WhitePaper

Lower network implementation costs with gateways

Gateways are sometimes only seen as the last resort to a problem, but maybe should be thought of as the first and most obvious choice for improving, in many different ways, serial, field bus and industrial Ethernet networks. **Bjorn Franzen of HMS Industrial networks discusses the potential of Industrial network gateways.**

Networks in modern automation systems are sometimes struggling to provide users with simple and maintainable solutions. Reasons for this are many, such as the speed of development of new networks, the more complex demands put onto networks, and that they are now being used to bridge not only between devices on a factory floor but now increasingly to connect onto IT networks and services.

However help is at hand in the form of the industrial network gateway. These simple products are known by many names such as Babel boxes, X-gateways, black boxes, communicators etc... but whatever the name they have the same basic function - which is to simplify connection between two disparate devices or systems.

So what exactly is an industrial automation gateway? A basic definition is a device capable of joining together two networks that use different base protocols. It is notable that there are over 150 open and proprietary networks available, so there are plenty of connection opportunities.

A network gateway can be implemented completely in software, completely in hardware, or as a combination of both, depending on the types of protocols they have to support. When talking of IT gateways these at present are slightly different in their application than industrial network gateways. IT gateways tend to be used purely in Ethernet networks and normally include functionality such as acting as a firewall and/or as a router/switch, whereas an industrial network gateway should be seen as a translator between a machine and an industrial data network, and can be used to connect devices such as robots, control systems, motors and sensors to any industrial network, regardless of communication protocol together.

Industrial network gateways can be broken down into two basic functionality types. The first type acts as a link between two different networks, such as linking Profibus to Ethernet. The second type is used to connect simpler devices such as sensors and weigh-scales using a simple connection, such as using an integral serial interface to connect the device onto more complex networks.

Bridging the gaps created in industrial data communication systems, modern industrial gateways for Ethernet based connections now include support for web functions such as integrated web server with SSI, E-mail client and FTP server. They also offer offering dual port switching for Ethernet daisy-chaining, saving the user additional network material costs.

The need for flexible and sustainable hardware platforms has lead many gateway manufacturers to produce their own ASIC technology to help meet the needs of the most modern Ethernet based networks, while also allowing old connection to legacy systems.

Gateways can be used in various applications in the automation world. Perhaps the most obvious is as a bridge between two PLC systems from different brands such as Siemens, Rockwell, Schneider, Mitsubishi, Beckhoff, ABB etc. This can of course be achieved by using other methods, such as using PLC rack based communication cards, but this comes at the cost of finding an empty slot on a rack, and providing complicated PLC code that must be programmed, commissioned and maintained. Gateways on the other hand provide an out of the box solution that requires in most cases no programming, need virtually no commissioning and maintenance is extremely simple.

Another use of gateways is segmentation of networks, where gateways are used to divide a network topology into logical segments. Gateways can allow clear divides between different parts of the plant, both logically and electrically where network performance optimization and availability is needed.

Enterprise level integration where factory floor data must integrate with enterprise level systems such as SCADA or SAP using OPC for dynamic data exchange is another application for gateways, as is production line extension. Production line extension is where gateways are used to add segments of new machines with new network types into the manufacturing environment without major alterations and disruptions to the existing production line.

Factory upgrades where replacement of an old PLC system with up-to-date control equipment is needed can, if gateways are used, allow the reutilisation of existing I/O modules and wiring infrastructure, reducing upgrade costs considerably.

A major gateway application is providing PLC system extension, where the gateway allows a simple cost effective way of connecting devices from several brands that use different network types. This allows the end user to select the best devices available for their application, rather than being reliant on what one manufacturer can provide.

The last provided scenario is the use of gateways to extend the life of products from a device manufacturer due to extending its network options. Gateways can easily provide support for new up and coming network technologies, without the manufacturer having to redesign their products to meet the new networking needs.

When looking to extend, redesign or configure your next network solution, consider gateways to help you optimize your network needs now and in the foreseeable future.

HMS Industrial Networks is the leading independent supplier of embedded network technology for automation devices. HMS develops and manufactures solutions for interfacing automation devices and systems to industrial networks. Development and manufacturing take place at the headquarters in Halmstad, Sweden. Local sales and support are handled by the branch offices in China, Denmark, France, Germany, Italy, India, Japan, UK and USA. HMS employs over 200 people and reported sales of £33 million in 2010. HMS is listed on the NASDAQ OMX Nordic Exchange in Stockholm in the category small Cap, Information Technology: ISIN SE0002136242.

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