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Special Feature

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Initiatives on Regulation of Transmission Media Between Smart Meters and HEMS

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C O N T E N T S

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Efforts to Promote Smart Houses

— *Leveraging the spread of HEMS and ECHONET Lite* —

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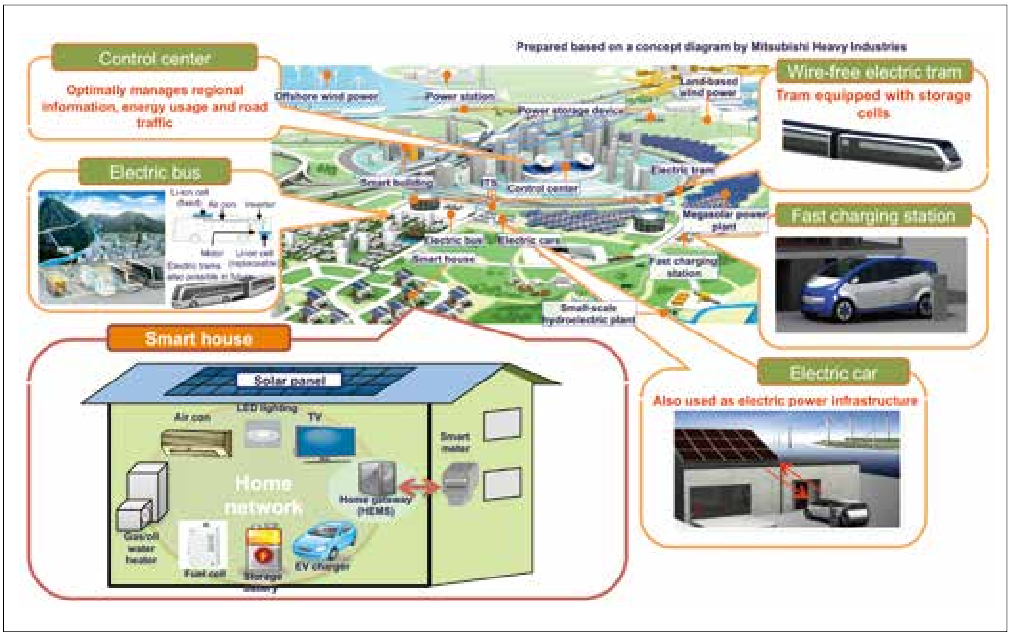
1. Introduction

Since the Great East Japan Earthquake of March 2011, Japan has been beset with severe shortfalls in electricity production, and has had to step up its measures relating to energy conservation. These measures include promoting smart communities, where greater convenience and efficiency is achieved by using IT (information technology) to integrate and optimize systems such as energy supply and transportation. In particular, it is expected that Japan would be able to contribute significantly to the promotion of energy savings in the household sector if progress is made in the spread of smart houses (an essential ingredient of smart communities).

Figure 1: The smart community and smart house concepts

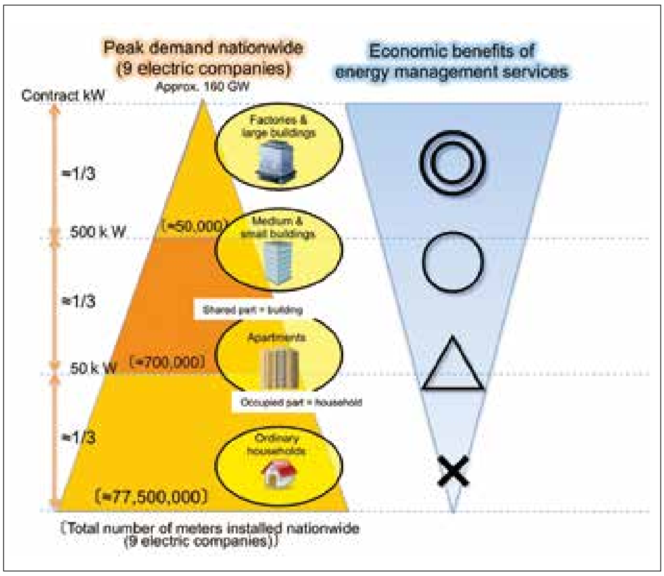


A smart house is one that uses IT to control storage energy-saving equipment in the home, centered on a HEMS (Home Energy Management System), and implements energy management by using electric power prudently and widely. The use of IT for fine-grained control of electric power demand enables the implementation of advanced energy management techniques called "peak cut" and "peak shift".

The pros and cons of introducing HEMS and other energy management systems are strongly dependent on scale of the customer base and their decision-making viewpoint. For example, heavy users of electricity such as factories and large-scale buildings can achieve large energy savings, and since they are able to concentrate on investment efficiency as a corporate activity, they are likely to go ahead and introduce these systems if they decide they are profitable, even if it will take a relatively long time to recoup their investment. On the other hand, ordinary households stand to benefit less from energy-saving measures because they use less electricity per building. Also, people tend to concentrate more on non-economic factors such as convenience and lifestyle fulfillment than on investment efficiency, so they are less likely to install energy management systems.

But although the energy consumption per building may be small, there are approximately 50 million ordinary households in Japan, and together they account for a substantial proportion of the nation's total energy demand. It is therefore becoming essential to promote the spread of smart houses by enticing consumers with new services backed by appropriate policies.

Figure 2: Characteristics of the energy management market



2. Specific initiatives

As mentioned in the previous section, the key to promoting the spread of smart houses lies in creating new services that are not confined to energy management. Therefore, the government should promote the following three measures: (1) standardization of communication specifications, (2) cultivation of business practitioners (aggregators), and (3) preparation of an environment for the creation of new services.

(1) Standardization of communication specifications

For efficient and effective energy management, it is important to be able to communicate with and control smart meters and domestic stored-energy equipment produced by any manufacturer.

For this reason, the government initiated a dialog with experts and businesses in the private sector, and in February 2012 it decided to recommend ECHONET Lite as the communication interface between HEMS and smart meters or domestic stored-energy equipment. ECHONET Lite is a Japanese communication standard that is expected to become an international standard during 2015. The government is also studying communication media and drawing up specifications for achieving stronger connectivity, especially for the eight types of equipment that are envisaged to make a large contribution to domestic energy management (smart meters, photovoltaic solar panels, storage batteries, fuel cells, gas/oil water heaters, air conditioning, lighting equipment and EV chargers).

As of February 2015, ECHONET Lite supports over 90 types of equipment, and compatible products in all eight of the key categories have already appeared on the market. The development of compatible products and investment in this market is expected to increase in the future as environments are set up for purposes such as establishing third-party verification schemes to ensure connectivity.

(2) Cultivation of business practitioners (aggregators)

To promote the spread of energy management, it is essential to cultivate players who can develop it as a business. In energy management, it is generally the case that achievable energy savings are lower for small-scale customers, making it harder for them to recover their investment. Aggregators who provide energy management services through the collective management of small consumers are therefore likely to play a key role in the promotion of energy management in the household sector.

During the fiscal years from 2011 to 2014, with a view to

Figure 3: Standardization of communication specifications

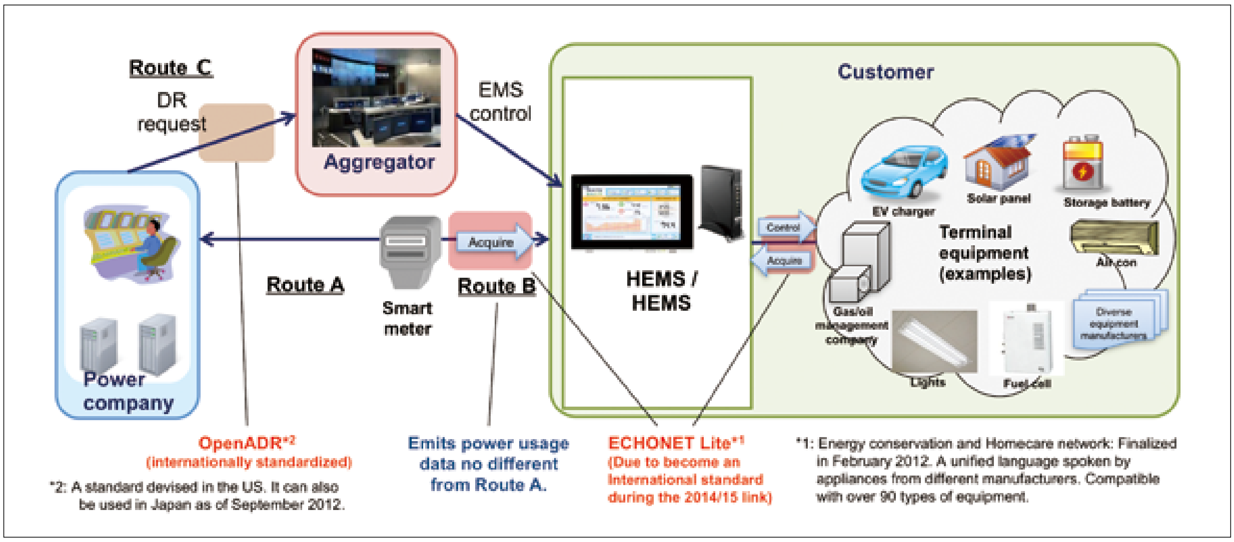
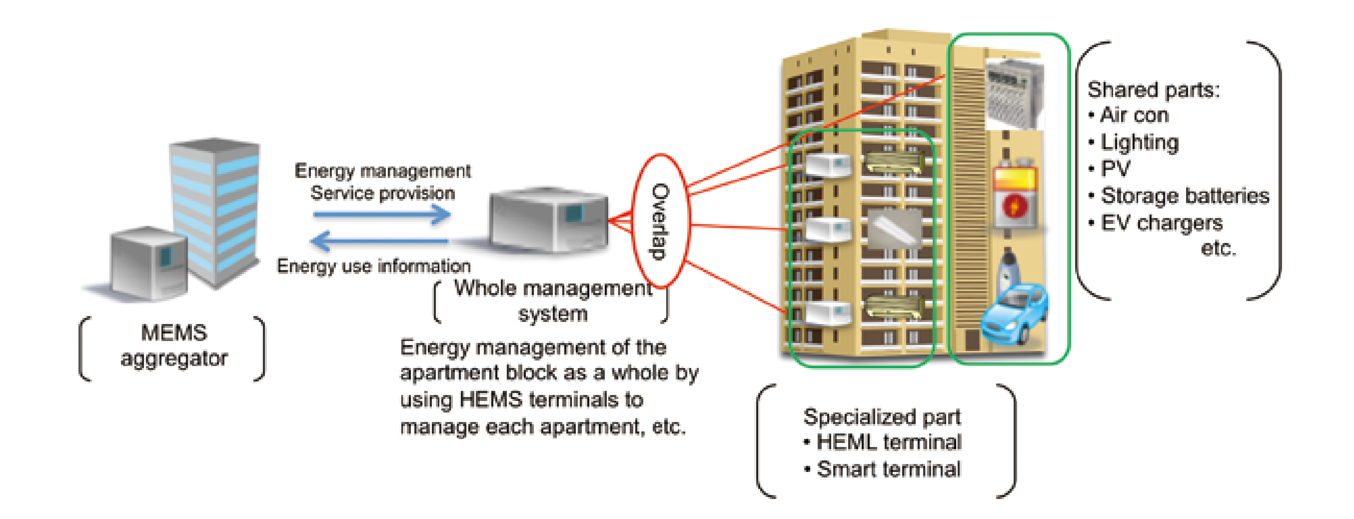


