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M2M communications brings new level of sophistication to the water industry

The 'Internet of Things' is coming to the water industry, delivering new levels of data that will enable water companies to control remote assets with increased sophistication, minimise risk, ensure security of supply, save energy and meet ever more stringent EU directives. Jeremy Shinton, Product Manager – Business Solutions & Software for Mitsubishi Electric, discusses the role of machine-to-machine communications as a driver for change.

The water industry is one of the most tightly regulated sectors, with companies under pressure not only to deliver optimum efficiency and productivity but to do so under the watchful eye of regulating bodies. This places stringent demands on the automation systems employed, where control architectures are implemented over vast sites and assets often spread over wide geographic areas. Pressures to optimise plant performance, increase availability, reduce installation and operational costs are acute, not just when it comes to ensuring reliable drinking water supplies but also as part of strategies to eliminate contamination risks from treatment plants and even to play a key role in minimising flood risk.

Meeting consumer and stakeholder demand effectively and efficiently, in a way that addresses the requirements of today's increasingly stringent

regulations, demands processes which are both robust and reliable. They also need to be capable of delivering the performance that is required for as long as it is needed – which may be decades! The consequences of falling short are severe, with the possibility of compromised supply quality, environmental impact and regulatory non-compliance risks.

What water companies are increasingly realising is that the key to meeting these diverse – and sometimes contradictory – requirements is data. In particular, it is about how much data you can collect, how quickly you can collect it and how best you can act on that data. The more data that can be collected and analysed, the more the intelligence of the automation systems at the heart of water plants can be increased. This enables improved operational control, remote management, predictive maintenance and quality.



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The amount of data generated in the water industry is phenomenal. A typical plant might collect data from hundreds of thousands of I/O and telemetry points, from local assets and from unmanned pumping stations, remote reservoirs, pollution monitoring systems and more. In addition, with leak management firmly under the spotlight, companies are also installing flow and pressure sensors at frequent intervals along pipelines, exponentially increasing the number of data points. How can all of this data be collected and managed?

The traditional picture of leased lines and wireless telemetry systems is one of cost and complexity. Making it practical and affordable meant dealing with quite small volumes of data, perhaps only transmitted three or four times per hour and generally only in one direction. For effective asset management and decision making, water industry operations need more data more quickly and need to be able to analyse and react to that data in real time.

Ethernet and internet connectivity revealed how large volumes of data, made available anywhere, could really help to enhance process and production operations. Now GSM networks are delivering on the promise of high-speed, bi-directional transfer of large volumes of data between individual devices, with barely a consideration needed for range, on-time, power, cost or data limits. All of this is without any incurred expenditure on network infrastructure or installation.

In fact GSM is proved to be the enabler for the 'Internet of Things' (IoT), or as it is alternatively referred to, Machine-to-Machine (M2M) communications.

M2M communications can be defined as a system in which individual devices capture data on events, and relay that data through a network (wired, wireless or hybrid) to an application (software program) that translates the captured data into meaningful information.

Mitsubishi Electric is at the forefront of this revolution with its M2M platform, delivering affordable, end-to-end IP data connectivity for water utilities – and many other potential

applications. The solution is built on the MAPS SCADA software and Mitsubishi FX/L/Q series PLCs, for both control and data acquisition, to and from remote sites. The communication's intelligence lies in the standard integrated PLC function blocks matched to an M2M driver in the MAPS SCADA.

The Mitsubishi M2M solution provides remote communication with the PLC without the presence of an on-site technician. The operator can monitor and control an individual device or group of devices through the MAPS SCADA interface. This solution can also allow a technician to do PLC programming over the air to the remote M2M device. There is no need for a technician to go out to site to do a program change.

The intelligent M2M driver in MAPS automatically monitors the connection between the MAPS I/O server and the PLC in the field, without the need to poll or establish a connection to the device. The operator will be notified if the link goes down. The operator will also be notified when the communications link is healthy again. Information on communications is available for any device on the M2M network.

The Mitsubishi M2M solution offers efficient communications with cost-effective data transfer. The PLC can be configured to send data on a time interval, on an alarm event, when the storage buffer limits are reached, or when it is manually polled. Event and alarm data is transmitted to the SCADA simultaneously. Communications can also be set to live mode which will show real time data as the site changes.

For example, at a remote pumping station engineers might want to monitor the temperature of three different bearings, a motor's load and its run time, the flow rate of the water and its turbidity. Retrieving this data is a simple matter of adding the appropriate data-logging hardware and one or more communications options. When the data is collected, the software can then convert this raw information into reports, each formatted appropriately for the intended user. For instance a maintenance engineer would look at current temperatures and total run times; a process engineer would focus on flow rates and volume, while an environmental scientist would check the



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turbidity.

Once the data is transferred to the central server, it is integrated with data from other pumping stations to produce management level reports and to update business systems.

Imagine similar scenarios for every aspect of a water industry's assets and we can see that the amount of data involved is massive. M2M communications mean that collecting that data, even in real time, is simple and affordable; the storage of the largest amounts of data is virtually free and software packages such as Mitsubishi MAPS are powerful enough to mine that data, analyse it, highlight relationships within it and provide operators with the information they need to predict the behaviour of the complex systems that the data represents, so optimising performance.

By embracing M2M communications, the water industry has the ability to implement new and vastly improved water management strategies for drinking water provision and security, wastewater treatment and pollution control, bathing water quality, the management of waterways and reservoirs and the provision of flood defences – all against a picture of increasingly stringent standards and legislation.

About Mitsubishi Electric

With over 90 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, as well as in products for the energy sector, water and waste water, transportation and building equipment.

With around 124.000 employees the company recorded consolidated group sales of 39.3 billion US Dollar* in the fiscal year ended March 31, 2014.

Our sales offices, research & development centres and manufacturing plants are located in over 30

countries.

Mitsubishi Electric Europe, Industrial Automation – UK Branch is located in Hatfield, United Kingdom. It is a part of the European Factory Automation Business Group based in Ratingen, Germany which in turn is part of Mitsubishi Electric Europe B.V., a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

The role of Industrial Automation – UK Branch is to manage sales, service and support across its network of local branches and distributors throughout United Kingdom.

*Exchange rate 103 Yen = 1 US Dollar, Stand 31.3.2014 (Source: Tokyo Foreign Exchange Market)

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