



Automate to innovate

Increasingly, companies are embracing some form of automation to provide synergy between their offices and manufacturing facilities. Enter industrial Ethernet as a way to reduce cost, broaden access to information and improve productivity.

But this requires networking products that are rugged, customisable to individual circumstances and cost effective, yet capable of connecting, communicating information and controlling almost any type of equipment in an industrial environment. To assist remote monitoring and managing, manufacturers can place their equipment on an existing area LAN or on the internet using industrial device networking.

Ethernet and the TCP/IP protocol have found acceptance within the industrial automation sector and major advances have turned it into a powerful communications tool with obvious attractions. So far, so good, but what do system integrators need to be aware when specifying industrial Ethernet based systems?

Spectre (Communications) sales director John Jones advises that you first consider which company is behind the standard and whether it is prominent in the sector in which you need to be interoperable.

“Find out if you can use standard silicon or whether

Industrial Ethernet can provide a communications backbone for your organisation – from the shop floor to the top floor.

By **Mike Richardson.**

you need a special ASIC and how the synchronisation is done,” he explained. “Bear in mind network topology, as line or star can greatly impact cable cost and hardware required, and determine the ease of configuring the network in the field.

“Hardware considerations are also paramount. For example, are response times guaranteed? What is the influence of legacy Ethernet and TCP/IP traffic on performance? Will other drivers or sources of interrupts have an influence on performance? Is the system robust and is the hardware and software optimised and adapted to each other?”

Networking devices that aren't normally networkable is where

Digi International comes in. Product marketing manager Jason Sprayberry says the company's products are designed in much the same way as the devices they are connecting with.

“To us, industrial Ethernet has a different context. It's not only the physical hardware, but also the philosophy of where TCP/IP has come from and moved to over time within the industrial automation market. Our challenge is more to do with making IP more robust in these environments. It's about the industrial protocols that are being communicated over these TCP/IP connections, how you make it easier to manage these devices over IP networks and how you handle issues around latency.”

Amplicon group product manager, David Evans agrees that customers will need to overcome the design issues of switch latency. Last year saw the formation of Amplicon's security automation division to tap into the market potential of IP surveillance, CCTV and many other security applications.





Above: Smart Network Devices' Ethernet Powerlink development kit, supplied by Spectre (Communications).

"The challenges in making Ethernet more appropriate for industrial applications are in manufacturing hardened products, understanding power requirements and reducing the latency in the network," he explained. "If you build a ring with a multitude of switches, there is a small delay as the data passes through each switch. IEEE recommends that you only cascade seven switches, but many companies prefer to do things their own way."

Jones claims that industrial Ethernet realises the requirements for control in automation. "This means choosing the



David Evans: "Lowering prices have made this technology more accessible."

right standard, hardware and software to achieve real time capabilities that need to be guaranteed for time critical applications, as a real time network guarantees collision free communication. It's an embedded design task, rather than an IT systems integration task, and there is a whole new set of people to involve with different skill sets."

As the demand for industrial Ethernet grows, production volumes increase to yield some desirable cost reductions. Robust and technically enhanced industrial Ethernet qualities are flowing into the office environment and many commercial Ethernet items have inherited improved specifications.

"The reason why we are seeing growth in the market is because lowering prices have made the technology much more accessible," stated Evans. "Industrial Ethernet is enabling capability in terms of what it allows you to do and has become cost effective for system integrators."

Jones agrees that acceptance is growing, but the industry is slow in adapting new standards. "It will be big because it can replace virtually all existing fieldbus systems in industrial automation," he confirmed. "Most device manufacturers will jump on the new RTE standards and redesign their products, whilst many newly planned industrial plants will be equipped with RTE products from day one. The advantages are most of the existing fieldbus standards can be taken to the next generation and run much faster, Ethernet is standard, cheap and easy to integrate and that the RT protocols are standard, so interoperability is guaranteed (at least within one standard).

Long live the revolution says Evans, who recognises the substantial shift towards industrial Ethernet use and a progression towards associated IP based technologies such as video servers, IP cameras, GPRS and 3G. "I call it the silent revolution, because to many, it's out of the public eye, it's hard to get a feel for it and it's not very exciting. When I mention IP addresses to my girlfriend she walks off. So, it is like an industrial revolution, albeit an underground one. For me, it's very exciting to deliver this kind



John Jones: "Bear in mind network topology, as line or star can greatly impact cable cost and hardware required."

of technology to people who don't even realise it is available."

The sceptics had concerns that Ethernet couldn't handle the volume of transactions per second, but Sprayberry claims the bottleneck is with all the devices talking, not the network. "As Ethernet equipment improves, it will be harder to make the network 'sweat'. The evolution we are seeing is increased intelligence in products, able to talk more freely and with less effort so that you can actually move information easily."

Digi's principal engineer Lynn Linse feels that part of the Ethernet evolution is wireless. "It's an interesting misnomer that when people speak about industrial Ethernet, they are really talking about TCP/IP, not just Ethernet hardware or the protocol layer. Initially, when people talked about industrial Ethernet, they were thinking about taking networks like we see in offices and putting them onto factory floors. What this meant was that they were actually using TCP/IP for communications over the Ethernet hardware."

Digi's message is that the pervasiveness of TCP/IP on the factory floor is now a reality. "Right now," Linse concluded, "it doesn't make sense for IP to be on every little sensor for a lot of reasons, one of which is cost. TCP/IP's move to the shop floor is now a reality." 