NetCommWireless

Open platform SDK: The freedom to create

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Introduction

Machine-to-Machine (M2M) communications is changing the way the world operates. Businesses worldwide are racing to deploy solutions designed to increase productivity, efficiency and safety while decreasing costs and energy consumption, and the uptake of M2M is growing as a result.

M2M applications (Apps) are fast being developed to support specific business functions such as energy management, automation, temperature control, sea level monitoring, patient observation and asset tracking. Going beyond simply connecting physical infrastructure (such as medical equipment, smart meters, CCTV cameras, vehicles, ATM and vending machines) to a wireless network, M2M Apps allow businesses to perform precise tasks through the remote measurement, observation or control of data.

While most M2M products cover a multitude of scenarios, an M2M router with a Software Development Kit (SDK) that runs on an open non-proprietary platform can be tailored to meet the exact specifications of a project.

This white paper examines the broad differences between an open non-proprietary platform and a closed proprietary platform in terms of M2M App development time, costs, security and customisation; and looks at how open platform SDKs can be used to create custom M2M Apps for virtually any business need.

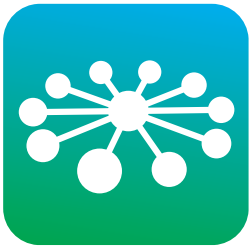
What are M2M Apps?

M2M Apps are small applications that extend and enhance the basic capabilities of an M2M device. Put simply, M2M Apps translate data into useful information. Using M2M Apps, the data from remote equipment, systems and assets (relating to temperature, location, fluid levels, inventory etc.) can be remotely monitored, measured or controlled over a network. These Apps can enhance existing functionality, or provide tailored solutions to specific business problems.

For example: A single M2M App can be developed to monitor and control room temperature, while allowing updates and alerts to be transmitted from any location. Alternatively, the same outcome can be achieved by creating multiple function specific Apps whereby a temperature sensor App monitors room temperature in real time and works with the air conditioning control App to turn on the air conditioning when the room reaches a predetermined temperature. The FTP App uploads log data, downloads updates and configuration changes; and the alerts App notifies a technician of a fault.

Weighing up the options: Open vs. Closed proprietary platform

M2M Apps are developed using software that runs on a common, or open, non-proprietary platform; or a closed propriety platform. Outlined below are some of the key differentiators between these two options:



Creating custom M2M Apps using SDK

With global market trends continually evolving in line with wireless network expansion and technological advances, any restriction to M2M App development can undermine M2M growth by making it difficult for businesses to adapt to changing needs.

A common, or open, non-proprietary platform, gives developers the freedom to create custom M2M Apps for specific requirements. This is achieved using a Software Development Kit (SDK) that enables shared access to a number of available development languages (such as ANSI C/C++, Shell Script, LUA Scripting Language).

Due to the code sharing restrictions of a closed proprietary platform, modifications can generally only be made by the programmers and developers that created the product, meaning users are forced to depend on a single device manufacturer.

As closed proprietary products are difficult to adjust to the changing needs of the business, these products are best suited to static M2M deployments that are not likely to change over the long-term. For businesses that require more flexibility, an open platform (such as Linux) allows users to create, adapt and share firmware or software for various M2M Apps.

Cost

A closed proprietary platform is generally distributed under a licensing agreement to authorised users for an ongoing fee. In most cases, improvements or upgrades incur further charges and there are strict restrictions to source code modifications and sharing. Proprietary software vendors can also regulate and limit license usage to maintain control over installation and distribution.

An open non-proprietary platform offers a cost-effective alternative as it does not usually charge licensing or ongoing fees, and users are not locked into a contract of any form.

Security

Closed proprietary vendors generally offer access to customer service, updates and bug fixes that can be downloaded by the user; but claims that keeping the source code closed offers a higher level of security have been disproved.

According to a recent report by Evans Data Corporation (EDC), a provider of IT industry market intelligence based on in-depth surveys of the global developer population, a survey of several hundred open-source and Linux developers has shown that for 36 per cent of open-source developers the average time between the discovery and solution of a serious bug is under eight hours as the transparency offered by Linux and other open-source products makes it easier for developers to deal with security issues.

