

Wireless world

Going wireless isn't just about flexible business communications. Brian Tingham discovers a fast emerging world of mobile production possibilities

Wireless networking, spanning everything from enterprise systems to machine connectivity, is maturing much faster than many may realise. Technology and even standards are emerging so quickly that it's little exaggeration to assert that yesterday's virtually impossible is already today's entirely feasible. That matters because, just as we've seen with convergence of voice and data communications, modern wireless systems are now changing the limits of what can sensibly be done.

This is no longer just about enabling mobile executives – such as sales people on the road, home workers or hot-desking information staff – to get online, high bandwidth, fast, secure access to their business applications.

All that can, of course, be done increasingly routinely and in real time, using a mix of mobile phone GPRS, 3G and HSDPA (high speed downlink packet access), as well as WiFi hotspots and internal WLANs (wireless LANs), along with Bluetooth connections. And there are equipment and services spanning the lot: look at organisations like Motorola Enterprise Mobility (Symbol Technologies as was), SAS Group and iPass, for example.

What's more, migrating from a wired to an integrated local and wide area, multi-platform wireless network doesn't appear overly complicated either.

Most suggest incremental change as the need arises, and beyond that it's back to basics – probably starting with a review of your existing network infrastructure and security, alongside the requirements of your applications and business process flows.

As SAS Group CEO Charles Davis says: "Wireless access points are just switches, so you need to look at your IP schema to ensure you can introduce wireless switches. Also, you've got to look at your applications and security. Say you have 100Mb wired or Gb wired and some 54Mb networks – you've got to look at demand and utilisation, and they will dictate what you need. If you're relying on a centralised ERP system, you may also want to introduce QoS [quality of service], normally achieved through MPLS [multi-protocol label switching] – so you need to make sure that will work on your wireless LAN."

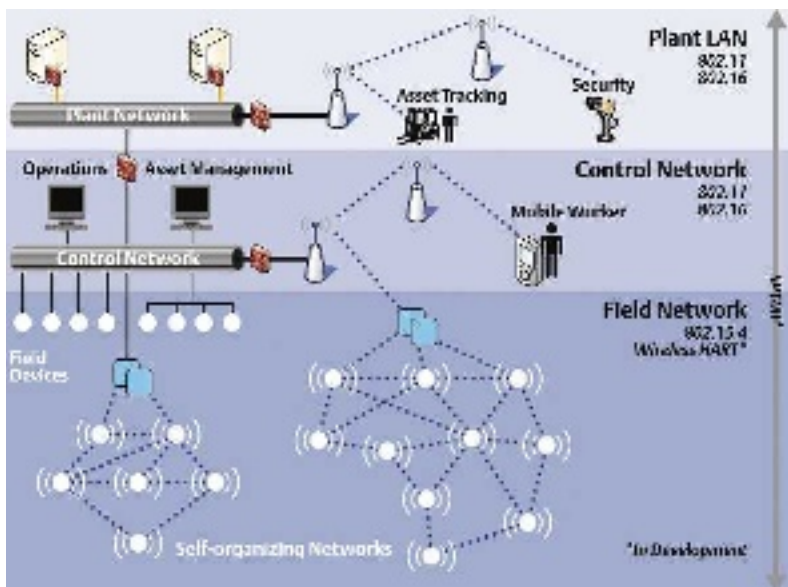
Production specific

But for manufacturers, in particular, there are at least two other broad possibilities. On the one hand, there are the now fairly well established technologies for warehouse operatives and the like, using hand-held and truck-mounted PDAs that provide wireless interaction with warehouse management systems etc, for direction and confirmation of their activities. Again, that's mostly about WiFi in warehouses, and GPRS (and above) in the wider world of distribution (see page 12). But, on the other, there is also newer, secure, wire-free monitoring and/or automatic control for factory and plant equipment – both manned and unmanned.

At this latter level, wireless system vendors have been rising to the serious challenges posed by real-world industrial environments. They've not just built ruggedised network hardware (access points, interfaces, peripherals etc); they've also developed self-organising 'mesh' network topologies, and harnessed standards-based encryption and authentication (for example, WPA-2) that have already been proven – even on petrochemical plants.

'Standards' is one of the operative words here – matching the requirements for industrial wireless networking is not trivial, but mainstream developers are using existing specs where possible to achieve what's required. Morris Becker, international sales manager for wireless networking specialist Funkwerk, points to IEEE 802.11 a, b, g and h WiFi protocols, which it uses with industrial grade hardware –

Below: Tomorrow's wireless plant backbone, courtesy of Emerson Process Management
Right: Emerson wireless process level transmitter



meaning capable of dealing with, for example, microwave reflections and disturbances common on plant with a lot of steel. "We are also working with the standard for voice and video stream for QoS Wireless Multi Media – 802.11 e," he says.

Which do you choose? Richard Welland, also of Funkwerk, suggests: "Because the data volumes to be transmitted are relatively low, the older 'b' standard with a transmission rate of 11Mbps is commonly used. The newer 'g' standard, with transmission rates up to 54Mbps, is used for more data-intensive applications, but the additional data rate is at the expense of range. In fact, four to five times as many access points are required to cover the same area for transmission at 54Mbps."

Meanwhile, on the equipment end, you need nothing fancier than RS232, RS485 and RS422, or, for example, Modbus and Profibus fieldbuses for PLC interfacing in machine-to-machine and (more frequently) SCADA (supervisory control and data acquisition) applications. And, indicative of just how mainstream this has become, Funkwerk also offers a centralised network management system, as well as intelligent access points, with network 'meshing' of sorts handled by the management system software. Again, both are important because they demonstrate product maturity and fitness for purpose: with a management system in place, for example, configuration, roll-out and administration are all covered.

