

ITU-T FG-M2M Meeting Report

Yasuo Ishigure

Abstract

The ITU-T (International Telecommunication Union-Telecommunication Standardization Sector) Focus Group on Machine-to-Machine Service Layer (FG-M2M) was established at the January 2012 meeting of the Telecommunications Standardization Advisory Group to study applications of M2M technology in the e-health field. The group held 12 meetings between then and December 2013. This article reports on the results of the FG-M2M meetings.

Keywords: ITU-T, e-health, M2M

1. Introduction

As societies have continued to age in recent years, it has become more important to deal with societal issues in the medical field such as increasing medical costs and shortages of doctors and other aspects of the medical services system. This applies not only to Japan, with its relatively aged population, but also to other regions, including developing countries. Anticipation of *e-health*, utilizing ICT (information and communication technology), is increasing as a strategy for addressing this.

The International Telecommunication Union (ITU), in cooperation with the World Health Organization (WHO), established the Joint ITU & WHO mHealth Initiative for Non-communicable Diseases (NCDs) in October 2012. The main objectives were to investigate the proactive use of mobile phones in developing countries for sufferers of NCDs such as cancer and diabetes and to stimulate international cooperation and verification activities. ITU-T (ITU-Telecommunication Standardization Sector) also agreed on resolution 78, *Information and communication technology applications and standards for improved access to e-health services*, at the November 2012 WTSA-12 (World Telecommunication Standardization Assembly) general meeting, the goals of which were to give higher priority to the medical field and accelerate cooperative efforts with standardization organizations such as WHO.

The ITU-T Focus Group on Machine-to-Machine Service Layer (FG-M2M) discussed in this article

established a venue for studying M2M technology focused on the e-health domain. It held 12 meetings between April 2012 and December 2013. This article discusses the objectives and status of the FG-M2M and gives an overview of the working group structure and results documents.

2. Meeting overview

2.1 Objectives

The objectives of the FG-M2M, as described below, are defined in its Terms of Reference (ToR), in order to avoid duplicating work done by other standardization organizations, and to clarify its contribution to the field of e-health, among other things. The specific objectives are to:

- Collect and document information from the global M2M community and from vertical market entities on current activities and technical specifications including requirements, use cases, and service and business models.
- Draft technical reports to support the development of APIs (application programming interfaces) and protocols to enable M2M services and applications, focusing initially on services and applications for e-health.
- Facilitate and encourage the participation and contribution of vertical market stakeholders and liaise with other SDOs (standards development organizations) to avoid duplication of activities.
- Assist in the preparation and conduct of the ITU/WHO workshop on e-health (26–27 April 2012)

with respect to M2M applications and services for the health-care sector.

The FG-M2M agreed on the main task of creating five results documents (deliverables) that would reflect the results of its study. These deliverables are described in section 3.

2.2 Meeting status

Twelve meetings were held, with the last one in December 2013. Three of these meetings were held remotely through teleconferencing. Each meeting was managed by a corporate host, and the 12th and final meeting was held by the European branch of Japan's NEC Corporation. The number of participants and documents submitted for each meeting ranged widely, but usually about 25 participants from about 8 countries (about 6 from Japan) participated, and approximately 20 documents were submitted (about 5 from Japan). Relatively more of the participants were from Asian countries, but the meetings were internationally diverse, with participants from Europe, North America, the Middle East, and Africa. This demonstrates the broad international interest in M2M and e-health.

3. WG structure and deliverables

Discussions at the meetings were held in three working groups (WGs): WG1 focused on e-health Use Cases and Service Models, WG2 on M2M Service Layer Requirements and Architecture, and WG3 on APIs and Protocols. Each WG was responsible for creating a deliverable according to its respective theme, but meetings were held so that basically all participants could participate in all of the WGs, and the main proponents were the leaders and editors of the deliverables for each WG. An overview of each of the deliverables is given below.

3.1 (D0.1) M2M standardization activity and gap analysis in the e-health domain

This deliverable is composed of two main parts. The first part describes e-health standardization activities. It explains the activities of existing e-health standardization organizations and lists the technical specifications and reports they have issued. The second part describes the technical content of documents created by the FG-M2M and analyzes the differences between those documents and the documents issued by the e-health standardization organizations listed in the first part. It also discusses the relationship between FG-M2M and the other organizations. The

analysis in this document will be useful in clarifying the overlap and differences with other standard specifications when creating specifications from other deliverables in the future, and we hope that other e-health standardization organizations will also use them to increase awareness of other technical areas that have not been standardized.