Figure 4: Market penetration of the eight key equipment categories

Equipment category	Market penetration
Smart meters	Approx. 3.66 million due to be installed during 2014 business year. Due to be installed throughout Japan (approx. 50 million) by the 2024 business year.
Storage batteries	Compatible with approx. 70% of equipment requested for a 2013 amendment ("Funding to support businesses with the introduction of fixed lithium ion cells")
Photovoltaic solar panels	At some large manufacturers, all products have been compatible since the 2014 business year.
Fuel cells	Compatible with at least half of all City Gas equipment by March 2015.
Gas/oil water heaters	Compatible with at least half of all City Gas heater equipment by March 2015.
Air conditioning	Compatible with around 30–40% of all units as of April 2014. Due to be successively increased.
Lighting	Market penetration scheduled for 2015 and beyond. (One large manufacturer already has a line-up of about 30 compatible products)
EV chargers	Market penetration scheduled for 2015 and beyond.

■ **Figure 5: Smart apartment concept**



promoting the spread of energy management through aggregators, the government launched subsidized projects for aggregators to introduce energy management systems in small buildings and apartment blocks. In this way, in addition to making progress with cost reductions through the creation of initial demand, the aggregators can increase their involvement not just with electricity providers but also with communication providers, equipment manufacturers, and other businesses that have no involvement with the conventional energy supply industry.

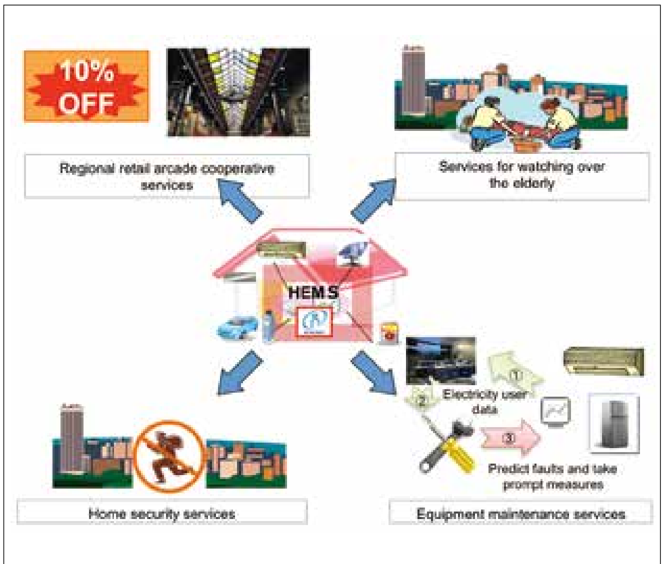
(3) Preparation of an environment for the creation of new services

Despite the steady progress being made in the standardization of communication specifications and the cultivation of aggregators, small-scale consumers in the household sector attach importance not only to economic rationality but also to viewpoints such as convenience and lifestyle, as noted earlier. To meet this demand, it will be necessary not only to further enhance the energy management services, but also to create attractive services that use electricity data obtained from HEMS, so as to attract more consumers and improve the prospects of this business.

On the other hand, there are two problems that stand in the way of creating new services based on electricity usage data obtained from HEMS. One is the standardization of an information infrastructure for the efficient acquisition of electricity usage data by a broad range of services including SMEs and venture businesses. The second is the development of data handling rules that strike the right balance between data utilization and the protection of personal information.

To resolve these issues and prepare an environment where new services can be created, the government began preparing a large-scale HEMS information infrastructure in 2014. This project involved introducing HEMS into 14,000 homes, building a large-scale HEMS information infrastructure system to perform cloud management, standardizing this system, and performing a study of privacy measures based on the opinions of actual consumers. The plan is to complete this project by the end of the 2015 business year with restrained deregulation of the retail electricity market.

■ **Figure 6: Image of new services**



3. Conclusion

There are various issues to overcome in promoting the spread of smart houses. These include expanding the market for HEMS and ECHONET Lite products, growing the number of aggregators, creating attractive services, and providing an environment for these services. However, advances in the spread of smart houses will reap large benefits for Japan, including the creation of new industries for the utilization of data, and expansion of the market for compatible consumer electrical products.

Against this background, it is possible that deregulation of the retail electricity market scheduled to start from the 2016 business year may provide an opportunity for smart houses to spread. Specifically, it is thought that a wide variety of operators will enter the marketplace as competitive funding for attractive services using power usage data obtained from HEMS. The government is moving forward with short-term intensive environmental improvements, but the ingenuity of private-sector providers will be essential if smart houses are to spread. In the future, it is hoped that the synergistic effects of both efforts will provide a large boost to the spread of smart houses.

The ECHONET Lite Specifications and the Work of the ECHONET Consortium

Hisashi Kodama
Managing Director
ECHONET Consortium

1. Introduction

To realize a sustainable society, it is important to take on the household sector where energy consumption is continuing to increase. In recent years, there have also been rapid advances in the spread of systems that can help reduce energy consumption. These include not only energy-saving appliances, but also energy-creation systems such as photovoltaic solar panels and fuel cells, and energy-storage devices such as batteries. This is adding to the complexity of using energy efficiently in the home.

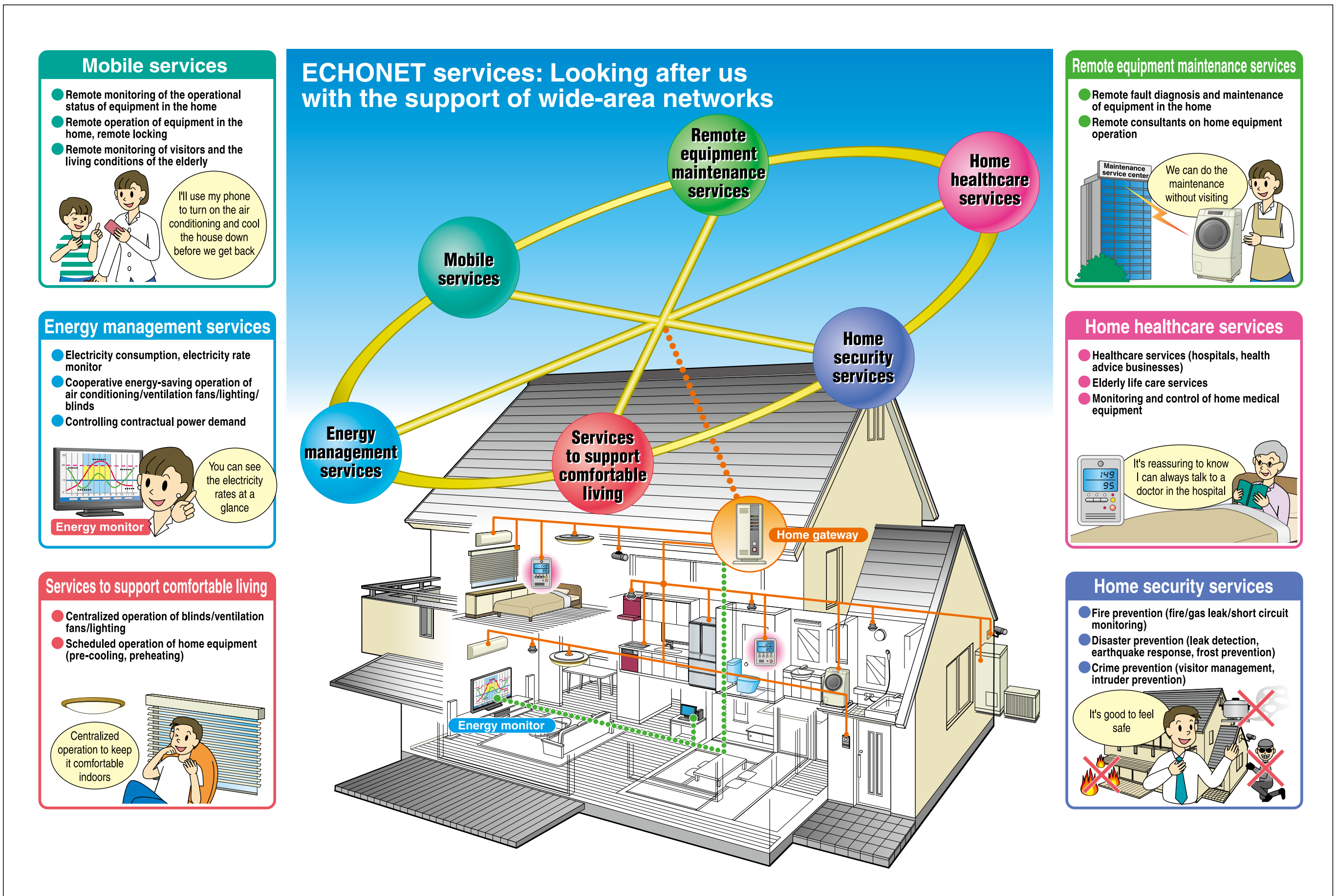
It is therefore essential to introduce HEMS (Home Energy Management Systems) that can control these devices to achieve efficient operation, which means it is vital that all manufacturers provide controllers and appliances that use a standardized interface.

This article presents an overview of the ECHONET Lite specifications,[1] which define an open standard interface for smart house equipment, and introduces the activities of the ECHONET Consortium, which drew up these specifications and is working to spread and promote smart house systems.

