily fit into the TCP/IP world.

Plant engineers often source the switches used to build industrial networks from the IT world, a decision that may make sense for higher-level infrastructure, but one that essentially introduces technology foreign to machine-level control systems. For example, a modern machine may have every component networked and may allow every conceivable piece of status information to be displayed on its HMIs, but the network switch itself—the failure of which could take down the entire machine—sits alone or is loosely integrated via expensive and seemingly incomprehensible SMNP drivers.

Therefore, to make basic switches compatible with the connected factory concept, manufacturers must use a complex combination of drivers to provide protocol compatibility, replace existing hardware with more complex devices, or choose advanced HMIs, protocol converters, and industrial-grade switches that offer industrial fluency and multi-protocol support.

The first two options add complexity and development costs to the system. The third—deploying equipment with native support for all required standards and protocols—provides a simpler solution.

Get More Devices Talking

Metcalfe's law applies to the connected factory: The value of the network increases exponentially with the number of connected assets. Therefore, it's time to give your remote assets a cell phone. Cellular routers and modems now provide native support for industrial automation equipment and protocols, including models that support 4G network connectivity. These products enable two-way communications from facility to facility, and enable information exchange with remote assets, such as offshore platforms or unattended substations or pipelines.

Connecting equipment that can't easily be reached enables real-time information access and greatly enhances remote troubleshooting capabilities. This clear value proposition for remote connectivity is driving the current boom in cellular M2M connection. Approximately 700 million machines will have cellular connections by 2017, up from 100 million in 2012, according to GigaOM. An ABI Research market report also predicts 26% compound annual growth for cellular M2M connections through 2018.

Create a Better Place to Talk

Despite the exponentially expanding volume of networkable devices and data points, bandwidth remains the same. Further, the hierarchical nature of the industrial world—with PLCs and HMIs grouped into machines, machines grouped into cells, and cells grouped into factories—is often incompatible with a centrally managed IP address allocation policy. Assigning an IP address to every PLC and sensor could require the reconfiguration of self-contained machines while creating a management nightmare.

New approaches to network design and configuration are thus necessary to take full advantage of the available connectivity and control. Instead of assigning individual IP addresses, engineers can solve the problem by using an appliance (such as Red Lion's Data Station) that manages communications with dozens of disparate devices (including sensors, PLCs, and HMIs) while serving as a single point of contact for the network.

Conclusion

The value of the connected factory doesn't come from making more connections; it comes from creating more meaningful connections. Practical networking options and support for native features and protocols, coupled with the ability to seamlessly communicate with operators, control systems, and software applications, provide meaning to data from industrial devices. These capabilities create the context to take automation and remote management to new levels, making the connected factory a reality.

This doesn't require new facilities and new manufacturing equipment, but a new approach to factory automation and the thoughtful integration of the supporting components. The end result drives productivity by providing an unprecedented ability to connect, monitor, and control.

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