



Standards-based tools and platforms are essential to rapid development of intelligent devices and services, says **Claus Giebert**

The growth of connected devices is fuelling a societal shift changing the way people work, live and think. Embedded OEMs and designers are at the forefront of this shift, thinking creatively and developing new M2M (machine-to-machine) systems that take advantage of a connected world.

M2M holds the promise of enabling intelligent data gathering and sharing among literally billions of connected devices. This includes embedded CPUs that can be net-

worked with the goal of connecting devices, systems and processes to create transparent control of human and machine transactions.

But once designers embrace this broad concept, how do designs evolve to take advantage of its extended promise? The answer lies in smart services, or applications that provide the autonomous device management required for efficient, cost-effective and highly intelligent M2M deployments.

Autonomous manageability enables new ways of interacting with users, as well as

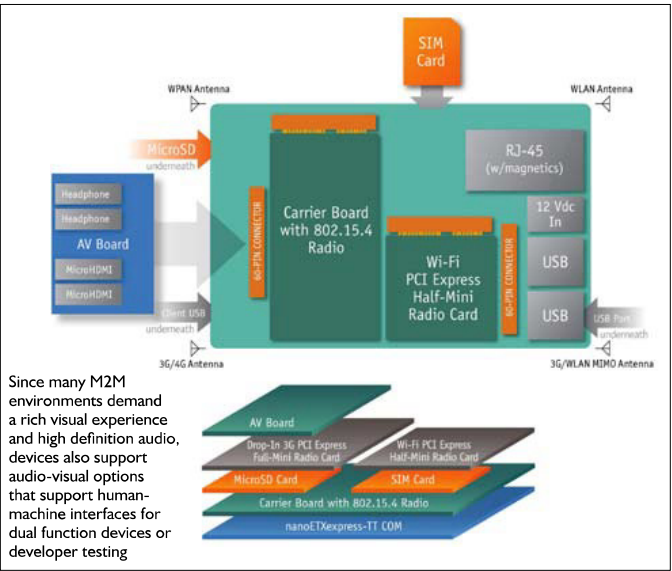
new vehicles for delivering services. Revenue potential is significant when communications are always on, yet the complexity of deploying such systems can be daunting. Developers must fine-tune a multitude of design, processing and communications factors to assure connectivity, and at the same time achieve an acceptable level of economic efficiency with each deployment. The challenge of serving a new market area with needed products is significant, but not insurmountable when working with the

right tools and partners.

Today, those challenges include electrical design and security complexities as well as costs. This is due to fragmentation of preferred wireless communications protocols and a proprietary M2M value chain, which functions in sharp contrast to the standardised hardware and software environments characteristic to internet protocols. Although it is anticipated that fragmentation will be reduced as the space matures, the M2M landscape today represents an uphill climb for developers who are intent on creating services that deliver concrete value. Ultimately, their forward progress and innovation will be given a needed boost by the growth and availability of standards-based embedded computing platforms that simplify development of smart services.

Standardised platforms

A brief look at trends in how data are gathered and shared for intelligent applications helps explain the need for standards-based



platforms. Using wireless, fixed networking and hybrids of the two, connected devices achieve a global network as a powerful domino effect. Device functionality and usage models are commonly split among three categories. Indirect nodes and sensors provide monitoring services, frequently using Zigbee or Wifi wireless communications. Direct nodes operate in a standalone capacity, using a range of radio technologies to send and receive data from the cloud. Gateways aggregate sensor data and similarly use a range of technologies to transmit information.

These methods allow M2M networks to



When integrated with a computer-on-module, an M2M smart services developer kit will work out-of-the-box, and allow the developer to test smart services applications in a connected environment similar to an actual deployment

collect data to be acted upon in a timely manner for profit – smart services, in turn, create actionable environments for applying the information in real-time enterprise business applications.

Actionable data are needed by CEOs and by operation teams across industries. In the past, the remote device data was gathered into remote hubs with a remote application making decisions. At some point, a summary of activity was sent to the enterprise. Now, this data can be moved directly to the business systems to streamline the business process. Some of the real life examples of actionable deployed M2M usages include but are not limited to energy, factory and building automation.