Development time

Closed platforms tend to hinder innovation by making it both costly and difficult to make ongoing upgrades or improvements to applications because specialist developers or extensive training is usually required.

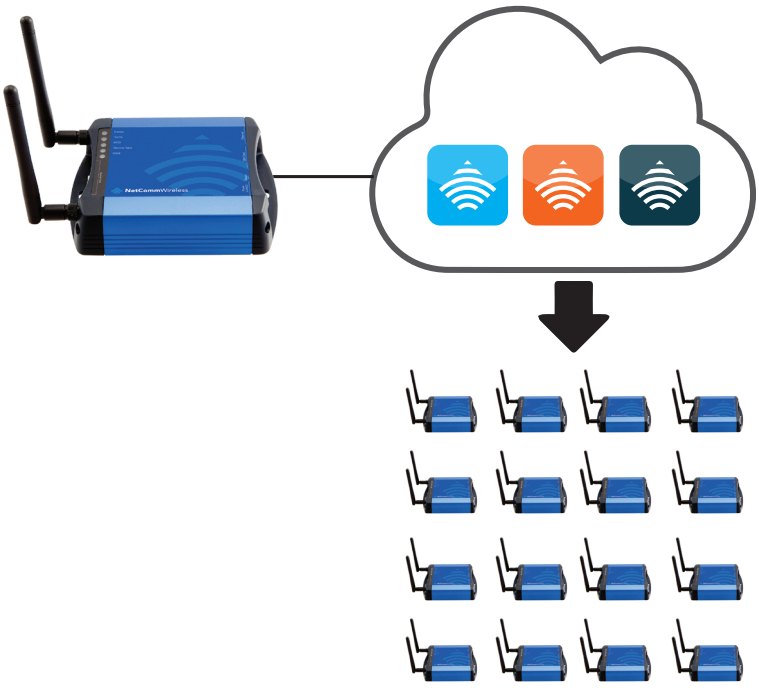
M2M development time and costs can be drastically reduced using an open platform such as NetComm Wireless' Linux based SDK which uses common programming languages so developers and programmers can use tools they are already familiar with, thereby allowing mission critical applications to easily evolve with changing business needs.

The increased uptake of open tools, protocols and application programming interfaces is therefore reducing development time, supporting adaptability and scalability, and ultimately accelerating M2M growth.

What is Cloud Device Management?

Cloud device management enables full control over a single device, or thousands. Expression rules operate in the cloud, and are configured with assets through SDK. The rules are formulated in a benchmark structure so, as in the case of an M2M App for temperature, an alarm will go off it the heat exceeds a set temperature. Using the cloud, a rule can be developed for one device, then deployed for every device in the network.

NetComm Wireless' Cloud Push allows M2M Apps to be installed on multiple devices at the same time without having to physically go to the devices location.



SDK application examples

Water Utility

Water utilities, sewerage and waste services typically cover a broad residential and business foot print. Water utilities are facing the issue of remotely managing their remote stations, assets and equipment particularly in locations without fixed line infrastructure. With the widespread speed and coverage of mobile networks, a 3G M2M device designed to pass data from each remote asset to their SCADA host system has become an efficient and cost effective way for remote management and control. To effectively manage and control these remote assets, custom built software applications can be developed specific to each requirement.

SDK requirements:

- Data usage needed to be less than 5MBs per month per device to minimise data costs
- Specific authentication with utilities Domain Name System (DNS) server
- Simplified deployment
- Updates to DNS records upon each connection

Solution:

Software application using NetComm Wireless' SDK (PAD Daemon) to pass DNP3 commands to the equipment to ensure reliability of the connection and to minimise data consumption. An application using the SDK (NSUPDATE) can also be developed to allow devices to authenticate and update records with the utilities DNS. Ongoing applications can also be send over the air if the requirement arises.