2. Past work of the ECHONET Consortium

ECHONET Lite is an open communication protocol that supports smart houses and HEMS. Although there had previously been means-based discussions on how equipment could be connected over a network, these resulted in standards based applications and needs, and standardization was promoted from discussions on what sort of world we were trying to create, and how to go about realizing it. In fact, six application domains such as energy management and home healthcare were established, and the aim was to devise specifications that enable the provision of services that can resolve social issues in these domains. Figure 1 shows the

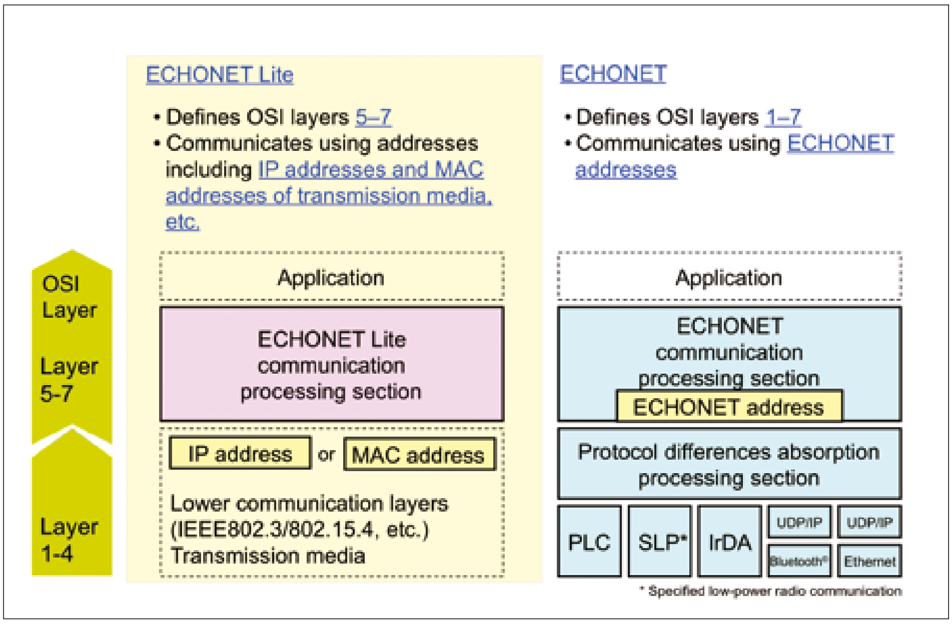
Figure 1: Support services provided by ECHONET



support services that are provided by ECHONET.

The origins of the ECHONET Consortium can be traced back to the Scientific Research Committee on 21st Century Home Networks (October 1996 – May 1997), which consisted of businesses in the electrical and domestic appliance sectors. In June 1997, it asked the Ministry of Economy, Trade and Industry (then known as the Ministry of International Trade and Industry) to promote the development and international standardization of networks supporting equipment from multiple vendors. The ECHONET Consortium was founded in December 1997 in order to carry out this work. Since then, with the nation's support behind it, the Consortium has continued to work on drafting specifications and promoting the spread of smart house technology. Today its membership comprises over 240 companies.

■ Figure 2: The ECHONET Lite and ECHONET specifications



Our specifications can be broadly classified into two types: the ECHONET specifications and the ECHONET Lite specifications. Figure 2 shows their respective protocol stacks.

The first version of the ECHONET specifications was drawn up in 1999, and by 2009 it finally became an international standard. This process models consumer electrical equipment and facilities as objects and standardizes the protocols to form a basic framework for ECHONET. At that time, there were no communication media that could be used in the home without carrying out installation work, so we developed our own communication media using specified low-power radio communication and power line communication, and specified its structure for all seven layers of the OSI model.

But since then, substantial developments were made with various forms of communication media, and there were also many calls for adding Internet Protocol support and allowing free use of communication media. As a result, the specification was pulled back to define only layers 5 through 7 of the OSI model, and the transport layer was left free so that IP addresses can be used. [2] To facilitate the installation of greater numbers of devices, we also drew up the ECHONET Lite specifications with a slimmed-down middleware section. These were published by the committee in July 2011. In the following December, the ECHONET Lite specifications were opened to the general public, making it an open standard both by name and by nature.

3. ECHONET device objects

The basis of the ECHONET specifications is the idea of a device object, which is described below.

It is envisaged that household networks will be used to connect a wide variety of equipment sold by many different manufacturers, so what is actually needed is compatibility between diverse systems. This is harder to achieve than with business systems, which are easier to manage. Take air conditioners, for example. The methods used to implement functions with embedded software based on measurement data from a group of sensors will differ from one manufacturer to the next, and even from one product to the next.

■ Figure 3: Overview of ECHONET device object

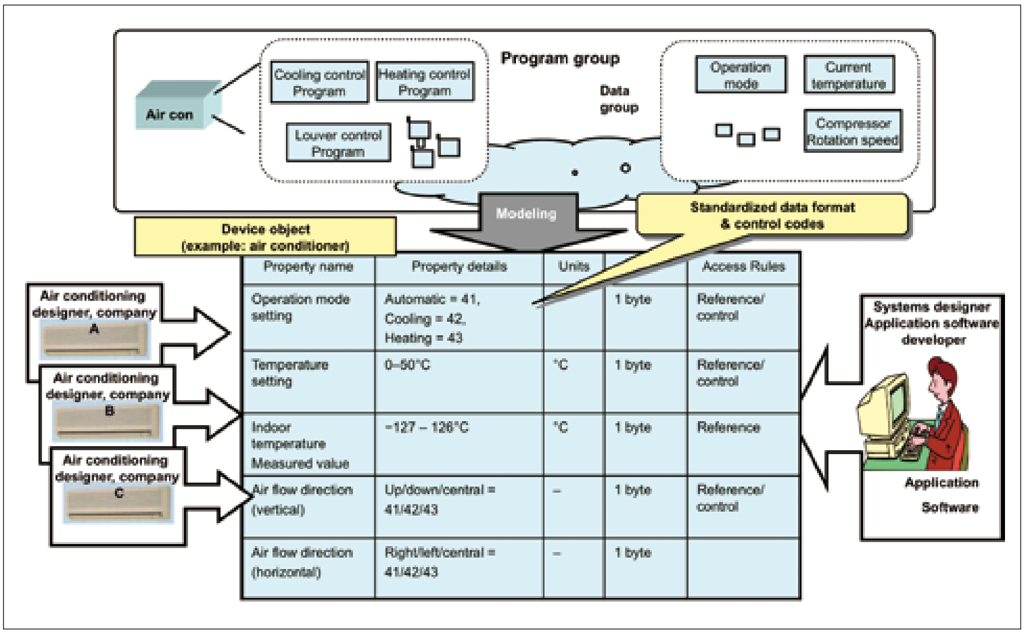
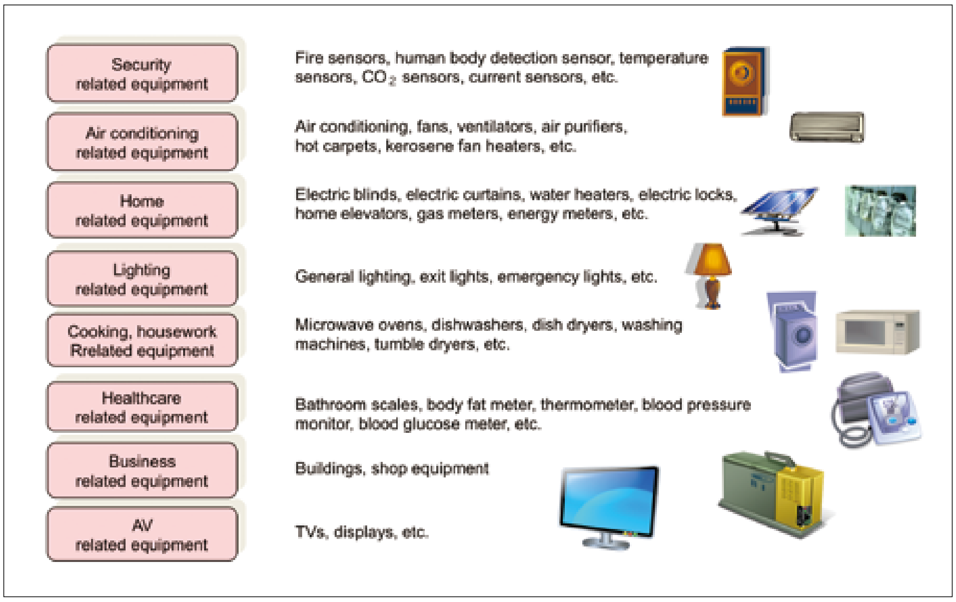


Figure 4: ECHONET device object types



To enable all air conditioners to be represented in a common manner, they have to be standardized as device objects based on an abstract model. By accessing and controlling the property values of this standardized object, an application program can provide compatibility with all air conditioners without any modifications. Figure 3 shows an outline of an ECHONET device object.

ECHONET device objects offer more than just simple interaction at the remote control command level (like "ON/OFF" buttons), but also standardize the functions of highly sophisticated equipment, making it possible to implement the advanced control needed by energy management applications.

Figure 4 shows an example of a defined device object.[3] Currently, over 90 different kinds of ECHONET device objects have been defined. These include security-related devices such as fire sensors and human detection sensors, energy-consuming domestic equipment such as air conditioners and lighting, and equipment for the creation and storage of energy, such as photovoltaic power generation systems, domestic fuel cells and domestic storage batteries. Members of the ECHONET Consortium have proposed revisions to the device object in order to adapt to new devices, and a permanent working group of experts for drafting new functions has been proposed and is continuing to expand.

4. International standardization

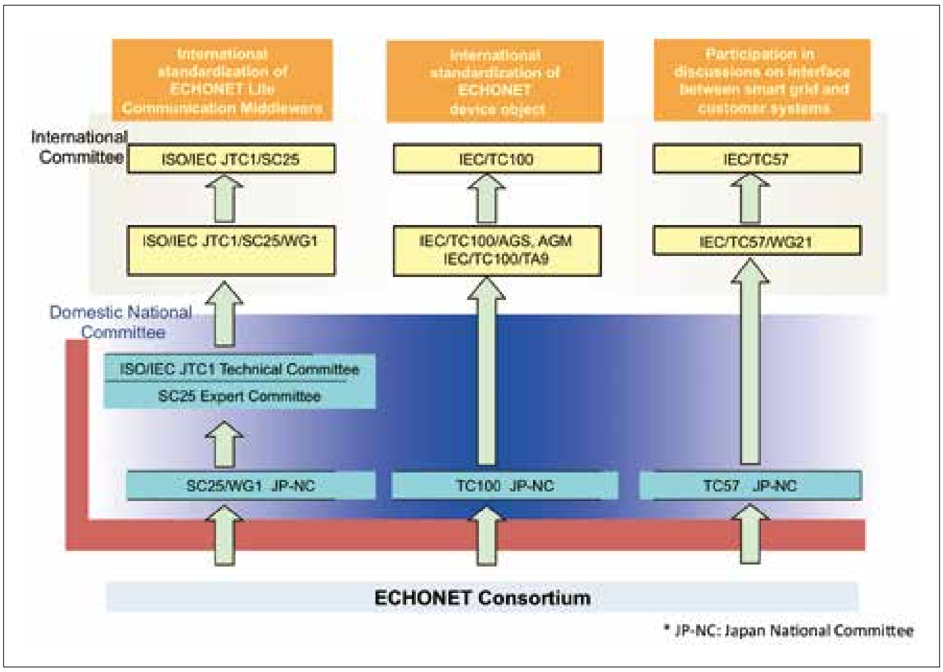
Figure 5 shows the progress made in international standardization of the ECHONET Lite specifications. The ECHONET Consortium is engaged in de jure standardization activities sanctioned by the ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission). Specifically, the ECHONET specifications are divided into six parts, and are proposed via two routes: IEC TC100, and ISO/IEC JTC1/SC25/WG1. The ECHONET device object became an international standard in October 2013, and work on the ECHONET Lite protocol is also continuing with a view to achieving standardization early in the 2015 business year.