Becker expects significant growth in the automotive manufacturing and transportation sectors – but also eventually in general manufacturing. "There's always latency in production to adopt new technologies, but radio working is as reliable as cable today, and that's especially useful where production layouts need to change frequently." He cites Swatch and Rolex, both of which need to change set-ups fairly frequently. "They can now just move their machines around and start up quickly, without new IT and cabling every time."

World of possibilities

And it's not just in unusually flexible production that wireless can score: not being faced with the cost or timescale of wiring, cable trays, trunking, marshalling boxes and the rest, opens up new possibilities, especially for plant monitoring, control and digital diagnostics. Projects hitherto deemed infeasible due, for example, to sheer inaccessibility, suddenly look realistic and able to deliver a decent business case.

Sarian, formed in the late '90s from a bunch of ex-Pace Microelectronics people, says it saw new opportunities for wireless machine-to-machine communications about four years ago when GSM was emerging. Says sales and marketing director Duncan Ellison: "I'd had a lot of customers using dial-up over mobile to get telemetry data back from outstations, but that was

limited to calling once an hour or day, because it was expensive. We saw that GPRS would change all that by delivering always-on wireless broadband paid for by the data you send, not the connection time."

That happened, and Sarian now has utilities and process industry users paying just £5 per month for a SIM card and data – which has transformed costs and thus the information available and the possibilities for improving operational performance. "GSM



"You need to make sure that QoS will work on your wireless LAN"

Charles Davis, SAS Group

coverage is still a little variable but in practice we just haven't had an issue," says Ellison.

However, the big story now is the mobile networks' moves onto 3G, with some offering 3.5Mb and enabling even more opportunities. Ellison says his company is working on projects providing temporary CCTV coverage, for example, on plants and building sites over 3G. But he also talks about 3G-based systems monitoring and controlling water levels, with connection to OPC servers driving motors and pumps. "We can now offer low-cost, long-distance wireless closed-loop control, covering hundreds of I/O," he says, citing EDF Energy and T-Mobile as current users.

On a slightly different tack, wireless has also come to the plant fieldbus world, with process systems giant Emerson among the leaders now offering wire-free digital flow, pressure, temperature and level transmitter communication. We're talking about different standards here though – mostly extensions to the existing fieldbus protocols.

Mike Ferris, EMEA market- ▶



ing manager for Smart Wireless at Emerson Process Management, explains that competing parties are using different technologies, but that Emerson has selected a self-organising, time-synchronised mesh protocol. Why? "Because if every device on the network can communicate via every other device, there are multiple redundant routes for data transmission – and that's important with plant environments that can, and do, change."

Standards body processes are notoriously (and probably necessarily) long winded, but Emerson is working with ISA SP 100, alongside other equipment vendors, users and industry associations, to get its technology (or something close to it) approved as the wireless networking standard for monitoring and, eventually, also control. Ferris is clear that this is one of the keys to widespread adoption.

BP wireless trials

Another is user references and testimonials. And there, work is already well underway and looking good, with BP, among others, running trials with Emerson wireless transmitters. Ferris says these



should demonstrate that this version of wireless plant fieldbus will work for ISA Class 5 to Class 3 applications (high latency monitoring, through to open loop monitoring and control) – although he believes that, in due course, it could get to Class 1 fast, closed loop control.

Earlier this year, Emerson formally launched its 2.4GHz Smart Wireless solution in Europe, having already introduced the 900MHz version for the North American market last October – signalling the potential for a brave new world of plant communications. "We're not suggesting using this for real-time control at this stage," says Ferris. "60% or more of plant requirements today are for process monitoring. So we're positioning Smart Wireless for that – think of all the measurement points you'd like to



"60% or more of plant requirements today are for process monitoring"

Mike Ferris, Emerson Process Management

measure today that you can't, because it's too expensive to run cabling or too difficult to get access on a tower or whatever. This will make a huge impact."

And, for the sceptics, here are a few additional observations. First, this is going through the standards bodies now; second, Emerson is guaranteeing an upgrade path to the future standard; and third, key aspects such as security and battery life have been well and truly thought through. Battery life for live nodes, for example, is already five to 10 years, depending on application, with the devices quiescent between transmissions, and Emerson is already well into power scavenging research, which promises to recharge batteries by harnessing, for instance, vibration and temperature difference.

Says Ferris: "The future is a plant with a wireless backbone and all functional devices plugging into that. This is going to result in a step change in how plants are operated." ■

Enter 302 at www.mcsolutions.co.uk/enquiry

RF audits by SAS Group: essential for sites of more than 50,000 sq ft

Polished Results

Designed with **CoCreateOneSpace**

Kellenberger relies on Dynamic Modeling from CoCreate
 ▶ Productivity increased by 25%
 ▶ Comprehensive PLM

www.cocreate.com/kellenberger

"Despite the increased complexity of our products and tight deadlines, with OneSpace Modeling we were able to deliver the machines with the new grinding head on time." Bernard Gschwend, Director of R & D at L. Kellenberger & Co. AG



Free 3D CAD! www.cocreate.com/gratis

Leading companies all over the world are adopting dynamic modeling for product development – the path to 3rd generation PLM.

CoCreate
a 3G PLM company