Opening The Lines

Industry experts believe M2M communications may be trending toward open communication protocol standards.

by Carrie Ellis

Not that there is no room—or need—for task-specific solutions in the M2M space, but while wireless demand wildly mounts, so too do the opportunities and need to leverage shared information and global resources to stay competitive. While the price of access to public wireless networks continues its plummet, conversely the popularity, and the functionality, of wireless networks feeding M2M continue to soar.

One way design engineers can benefit from these increasingly available wireless networks is by using them to connect remote machine-to-machine (M2M) devices for complex, long-range or mobile product designs. A couple of applications employing M2M communications on the market today are fleet management, video surveillance, vending machinery, car telematics and utility monitoring. M2M aims to ease the sharing of information. Therefore, the implications of incorporating M2M systems into product design can be far reaching and span across many industries. Currently, estimates are that there are upwards of 100 million M2M devices in the world.

M2M technology focuses on grouping sensors with the optimal middleware, software and applications to relay the appropriate data to the correct component to help improve machine, system or process efficiency, speed and reliability. Data transmission is two-fold—upstream to gather information from sensors measuring specific parameters, and downstream to pass along information or otherwise monitor machines. Data can be carried either by wire or wireless communication networks.

A M2M system is usually characterized by:

- Devices that can independently transmit data from various sensors.
- A connection to link these devices to a computer.
- A database to store data.
- A software interface to facilitate the examination and manipulation of data.

Industry Experts Weigh In On Wireless

One idiosyncrasy of traditional M2M systems is they tend to be task-specific or typically designed to apply to a particular machine or group of machines, which hinders cross-functionality from one design to the next. This obstacle to M2M cross-functionality has hampered efficiency in the design engineering scheme of systems integration because each task-specific M2M system duplicates many functions already existent in comparable systems. Pardon the phrase, but in other words, system designers are re-inventing the wheel in terms of task-specific or traditional M2M.

"Traditional methods for coordination [of M2M communications] involve hard-wiring interfaces between machines. This approach is costly, tedious, inefficient and limiting in terms of information that can be passed. The solution is to interface equipment through standard protocols. This generally requires the use of a gateway product, able to speak the language of many machines (various protocols), and intelligently pass information back and forth based on time or events," declares Roy Kok, Vice President of Marketing, Kepware Technologies.

Not surprisingly, A.J. Smith, Eaton Hydraulics Operations strategic marketing manager, concurs, "An obstacle related to the communication of M2M information is the different infrastructures used worldwide. Having a modular system in which the actual data is created in one module and can be connected to any number of communication modules for transport to the other machine will help ensure that a system can be used globally with minimal alterations.

"One of the main things that will cause issues with end customers is when they have multiple M2M communication situations for a single machine. It may be that there are three critical components from three different manufacturers on the same machine, each wanting to share its information. Without some standards in the type and the manner of the communication used for such systems, there will be no good way to combine these into a single M2M communication stream. My advice for circumventing this obstacle would be for manufacturers of all levels to participate in developing sustainable industry standards."

According to OPC Foundation President and Executive Director Thomas J. Burke, "The complication is the machines of yesterday and machines of today and the machines of the future all have different capabilities, and there is not necessarily a standard for what the data and information components are and how to publish the data between machines. The most important thing is to define the information that you want to exchange between machines. Agreement on terminology will allow machines to appropriately operate on the information communicated."

"Leveraging the OPC standard [as an example] as a mechanism for M2M medications makes a machine builder's job a lot simpler because they don't have to worry about the intricate technological details of the upstream and downstream machines that they want to communicate with. The importance of open standards plays a significant role in facilitating optimized communication between machines. Typically, in the past, M2M communications were hardwired and complicated, but through the advantages of open standards, we can simplify and better take advantage of M2M communication."

Where Does M2M Make Sense?

"There are so many significant advantages for design engineers using M2M communications." Burke explains, "With reliable delivery mechanisms being part of a standard protocol in M2M communications, you can appropriately design your machines to understand intricate operational details and take advantage of efficiencies in the deployment of real solutions, essentially benefiting end products by reducing both operational costs and complexity." Operational costs and complexity are reduced due to the absence of wiring and the automatic integration of data, in addition to re-use of this information for more pragmatic follow-up applications.

Although gathering status information is important, it is even better when used to benefit the application of the connected machinery. Kok says, "Product benefits arise when parameters, other than status, are passed from machine to machine. For example, one machine passes a part along with parameters like serial number, raw material codes and physical properties, such as temperature, upon which a follow-up process depends." Think car telematics in which a sensor can detect a maintenance issue, then transmit the data to actuate an indicator to alert the motorist.

Thus, designing M2M communication into products or systems is especially beneficial when action is realized due to the leveraging of that information. “The result is equipment communication for optimized operation,” states Kok. “For example, downtime caused by one machine can invoke another machine downstream to perform some routine maintenance, enter a power-saving mode, or better qualify its operation in terms of performance and downtime.”

With a marketable post-design perspective, Smith adds, “Designers can use M2M communication to help highlight the features they have implemented into a new product. For example, a new product that saves on the amount of energy used can continually report on that energy savings to help support the value proposition of the new product design. M2M communications can also give designers insight into products and systems as they are currently being used today. This duty cycle and usage information can give them a large head start in designing the next-generation product.”

Relying On M2M

“System performance is improved through machine communications in a number of ways,” according to Kok. “Better communication between machines, regardless of industry, will result in higher quality and improved predictability. Just as improving M2M communications enables a level of coordination that increases system performance, so too does it increase reliability by minimizing equipment stress, reducing up and down cycling, and increasing appropriately scheduled maintenance.”

He continues,“The typical measure for machine performance is overall equipment effectiveness (OEE), a measure of Speed x Quality x Uptime = Final OEE. Generally, running machines at slower than rated speeds can improve product quality and reduce downtime. If machines are linked, then each machine can run at the optimum rate based on quality or required throughput. If filling can only happen at 50 percent speed, then it makes no sense for a capper to run at high speeds and pause intermittently.”

Burke suggests, “If information is available from one machine when you’re building a complex system, you should always look for opportunities to gather data from other machines to increase product quality and lower product costs. The importance of tying together control systems in the IT systems of today and tomorrow cannot be underestimated. The ability to provide information, not just raw data, allows effective utilization of all possible assets,” which can lead to increasing product utility and innovation.

He goes on to say that “Design engineers should work closely with manufacturers to make sure that machine builders focus their energy on leveraging open standards for integration between machines to facilitate M2M communication. And even if [a design] currently doesn’t require coordination between machines, it probably means that someone hasn’t analyzed the system appropriately to take advantage of operational efficiencies that can be best suited by coordination and communication between machines.”

Kok concludes, “As more information about each machine becomes accessible, expanded policies and higher standards become viable up and down the line.” Therefore, not only can designers try to circumvent the wireless learning curve by working toward standardizing open communication protocols when integrating this technology into products and systems, but they can also contribute to the increasing reliability of products.

M2M proponents continue to contend that wireless M2M more easily and efficiently keeps the lines of communication open ... Where do you stand?