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M2M is Becoming an Important Wireless Market

Gary Breed
Editorial Director



Machine-to-machine (M2M) wireless communications is gaining momentum as a practical application. For those of you new to the concept, M2M is the direct connection of appliances, HVAC systems, lighting and other equipment to each other, and to a controlling network. It is the long-promised expansion of the Internet that

will do more than just connect people to each other—it will add device-to-device monitoring and control without human involvement.

M2M is not limited to the Internet, and in many cases it will be a self-contained building control and monitoring system. But it is the capability to connect beyond the physical limits of one place that provides much of the anticipation as a new market application. In particular, it is seen as a key element in energy conservation, where a building owner, or a utility company, can monitor energy usage in detail and manage the supply and demand of electricity, gas or water.

A few power companies are already using M2M technology to control their customers' dual-fuel heating systems. Electric heat pumps are operated when the outside temperature supports their efficiency. As temperatures fall, less efficient electric resistance heat is added, but only in off-peak times with plenty of available generating capacity. Finally, natural gas or propane heat is brought on line when it's high output is needed. This scenario only works where there is ample electric capacity and moderate costs. The value is magnified if the local price of natural gas or propane is relatively high. Rural areas are most likely to meet these conditions, so control via wireless network, or using broadband over power line (BPL) technology, is attractive, needing no control lines. This network will certainly be used with a remote metering system as well.

I've discussed building monitoring and control systems before, and the number of products available for this type of system is growing rapidly. In particular, energy harvesting technology that powers a sensor node from local heat and/or vibration has been developing at a fast pace. The pace of implementation is uncertain, although I expect to see success stories published in the near future as the technology moves from laboratory and demonstration projects to routine facilities operation.

M2M at Home

In addition to the management of heating systems, control of individual appliances offers the possibility of automated energy management. Many electric utilities have off-peak rates that are lower than anytime rates, and may even be priced so that excess usage during peak times has a high penalty.

Fortunately, the peak use is driven by business power consumption in the daytime, with off-peak times occurring in evening, overnight and weekend hours. An individual can certainly manage some power usage without automation, such as doing laundry and cooking during off-peak times. But there are many ways that energy savings can be accomplished in an automated system that operates when no one is at home.

Refrigeration, water heating,

air conditioning, and a few other items consume a high percentage of a household's power. With no one home and the door closed, a refrigerator does not need to run as often. Water heaters do not need to reheat water that simply has lost heat due to radiation instead of usage. Sure, we have programmable thermostats for air conditioning, but many people never bother to set them properly. For all these things (and more), a well-designed control system has great value, especially using wireless technology.

Retrofitting an existing home with sensors and controls would be very expensive if hard-wired connections were needed. Wireless interconnection makes it simple to add new units to the system as they are acquired. Allowing the utility companies to apply their

knowledge and resources to the control process is smart, too. Using a cell-based wireless system, BPL, or some other wireless network (700 MHz?) makes a lot of sense.

Security and Trust

Although many people will hesitate to have an outside party running their house, they should remember that the security industry has been monitoring homes for many years with very few instances of impropriety. Fail-safe procedures and data security have become well established. And physical security is enhanced by wireless operation, since there are no wires to cut or tap into.

Finally, the things noted here are only the beginning. M2M technology also has a role in other places, such as manufacturing, vehicles and retail stores.