# Current and Future Trends of M2M Services

IZUMI Hisanori, YAMASHITA Akiko

**Abstract**

Most M2M services at present are limited to product management. NEC is expecting to develop these services and to create innovative M2M services that feature safety, security and convenience.

This paper introduces the development background of the current M2M services, future prospects for M2M services, technologies related to M2M and our approach towards future M2M services. It also introduces new values that can be created via our M2M solution, "CONNEXIVE."

**Keywords**

M2M, CONNEXIVE, smart city, smart community, Network of Things

## 1. Introduction

When considering the environment of M2M services of recent years, it is evident that it has been rapidly improved. Various devices have been developed to equip communication modules so that sensing data acquired via networks becomes available to be used in a greater variety of scenarios. At the same time, costs for 3G modules and network line expenses have decreased. As a result of these trends, the domestic market size of mobile M2M is expected to reach 9 million lines in 2014 ( **Fig. 1** ).

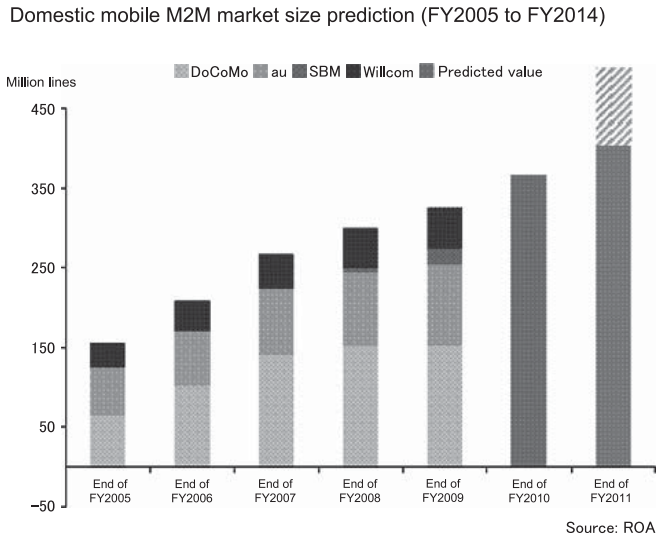


Fig. 1 Market size trends classified by carriers (B2B and B2C).

The current M2M services are mainly for managing products or machines (visualization of sensor data, remote control of machines, etc.). However, more innovative services are expected to be created and the market will be further activated in the future. These advances will be brought about by technological progress including that of network systems, sensor devices and user terminals, etc.

This paper introduces NEC's future vision for the M2M services, technologies related to M2M and our approach towards future M2M services.

## 2. M2M Services So Far

The growth of the M2M services is assumed to be related profoundly to the development of mobile networks and Internet environments. This section describes the development of the M2M services from their inception to the present time.

Before the spread of the Internet if you needed to research, for example, a specific technology for your work it was necessary for you to search for information by consulting lots of books in a library, etc.

However, since the spread of the Internet throughout society, the method of searching for information has changed significantly. Now you need only to input keywords into your terminal to acquire abundant information. At the same time, the spread of mobile networks has enabled us to search information from a terminal even when outside the home.

Information searching via a user terminal means that the terminal is available to exchange data with the server where the required information is stored via a network.

The above is an example of an Internet search service. A new

service is added to the network services, which we call the “Things” management service. “Things” equipped with communication modules has enabled further progress. For example, it has resulted in meteorological sensors, meters for gas, electricity, water, etc., and vehicle-mounted devices being connected to the network. With M2M services, it is possible to utilize information acquired from “Things” that are connected to the network, and also to control them via the network. However, M2M services at present are simply used to control “Things.” The information acquired from “Things” is only used to visualize them into graphs and tables, and the actual control of “Things” has to be carried out by operators.

## 3. Future Vision for M2M Services

As described in Section 2 above, the current M2M services collect information from “Things” that are installed in order to achieve a specific service. Also, information acquired from these “Things” is simply used without any added value. Moreover, these systems are configured for an individual service so that only the vertical integration type services are available.

It is essential that these vertical integration type services are modified into horizontal integration type services for the future development of M2M services. This will make it possible to accumulate data from “Things” that are used in various services. At the same time, we are expecting to utilize “Life Logs” in future M2M services, which is information acquired from human activities. When such information becomes available, M2M services will be totally different from the conventional ones and will become a significantly innovative service ( **Fig. 2** ).

One other important factor in the development of M2M services is the trend toward energy efficiency, especially in cities where large populations are concentrated. In order to achieve energy efficiency, it is necessary to control the energy of “Things” comprehensively. Also, controlling unnecessary excess usage of energy, replacement of facilities and controlling systems to suitably achieve the required services, etc. will also be required.

A suitable system for achieving these controls has to be created as a social infrastructure to support our daily lives. M2M services are essential factors for creating the requisite social infrastructures.

