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MACHINE TYPE COMMUNICATIONS

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ABSTRACT

Machine Type Communications (MTC) allow machines or electronic devices to communicate and transfer data among themselves without human interaction. This machine-to-machine communication is new and drawing attention of researchers and decision makers. It has quickly become a force for various real-time monitoring applications. This paper presents a concise review of MTC.

Key words: *Machine type communications, machine-to-machine communications, device-to-device communications.*

1. INTRODUCTION

Communication is essential for social networking. In modern times, communication is not reversed for humans, intelligent electronic devices can also communication. Machine type communication (MTC) or machine to machine (M2M) communication deals with enabling communication among electronic devices or machines. It involves data communication between one or more devices without human interaction. The communication may take place between two MTC devices (usually sensors) or between a server and an MTC device. It may involve using wired or wireless networks (e.g. Wi-Fi, Bluetooth), with limited human intervention.

MTC is different from human-to-human communications (H2H) which usually involve voice calls, messaging, and web browsing [1]. MTC devices will outnumber voice subscribes by at least a magnitude of two. MTC will connect numerous MTC devices to the Internet and other communication networks and form the Internet of Things [2]. It has been proposed that there will be 50 billion devices in machine-to-machine networks by the end of year 2020.

2. BASIC FEATURES

Although there is no consensus on a general MTC network architecture, a typical one [2] is shown in Figure 1. It consists of three domains [3,4]: the MTC device domain, the communication network domain, and the MTC application domain. MTC devices can be static or mobile. They may be embedded in different objects like cars, vending machines, etc. Based on the operating conditions, MTC devices must meet the following requirements [5].

- Very low energy consumption for data transmission
- Devices should have low complexity
- Devices must have long battery life
- Very large number of devices per cell

The communication network domain may be wired or wireless. MTC application is typically hosted by an application server and can adopt the client/server model or peer-to-peer model.

Wireless networks, such as ad hoc networks, mesh networks, or sensor networks have been considered to provide Internet access for MTC devices. These networks suffer from limitations that restrict their wide implementation for MTC. Cellular systems (such as Long Term Evolution (LTE)) with their ubiquitous presence are regarded as a good candidate for providing connectivity for MTC devices.

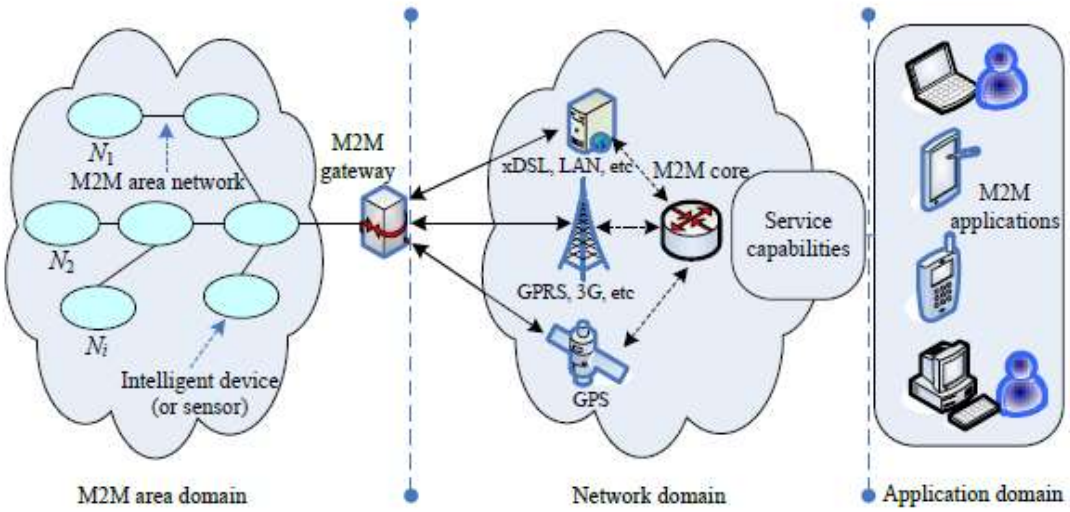

Figure 1. M2M architecture [2].

3. APPLICATIONS

With MTC, a wide range of applications can be offered [6,7]. Some representative applications are presented as follows.

Telemetry: Machine-to-machine communication emerged from telemetry technology. It involves the automated process of collecting and transmitting data from remote sources.

Metering: This application facilitates automatic meter reading and automatic collection of utility data. This includes electric power, water, and gas metering. Using human-unassisted devices provides more accurate measurements.

Tracking: This application assists in fleet management and asset tracking. It may relate to vehicular tracking such as navigation and traffic information.

Retailing: This helps perform faster, easier purchases. It also helps monitor goods available in store.

Public safety: This basically involves surveillance and monitoring of the environment.

Other applications of MTC include industrial automation, manufacturing systems, healthcare, smart grid, smart homes, smart robots, intelligent transportation, logistics, education, energy, vending machines, and utilities.

4. CHALLENGES

Despite the promising potential applications and benefits, MTC faces many challenges. The MTC solutions presently deployed are proprietary due to lack of standards. Overcoming the diversity in devices' hardware and software is a demanding task.

Although other some technologies (such as Wi-Fi, ZigBee, RFID, etc.) are being used for MTC, they have their limitations. Handling a massive number of connected devices presents some challenges for existing wireless LAN environment. Other challenges posed by MTC devices include spectrum scarcity, spectrum inefficiency, and network overload [8].

MTC applications in external network uses service provided by the Third Generation Partnership Program (3GPP) system. 3GPP, the IEEE, the Alliance for Telecommunication Industry Solutions (ATIS), the European Telecommunications Standards Institute (ETSI), the China Communications Standards Association (CCSA), and the Open Mobile Alliance have worked together to standardize MTC.

5. CONCLUSION

MTC is a concept that defines the rules and relationship between electronic devices. Its main objective is to connect thousands of devices into one large network. This new technology works with other new technologies in mobile communications. The MTC market with massive devices is very attractive to industry as it promises huge market growth. MTC will have a major impact on next-generation networks.

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