

# The Internet of Things - what it means for the networks

by Gary Smith, President and CEO, Ciena

‘The Internet of Things’, or machine-to-machine communications (M2M), will automate and improve the many processes surrounding us - our electricity supply, traffic management, at home healthcare and much more - ultimately making life more convenient. Nevertheless, the Internet of Things will greatly tax network capacity, so accommodating these capacity demands on future networks is critically important. A transition to next-generation network infrastructures will be necessary to support the new services that the Internet of Things will bring and to fully realise its benefits.



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As the car passes the traffic lights closest to home it contacts the oven, switching it on to warm the supper. The heating also switches on in the house while the fridge, which is almost a year old, books itself in for an annual service.

This may sound like science fiction, but according to some analyst predictions, we are about to witness a true rise of phenomena like those described, otherwise known as Internet of Things. Sometimes referred to as machine-to-machine communications (M2M) - although definitions of that term vary widely - the

concept promises a world in which the equivalent of an autonomic nervous system, working in the background and keeping the world around us healthy and functional, delivers a range of value-added services to consumers and businesses alike.

The benefits of autonomous and adaptive M2M communications are still being explored, but the possibilities are vast. One example involves vehicles communicating with roadside equipment and one another, allowing for better traffic management, reduced congestion and a reduction in accident rates. Projects of this type, relying

on telecommunications technologies, are already underway and well advanced in their research. A good example is the European Union co-funded CVIS Project ([www.cvisproject.org](http://www.cvisproject.org)), aiming to tackle the next big challenge in the world of automotive electronics - intelligent co-operative systems, which promise improvements in both the efficiency of transport systems and safety of road users.

The development of the smart grid is another good example. The smart grid will see electrical devices equipped with connectivity so they can report back on elements such

as power consumption and monitoring equipment within utility providers' networks. This promises higher efficiency in our power distribution networks in the form of more availability of power to homes and factories at a lower cost. It will also allow distributed power generation, including local solar and wind generators.

The potential of Internet of Things doesn't stop there however. In the logistics sector, quick and automated processing of packages is already based on 'talking' packages and appliances equipped with RFID tags so that they can share information about destination and size. The evolution, therefore, has already begun - and in multiple industries.

However, while this progress is important to our society as a whole, there are certain network implications to take into account for The Internet of Things to be truly successful. Most importantly, networks will need to be secure and reliable, as many of the autonomic functions that will run across them will be critical.

Remote healthcare is a growing sector in which the security and reliability of The Internet of Things must be of unquestionable quality. Remote patient monitoring is already becoming increasingly more sophisticated and prevalent due to the lower costs of wireless devices, the wide availability of broadband networks and healthcare providers' need to find new ways to streamline patient care and costs. One possible healthcare application could be a heart rate monitor notifying the hospital when certain pre-set levels are reached. Necessary steps to deal with the medical situation could then be set in place automatically without the need of human intervention - for instance, increasing the dose of medication to an IV drip.

The remote patient monitoring market is on a dynamic growth trajectory. In fact, Juniper Research estimates it is likely to reach nearly US\$1.9 billion globally by 2014. Still, none of this potential growth and improved patient care is possible if networks can't accommodate absolute performance perfection. Just imagine the consequences if that heart rate monitor loses connectivity with the network, or if patient monitoring information is unable to get through a congested or unreliable network.

The exponential increase in the number of network-connected devices exchanging information will drive a need for additional bandwidth. In fact, the proliferation of networked devices changes the nature of

the network by significantly raising the threshold of 'baseline' Internet traffic. Operators struggling to cope with 3G or rising broadband demands will need to consider 'intelligent' ways of growing the network without increasing costs. Furthermore, networks must be prepared to simultaneously deal with multiple services and increasingly rigid quality requirements. The need to differentiate between high and low priority traffic will be just as important as dynamically adapting the network to changing capacity requirements on-demand and in real time. Service-driven networks that meet these requirements will allow the flexible use of existing capacity without impacting the quality of service.

Today's network infrastructures, largely based on SONET/SDH, cannot physically or economically support the evolving demands caused by this overwhelming increase in bandwidth and the transport of IP traffic, as well as the need for more flexible connectivity, higher resiliency and network automation. To address this concern and remain competitive, service providers have been investing heavily in modernizing their networks.

The benefits and applications promised by Internet of Things are vast, and many network operators have already begun to adapt their infrastructure to support them. However, depending on business or networking pain points and technological and service imperatives, their current approach to the problem may not be truly effective. If we are to truly benefit from the promise of Internet of Things, it will be essential to put next-generation network architectures in place.

A critical component of any modernized infrastructure is the switching and aggregation function. To fully reap the benefits of next-generation infrastructures, an unprecedented level of switching system modularity and optimization is required. Given the importance of switching and the intelligence it must possess, there are many technological solution options that operators must consider.

Some key technologies have emerged as common components of these new switching architectures, including Carrier Ethernet, Multiprotocol Label Switching (MPLS), and Optical Transport Network (OTN). In addition, software-based automation of the network - via intelligent control plane - is essential to realizing this next-generation network and associated technologies. The result, when implemented appropriately,

is a service-enabling infrastructure that facilitates the convergence of networks and allows for resource optimization.

There are countless applications of Internet of Things that can help automate and improve the many processes surrounding us - ultimately making life more convenient. However, we need to ensure that we implement all aspects of the required technology needed to fully support this societal evolution.

The Internet of Things will tax the capacity of future networks, and thus accommodating the huge capacity demands on future networks is critically important. A transition to next-generation infrastructures will be necessary to support the new services The Internet of Things will bring and to fully realise its benefits. ●



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