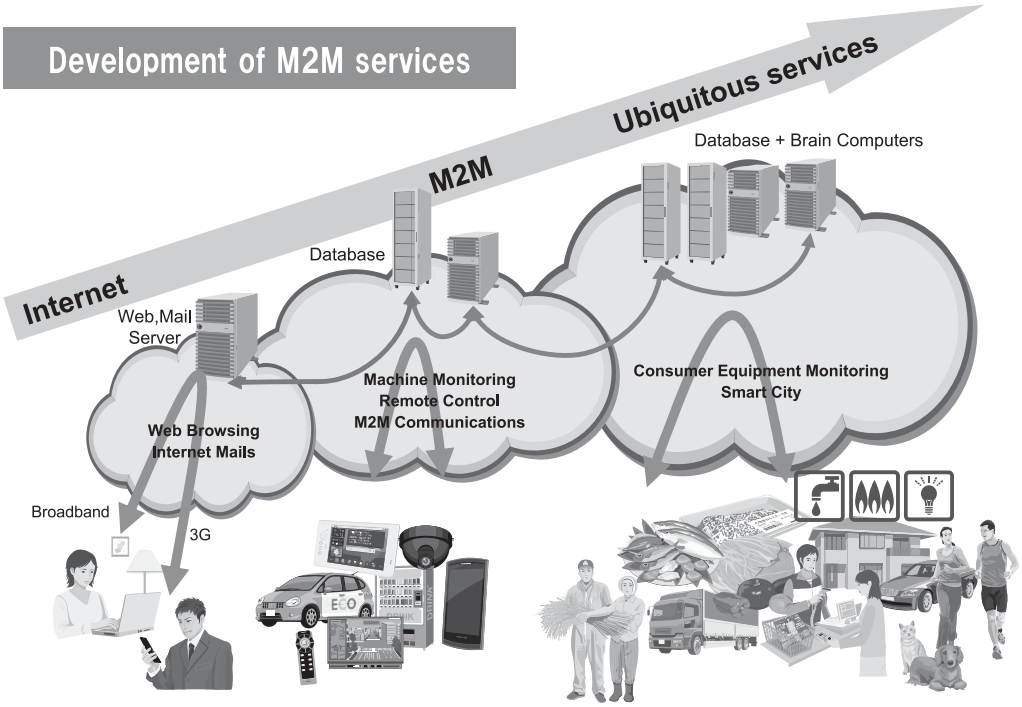


Fig. 2 Development of M2M services.

When considering the above issues, we expect that M2M services will rapidly progress and that innovative services will be created in the future.

## 4. Fusion of Devices and Networks (Vertical Linkage)

So far M2M services have been explained from the view point of providing services. However, in this section we focus on individual configurations to create Internet and M2M services.

As it is described in Section 3, the world of Internet services has been constructed in order that users may access various information sources.

Users can access various services on the network from their terminals and also use various services on the Internet.

On the other hand, the world of M2M enables "Things" to connect to the network and to exchange information without the aid of humans. This world has been developed to efficiently control various machines in distant places.

These two worlds have been developed to achieve different purposes. **Fig. 3** shows these worlds by classifying them under common layers such as devices, network and service platforms.

In the following section, individual configurations of M2M services and Internet services are described. Devices for M2M that connect "Things" to a network and the devices for the Internet services that connect humans to networks have different features.

This is because these devices have been developed according to specific factors in order to achieve different purposes for the Internet services and for the M2M services.

With regard to the Internet services, fixed type devices such as personal computers are the mail devices of the Internet services. However, these devices have been eventually replaced by portable devices and even by mobile devices to meet the various needs of the user. As of late, the dissemination of smart phones has enabled users to access services and any required data on the network at any time and from anywhere.

With regard to M2M services, they used to be provided only to limited machines such as vending machines, elevators, etc. However, cost reductions and the downsizing of communications modules has increased the number of machines being targeted by such services.

As described above, devices have been advancing from many aspects and they are currently becoming gateways to connect humans and "Things" to the world on the network and also used to convert actual data into virtual data so that they will be required to advance according to various scenarios of the future.

Although the connection areas of conventional network systems were limited, the mobile devices have realized a world of

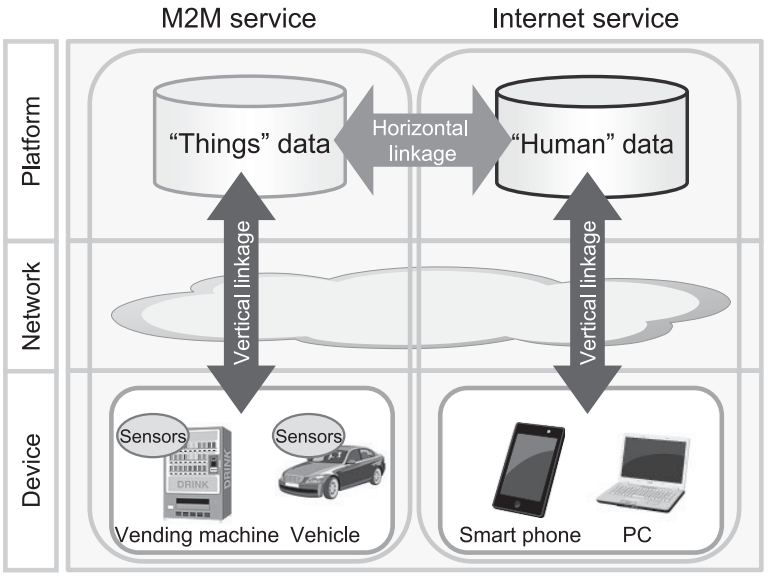


Fig. 3 Comparison between M2M services and Internet services.