IEC TC57 is also working to standardize the interface specifications between smart grids and customers, and is raising the international profile of ECHONET Lite by proposing use cases that involve these specifications.

5. Promotion of ECHONET Lite

The Ministry of Economy, Trade and Industry is promoting standardization relating to smart houses to respond to calls from society for greater energy savings, and has therefore started up the "JSCA International Standardization WG Smart House Standardization Working Group". At the third study meeting held in February 2012, ECHONET Lite was recommended as the standard interface between HEMS (controllers) and domestic equipment, and between HEMS and smart meters.[4] Thus, since April 2012, each manufacturer has started investing in the market for ECHONET Lite equipment. After that, a "JSCA Smart House/Building Standards/Business Promotion Study Group" (the successor of the abovementioned committee) was established in June 2012. This Study Group defines eight key equipment

Figure 5: International standardization activities



categories for smart houses (smart meters, photovoltaic solar panels, storage batteries, fuel cell, electric vehicle charging systems, air conditioners, lighting, and water heaters), formulates operational guidelines for this equipment,[5] and promotes the spread of HEMS equipment. To support product development in each company, the HEMS (ECHONET Lite) Certification Support Center was established in the Kanagawa Institute of Technology to support certification applications for equipment developed using the ECHONET Lite specifications, and to provide a product development environment and interconnection environment.

■ Figure 6: Number of certified ECHONET Lite devices (as of December2014)

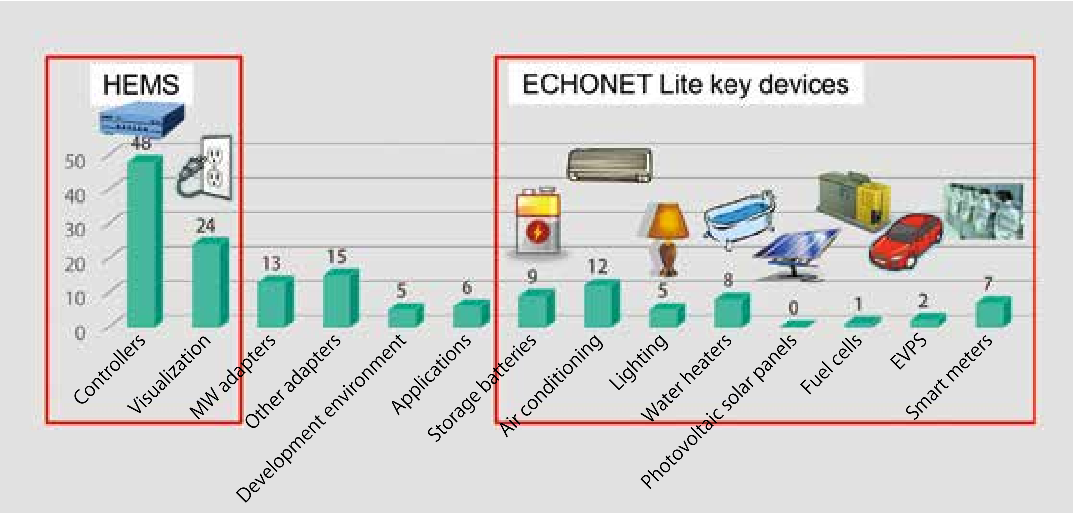


Figure 6 shows the number of items of ECHONET Lite equipment that have so far been certified (as of December 2014). Through the above-mentioned cooperative efforts of industry, government and academia to promote the spread of smart houses, it can be seen that the market penetration of HEMS equipment (controllers and energy visualization) is being promoted. Thus, the introduction of HEMS equipment is currently being advanced as a step towards the spread of smart houses.

However, realizing true smart houses involves more than just energy savings through visualization. It is also necessary to optimally control the energy creation equipment and energy storage equipment for an even greater effect, and to offer services that enable the user to feel the benefits of this technology. In the future, as the next step, we will strengthen our efforts to facilitate contributions to the promotion of commercialization by member companies, such as rapid investment in the market for equipment on the controlled side, and support for commercialization of the eight key equipment categories.

It is also essential to ensure interoperability in order to promote the spread of these devices. At the ECHONET Consortium, we are working on a certification system for ECHONET Lite by drawing up certification specifications and accrediting third-party certification organizations. We are also working on to help member companies with product development and certification by holding regular events called Plugfests that give people the opportunity to actually try out interconnectivity with equipment from multiple vendors.

6. Conclusion

In this article, I have introduced the ECHONET Lite specification, which provides an open standard interface for smart houses, and the activities of the ECHONET Consortium. In April 2014, the ECHONET Consortium changed from a private organization into a general incorporated association. As we strengthen our systems, we intend to work harder than ever to respond to the needs of companies over a wide range of activities. Through our efforts to spread ECHONET Lite specifications and products, we hope that the consortium will contribute to the realization of a smart, sustainable society by exploiting the benefits of consumer electrical equipment and household facilities that have been cultivated in Japan so far in order to promote international business development.

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[4] Ministry of Economy, Trade and Industry: Collected publications of the JSCA International Standardization WG, Smart House Standardization Study Group, http://www.meti.go.jp/press/2011/02/20120224007/20120224007.html

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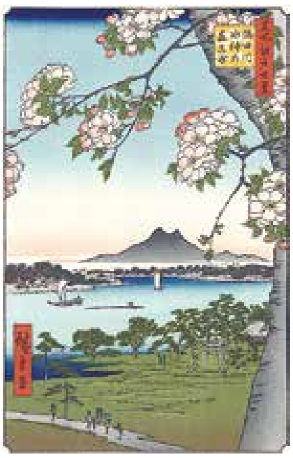
Cover Art



Meisho Edo Hyakkei Sumidagawa Suijin no mori Massaki

(Suijin Shrine and Massaki on the Sumida River, from the series One Hundred Famous Views of Edo)

Utagawa Hiroshige (1797-1858)

Woodblock print:
Courtesy of Sakai Kokodo Gallery

Smart Houses – HEMS Initiatives –

— *Certification of Smart Meter Communication* —

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1. Introduction

This article introduces the situation of smart electric energy meters in Japan, especially with regard to their certification.

Since meters are thought to be a key element of smart houses, it has been decided that they must be able to work closely with HEMSs (Home Energy Management Systems). However, meters are only provided by electric power companies, whereas HEMS services will be provided by other companies via open markets. This means that the meters are public goods installed in all houses and shared by many related businesses. In this regard, securing the interoperability and communication performance of these devices is of key importance in creating an environment for cooperative services.

A smart meter consists of three parts: (1) an electric power meter that has been certified based on the Measurement Act, (2) a communication unit that carries information between the meter and the electric power company (using communication methods specific to this particular company), and (3) a communication unit that provides data to the HEMS. As previously described, the communication units for (3) must all use the same standard protocol defined by the industry in Japan, and are required to pass SMA certification (to certify compliance of the smart meter's application layer) to ensure conformity.

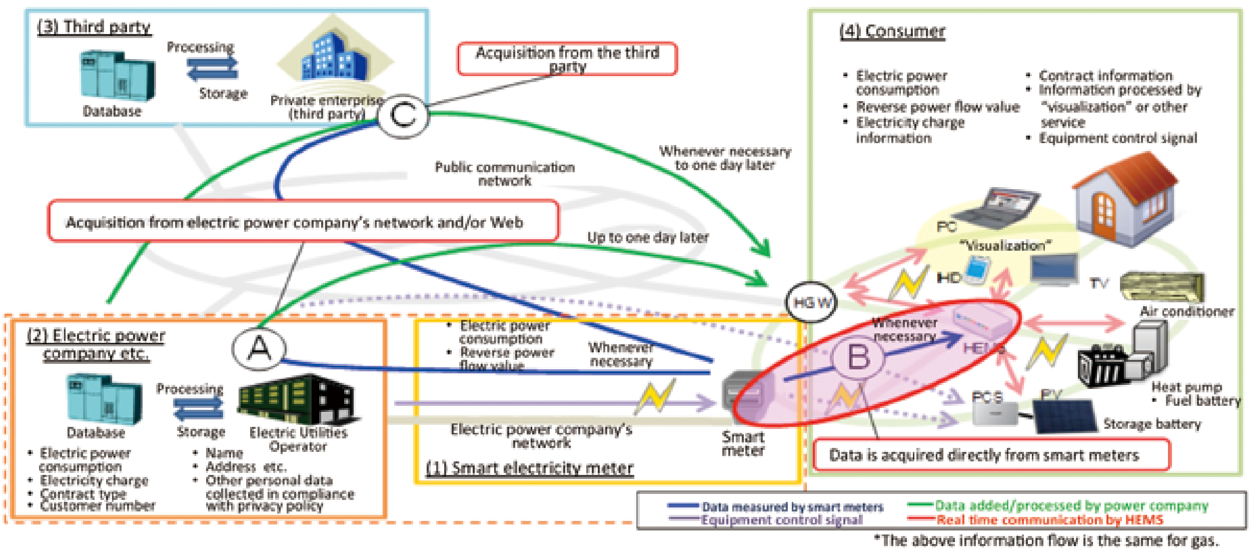
SMA certification has been in operation since April 2014. As a result, certified smart electric energy meters have been installed in limited areas since September 2014 by Tokyo Electric Power Co., Inc., and since the October 2014 by Chubu Electric Power Co., Inc.

The following sections present the background of smart meter certification, the framework of the certification, and the future prospects.

