

MANUFACTURERS' MART

Taking Advantage of Industrial Ethernet— Are You Ready ?

By Mark Fondl, President, Industrial Communications Technology

Advancements in communications have yielded some of the most dramatic improvements in decades but many companies are unprepared to take advantage of these benefits. Ten years ago, a cell phone was the size of a lunchbox with the handset the same size as a conventional phone. Connecting to the Internet meant a maximum of 9600bps dial-up connection and minutes to bring up a single page. No one today would think about lugging around a massive phone or using a 9,600 bps modems. However, many companies continue to live in the past with their communication networks.

The conservative approach is costing companies hundreds of thousands of dollars in added support costs as well as limiting productivity gains from a common information network structure. The legacy proprietary communication networks require greater reliance on specialized software and unique and uncommon procedures. This means that anyone new coming in to the company has to go through weeks of training. Today, in the office environment almost every printer is placed on an Ethernet network, and its configuration is through a web browser front end that almost everyone understands. Industrial devices (Drives, Power Management, MCCs) now have the same easy-to-use web browser front end but most companies continue to use proprietary serial connections and specialized software. When there is an emergency these packages are sometimes difficult to locate, or the individual who knows how to operate the software is not in the plant.

Once attacked as unpredictable and non-real-time, vendors such as Rockwell, Siemens, and Schneider are now embracing Ethernet and the advantages of web management. Last month Rockwell joined both Schneider and Siemens in introducing an embedded web server in their main PLC. The announcement last month read:

To provide convenient access to plant-floor information, Rockwell Automation has introduced the Allen-Bradley 1756-EWEB module for ControlLogix controllers. The module supports EtherNet/IP communications and offers a suite of Web capabilities that enable users to view plant-floor data via Web pages, receive e-mail or pager-based alarm notifications, and transmit information to a variety of software applications using XML data. The 1756-EWEB serves preformatted and custom Web pages containing control system data. Users who are authorized to access the information can do so on any computer with Internet access and a browser. This feature allows plant managers, engineers or maintenance specialists to gather and analyze control system data at their convenience.

The problem for those companies who are slow to adapt to Ethernet communications lies in a number of organizational issues and old perceptions. In visiting hundreds of companies over the last four years, we have seen companies at different stages of transformation. The first major hurdle many companies face is the ownership of the Ethernet network. Initially, Ethernet on the plant floor was a few PCs used as operator interfaces. It was easy to include them with the other PCs being handled by the IT group. As companies are given the option to purchase equipment with embedded Ethernet communications, the thought of giving

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up the communications networks that coordinate this equipment to another organization is frightening. The ability to resolve and delegate responsibilities has proven very successful for companies opening up these discussions. It is important that the "All-or-Nothing" attitudes be left out of either side. Ever since H. Ross Perot and EDS tried to integrate IT into the manufacturing structure of GM, there has been a conflict. This cold war still continues at even the largest of companies but, like the cold war, we must break down the walls and work out the differences.

Ethernet for the plant is not a technology that should be just passed over to IT. The most successful companies work to segment office and plant floor networks using Routers to isolate and protect networks from one another. Remember, if you start to use Ethernet communications in PLCs, Drives, and Motor Control Centers it is not likely that an IT person will be interested in opening up an electrical enclosure and servicing this equipment.

The focus of each group is also different. The main focus of IT is Network Security and large server availability, while on the plant floor, typically isolated from outside connections, it is uptime of the connected devices. The individual devices on the plant floor generate information required to feed a few computers, while, in the office, a few systems (servers) feed information to many subscribers. This shift in information flow is why it is important that the end device be considered important for the plant floor and not a high priority in the office (that is, unless you're the President). In the office the large server computer is critical, not individual workstations.

Plan and segment your networks so as to not mix office and factory floor devices. Sometimes this happens or better put " #*it Happens". IP address ranges are important to organize and using private network ranges allows you to isolate your networks without having to ask for new addresses every time a new device is added. We have seen several applications in which the plant and office addresses were mixed. These situations usually started as a few plant devices and over months or years, all of a sudden there were 100 factory floor devices mixed with several hundred office computers. This eventually required the company to identify all devices and then renumber and separate the areas. It is far better to do this before you have hundreds of devices installed. The most successful applications at locations such as General Motors, Exxon, Philip Morris, and RR Donnelley have been those that have been properly designed and isolated. This is not difficult or costly but can save time and money as the network expands.

The next problem we discover is that the control groups feel unprepared to handle the support of Ethernet networks. They see complex network packages and complicated sniffer agents and packet analyzers, which are far more sophisticated for the typical problems encountered. Eighty percent of the problems experienced on the plant floor are connection or device specific. Not only are these typical IT packages expensive but they require a great deal of training and are overkill for the plant floor. It is not uncommon for us to come into a company and see expensive software unused.

The Ethernet applications developed today are easier to use than any traditional network developed for the plant floor. The common physical media and variety of connections make Ethernet by far the most supported communication technology. From standard phone-like RJ45 connections that now exist as a common connection on every computer to IP 67 watertight connections for extremely harsh environments, most industrial devices such as PLCs are coming with built-in Ethernet ports and many vendors have already introduced Ethernet I/O modules. Software such as IntraVUE from Network Vision Inc., is eliminating the complexities of field replacements. With IntraVUE's new feature, Auto-IP, an electrician merely unplugs the failed unit, places the network cable into the replacement device and then powers up that device. The system will automatically add the IP address and log the change into the system. The system log can then be used to quickly identify what has failed and when. IntraVUE software also provides a real time view of the network and actual point-to-point details. There are no special cables or software and the software eliminates potential for improper numbering which often happens even on traditional automation networks.

IntraVUE software is the network equivalent of how relay ladder power-flow helped with machine uptime. In the early PLC days any time that the machine stopped the operator called the PLC programmer, complaining the program was terrible because the machine stopped. Ninety percent of the time it had little to do with the program but was a mechanical problem such as a failed limit switch. Power-flow aided in the ability to see why the machine stopped and reduced downtime. This also reduces the need for a programmer to be involved with a simple problem. IntraVUE provides a graphical view of the network and color-coded status of communications between devices. This proves to be all that is typically necessary to troubleshoot most plant floor problems. This new software is providing the controls group the necessary tools to provide first level support and thus eliminate the problem of asking IT to come and solve connection problems. This has also reduced tension, as each group can stay focused on their responsibilities.

The tools developed for level one support do not violate security as they provide read-only capabilities. The development of tools for the plant floor does not mean an isolationist policy when it comes to IT. These tools separate responsibilities to the most appropriate group. Integrating the networks will require a collaborative effort to join the private networks of the plant with the public or corporate networks. This responsibility is clearly that of the IT group. The most successful companies have developed a healthy relationship between both groups. The IT group realizes that equipment exists that is better supported by the local personnel, and both IT and the Control group are able to work in cooperation to develop a common architecture that can take their company into the future.

Mark Fondl is President of Industrial Communications Technology, a company specializing in assisting companies in the deployment of Industrial Ethernet equipment from a variety of suppliers including Cisco, Hirschmann, Network Vision, Digi, and Lantronix. You can learn more about ICT at www.ictglobal.com For more information on IntraVUE you can visit www.intravue.net Mark has over 27 years of automation experience. You can email Mark directly at mark.fondl@ictglobal.com.

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