

Broadband drives the Internet of Things

The broadband world is taking shape and, as it does so, experts are carefully crafting predictions of what it will look like and what applications it will carry. Video – the application currently most hungry for bandwidth – is inevitably high up the list, and on a global level, will make gigantic demands on current network capacity. But broadband may likewise support another dimension of connectivity entirely: machine to machine communications, or M2M. M2M is an idea whose time has come. Thanks to innovations in areas like smart sensors and RFID chips, inanimate objects are increasingly becoming part of the network as a so-called ‘Internet of Things’ (IoT). Underlying both acronyms is a basic concept: using the Internet to transpose the physical world onto the networked one. IoT/M2M makes everyday objects ‘smart’ and context-aware. In doing so, it offers significant economic benefits and a huge range of new possibilities, because smart objects can sense their surroundings and respond to them without the need for human intervention.

The original idea for the IoT revolved around the conceptual possibilities of what could be achieved with sufficient scale and development of the Internet. Now, possibilities that were once confined to the realms of science fiction are increasingly practicable. Smart objects are increasingly able to tailor their response to their environment, regardless of how complex it may be. When they do so, this sense-and-control loop can optimize precious natural, financial and human resources, cutting out wastage in areas as diverse as agriculture, stock control or manufacturing, yet in every case improving productivity and quality.

Residential home-grid applications are another area where IoT/M2M are expected to make substantial contributions, aggregating applications from multimedia entertainment to energy management and home security. Emerging broadband capability in turn means sophisticated, yet cost-effective communication between these myriad smart elements.

The range of potential applications is vast. Consultants at McKinsey say smart billboards in Japan already surreptitiously analyze the shopping habits of passers-by – and change their display messages to suit. Meanwhile, smart farming can analyze parts of a field under cultivation and adjust fertilizer spread according to prevailing conditions. Manufacturers can make on-the-fly changes to product detail by making their production lines and products smarter with smart sensors and actuators.

McKinsey predicts two broad categories of application: information and analysis, on the one hand, and automation and control, on the other. Within these categories, the company further identifies six broad applications, ranging from behaviour tracking (how people use products) to enhanced awareness in monitoring environmental and other events; decision analytics in resource exploration; process optimization; resource consumption control involving smart metering; and even complex autonomous systems that give vehicles ‘autopilot’ facilities.

Broadband represents the vital final piece of the puzzle. The need for always-on bandwidth combined with potentially huge numbers of networked objects – some estimate many billion individually connected devices – imply an immense data throughput on networks. European Commission predictions suggest that some applications could involve the networking of up to 70 billion devices Europe-wide. In this, the communications economics and economies of scale that broadband brings are key for success.

Adding to the mix is the flexibility of broadband wireless, because many of these devices will be physically isolated from their surroundings. While it’s difficult to be certain what actual near-term demand will be for M2M, evaluations by independent agencies such as CMT, the Spanish regulator, suggest that M2M-related applications may already be exerting a significant impact on new mobile connections.

Enter the Smart Grid

New thinking in broadband could provide the crucial impetus for a veritable explosion in IoT/M2M applications: the building of national broadband infrastructures. As the Broadband Commission this year considers strategies for accelerating broadband policymaking and implementation on a national scale, one key area that is already taking shape is the Smart Grid concept. This will see deployment of complete energy monitoring and management infrastructures providing optimized energy production and consumption, and will be a prime example, says Helios, a consultancy, of the upcoming potential of M2M/IoT. Government administrations in several countries, including the US and South Korea, have already committed themselves to supporting major Smart Grid development.

But looking ahead to the future, IoT/M2M has big implications for network architectures, protocols and management, which may be quite different to networks ‘powered by humans’. And getting there will require the development, standardization and deployment of many technologies, from smart sensors and actuators to new broadband protocols.

Major parts of the roadmap are already becoming clear. ITU is already heavily involved in Smart Grid standardization programmes on an international level, and following requests from industry executives, has established a Focus Group that’s working towards agreement on Smart Grid telecommunication standards with other stakeholders, particularly in the energy sector. Under ITU auspices, experts have already agreed on Smart Grid standards for home networks. Other infrastructures will follow. Another ITU Focus Group is also engaged in promoting coherent standardization for fully networked cars and related transportation systems.