2. Background: Smart Meter Route B

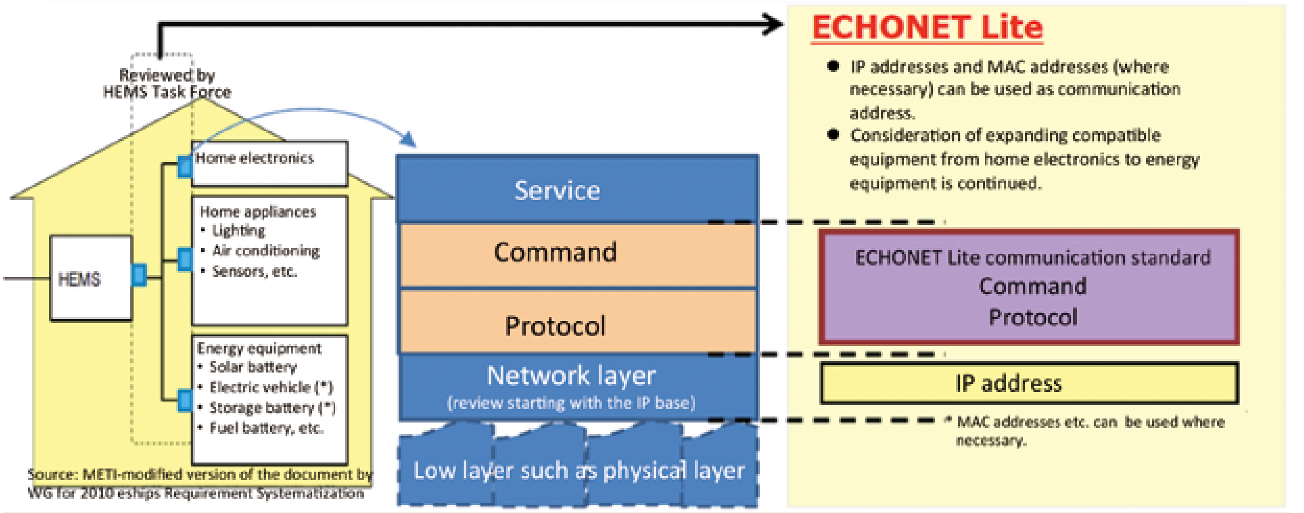
In this section, we first explain what are meant by the terms "smart meter" and "route B", and we discuss the significance of route B (the target of the certification).

Figure 1: Routes for Smart Meter Communication



Source: "The Smart Meter Scheme Study Group Report" on the 10th meeting the Smart Meter Scheme Study Group , Feb. 27, 2011
http://www.meti.go.jp/committee/summary/0004668/report_001_01_00.pdf

Figure 2: The position of ECHONET Lite in a HEMS



Source: Interim report (draft) by Smart House Standardization Study Group
http://www.meti.go.jp/press/2011/02/20120224007/20120224007-2.pdf

A smart meter is generally defined as an electronic meter that is equipped with a bidirectional communication function that allows the electric power company to read the meter and, if necessary, operate a breaker remotely. Such meters are also expected to create cooperative services with HEMSs.

A more detailed description can be found in a report by the Smart Meter System Study Group [1], which was established in May 2010 to discuss the basic concepts of smart meters, their introduction, and their future prospects. This report set the direction of smart meter deployment in Japan and triggered their introduction.

The smart meters being introduced on a wide scale in Japan are capable of cooperating with HEMSs. Another significant point is that all smart meters communicate using the same protocol, allowing any private company or electric power companies to access the same information in a common format. It is therefore no exaggeration to say that the smart meters in Japan are revolutionary, cutting-edge devices.

Here we describe the communication routes whereby data is obtained from smart meters. Currently, there are three routes, called routes A, B and C. Figure 1 shows a conceptual illustration of each route.

These routes were set forth in the report by the Smart Meter System Study Group. Route A is the route used by electric power companies, mainly to obtain meter data for billing. Route B is a newly introduced route, with which the meter data can be obtained directly from the meter by household equipment. Route B has the following three noteworthy characteristics:

i) Its data is no different from the data obtained via route A (i.e., identical to the electric power meter information for billing).
ii) Ordinary consumers are able to obtain this data with relatively little expense and effort.
iii) It provides better real-time data on electric power consumption than route A.

Point i) was published in the distributed material of the 14th Smart Meter System Study Group meeting, and was underwritten by the Ministry of Economy, Trade and Industry. For electricity providers, especially new entrepreneurs, this is the most important point in researching businesses that utilize the route B information. Of course this information is also useful for helping ordinary consumers save on their electricity bills.

As for point ii), a HEMS controller device that has gained SMA certification for route B is necessary to obtain data from the smart meter. In general, route B communication is scheduled to start earlier than route A. (Figure 2)

Those characteristics are premised on an open standard and secured by third-party certification. The communication protocol in route B, ECHONET Lite, is an open standard, which means that all sorts of information related to route B are published, and the essential data set is identical across the smart meters of all electric power companies. The ECHONET Lite specifications are published by the ECHONET Consortium [2]. Guidelines to the configuration and operation of route B have also been published by a committee [3]. It has thus been ensured that all the necessary information for conducting business related to route B is publicly available.

With regard to point iii), it is worth noting that route B also provides data on the instantaneous electric power consumption, which shows how much electricity is being consumed by the whole household at any particular moment. This information is almost useless without real-time handling, so route B is the only way it can be delivered. As described in the use cases shown in the guidelines, if consumers are presented with information about their instantaneous power usage through a HEMS (or are able to fetch this information at will), then they can be expected to take energy/electricity-saving actions such as turning off unnecessary appliances or adjusting the temperature settings of air conditioners. Alternatively, a warning message can be issued when too much electricity is being used, which can be useful for preventing circuit breakers from tripping unexpectedly.

The other information that can be obtained via route B, such as the cumulative energy consumption measured at every fixed period of time, and the current time, are fixed so as to be identical to the information used for billing that is obtained via route A. Other information related to billing, such as billing rates, is not currently available via route B, although new entrepreneurs entering the electricity retail business are expecting this situation to change in the future.

3. Framework of Route B Certification

So far we have explained the characteristics of smart electric power meters and route B. In this section, we describe the framework of certification according to the guideline [3].

A key point is that it requires the following three forms of third-party certification:

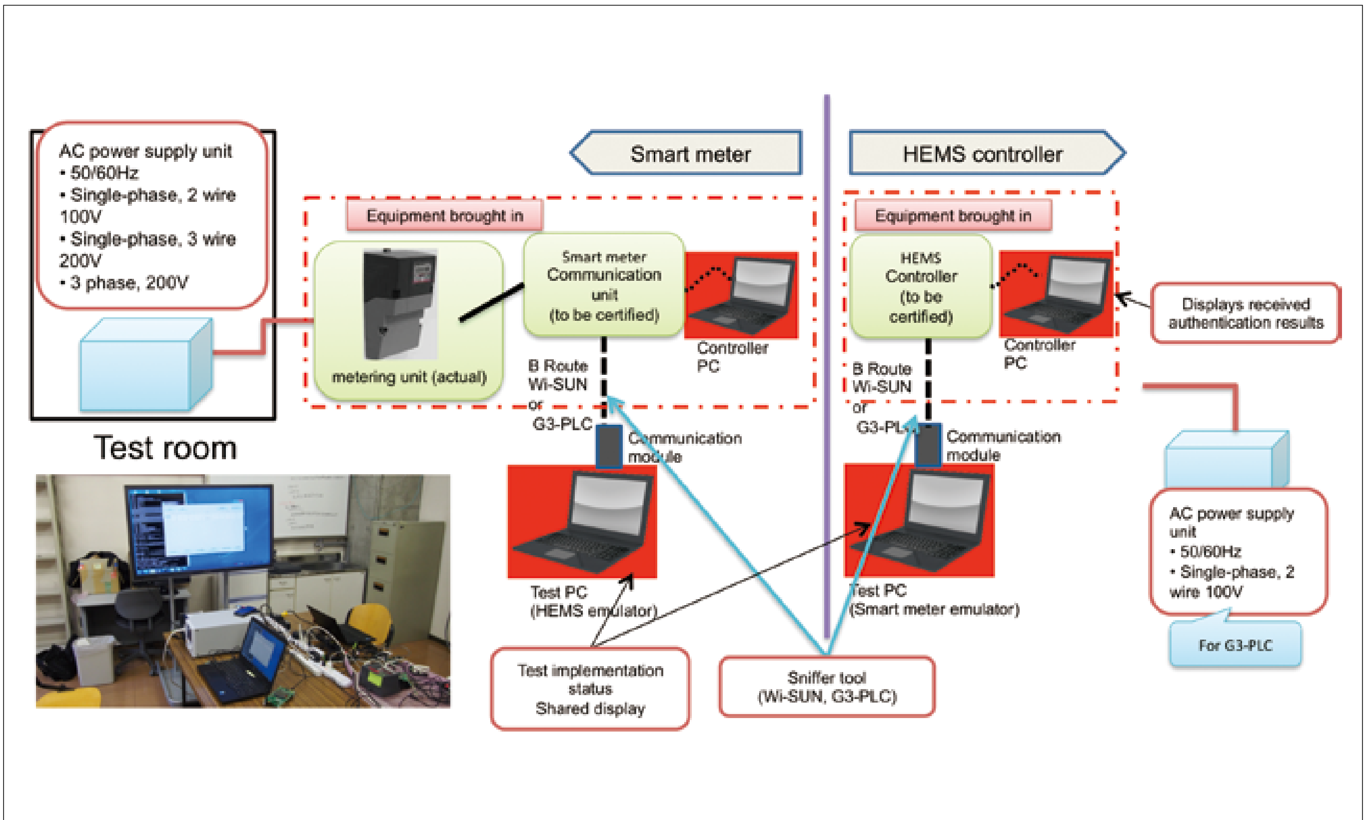
i) Certification of the lower communication layers (media part),

ii) ECHONET Lite certification (protocol layer of ECHONET Lite), and

iii) SMA certification (application layer of ECHONET Lite).

For i), the guidelines specify eligible methods for the physical layer and the layers below layer 4, and two methods are adopted by the electric power companies. The primary communication method is 920 MHz wireless communication (Wi-SUN(IP)) and the complementary method is power-line communication (G3-

Figure 3: SMA certification test system



PLC). A third-party certification test ensures conformity up to layer 4 (UDP) including the physical layers. Certification of both communication methods has already started.

For ii) and iii), the HEMS Certification Support Center at Kanagawa Institute of Technology has been named as the third-party certification organization by the ECHONET Consortium [4], and started providing certification in April 2014. For the purpose of securing conformity and interoperability, the center requires that the actual devices are submitted for both smart meter and HEMS controller testing.

Figure 3 shows the configurations of the SMA certification test system.

Note that all the three certifications must be granted in the correct sequence. After successfully completing the SMA certification test, a registration certificate is issued and the device is publicly listed on the ECHONET Consortium web site.

As of 12th February 2015, there are already 19 devices that have achieved SMA certification and registration (eleven smart meters and eight HEMS controllers), and this number will grow steadily when smart meters are introduced in earnest.

The HEMS Certification Support Center at Kanagawa Institute of Technology is also performing interoperability tests (IOTs) on SMA certified and registered devices. By introducing the actual smart meters from multiple electric power companies, an IOT laboratory is provided to the applicants for SMA certification. These interoperability tests are indispensable to developers because they make it possible to provide customers with services that are reliable but are also differentiated from the services offered by other companies.

4. Future Prospects

Environmental measures for the full-scale introduction of smart meters are now in an advanced stage of preparation. From now on, service providers are expected to clearly present the merits of improved interoperability. The government's involvement will probably shift towards the study of new services valuable to consumers, and how to facilitate those businesses.

