NetCommWireless

In-vehicle M2M White Paper

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Introduction

Machine-to-Machine (M2M) communications, also referred to as telematics, describes the various technologies involved in giving everyday objects the ability to communicate with, and control, other objects over wireless networks without the need for human intervention. M2M enabled devices can transmit real-time information about everything from road conditions to manufacturing processes through an exchange of data between a remote machine and back-end IT infrastructure. Assets, equipment or systems can be analysed and controlled from virtually any location using a 3G/4G M2M router to transmit data over a wireless network to a computer.

With mobile phone penetration reaching one hundred per cent in some areas, M2M is undergoing unprecedented growth as telecommunications carriers look to new revenue sources. Widespread wireless network availability, declining access costs, improved bandwidth and economies of scale are redefining what it's now possible to connect. Mobile by nature, the automotive and transportation sector represents one of the greatest opportunities for wireless M2M over GSM, GPRS, CDMA, 3G/HSPA+ and 4G/LTE networks.

While the automotive industry looks to extend mobile technology into the connected car in the near future, the purpose of this white paper is to discuss in-vehicle M2M technologies with the capacity to connect present-day vehicles to wireless networks worldwide. The installation of a 3G / 4G M2M router enables a virtually limitless range of existing vehicles including public transport, emergency response and waste disposal vehicles to be remotely monitored and managed in real-time over wireless networks.

The In-vehicle M2M landscape

1 Analysis Mason research, 2011.

2 Machina Research: M2M and mobile broadband strategy research and forecasting

3 National in-vehicle telematics strategy: The road freight sector; July 2011.

4 Australian Transport Council's (ATC) vision and objectives

Leading service providers and international carriers are moving on the M2M opportunity, but the uptake of in-vehicle M2M has yet to be fully realised. Wireless World Research estimates there will be 7 trillion wireless devices, including sensors and tags, contributing data by 2017.[1] From less than 90 million connections globally in 2010, the automotive and transport M2M market will grow to almost 1.4 billion connections by the end of 2020. Of these, one billion will be application-specific 'aftermarket' devices, and well over 300 million will be vehicle platforms supporting multiple applications.[2]

In-vehicle telematics has developed beyond early, stand-alone devices to more interactive, intelligent and event-driven systems. New M2M technologies are forming part of transport management systems that monitor, communicate, evaluate and respond to events in real-time over wireless networks. These technologies are designed to drive commercial benefits such as improved asset management and business efficiency.[3] Ultimately, the increased uptake of in-vehicle telematics will support the productivity, safety, economic and environmental objectives being pursued by governments and business.[4]

The transport and automotive sector is investing in new and innovative M2M technologies to enable cost-effective improvements to efficiency, safety, maintenance, logistics and customer loyalty across applications such as: asset tracking, road freight, fleet management, security, emergency / roadside assistance, vehicle recovery, traffic information, navigation and voice.

M2M Opportunity

5 Visiongain. M2M 2011: Opportunities and challenges with connected devices.

While the M2M opportunity applies to everything from vending machines to smart metres, the ability to connect to, and control, remote assets without fixed line (ADSL/cable/Fibre) requirements is particularly beneficial for the automotive and transport sectors.

Connected technology is enabling the live observation and management of trucks, buses, trains, ships, construction, farming and other industry vehicles over global 3G / 4G networks; and is expanding to meet diverse transport infrastructure needs covering areas such as ticketing and toll systems, traffic management and fleet optimisation.

Much of today's technology is 'system aware'. For example, a car with an engine problem will have a flashing indicator light to alert the driver; microprocessors already part of the car will transmit information to a mechanic about the specific nature of the problem and light sensors can turn themselves on and off using embedded intelligence.[5] Present-day automobiles rely on proprietary buses and hundreds of dedicated microcontrollers to support advanced in-vehicle infotainment (IVI) and other systems on the market today.

This white paper discusses the role of wireless M2M devices in a diverse range of in-vehicle applications for point-to-point or point-to-multi-point wireless communications and multi-level system monitoring and control without existing embedded intelligence requirements.

Transforming transportation

6 National in-vehicle telematics strategy: The road freight sector; July 2011.

3G M2M application examples:

Road freight management

In relation to the road freight sector, in-vehicle M2M encompasses the electronic monitoring, management and regulation of vehicles, their devices and their loads. In-vehicle M2M has the potential to improve the way industry operates. In the road freight sector, M2M enables supply chain productivity through: improved management and asset coordination; better access to infrastructure; visibility of inventory movements along the supply chain; information to proactively manage driver behaviour, vehicle speeds, loading, engine performance and fuel consumption as well as the improved management of regulatory and compliance obligations.[6]

Public Transport Ticketing System

The Australian NSW State Government's 1.2 billion dollar electronic ticketing project aims to introduce an integrated electronic ticketing system designed to operate across the state's public ferries, trains and buses. Once in operation, cash will be replaced with smartcards that commuters can link to online accounts, or credit and debit cards. The move to a cashless transport system depends on the timely delivery of heavy duty 3G Wi-Fi devices developed to deliver undisrupted wireless connectivity.

Emergency Services

Emergency services cover a diverse and challenging range of M2M requirements covering applications such as remote diagnostics, messaging, vehicle management, real time tracking and traffic information. The effective handling of emergency situations continues to improve dramatically from the ability to provide real time information back to a central control point.

