

Maximizing the Lifetime Value of M2M Wireless Devices

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Machine-to-machine (M2M) communications technology is increasingly common worldwide in a wide variety of vertical markets. The worldwide M2M market will grow from \$20 billion today to more than \$220 billion by 2010, predicts IDATE, a market research firm. That outlook is based on strong adoption over the past few years: Between 2005 and 2006, M2M module revenues grew 34 percent, from \$621 million to \$830 million, according to Gartner.

The projected annual growth rate of nearly 50 percent through 2012 is due to M2M's strong business case. By enabling machines to communicate wirelessly with one another or with a central control unit, enterprises are streamlining their business practices. That translates into a significant reduction in overhead costs and new revenue opportunities.

A prime example is utilities, one of the first industries to deploy M2M for applications such as automated meter reading (AMR).

"The utility industry is a prime example of how, by networking and remotely monitoring machines, data can be analyzed and collective behavior understood in new ways," Juniper Research concluded in a 2007 report. "For example, a real-time, unified view of how power is used will help safeguard this increasingly rare resource. And what can be measured can be controlled and ultimately optimized."

The Juniper report cites an Italian utility that increased revenue by \$1 billion after deploying AMR across 6 million electric meters. That success prompted the company to expand its AMR infrastructure to 30 million meters. "Similar cost and benefit patterns are expected across the whole of the wireless AMR segment," Juniper wrote.

Despite these benefits, M2M also faces several challenges in terms of maintaining the technology and protecting the investment. These include:

- **The Rapid Pace at Which Cellular Technology is Constantly Evolving**

For example, although many wireless carriers are in the midst of deploying third-generation (3G) technolo-

gies such as High-Speed Downlink Packet Access (HSDPA), they're already preparing to launch fourth-generation technologies such as Long Term Evolution (LTE) and WiMAX – in some cases, as early as 2009.

- **New Regulatory Requirements**

For example, some European governments recently required utilities to have the ability to control energy usage in individual homes. If a utility doesn't have an M2M system flexible enough to meet those mandates, it could have to physically replace all of its AMR devices with compliant ones – an expensive, time-consuming project. Even without government mandates, enterprises often want to add capabilities, another reason why flexibility is key.

- **Patching Software and Firmware**

AMR and automotive/trucking are two examples of M2M applications where modules typically are deployed for five to 18 years.

Sending an employee to physically update or replace an M2M device in the field or recalling vehicles to the dealership for software updates generates significant expense.

- **Putting off Obsolescence**

To maximize the lifetime value of its M2M devices, enterprises are increasingly seeking solutions that support firmware over-the-air (FOTA) remote updating. This feature lets enterprises quickly respond to network changes and mandates, software updates and application changes.

With FOTA, the mean time between failures (MTBF) value can be optimized for integrated M2M modules, as well as for all of the subsystems used in the application. This design reduces the M2M application's maintenance costs, which in turn has a positive impact on the application's overall running costs. In the future, FOTA will be able to update both the module software and the M2M application's device software, increasing the application flexibility, utility and profitability.

But not all FOTA solutions are created alike. The ideal solution should update modules using the smallest possible file size in order to minimize network data charges and enable faster remote updates. For example, the Telit Firmware Update Service – co-developed by Telit

Wireless Solutions, Inc., and Red Bend Software – uses file sizes typically less than 100 kb. That's roughly 5 to 10 percent of the original firmware file size, reducing net usage costs by up to 95 percent.

The ideal FOTA solution also should be 100 percent fail-safe, even if power is lost to the module during the update process. Without this fail-safe feature, a device could remain non-functioning until the application could be physically reached and updated, replaced or repaired by a technician, which would negate the business case for deploying over-the-air updates.

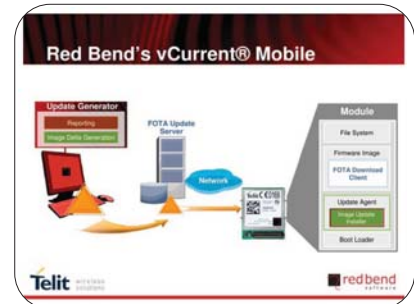


Figure 1: Illustration of the key components of a FOTA solution

All of these features produce a FOTA solution that is always predictable and repeatable, with no limits on the number of updates. It's important to note that although FOTA is a relatively new option in M2M, it's been widely used in the handset industry for several years. In second quarter 2007, roughly one-third of all mobile phones sold were FOTA-compatible, according to Ovum, an independent research firm. That adoption helps provide peace of mind for enterprises considering FOTA M2M because it means that FOTA is a mature, widely used technology.

To understand the benefits of FOTA, it helps to look at how it's used today in verticals such as OEM automotive, utilities and data synchronization.