NSUpdate Application to securely update DNS records

Packet Assembler/Disassembler to communicate DNP3 protocol with the cloud

Public Transportation

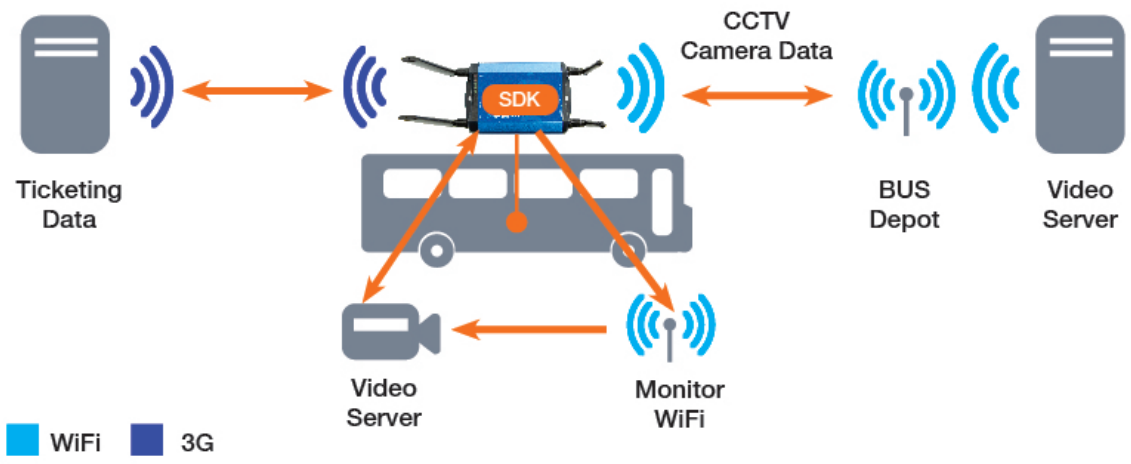
Public transportation are looking at ways to enhance their services and safety to their customers. This can include an integrated electronic ticketing system, WiFi Internet access and CCTV security cameras. Each application requires the right M2M device and ability to develop custom applications to suit each transportation requirement.

SDK requirements:

- Extended memory to run their Linux application
- Application to initiate and receive communications
- Cross reference / validate ticket information
- Upload data to a central database periodically
- Minimize data costs
- Integrate into existing equipment – and prevent using additional equipment such as a separate Linux PC

Solution:

NetComm Wireless' SDK allows for custom applications to be developed to meet each deployment requirement: initiate and receive communications; collect and store data; validate ticket information and upload data onto their central database. The SDK is also designed to reduce data costs by switching their data connection from 3G to WiFi once in the depot's WiFi zone, and to conserve power by switching the status to low power mode when ignition is switched off.



The Meteorology

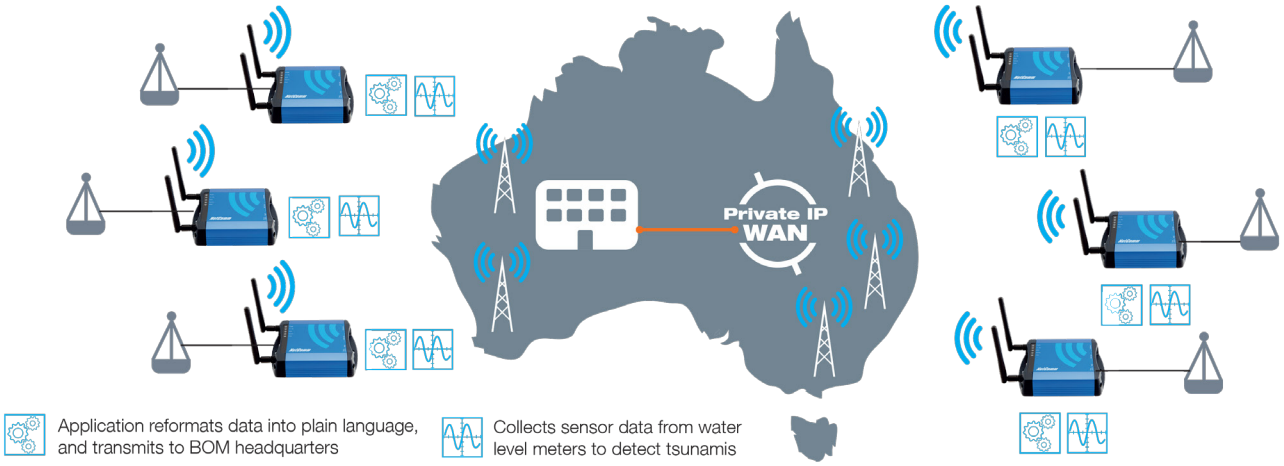
A weather warning system using a rugged 3G M2M router can be used to collect accurate weather data from sensors installed in remote onshore and offshore locations. Many of the installations are within mobile range and can also include radar units that collect data from sensors to monitor sea level changes. The weather data is collated and uploaded to the meterology's headquarters where it is combined with tidal measurements, seismic readings and data from a variety of other sensors to form the basis of accurate reporting.

