



A single chip ZigBee approach may not cut the mustard on the shop floor. By **Mike Dormer**.

# Serious solutions

**M**any of the semiconductor firms developing solutions for use in the wireless market would have you believe that a single chip ZigBee design is the answer to everyone's prayers when it comes to developing an industrial control system. However, although chip based solutions work well within a laboratory environment, they lack several attributes necessary to make them successful on the factory floor.

Firstly, the issue of interference needs to be considered seriously. A wireless control implementation that is truly capable of proving itself worthwhile will need to exhibit strong resistance to the various electromagnetic sources that are found in the average industrial setting,

with the ability to easily move between different channels. With the ZigBee standard occupying the already over cluttered 2.4GHz band – which is also used by WiFi and Bluetooth – it is left at a disadvantage from the start.

Then there is the question of robustness. Any control solution must be able to cope with both extremes of temperature and a certain degree of mechanical stress, as life in the world of heavy industry is generally far less forgiving than most semiconductor solutions will be used to. And industrial locations tend to be very 'lossy', with a great deal of metal around which can not only affect the strength of the signal, but also reduce expected performance levels.

Reliability must also be assured. For one thing, the task of troubleshooting an installation can be a long drawn out affair. Then, of course, there is the simple matter of safety. Clearly, when working with heavy machinery, there are various potential dangers involved in having a control system that might fail – and this must be taken into account at a very early stage. For example, the possibility of a crane or a forklift not responding correctly could have calamitous consequences.

Therefore, in order to avoid such circumstances arising, efforts must be made to implement a wireless control solution that is effectively 'bullet proof'.

The roll out of any chip based solution will definitely require the services of



## Cable replacement

Most industrial applications are based on RS485 or RS232 interconnects, so any replacement wireless solution has to be simple and quick to install, keep costs to a minimum and require no additional infrastructure.

Every engineer who is given the task of upgrading such a communication system wants a way of achieving the goal with: the minimum of integration; the shortest possible development time; the lowest overall cost; and the least risk that there will need to be rework, due to the original implementation not being done correctly.

Radiometrix has recently developed the



TDL2A, a multichannel uhf transceiver capable of emitting 10mW of transmit power. Operating in the European unlicensed 433MHz ISM band, it can support data rates of up to 9600bit/s and has five non overlapping channels at its disposal.

It comes in a 33 x 23 x 7mm metal screened package, requires a properly regulated 5V rail and draws 25mA.

an experienced rf engineer – and they are, normally, in very short supply. But with a radio module alternative, most of the complex work has already been done by the manufacturer and, as a result, this will usually only call for the services of an applications engineer – and they are generally far easier to get your hands on.

**"Single chip doesn't necessarily mean easy implementation; in fact, it's usually the exact opposite."**

Mike Dormer, **Radiometrix**

So herein lies the common misconception – single chip doesn't necessarily mean easy implementation. In fact, it is usually the exact opposite; the development time needed to put a semiconductor based solution in place often far outweighs the perceived cost savings. In the end, this solution comes with a higher overall price tag because of the man hours required to set it up correctly.

In general, the size of an industrial

control system does not really justify the amount of silicon needed to make a single chip solution truly cost effective. And it is worth mentioning at this point that such implementations will often be overkill when it comes to speed.

There is no great need for huge data rates in these sort of applications; it is far more a matter of reliability –

and this brings up another major flash-point. The semiconductor vendors may have

the specifications needed to meet the demands of high end communications systems, but by trying to play in the industrial radio market, they are far from their home turf. For reasons more to do with their own self interest than actual suitability, they have elected to go for a piece of the action in the industrial sphere. But, in truth, they don't really possess the tools to do the job.

The fact is engineers need serious solutions, not just PR stunts. What is required is a communication system that meets the actual specifications that are set, and at the same time is tough and dependable. By way of an analogy, we could think of this in terms of a cross country race. There is no point in putting a sprinter into that sort of competition, as it won't be speed that is the telling factor; it will be a mixture of stamina and ruggedness that will win the day.

With this in mind, companies like Radiometrix make sure they approach such problems from the right angle. As an example, Radiometrix' LMT2/LMR2 transmitter/receiver modules can provide a multichannel, low power, high reliability data link which can deal with interference issues, and have more than adequate range for the vast majority of industrial control systems.

The LMR2 has a receive signal strength indicator, which measures the incoming signal over a range of 60dB. This allows an assessment of data link quality and an accurate prediction of available range margin which can be tolerated before there is a major drop in performance.

The devices, which conform to EN300220-3 and EN301489-3, can maintain a good signal over a span of at least 500m, making them suitable for even the largest of factory sites. A data rate of 5kbyte/s can be happily supported, and with up to 32 channels, there is room to manoeuvre in order to avoid interference.

### Don't believe the hype

In conclusion, industrial control implementation cannot be just an afterthought. It is simply not sensible for wireless manufacturers to assume that they can encroach on this arena using their consumer oriented products in an attempt to gain some additional revenue. Focussed solutions are what is required. 

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