Data from nodes are added to corporate databases via secure transactions over the cloud so that analytics can be generated via smart services and middleware software. For instance, in the use of energy analytics, a business can view the cost and carbon footprint of their energy usage. This is useful for a multi-national company to see the summary and then drill down by country, region, building and department.

Energy offenders can be identified and corrective action can be taken. Energy usage is being tracked by occupancy hour and delivered on dashboards on a real-time basis. This kind of information can help companies reduce costs, diagnose symptoms and make changes that impact the business.

Another area that is starting to use M2M data is factory automation and equipment. Overall equipment effectiveness is frequently used as a key performance

indicator by manufacturers. Loading, availability, performance and quality metrics can be delivered as dashboard indicators for total effective equipment performance. A plant may receive a dashboard as a smart services product that provides the plant's performance compared with other plants in the company, whereas the CEO may need the combined information to understand the overall business on a real-time basis. Dashboard tools using M2M scada data are available now. As some industries struggle to keep up with the brisk post-recession demand for their products, real-time asset optimisation can increase revenues and avoid opportunity loss.

Some users have enabled a sustainable building technology programme which uses commercially available technologies to monitor and make available smart building data points fully from over thousands of critical points.

This allows central monitoring and control of complex system to simple items such as being able to change the times that AC is on from a central point out to several different AC control systems.

Also, remote access and support are using M2M. Some users have created a scalable and secure virtual support network that enables all remotely located managed devices to appear as if they are on the same physical lan as the support or service organisation's operations centre network.

This allows support users to perform on-demand remote remediation and predictive maintenance without the need to create and administer complex VPNs for onsite and remote personnel.

Using a Swiss army knife scalable edge node and gateway system, OEMs can semi-customise these complex systems to ensure that any unnecessary M2M features are removed. This approach reduces

costs without requiring major design efforts. By simplifying the development process, designers are relieved of having to master complex wireless technologies for connected computing.

By using an application-ready systems platform, smart service developers can streamline development by readily supporting 90% of the world's software. This includes devices incorporating standards-based architectures, replacing the earlier focus on purpose-built devices – in turn reducing dependence on single vendors, enabling more easily scalable products and building a faster path to smart services revenue.

Ready for more

A series of hurdles remains for effective and widespread M2M deployment. Regional operators may delay deployments based on their need to certify every device in the network. Global deployments might require assistance of MVNOs (mobile virtual network operators) to expedite and streamline the process. Further, mass provisioning needs to become simpler and incorporate devices other than sim cards.



An M2M smart services developer kit can generate the transaction data needed for analysis, aggregating and then transmitting the data to the cloud

Protection of sensitive user data is imperative and may require complex settings designed to restrict or allow access based on how the data are being used in real time. Customer service representatives will be managing thousands of M2M devices, and the devices themselves must perform round the clock for lengthy deployments. Yet as important as these issues are to overcome, standards development is at the heart of the M2M designer's perspective.

While most consumers probably do not consider their washing machine, thermostat or vehicle navigation system a connected device – those devices and their ongoing data services are generating benefits for users and revenue for providers. All this furthers the likelihood of M2M suppliers flooding a new and evolving market. Standardisation is essential in this evolution, fuelling competitive designs that not only meet application needs but also keep designers doing what they do best.

In the foreseeable future, fixed-function devices will become passé and devices must be smarter from the outset – ready to play an important role in delivering intelligent services to the end user.

Consider the home thermostat that automatically communicates with the energy company for reduced usage and costs, or the smart-grid energy management used by a multi-national company in real time to diagnose and reduce carbon footprints by country, region, building and department. These smart services, or the effective use of the embedded internet to deliver intelligent consumer and business services, represent significant new revenue streams for providers. And with the potential to build long-term business in industrial and building automation, manufacturing productivity, renewable energy, healthcare and more, the financial gain goes to innovators who get there first with standards-based intelligent devices and increasingly smarter services. ■

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