The investigation covered documents published by the following organizations:

- CEN TC251 (European Committee for Standardization, Technical Committee 251)
- Continua Health Alliance
- DICOM (Digital Imaging and Communications in Medicine)
- epSOS (European Patients Smart Open Services)
- ETSI (European Telecommunication Standards Institute), M2M for use cases
- GSMA (Groupe Speciale Mobile Association)
- HL7 (Health Level 7)
- IHE (Integrating the Healthcare Enterprise)
- ISO/IEC (International Organization for Standardization/International Electrotechnical Commission) TC215
- ITU-T (Q2/13 and Q28/16)
- M-Health Alliance
- WHO

3.2 (D0.2) M2M ecosystem in the e-health domain

This deliverable describes high-level requirements by defining terminology and concepts related to e-health and describing a conceptual model of the e-health ecosystem using M2M technologies (**Fig. 1**). There are differences in the way similar terms such as telehealth, telemedicine, and remote patient monitoring are understood in different countries and regions, even among specialists, and much time has been spent on reaching a common understanding in meetings. This is an important deliverable because the high-level requirements derived from e-health concepts and ecosystems form the basis for content in other FG-M2M documents.

3.3 (D1.1) M2M use cases in e-health

This deliverable describes typical use cases for M2M technology in the e-health domain. A total of ten use cases are described in two main categories: those using vital data monitoring sensor terminals and server systems, and those using devices other than sensors with server systems. The use cases described in the document are listed in **Table 1**.

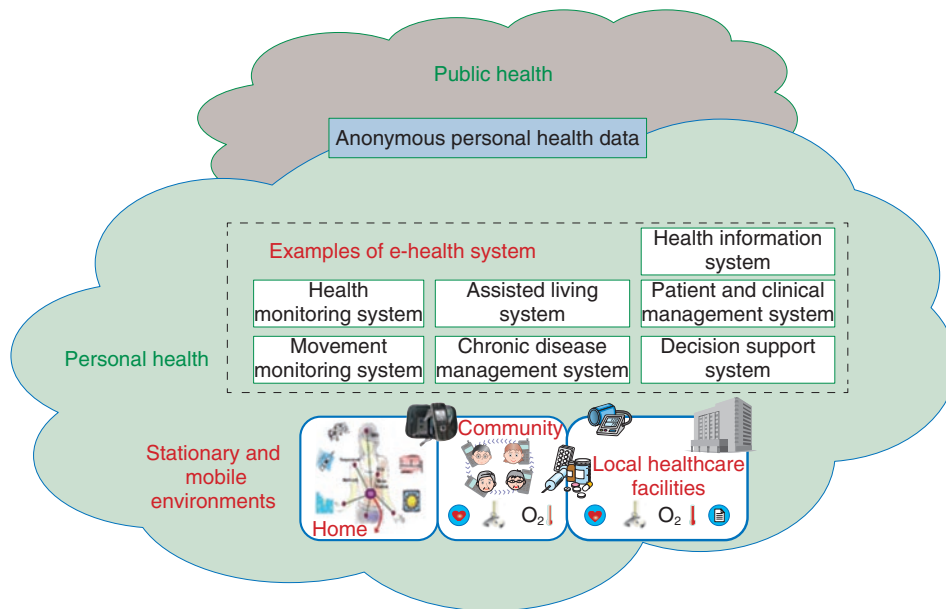


Fig. 1. e-health system overview.

Table 1. List of use cases.