Converting the smart house market to an open platform business is essential for the growth of this market. ECHONET Lite is an open platform and occupies a key position. The government is focusing its efforts on the cultivation of new business associated with smart houses through this platform.

In the future, it is expected that various new forms of business will emerge to make use of electricity usage data, especially data gathered through smart meters and HEMSs, and to provide related services. In particular, since there will have to be many services rooted in a particular region, we think that there is a pressing need for the cultivation of HEMS integrators that can respond to the needs in each region and provide their residents with the services they require. This is a new form of business that is expected to create circumstances that will cultivate housing ventures in housing business areas. This would take the form of a HEMS integrator service as a professional fusion of network technology and residential services.

The introduction of smart apartment blocks (condominium energy management system; MEMS) is also being promoted. The smallest unit of a MEMS is a HEMS, and the application of ECHONET Lite to small-scale BEMS such as tenant buildings is also being studied. In the future, this market is expected to grow in the same way as for smart houses.

At the same time, the emergence of many products and services that are useful to users (residents) will also be required. It is essential to create "living innovation" in order to realize smart houses that are of value to the people that live in them. It is essential for smart houses to provide a new kind of living environment that nobody has experienced before, where household electrical appliances, facilities and IT equipment work together cooperatively.

Finally, we would like to send a message to all businesses that are responsible for the growth of smart houses in the future.

As a major step towards the introduction of smart houses throughout Japan, smart house (HEMS) businesses based on the ECHONET Lite open standard interface have now started. This highly significant development demonstrates that initiatives such as the use of open standards, the open publication of various guidelines, and the creation of a third-party certification scheme have resulted in an environment where anyone can participate, and in the future we will promote activities to facilitate the creation of an open HEMS platform that will benefit everyone.

We are looking forward to seeing how things turn out in the future.

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Japan's Power Meter Deployment with ECHONET Lite over IPv6

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1. Discussions in JSCA regarding the deployment of an open standard interface

The Information Economy Committee of the Ministry of Economy, Trade and Industry's Industrial Structure Council held architecture-level discussions on the system theory aspects of Home Energy Management Systems (HEMS) and on the overall strategy regarding smart houses.

An energy management system is a system that implements Demand Side Management (DSM) to improve the efficiency with which energy is used at the customer side. There was a discussion on the subject of whether the system architecture should be vertically integrated with a closed interface, or should be horizontally specialized with an open interface.

A review of the published proceedings will show that a lively debate took place, but through these architecture-level discussions, it was resolved that new participants should be encouraged to realize innovation in relation to smart houses, emphasis should be placed on increasing the potential for added-value creation not limited solely to energy management, and the design of smart houses by horizontally specialized architecture based on known standard interfaces should be promoted.

With a horizontally specialized architecture, the overall system is built by using predetermined interfaces to assemble together smaller systems (subsystems). This results in a configuration with redundancy in the connections between subsystems (Carliss Y. Baldwin, Kim B. Clark, 2000).

Conversely, in a closed system that can be easily customized, it is easy to obtain a streamlined design that has little redundancy. Nevertheless, open systems that are wasteful in various aspects are used because of the larger incentives for the construction of many diverse systems at the same time.

In an open system, the interface selection is done in advance. Pre-selection of the interface is therefore essential. Another important is implementation. In gathering key players on demand side management such as Toshiba, Panasonic, NTT, Japanese Government has launched Smart House and Building Committee in JSCA.

2. Decision to recommend ECHONET Lite based on a public-private partnership

ECHONET is a home network communication protocol created by the ECHONET Consortium, which was founded in 1997 by a group mainly comprised of Japanese manufacturers of consumer electrical products with the aim of standardizing the implementation of home automation.

The distinguishing feature of this protocol is that it facilitates detailed control of Japanese consumer electrical products. On the other hand, since it defines interfaces for everything from physical media to application software, it is unable to adapt to the global trend towards the increasing use of IP at the network layer.

In particular, the presence of ECHONET addresses, which are intended to facilitate seamless connections to various physical layers, presents a major barrier to the formation of an international strategy. In response to requests from the public and private sectors, the ECHONET Consortium investigated the idea of abolishing ECHONET addresses and switching to a new communication protocol consisting of the ECHONET protocol superimposed on a physical layer using ordinary IP addresses.

This culminated in ECHONET Lite, which was released by the ECHONET Consortium on in July 2011. This specification has a new interface definition that does not define the physical layer and only defines parts of applications and the command systems of domestic electrical appliances and facilities.

Table 1: The leading smart house interfaces used in Japan and overseas

Type	Name of specification	Summary
Japan	ECHONET Lite	IP-based. Compatible with XML, etc. Defined for over 80 different devices. Allows detailed control
U.S.	SEP	IP-based. Predominantly offers superficial access to crude controls
Europe	KNX	Considerable experience of implementations in places on a larger scale than residential buildings (e.g., BEMS)

The two changes made by the ECHONET Consortium to the technical specifications (synchronizing with IP and leaving the physical layer unspecified) have had a major impact. This is because it facilitated cooperation with other protocols that have already been deployed and achieved international standardization. It could also be said that these changes made the protocol easier for new businesses and overseas businesses to use.

Although ECHONET Lite is sometimes criticized for being a Japan-only specification, this is not actually true. There are still many things that could be improved — for example, there are no training systems in place (even for engineers), no SDK or software development environment has been set up, and the only countries with equipment certification systems in place are Japan and Malaysia. However, it would be incorrect to call ECHONET Lite a national standard.

First, it has been ratified as an IEC standard. Second, the ECHONET Lite specification is an open standard. Third, it synchronizes with the direction of architectural maintenance of the international M2M network maintenance. And fourthly, it is being used in a growing number of implementations. The simultaneous promotion of these four factors is bringing ECHONET Lite to a firm international standing.

The ECHONET Consortium has received the support of the JSCA Smart House/Building Standardization and Business Promotion Study Group (established as a public/private partnership in Japan), and selected the IEC as the stage for the acquisition of international standardization, and has been steadily promoting de jure international standardization.

Specifically, it is participating in ISO/IEC JTC1 SC25 WG21, IEC TC57 WG21 and IEC TC100 in order to ascertain the trends in international standardization and engage in consultations with experts from around the world. Its main activities are outlined below. First, with regard to the standardization of ECHONET Lite, progress is being made in establishing the ECHONET Lite specification (ISO/IEC14543-4-3) as a communication standard in the form of a supplement to the ECHONET specification (ISO/IEC14543-4-1,2) that has already become an international standard. Second, an expanded proposal is also being prepared whereby control target objects (also usable in ECHONET Lite) are added to the ECHONET specification (IEC62394).

The ECHONET Lite specification (which is the unique intellectual property of the ECHONET Consortium) also plays a large role in open standard decision-making. All the technical specifications can currently be obtained via the ECHONET Consortium's public web site (http://www.echonet.gr.jp/spec/index.htm).

With regard to this decision-making, the ECHONET Consortium's Representative Director Morio Hirahara has stated the following:

> *"ECHONET Lite will only become valuable when everyone is using it and a market has grown around it. There is no point in guarding it jealously. In manufacturing, a leading manufacturer can make anything from scratch, but in networks, one should remember that value is expressed by connecting diverse equipment together. I hope that we can create products with the participation of people from as many different business fields as possible."*

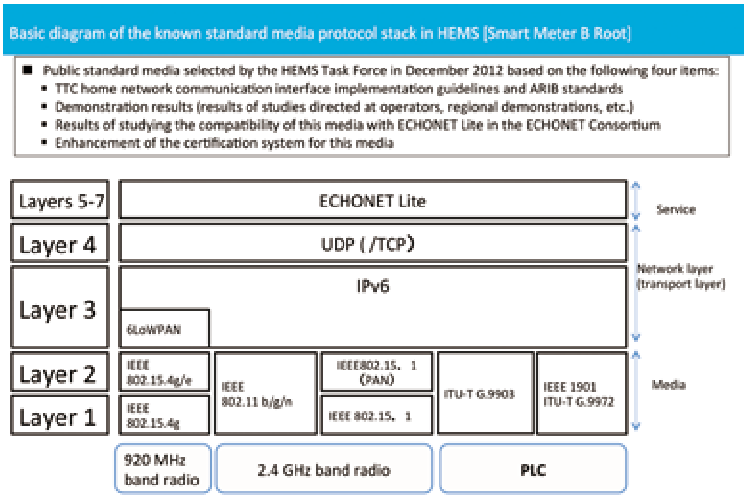
In practice, since the "four decision-making", the members of the ECHONET Consortium rapidly increased from 20 companies to over 200, stimulating the activity of participation in the ECHONET Consortium. (Figure 1)

The number of devices compatible with ECHONET Lite is continuing to grow steadily. At present, devices for which the specifications have been fixed account for not just consumer electrical products but over 90 different types of equipment.

Conventionally, the properties of air conditioners, lighting and other devices that use energy are defined, but the properties of photovoltaic solar cells, fuel cells and storage batteries are defined. In addition to consumer electrical products that use electricity, it is also intended that the same ECHONET Lite protocol should be used to connect devices that create or store electricity in the home.

By using ECHONET Lite, a well-known standard interface, to connect diverse types of domestic appliances to a network, we arrived at the implementation of an environment in which they can be integrally operated as a Home Energy Management System (HEMS).

Figure 1: The ECHONET Lite protocol stack



I also hear from overseas manufacturers that they are studying the writing of their own country's specifications for consumer electrical equipment and sensor devices. By paying a registration fee of just ¥300,000 (less than $3000 in U.S. dollars), anyone in the world can help write the specifications for new ECHONET Lite equipment.

3. Leading implementation of "B Route" smart meters

In March 2012, the Ministry of Economy, Trade and Industry Smart Meter System Investigation Committee announced that users of electric power usage information would be introducing the "B-route" technical specifications acquired directly from smart meters. This smart meter specification, which required the implementation of an IPv6 single stack and ECHONET Lite, has achieved global recognition as an advanced architecture.

The author gained the opportunity to lead the development of this specification, but in fact before the announcement of this specification, the smart meters had become a symbol of Japan's closed architecture, but since this announcement there has been a lot less criticism of this sort, especially from overseas.

At present, the implementation of smart meters using B-route is progressing smoothly. This stepped up a gear with the opportunities presented by the July 2014 publication of smart meter specifications for the Tokyo area (TEPCO) and Nagoya area (Chubu Electric Power). The US media company Bloomberg has reported that by 2020, 85% of Japan's demand for electricity will be obtained through smart meters. New smart meters are being installed in every home in Japan ahead of the rest of the world, and it is expected that Japan will lead the world in the innovation of smart meters and the IOT (Internet of Things).

