SGR
SPECIALTY GAS REPORT

# Faster is better

## How M2M-4G convergence will speed the industry


AT&T is currently promoting its fast new 4G service with a series of television commercials, where a spokesperson and group of children discuss humorous hypothetical situations about speed. Conversation topics include whether more speed is better, and whether taping a cheetah to a grandmother's back is a good idea. Each installment ends with the tagline: "It's not complicated. Faster is better."

The commercials get it half right. Faster is better for cellular connectivity. However, the decision to upgrade to a faster network can be complicated, at least for industrial customers who are wondering whether 4G Long Term Evolution (4G LTE, or simply 4G) connectivity would be beneficial for their operations. Many controls and systems used in gas operations today function very reliably and effectively using 3G and 2G cellular networks or private radios, so what is it about 4G that will help them?

Today, 4G LTE is available in the industrial control units that are widely used in the gas, energy and other industries. This development represents the convergence of 4G with machine-to-machine (M2M) technology. There will be more than 700 million cellular M2M devices in use by 2017, compared to about 100 million now, predict the industry experts at GigaOM. By the end of 2013, there will be 234 commercial LTE networks in 83 countries, according to the GSA, the trade association for cellular technology suppliers.

In general, faster is better. But is it better for your M2M system? This article will help you decide, by presenting an overview of 4G M2M technology, highlighting the key differences of 4G compared to earlier-generation networks and explaining how to take advantage of 4G in M2M to make operations more reliable, safe and secure.

**A primer on 4G M2M**

4G LTE represents a significant improvement over previous cellular technologies. It enables wireless broadband applications, and is the first wireless technology to provide data transmission rates that approach physical Ethernet. 4G LTE is not simply an incremental improvement over previous generation technology – it is up to 100 times faster than 2G and 3G networks. Not all current M2M solutions need this additional speed, but all can benefit from it.

Improved speed and bandwidth get the most attention, but reduced latency is the biggest advantage to using 4G in M2M systems. Minimizing latency is essential for applications that rely on responsiveness – such as automated controls for shutdown valves, security systems, pumps and reclosures.

> "Minimizing latency is essential for applications that rely on responsiveness..."

With 2G and 3G networks, it is common for M2M devices to experience one to two seconds of latency during data transmission. The latency does not prevent systems from running reliably, but it does create limits for the type of activity that can be performed over the network, particularly for remote control, support and troubleshooting.

Latency in 4G LTE networks is less than 100 milliseconds. Users will see the differences in how quickly input is processed and data is presented for their current applications. System administrators and application developments will see an even bigger difference in how they can manage M2M devices and what they can do with them.

4G LTE technology can be added as an upgrade to currently operating 2G and 3G networks. Organizations that have 2G or 3G-based M2M systems in place today can convert simply by replacing current M2M devices with 4G models – no additional components, adapters or software changes are required. New 4G LTE M2M products can also be used where there is no 4G LTE network coverage. The devices will run on the 3G or 2G network (at those network speeds) until 4G connectivity and data plans are available.

From an operations perspective, 4G LTE data rates are *revolutionary* more than evolutionary. The bandwidth that 4G LTE provides enables new applications and M2M control solutions that previously weren't possible at remote sites. For example, 4G LTE supports streaming video for remote monitoring and surveillance. Combining 4G LTE with M2M devices enables operators to get real-time data from more locations and from more sources, including sensors, controls and other input devices. These capabilities – combined with reduced latency – improve operational reliability, security and control.

**Improved reliability**

Regardless of how wireless M2M devices are used, 4G LTE connectivity is advantageous to 2G and 3G for device management and support operations. System administrators and device management applications regularly receive performance and diagnostic data from remote devices. Visibility into remote device performance depends on bandwidth – the more readily this bandwidth is available, the more frequently devices can report back, and the more data they can provide.

The big advantage to having 4G LTE connectivity comes when remote support is required. Without real-time visibility into performance, it is difficult – if not impossible – to perform remote diagnostics and troubleshooting. Sometimes, operations time out because it takes too long to process data packets from remote devices. Latency of only two seconds can prevent support staff from seeing what they need to keep systems from crashing. In some cases, applications are hard-coded for low latency and cause timeouts over a 2G or 3G cellular network.

Higher bandwidth also makes routine maintenance and support more cost-effective. Timeouts can also commonly occur when large files like firmware upgrades, security patches and application software updates are being uploaded to remote devices. If these files can't be sent wirelessly, they need to be installed manually, which significantly drives up operating expenses.

Device management systems and support

operations will likely evolve to take advantage of real-time, two-way communication with remote devices. As noted, 4G LTE bandwidth enables organizations to collect more data from more sources, and to collect and process it more frequently. Improving the quality and timeliness of data will improve responsiveness, help alert staff to potential issues before there is a problem, and make predictive maintenance systems more effective – a significant change to the current reactive business model.

**Expanded capabilities**

The backwards compatibility and improved troubleshooting that 4G provides means organizations can maintain their current M2M applications and run them more efficiently. The added bandwidth, with the increasing intelligence and flexibility of M2M devices, combine to create many exciting new ways for organizations to make their operations safer and more efficient.

One of the new capabilities that 4G makes possible is the ability to stream video. There have been many creative ideas expressed about how streaming video enhances monitoring, maintenance and safety for remote locations. In emergencies, remote video can help locate and account for personnel. Video can also help technicians assess conditions and make sure they have the right equipment and staff for the job, resulting in higher first-time-fix rates. These and other new applications are just beginning to be imagined now that 4G M2M devices are being installed in the field.

Today, 4G M2M devices cost more than their 2G and 3G counterparts. The higher price will initially inhibit adoption. As we've seen with Wi-Fi, Bluetooth and earlier-generation cellular technology, 4G LTE prices will likely fall dramatically once adoption begins to grow. The overall benefits 4G provides make it a cost-effective solution.

Red Lion Controls has seen some of these innovations and benefits first-hand, because our customers are using our carrier-certified M2M 4G cellular routers to manage the delivery of data and control mission-critical devices at remote locations. Thousands of Red Lion products are used in gas production facilities, depots, pipelines and wells all over the world. AT&T, Bell Mobility and Verizon are among the cellular carriers that have certified our 4G cellular routers for use on their 4G networks in North America. Together, we are connecting remote and hazardous environments at unprecedented speeds.

In time, 4G will become the standard for M2M communication as cellular services phase out their 2G networks and as organizations develop creative ways to take advantage of the extra speed. Taping a cheetah to Grandma's back is questionable, but for industrial control, faster *is* better – especially when the combination of 4G and M2M can increase visibility and control, improve responsiveness and enable organizations to introduce video and other advanced features into operations. SGR

**Contributed by Red Lion Controls**

As global experts in communication, monitoring and control for industrial automation and networking, Red Lion has been delivering innovative solutions for more than 40 years. Its extensive range of M2M products include cellular routers that have been certified by multiple wireless carriers for use on their 4G networks. For more information, visit: **www.redlion.net/together**