No.	Title of use case
1	Legacy mass medical examination
2	Travelling mass medical examination with BAN
3	Remote patient monitoring
4	Telehealth counseling system
5	Telehealth management system using NFC e-health device and smartphone
6	Telehealth system for home care support
7	Ambient assisted living (AAL)
8	Easy clinic
9	Personal healthcare data management
10	Expert system for sharing medical information/applications

BAN: body area network

3.4 (D2.1) Requirements and architecture for the M2M service layer

This deliverable describes common requirements for the M2M service layer and requirements for e-health system applications. The M2M service layer is shown in relation to existing recommendations by mapping it to the IoT reference model diagram as described in ITU-T Recommendation Y.2060, Overview of Internet of Things (IoT) (Fig. 2). The M2M service layer requirements use the high-level requirements in the D0.2 M2M ecosystem document as a starting point, refer to the D1.1 use-case document

and definitions in documents from other standardization organizations, and identify common requirements. They also describe architecture and basic concepts for reference points. Although a detailed study was beyond its scope, it should be useful for conducting a detailed study in the future.

3.5 (D3.1) Overview of M2M service layer APIs and protocols

This deliverable gives an overview of APIs and protocols desired for the reference points in the architecture deliverable (D2.1). It gathers information on

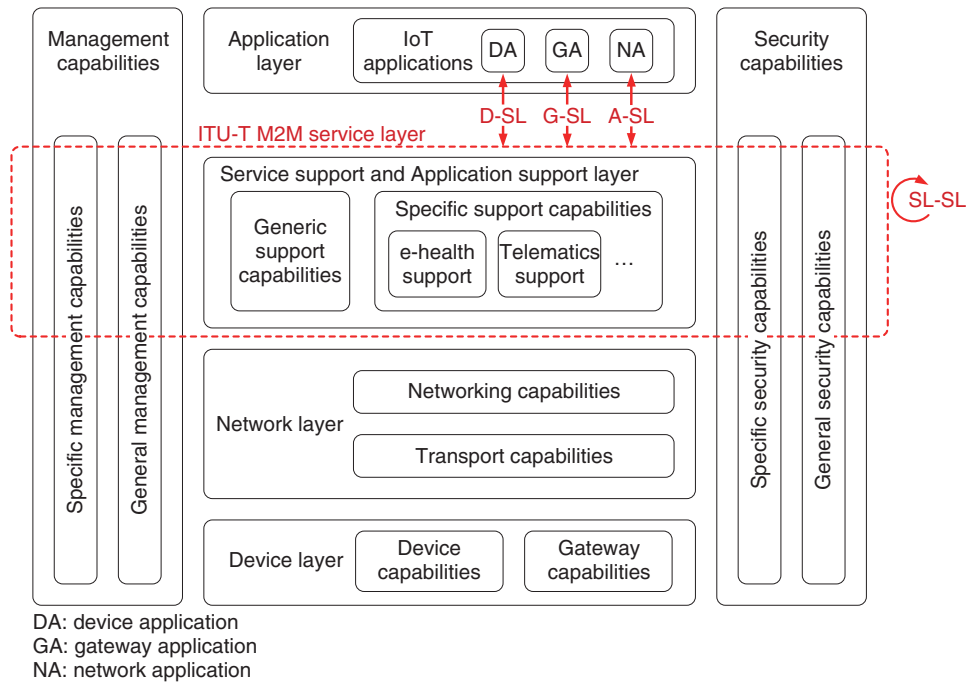


Fig. 2. ITU-T M2M service layer (SL) in the IoT reference model.