SDK requirements:

- Prompt relay of accurate information
- Gather and analyse data from weather stations
- Cost-effective solution to transmit summarised results to a central database when certain conditions were met

Solution:

NetComm's open Linux SDK platform facilitated an application on its 3G device (PAD Daemon) to receive the data reliably from legacy meters and equipment that previously required connectivity via fixed line. The team developed an SDK application designed to program the device to: receive raw data measurement readings directly from the weather sensor; reformat the data into plain language and then wirelessly transmit the data to the central database.



News crew

News crews on the road need to send video footage back to a production house or editing suite as quickly as possible. In this fast paced environment, physically sending the material back to base is no longer an option. Traditional solutions such as microwave links are costly, and although video can be stored digitally and then compressed and sent over the Internet, this requires a camera operator to connect a PC to the camera to transmit the data, causing downtime where the operator is not filming.

SDK requirement:

- Transfer video feed directly from television cameras back to the news centre
- Simple integration into existing media program

Solution:

NetComm Wireless' M2M router mounted directly on the camera. The SDK application was developed to automate the immediate process of transferring video files via the FTP to the television networks servers. The application was also designed to deliver clear communication to the camera operator once the file transfer has been completed. Breaking news footage is transferred very quickly to the News Centre in Standard Definition, allowing immediate editing to commence prior to physical receipt of the High Definition video footage.

Genesys Electronics

Genesys Electronics Design Pty Ltd, a NetComm Wireless certified software development kit (SDK) integrator, provides a complete electronics product and software development service from initial concept through to the production of innovative commercial ready solutions. Answering the call for effective energy management, Genesys created a unique custom application that captures data from smart meters to provide visibility and remote access to real time information.

Developed to help homes and businesses cope with the escalating cost of energy, Genesys' interactive energy monitoring tool helps to cut energy consumption, better manage energy bills and reduce greenhouse gas emissions. The breakthrough application uses NetComm Wireless' 3G M2M WiFi device (NTC-40WV) and its SDK feature to establish a custom ZigBee personal area network (PAN) incorporating sensors and displays.

Geoff Sizer, CEO of Genesys Electronics Design, said the project successfully setup the NTC-40WV as a ZigBee data logger that can log and display metering data from a ZigBee smart energy network.

"This integrated ZigBee system allows users to continually monitor and log mains power consumption for multiple separate power circuits, both locally and remotely via the Internet. To gain familiarity with the SDK, our software engineers initially integrated a Bluetooth USB dongle with a NetComm Wireless 3G M2M WiFi modem followed by a ZigBee USB dongle, ZigBee-enabled multi-channel mains power metering system and a commercially available power monitoring display."

What this means for consumers is effective energy consumption management from virtually any location. Genesys' simple to use in-home display unit gives homes and businesses the capacity to set up energy saving targets, receive consumption alerts and access peak pricing and historical data over 3G.

SDK requirements:

- Enabling ZigBee on the Genesys-designed digital generator management (DGM) mains power monitoring system using the smart energy ZigBee profile as a convenient test bed device.
- Enabling NetComm Wireless as a smart energy interface and gathering power readings (kWH) from the DGM.

Notes:

1) The In Home Display used is a commercially available product for the Australian market.

2) The Victorian govt. specification does not allow more than one metering device on a smart energy network, and that the metering device should be on the ESI. The 15 metering device endpoints were therefore set as gas meters and one electric meter is set on the ESI which accumulates the energy of all the 15 metering device endpoints. This is shown on the IHD, which is the Total Site Consumption.