- **OEM Automotive**

Automotive manufacturing is an excellent example of an industry that will significantly benefit from the implementation of M2M technology with FOTA capabilities. Currently, vehicles are generally designed for a lifetime of 10 years or 150,000 miles. FOTA helps ensure that the M2M module can remain in service as long as the vehicle does.

A significant amount of a vehicle's actual cost is related to electronic components. This cost can increase further because many expensive vehicle recalls are related to electronic components.

When vehicles are recalled to the dealership for software updates, this generates an enormous expense for auto manufacturers. Not only does it entail the costly maintenance on thousands of vehicles, but it also involves expensive human interaction at the dealership. Every time the vehicle needs servicing for M2M application software upgrades or changes in cellular networks, it requires a visit to the dealership. That's a hassle for vehicle owners, and it can drive additional costs for the dealership if, for example, it has to maintain a fleet of loaner vehicles or shuttles to minimize customer inconvenience while service is performed.

By utilizing FOTA, auto manufacturers can drastically cut back on vehicle recalls by simply upgrading or solving software defects remotely. Meanwhile, OEMs can remotely track and run diagnostics on vehicles, often recognizing and remotely solving electronic component problems in

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the vehicle even before the consumer notices trouble. Once the problem is recognized, the auto manufacturer can make necessary changes on the assembly line prior to deploying more potentially faulty components. Besides saving money on recalls, avoiding those problems also protects the vehicle manufacturer's brand reputation and market perception.

In addition to significantly reducing recall costs, FOTA also lowers warranty costs and extends the lifetime of the vehicle. At the same time, FOTA can quickly reprogram the M2M application to almost immediately adjust to changes on the cellular network.

Networks throughout the world vary greatly with respect to their configurations. While GSM is a global standard, there are thousands of parameters within any given network setup that are configured by the network operator. These parameters include such items as timeouts and registration intervals. While interoperability testing greatly improves the chances of a device operating correctly in a given network, there are no assurances. Some network operators require certification of the device on their network, but even this level of testing is only valid for the current configuration. Should a network operator change settings, existing devices in the field may begin to experience problems that were not apparent when the device was validated. FOTA can help to resolve these issues by updating the firmware to a compatible configuration.

Utilities and Metering

Much like the automotive industry, the utilities and metering sector stands to benefit from significant cost savings by implementing M2M technology with FOTA capabilities. M2M enables AMR to transmit utility usage data via cellular networks at regular intervals. By implementing an M2M application, this eliminates the need for human meter readers, a significant cost savings. Those savings are one of the reasons why M2M deployments in the electric, water and gas industries will have a compound annual growth rate of 24 percent through 2013, according to a December 2007 report by ABI Research.

FOTA enables quick response to a growing phenomenon in the utilities and metering sector: government legislation. Recently, some European governments mandated that utility companies have the ability to control energy usage in individual homes. Instead of physically replacing all meters with technology programmed to meet the government's mandate, companies using FOTA-enabled M2M devices would simply send an over-the-air update to meters upgrading the application.

By implementing a FOTA-enabled M2M device, companies also can upgrade a meter to track and control energy usage as precise as an individual appliance in a user's home. Utilities can then educate their customers about energy and cost saving opportunities by sharing that detailed usage information.

Data Synchronization

A relatively new concept that is taking off at an incredible rate, data synchronization is a function that is primarily a result of FOTA capabilities. M2M enables cellular phones, computers, MP3 players and other devices to communicate with one another via a combination of cellular, Bluetooth, Wi-Fi and ZigBee technologies. With the addition of FOTA capabilities, devices can automatically synchronize data when prompted.

FOTA not only enables quick over-the-air

updates, it also updates the differences between the two devices. That approach significantly reduces airtime costs and time spent downloading. In the process, FOTA also frees up network capacity for revenue-generating applications, instead of using it for mundane tasks such as synchronization.

Flexibility for the Future

FOTA provides an excellent solution for implementing, maintaining and updating M2M devices in the field, as well as maximizing their useful lives. FOTA protects the enterprise's M2M investment by giving it a graceful, cost-effective way to adapt quickly to changes in network configurations and software upgrades implemented

by the wireless carrier.

FOTA is particularly valuable for M2M applications that involve devices and assets that are constantly moving or are located in remote locations, such as shipping containers, trucks and utility meters. For those applications, FOTA helps preserve the business case for deploying M2M by minimizing the cost of upgrading modules in the field.

Telit is a global wireless technology company. It develops, manufactures and markets GSM/GPRS, UMTS/HSDPA and CDMA/EVDO enterprise communication modules for machine-to-machine (m2m) applications. For more information about the company, please visit www.telit.com.

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