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Initiatives on Regulation of Transmission Media Between Smart Meters and HEMS

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1. Introduction

Concern for managing the supply and demand for electrical power increased in the wake of the Great East Japan Earthquake in 2011, and with the increased awareness and demand in society to install and spread use of smart meters—electricity meters incorporating a communications function—in society, related initiatives are becoming more active. The government-initiated Japan Smart Community Alliance (JSCA), established in 2010 to unite the government and citizens in advancing smart communities, created the Smart House/Building Standardization and Business Development Forum. To promote the spread of smart meters and related services, The Forum has defined the ECHONET Lite[1] standard interface between Home Energy Management Systems (HEMS) and eight types of key devices, including smart meters (the others are air conditioners, lighting, solar power panels, storage batteries, EV/PHV, fuel cells, and hot water heaters).

This paper introduces initiatives for regulating the transmission media and interconnectivity issues when using ECHONET Lite as the communication interface between smart meters and HEMS.

2. Issues with regulation of transmission media for ECHONET Lite

ECHONET Lite is a communications standard set by the ECONET Consortium[2], a standardization organization comprising manufacturers of HEMS-related electronics, communications providers, and power companies. It describes in detail, the states and control commands for more than 90 types of HEMS-related devices. ECHONET Lite defines communications protocols and device objects corresponding to layers 5 to 7 of the OSI model (the upper layers), but does not define layers 4 and below. Since various media could be used for transport, maintaining interconnectivity at the transmission level has been an issue. The lower levels for ECHONET Lite are shown in Figure 1. To implement interconnectivity between ECHONET Lite devices from different device manufacturers, it is very important that they adopt and implement a well-known

Figure 1: Lower layers of ECHONET Lite

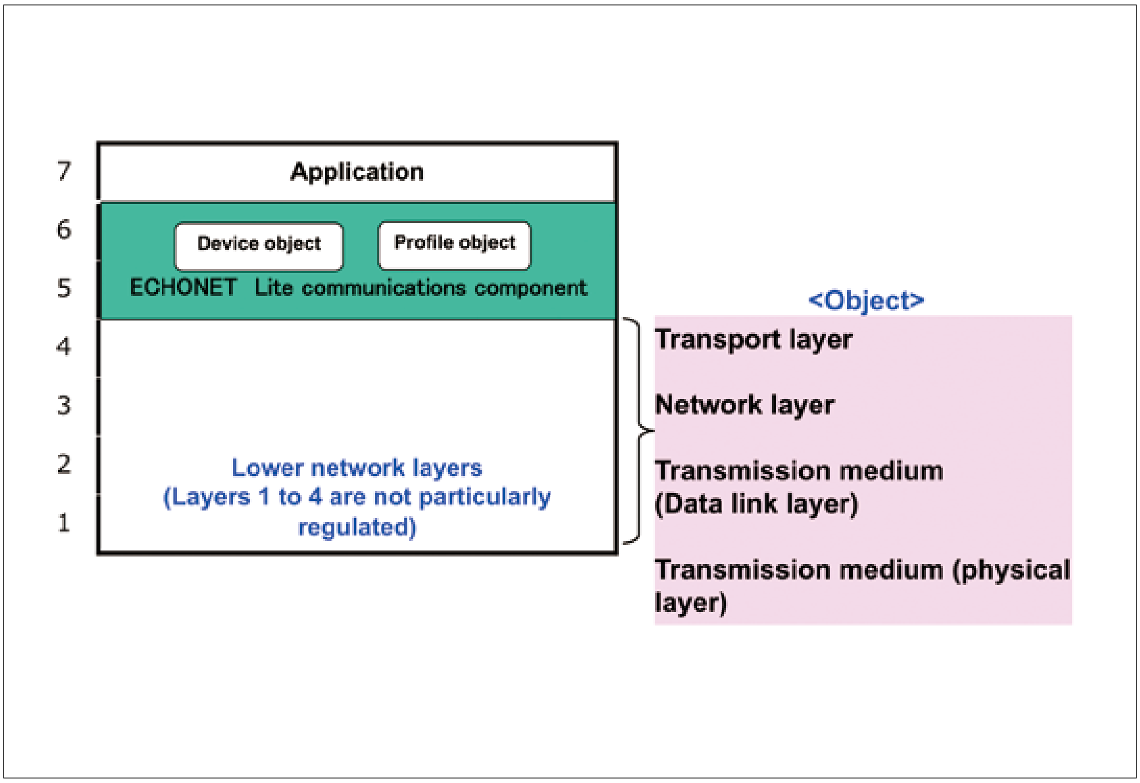
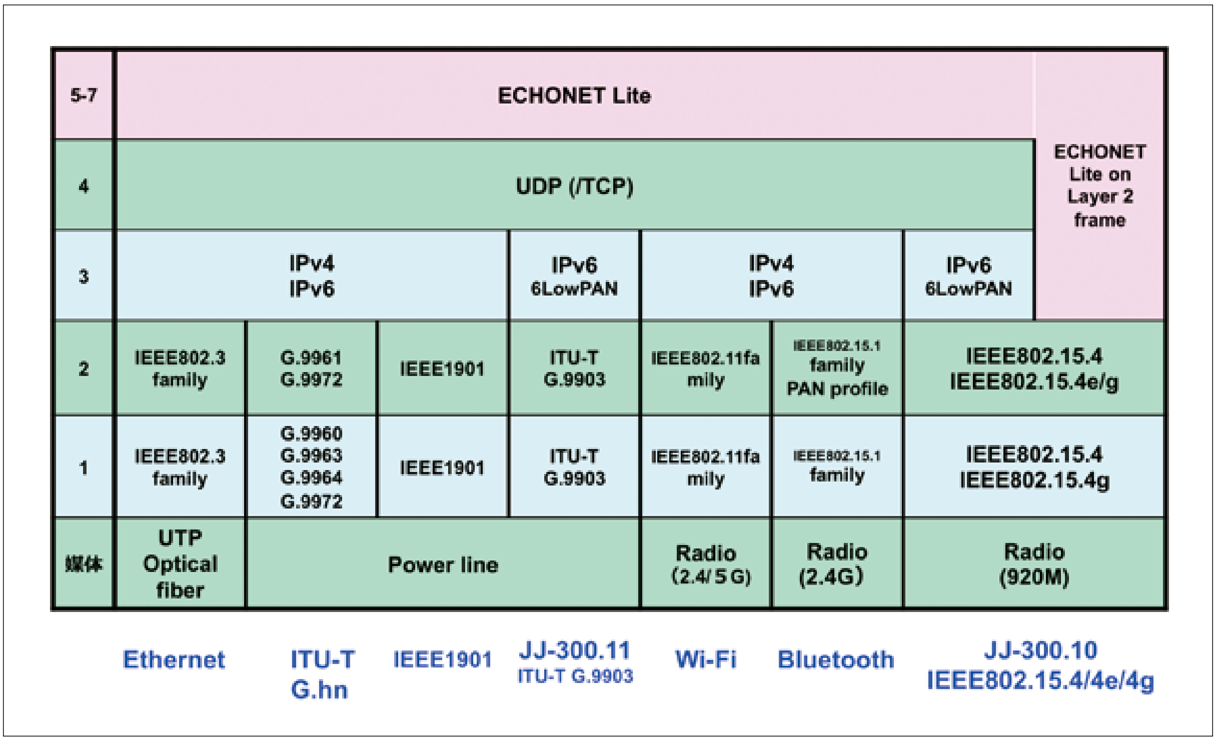


Figure 2: Overview of protocol stacks for ECHONET Lite lower communication layers



standard communication format and not their own original format.

3. Regulation of ECHONET Lite lower communication layers at the TTC

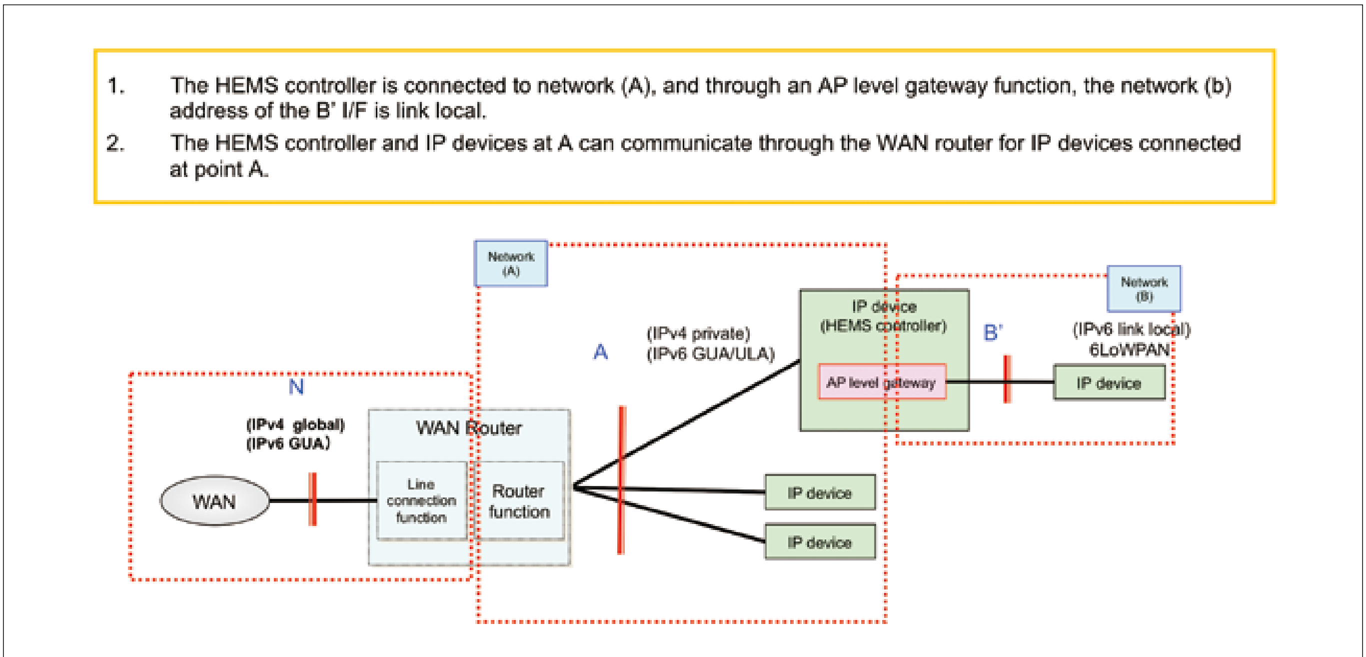
Considering the above issues, the TTC Next-generation Home Network System Expert's Committee has created technical and standardization documents[3][4] defining various standards for the ECHONET Lite lower communication layers. An overview of documents related to the standard is given below.