“connecting networks at any time and anywhere.” This progress in network environments is one of the significant factors to support the development and attainments of the projected Internet and M2M services.

Such advancement of devices and networks allows users to access networks in almost any situation, to use various services and also to control “Things” via a network.

In the above, the individual configurations of Internet services and of M2M services were explained. Let us assume that connecting devices to a network is a “vertical linkage.” Internet services and the M2M services are connected via this “vertical linkage” and data that has accumulated by such connections is also linked. We call this phenomenon “horizontal linkage,” which will be described in the following section.

## 5. Fusion of Things and Humans (Horizontal Linkage)

As described above, many services have been realized by connecting “Things,” humans and devices to networks. Such a “horizontal linkage” gathers an enormous amount of information regarding “Things” and humans on the networks.

With an M2M service, “Things” are controlled and connected to each other thereby enabling them to exchange data with each other automatically. The result is that the enormous amount of such accrued data will be accumulated in the servers on the network. This includes essential items that are directly connected to the services. However, this also includes additional information such as metadata and descriptions.

At the same time, various information regarding users will be expected to be accumulated with Internet services, such as “Life Log.”

Fusing such huge amounts of data about “Things” and humans, which is meant to promote the “horizontal linkage” of “Things” and humans, releases us from restrictions in accessing information and enables us to access further information and to use a wider variety of services.

This trend also enables us to access almost all “Things,” to control them remotely and to assess their status visually, as well as to change their status and environment according to human activities. The world of the ubiquitous that used to be a mere dream is thus becoming a real world. In such a world, a more convenient and efficient society will be realized.

## 6. Conclusion

As described above, the mutual linkage of “Things” and humans via networks in every environment will create new

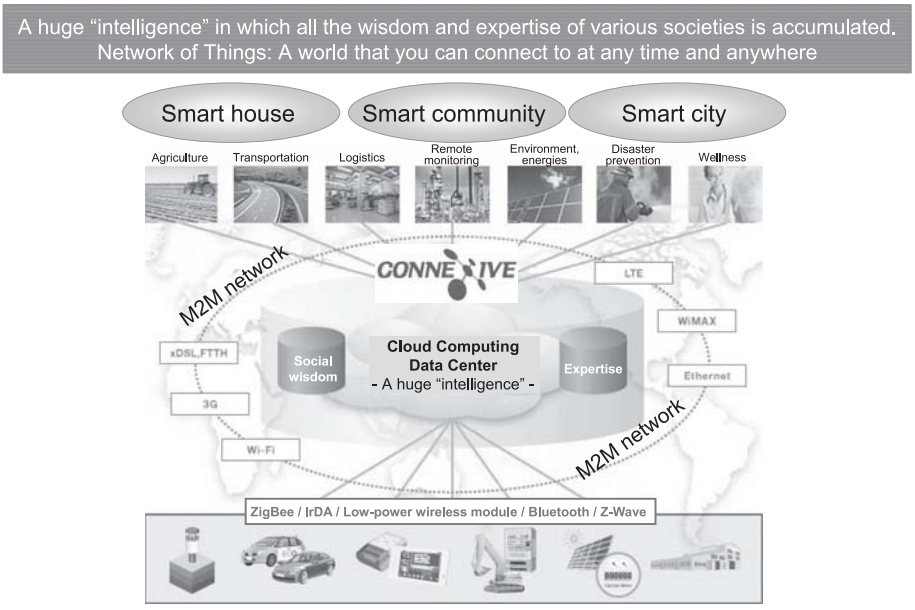


Fig. 4 NEC’s M2M services.

services and enable us to provide more comprehensive services such as smart cities and smart communications environments etc. NEC has labeled such a world as the "Network of Things." Such a world realizes innovative services by connecting all "Things" the world over. We aim to promote such an innovative world under the slogan "Network of Things."

Our M2M solution "CONNEXIVE" is intended to support the realization of the "Network of Things" ( **Fig. 4** ). NEC aims to contribute to such a society via the innovative and optimal use of "CONNEXIVE."

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## Authors' Profiles

**IZUMI Hisanori**
General Manager
3rd Carrier Services Division
Carrier Services Operations Unit

**YAMASHITA Akiko**
Assistant Manager
3rd Carrier Services Division
Carrier Services Operations Unit

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