3) All the devices are installed with the Smart Energy Profile test certificate from Certicom.

4) The network uses ZigBee Stack Profile 2 (ZigBee Pro).

Currently, in the Australian market, the smart energy network consists of an energy service interface (ESI) which also hosts the metering device and an in home display (IHD) which can be added to the network as an option. A Genesys designed power monitoring system which monitors Genesys' office power split into 15 feeds has been enhanced as a ZigBee smart energy metering device with 15 endpoints. The ZigBee stack is on the USB device, and the 15 metering endpoints are updated every minute by the power monitoring system. This means the DGM can set the real power from 15 independently-monitored feeds to 15 endpoints on the ZigBee USB stick and a coordinator on the other end can read the data via the ZigBee network.

The ZigBee ESI is another USB device that is connected to the NTC-40WV, and the software running on the NTC-40WV polls the data from the 15 metering devices at a set interval. Metering data from the 15 devices is then logged onto the RDB variables on the NTC-40WV and the values are displayed to the user through the web interface. The total site consumption metering endpoint on the ESI is updated by the NTC-40WV by summing the values from all the 15 feeds. The ipkg install file on the NTC-40WV consists of a: Qt application, Qt Libraries, web page, RDB manager template file in addition to the default install files; and the IHD connects to the smart energy network and displays the value of the total site consumption metering endpoint in kWH. Genesys expects this will also include an off-the-shelf stand-alone ZigBee linked power display for one power channel.

Genesys created an install for the NTC-40WV which includes: Bluetooth, USB drivers, Bluetooth library and tools to successfully scan for nearby Bluetooth devices as well as establishing a web page to enable or disable Bluetooth.

Benefits of a true open platform

Open standard benefits to carriers

- Open management platform provides vendor flexibility
- Facilitates a broader range of applications for a wide range of industries
- Attracts large customer accounts
- Provides a stronger M2M value proposition to customers
- Helps retain M2M customers and prevents churn
- Provides a total end-to-end M2M solution
- Customisation flexibility will result in customer satisfaction
- Provides a basis of an ongoing relationship

Benefits for businesses

- Non proprietary, Open Standard Linux
- No hardware lock-in
- Wide use of Linux means existing technical staff will likely already be familiar with platform and software
- Wide use of Linux means developers are easy to recruit
- Easy to get started and learn
- Vast online resources

Conclusion

Today's businesses operate in a fiercely competitive and fast changing world where those that fail to innovate and adapt will struggle to survive. It is therefore critical that M2M developers have access to the tools needed to create new applications as quickly and efficiently as possible. It is also important to ensure that M2M Apps can be managed and maintained over the long-term without restriction.

A Software Development Kit (SDK) that runs on an open non-proprietary platform provides the flexibility to create M2M Apps that can interoperate freely without being locked into a license or long-term contract with a single vendor.

Flexible outcomes can only be achieved using an M2M device that enables shared access to existing development languages while also allowing new languages to be downloaded and installed. NetComm Wireless' 3G (HSPA+) M2M WiFi Router (NTC-40WV) and NTC-6000 Series devices support custom M2M App development by giving developers the freedom to install custom firmware to the on-board flash memory via the programming interface. A wide range of existing software can easily run on NetComm Wireless' M2M devices, and further development is as simple as writing software for any computer running Linux.

Find out more at: www.netcommwireless.com

About NetComm Wireless

NetComm Wireless Limited (ASX: NTC) is a leading developer of innovative broadband products sold globally to major telecommunications carriers, core network providers and system integrators. For over 30 years NetComm has developed a portfolio of world first data communication products, and is a respected global provider of 3G and 4G wireless devices servicing the major telecommunications carrier, Machine-to-Machine (M2M) and Rural Broadband markets.

NetComm's products are designed to meet the growing needs of today's data-intensive home, business and industrial broadband applications and customized to optimize performance in line with global network advancements. Headquartered in Sydney, Australia, NetComm has offices in New Zealand, North America and the Middle East.

For more information about NetComm visit: **www.netcommwireless.com**