Plug into data

Despite 10 years of stop/go, broadband over powerlines could be an 'emerging market'. By **John Walko**.

I t may seem strange to classify the provision of broadband over powerlines as an emerging market: the idea is hardly new and has been a 'dark horse' data access option for more than a decade.

But recent progress in standardisation, regulation and technology are prompting some observers to believe the approach – maybe even the economics – is finally coming right.

Others contend the power grid will never be a viable, safe, and cost effective way of delivering internet access, forgetting there are numerous trials and some small commercial deployments in Europe and the US.

The idea is also getting a boost from the separate, but related, efforts of suppliers and trade groups – not least the HomePlug Power Alliance (HPA) – to establish networking in the home by plugging into the mains, rather than using coax cables or wireless routers.

Architecturally, broadband over powerlines (BPL) is a shared medium distribution system, but with some specific requirements. The equivalent of a dynamic host configuration protocol router is positioned on a pole next to a transformer, serving five to eight homes with a shared medium service. No IP addressable node is necessary between this unit and a platform in the home with an IP address, such as a computer or a WiFi router. Consequently, the most popular architecture for embedding MAC and PHY in first generation systems is an Ethernet adapter in a wall socket that provides pass through service to a pc or router.

Commercially, Google caused a buzz last year when it joined with other companies to invest a reported $100million in – and back a project with – US utility Current Communications. Meanwhile, IBM signed a deal with a Texas based power provider CenterPoint Energy to test BPL based last mile access technologies.

Several European utilities – notably in Spain, Portugal and France – have trials or small scale commercial offerings. However, this should be offset against some expensive failures. For instance, a major trial operating between 1997 and 1999 in the Manchester area involving Nortel Networks and Norweb/United Utilities had to be abandoned due to technical – mainly interference – and economic reasons.

Meanwhile, groups such as the IEEE and the European Telecommunications Standards Institute (ETSI) are working behind the scenes to come up with a single standard, but this is proving challenging. Last year, the IEEE defined a new project in its P1901 effort, with initial emphasis on specifications on the PHY and MAC layers.

BPL to homes and offices is attracting attention because it can transform sockets into internet portals, says Jim Mollenkopf, cochair of the IEEE's BPL PHY/MAC Working Group. "If BPL is to become widespread, there is a need for a robust standard that supports the use of many types of BPL device. Our intent is for P1901 to be that standard."

Meanwhile, ETSI is defining a coexistence layer for BPL that many consider is

crucial to a future standard.

The HPA has already defined PHY and MAC chips for the 200Mbit/s extension to the in building networking standard Home-Plug AV. Chip samples that support HomePlug AV are just beginning to appear.

The AV specifications – based on technology from companies such as Intellon, Conexant, Sharp and systems specialist Arkados – have taken some three years to develop.

Crucially, HPA has recommended the same PHY and MAC for the BPL solution, a decision that could see unwelcome delays and a potential standards war.

There are several fronts opening up – typified by the fact that the US calls the technology BPL, whilst Europeans prefer Power Line Communications (PLC).

Europe, backed by the Universal Powerline Association (UPA), is firmly behind the specification proposed by OPERA – the Open PLC European Research Alliance. The group maintains this is the first and only 'open' PLC acess specification.

The technology, based on previous chip design by Spain's Design of Systems in Silicon (DS2), has been developed over the past three years by 37 members, comprising industrial groups, universities and power utilities. The project, valued at €20m, is part funded by the EC.

The specification, again at 200Mbit/s, defines a PHY and MAC for BPL access and a complementary system specification. The group stresses the specification allows for interoperability for non OPERA technologies through a mechanism that guarantees backwards compatibility with today's deployments.

Even though both proposals are based on orthogonal frequency division multiplexing (OFDM), they are considered incompatible and both groups are now lobbying feverishly to have their versions ratified as the global standard.

The stakes are high: OPERA partners recently suggested broadband PLC could achieve 10% market penetration, once a standard has been ratified for equipment and transmission systems.

Luis Legorburu, the group's project coordinator, said agreement would boost utilities' commitment to use PLC, especially if they could link broadband access provision to other services, such as automatic meter reading and electricity network control.

"We will defend [our specification] over the remainder of the project and hope it will lead to a European PLC standard," said Legorburu.

Because of the huge potential, a war of words has broken out after some US vendors implied DS2's chips do not deploy in silicon the kind of notch filters needed to minimise interference with amateur radio and emergency radio bands; the problem being potentially most serious with medium voltage topologies from the home. Such notches are designed to keep BPL signals out of bands that could cause interference.

HPA members emphasise their work with OFDM modulation and notch filtering. Philip Poulidis, senior director of BPL standards at Intellon, said his company's chip set implements a number of notch filters in silicon and works with system partners to use soft, programmable filters for specific geographical problems.

Jorge Blasco, DS2's ceo (pictured opposite), suggests using the same PHY and MAC for access and home networking makes no sense from either the network topology or performance viewpoint. "One competitor claims to have solved the issue, but the reality is they have fixed notches that will be difficult, if not impossible, to upgrade to new radio services." More generally, Blasco says the HPA is making a strategic mistake with its approach and will pay for it later.

He stressed the notch filters implemented in the latest DS2 silicon not only meet the FCC's exclusion bands for BPL in the US, but can be adapted, with a simple firmware upgrade, to meet all countries' regulatory requirements for hf radio.

And he adds that, since the OPERA specification and DS2's 200Mbit/s silicon have been tested in numerous field trials in the US and Europe: "It is well ahead of any other proposal for broadband over powerline."

Whatever the rights or wrongs, both groups agree they need to focus on real deployments and to show that BLP/PLC can compete with established access technologies.