The Netherlands Government Highways Agency runs a fixed CCTV-monitoring system along several of its highways. The Agency's road management control room monitors these cameras on a 24/7 basis to observe traffic congestion and general incident or emergency situations that may arise. Due to the inability to install a fixed CCTV monitoring device on every stretch of highway, the Agency decided to mount a live to air camera on each of its service vehicles. With the mobile solution in place, the control room is now able to collect the quality real-time visual information needed to assist emergency services. The installation of an in-vehicle 3G device was identified as the most effective way to communicate data from the site back to the control room over a wireless network.

The Connected Ambulance

Distance and terrain can cause connectivity issues for paramedics requiring critical information from doctors or specialists. By streaming video, audio and text sent by a mobile phone handset to a web interface, hospitals can be better prepared for incoming patients while also providing in-transit care from the information being relayed from the field back into the hospital.

Maintaining connectivity in remote areas is itself a challenge, and standard mobile phone coverage is not usually consistent. Using high-gain antennas for both 3G and Wi-Fi, coverage in marginal areas plus a footprint of up to 250 metres around the vehicles can be achieved. By using VoIP hardware, a health worker's handset pairs with the device when they enter the vehicle. Those wishing to make contact do not require the individual's phone details as the VoIP number of the vehicle is all they need. This can then be matched to whatever handset is in the vicinity of the 3G device and the call is connected. In a shift-work situation this is an ideal scenario as workers move on and off duty but the relevant crew remains automatically contactable via the one VoIP number.

Waste disposal vehicles

Across the globe the focus on recycling has never been greater. From the moment a waste disposal truck pulls up at the front of a house, recycle bins are placed under close surveillance to ensure the correct segregation of material. Careful monitoring at the point of collection supports increased efficiency and lower energy consumption at the next stage of the process where reusable resources are recovered at recycling centres. By equipping vehicles with rear view cameras connected to the Internet via 3G networks, waste disposal companies and councils can save time, money and their reputation using accurate real time observation. Keeping watch over 3G networks can also streamline the end-to-end collection process by ensuring that green waste, general garbage, paper and plastic are placed in the correct bins.

Wireless M2M Devices

While the benefits of M2M connectivity are widely appreciated, the key factors involved in optimising M2M performance are less well understood. Essential to achieving reliable M2M connectivity is the installation of a device with the capacity to create reliable point-to-point or point-to-multi-point connections for in-vehicle wireless hotspots and other M2M applications that require WiFi or Ethernet connectivity.

Designed for rugged deployments in harsh environments and unmanned locations, NetComm Wireless' Devices seamlessly integrate with existing applications for undisrupted 3G / 4G wide-area-network (WAN) communications in any conditions. The industrial-grade fixed wireless data devices are housed in a solid metal casing for extended temperature tolerance and feature: a WiFi access point; Ethernet connectivity; powerful processors; flexible power options; GPS support; remote diagnostics; firmware upgrade capabilities; high-performance antennas and wireless security.

Remote installation, reliable back-up and simple set-up capabilities are essential to achieving optimal M2M communications. A fully featured M2M device should include inbuilt communication interfaces and protocols designed to meet the demands of today's telemetry and WAN applications.

Central to consistent connectivity is the integration of a 'Keep Alive' system designed to periodically check the full status of the network connection by pinging an IP address, automatically re-starting to re-establish a lost connection.

Software Development Kit (SDK) - Bespoke benefits

An embedded Software Development Kit (SDK) offers the capability to install custom firmware to the onboard flash memory via the programming interface. This open management platform provides a real point of difference to customers who require custom application integration into their own system.

GPS - Vehicle tracking

By using a wireless M2M device with in-built GPS tracking, operators can track vehicles from virtually any location via 3G networks.

TR-069 - Remote control.

Business, enterprise and government sectors using M2M to manage their vehicles can achieve large operational cost savings using TR-069 to upgrade software or firmware, download data and test settings from a single computer in a central office. NetComm Wireless' products are PD128 certified to operate successfully with any TR-069 ACS server.

Economic benefits

Wireless M2M technology reduces operational and maintenance costs with remote real time access to data concerning factors such as each vehicle's operating condition, location and fuel levels. With the ability to control, measure, monitor and transfer vehicle data over a wide geographical area, the transport sector can use an M2M router to:

- Decrease costs through the precise control of operations;
- Streamline transport processes through continuous monitoring and management;
- Initiate vehicle malfunction warnings;
- Remotely keep watch of fuel levels and engine parameters;
- Accurately react to system inconsistencies from a central location;
- Reduce the level of spare parts stock storage; and
- Schedule servicing

Industries can utilise remotely located equipment and mobiles connected for monitoring, without the need for man power – presenting a potentially huge saving.[7]

7 Visiongain. M2M 2011: Opportunities and challenges with connected devices

The road to a connected future

Whether the need is to connect individual vehicles or to connect vehicles to vast networks of other devices, according to Wireless World Research, there is a need for vehicle-to-vehicle (V2V) communications as well as car-to-road, car-to-infrastructure, and car-to-driver communications. Whatever the need, the full potential of in-vehicle M2M connectivity will be realised with the continued uptake of technically advanced wireless M2M devices to monitor fuel levels, weather and traffic conditions, and to manage and communicate with vehicles from any location for improved business efficiency and productivity.

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 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:
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