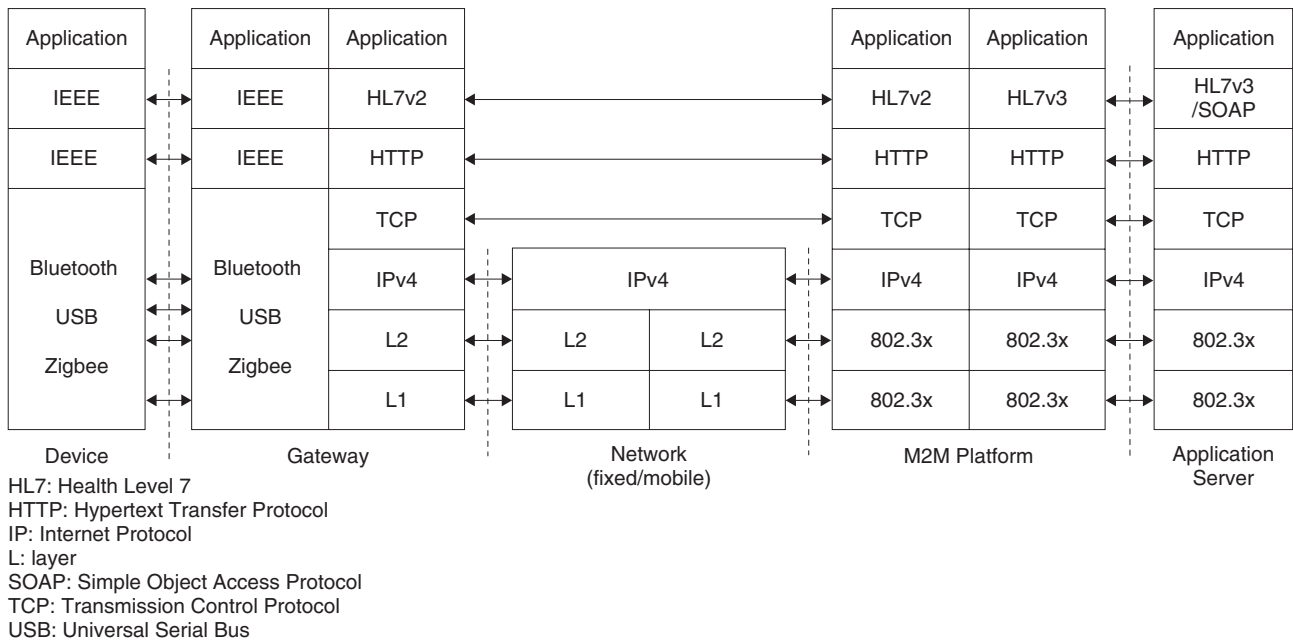


Fig. 3. Example of M2M protocol stacks for e-health application (using gateway).

existing APIs and protocols that are promising for application in the M2M service layer, analyzes proto-

col features, and gives protocol structure examples (Fig. 3). Analytical tools used in defining requirements

for each reference point are also presented in order to provide information as a base for studying API and protocol specifications in the future.

4. Reflection and future prospects

Since the inauguration of FG-M2M about two years ago, there has been a gap in awareness of M2M and e-health between M2M technology members and e-health specialists, but mutual understanding increased as the meetings progressed, and in the end, they were able to cooperate in producing the deliverable documents. In particular, the participants from Japan discussed issues before each meeting in the e-Health Working Party of the Telecommunication Technology Committee, as a place for deliberation within Japan, and proactively submitted documents to FG-M2M. As a result, Japan contributed the most documents as

well as four of the editors, and led the overall discussion in the meetings.

In the future, plans after FG-M2M will be discussed in Study Group 11 (Protocols and Test Specifications) and the Telecommunication Standardization Advisory Group meetings, which are high-level sections of the FG-M2M, and activities will continue toward making recommendations in the related study groups.

Anticipation is high from the e-health marketplace, and more activity in standardization and promotion will be needed in the future. To expand the technical domains related to e-health, it will be important to cooperate with study groups within ITU-T to create recommendations and with medically related organizations such as WHO to create the necessary standards.



Yasuo Ishigure

Senior Research Engineer, Medical and Healthcare Information Systems Development Project, Public ICT Solution Project, NTT Secure Platform Laboratories.

He received the B.E., M.E., and Ph.D. in electronic and information engineering from National Toyohashi University of Technology, Aichi, in 1995, 1997, and 2000, respectively.

He joined NTT Cyber Space Laboratories (now NTT Media Intelligence Laboratories) in 2000 and studied super-high-reality communication technologies including super-high-resolution (4K/2K) and 3D image display systems and their human factors. He promoted the Super High Reality Communication Service via the broadband optical fiber network, which led to him receiving an award at the 3D Image Conference in Japan in 2005.

From 2005 to 2007, he was Deputy Manager of the Life Science Business Promotion Office, Business Innovation Sector, at NTT DATA. From 2007 to 2010, he was Deputy Senior Analyst at the Research Institute for System Science, Research and Development Headquarters, at NTT DATA.

He has been active in proposing electronic health records (EHRs) and personal health records (PHRs) in Japan and has published some books on EHRs and PHRs.

Since 2010, he has been studying technologies related to e-health services including EHRs and PHRs in NTT Secure Platform Laboratories. Since 2012, he has been leading e-health standardization at the Telecommunication Technology Committee of Japan.