3.1 TR-1043 Home Network Communication Interface Implementation Guidelines

This technical document[5] specifies well-known communications formats and protocol stacks for the lower communication layers of ECHONET Lite. An overview of these protocol stacks is shown in Figure 2.

The document also gives a network model with configurations of how smart meters and other HEMS related devices are connected to a home network and describes a physical configuration example based on the model. The physical configuration example is shown in Figure 3.

Figure 3: Example physical configuration



3.2 JJ-300.10 Home Network Communication Interface for ECHONET Lite (IEEE 802.15.4/4g/4e 920 MHz band)

This standard document[6] describes communication format specifications for the physical, data-link, network, and transport layers when using 920 MHz band radio as the lower layer communications environment for ECHONET Lite. The communication specification protocol stacks specified in JJ-300.10 and related standardization organizations are shown in Figure 4.

JJ-300.10 describes three modes: A, B, and C. For modes A and C, it describes the Wi-SUN specification defined by the Wi-SUN Alliance as the Route B connection format, along with parameters, and security specifications. For mode B it describes the ZigBee IP specification defined by the ZigBee Alliance.

3.3 JJ-300.11 Home Network Communication Interface for ECHONET Lite (ITU-T G.9903 Narrow band OFDM PLC)

This standardization document[7] describes communication formats for the physical, data-link, network, and transport layers when using power lines for the lower-layer communication with ECHONET Lite. The protocol stack for communication specifications in JJ-300.11 is shown in Figure 5.

3.4 TR-1052 HEMS-Smart Meter (Route B) Communication Interface Detailed Implementation Guidelines

This technical document[8] defines the required authentication methods and connection sequences in detail for each of the HEMS-Smart meter (Route B) transport media. Specifically, a common authentication ID and password format are specified for the Route B connection so that the same authentication can be used regardless of the selected transport medium. The Route B authentication ID and password usage and detailed connection sequence are also described for JJ-300.10v2 mode A (Wi-SUN IP) and JJ-300.11.v2 (G3-PLC), and JJ-300.10v2 mode B (ZigBee IP).

4. HEMS-Smart Meter Route B Communication Format Operational Guidelines and state of adoption at various power companies

JSCA is creating the "HEMS-Smart meter Route B Communication Format and Operating Guidelines"[9], describing

Figure 4: Overview of JJ-300-10

Protocol Stack	Protocol/Standard		
Session – Application	ECHONET Lite		
Transport layer protocol	a1. UDP	a2. TCP	b. ECHONET Lite on Layer 2 frame
Network layer protocol	IPv6 / 6LoWPAN		
Data link layer protocol	IEEE802.15.4, IEEE802.15.4e/g		
Physical layer protocol	IEEE802.15.4, IEEE 802.15.4g		
Medium	Radio (920 MHz band)		

a1: TTC JJ-300.10 (Mode A, Mode B)
a2: Published specification documents do not yet exist.
B: TTC JJ-300.10 (Mode C)

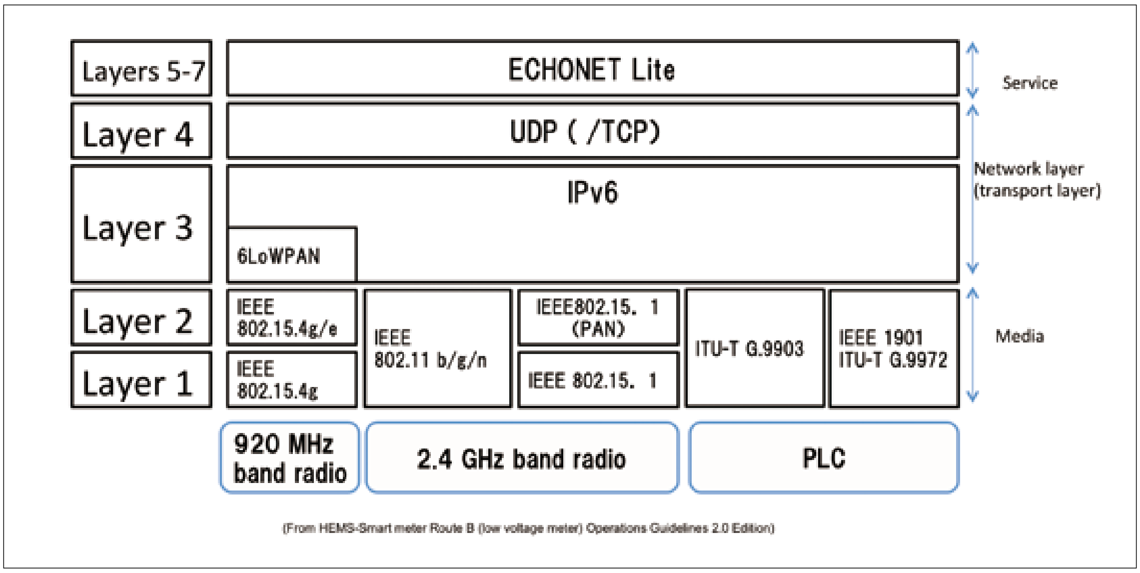
Mode	Selection in Table 1	Relevant organization	
Mode A	a	ECONET Consortium	Wi-SUN
Mode B	a		ZigBee
Mode C	b		Wi-SUN

Figure 5: Overview of JJ-300-11

Protocol Stack	Protocol/Standard		
Session – Application	ECHONET Lite		
Transport layer protocol	a1. UDP	a2. TCP	b. ECHONET Lite frame on Layer 2
Network layer protocol	IPv6 / 6LoWPAN		
Data link layer protocol	ITU-T 9903		
Physical layer protocol	ITU-T 9903		
Medium	Power line		

a1: TTC JJ-300.11 (over IP)
a2, b: Published specification documents do not yet exist.

■ **Figure 6: Basic diagram of well-known standard media protocol stack for HEMS**



agreed-upon common items for opening and operating Route B communications between smart meters and HEMS, so that these connections can operate properly. The guidelines describe the transmission media, communication formats and network structure with reference to the TTC technical documents introduced in Section 3. The protocol stack described in these guidelines is shown in Figure 6.

The Route B communication formats adopted by each power company are also shown in Figure 7, with JJ-300.10 Mode A (Wi-SUN IP) as the main format, and JJ-300.11 (G3-PLC) as the complementary format, according to the operational guidelines above.

5. Conclusion

We have introduced TTC standardization activities for transport media, as necessary to guarantee interconnectivity of devices using ECHONET Lite, which is the standard protocol used between smart meters and HEMS. Standardization of the communications interface between smart meters and HEMS is a key component of using smart meters effectively, and implementation of the standard specifications that include these transport media will be very significant for the proliferation and utilization of smart meters.

In the future, as ECHONET Lite is incorporated into various devices, it will be necessary to support new communications standards, and the standardization and technical documents will need to be revised to ensure interconnectivity. As such, the role that the TTC and others will need to play will continue to be significant.

Drafts of the TTC standardization and technical documents discussed here were discussed at the New Generation Network Promotion Forum, IP Network Working Group, Residential ICT Strategic Working Group (lead by Prof. Yasuo Tan [JAIST/NICT]), and went through deliberation in the Next Generation Home Network Systems Experts Committee before being settled. We would like to express our sincere gratitude to all those involved.

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■ **Figure 7: Route B communications at various power companies**

RFP status for communication and related systems (Route B) at each power company

Communication formats for routes selected by each power company (as of Sept. 2014)

	Main format	Complementary format
Hokkaido Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Tohoku Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Tokyo Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Chubu Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Hokuriku Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
The Kansai Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC G3-PLC format)
The Chugoku Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Shikoku Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
Kyushu Electric Power Company	920 MHz band radio (Wi-SUN format (IP)	PLC (G3-PLC format)
The Okinawa Electric Power Company	920 MHz band radio] (Wi-SUN format (IP)	PLC (G3-PLC format)

* Each company in principle considers installing the "Main format", but selects the "Complementary format" when environmental or other conditions make this difficult.

The only Broadcast Satellite Operator as Successor to the World's First Broadcast Satellite Service

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Broadcasting Satellite System Corporation (B-SAT)

1. Introduction

The world's first direct broadcasting satellite (BS) service in the 12 GHz band was started in May, 1984 by NHK (Japan Broadcasting Corporation). This BS service to households was made reality after eighteen years of research and with the cooperation of many organizations.

B-SAT was established in April 1993 to provide a successor to the BS-3 services, which provided programs with high reliability from NHK, WOWOW and HDTV promotion organizations, and to procure new satellites. B-SAT procured the BSAT-1 and BSAT-2 satellites (launched in 1997 and 1998 respectively), BSAT-2a and 2c (launched in 2001 and 2003 respectively) and BSAT-3a, 3b, and 3c (launched in 2007, 2010 and 2011 respectively). B-SAT contributed to the initiation of digital BS in 2000 and the termination of analogue BS in 2011. B-SAT now makes full use of the 12 BSS Plan channels, with 34.5 MHz of bandwidth. As of February 2015, the 28 broadcasters are providing 39 programs (28 HDTV, 8 SDTV, 2 Data, 1 Audio) through BSAT-3a, 3b, and 3c (Figure 1). NHK enjoys over 18 million subscribers as of August 2014.

Figure 1: BS programs through B-SAT satellites (As of February 2015)

	1 ch (11.72748GHz)		3 ch (11.76584GHz)		5 ch (11.80420GHz)		7 ch (11.84256GHz)			
	BS Asahi	BS-TBS	BS Japan		WOWOW		Star Channel		Animax	Disney
				[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	[PAY]
(slots)	(24)	(24)	(24)	(24)	(24)	(24)	(13)	(13)	(16)	(6)

	9 ch (11.88092GHz)			11 ch (11.91928GHz)			13 ch (11.95764GHz)		15 ch (11.99600GHz)			
	BS 11	Star Channel	TwellV	Fox	Sky Perfect	OUJ	BS Nippon	BS Fuji	NHK		Dpa	WNI
		[PAY]		[PAY]	[PAY]							
(slots)	(18)	(15)	(15)	(16)	(16)	(16)	(24)	(24)	(23)	(21.5)	(2)	(1.5)

	17 ch (12.03436GHz)	19 ch (12.07272GHz)			21 ch (12.11108GHz)			23 ch (12.14944GHz)		
	Dpa 7 SD Channels	GREEN	J-SPORTS				IMAGICA TV	Fishing Vision	Nippon Eiga	Dlife
		[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	[PAY]	
(slots)	(48)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

2. BS services with high reliability

B-SAT makes every effort to maintain reliable BS services, with measures including: (1) Three satellites for 12 channels, (2) Two satellite control centers at Kawaguchi and Kimitsu, (3) Two uplink stations at Shibuya and Shobu (A third back-up station will be built at Kimitsu in 2015 (Figure 2)), (4) Transportable back-up stations on vehicles (Figure 3), and (5) Receivers for monitoring at eight locations in Japan (Figure 4).

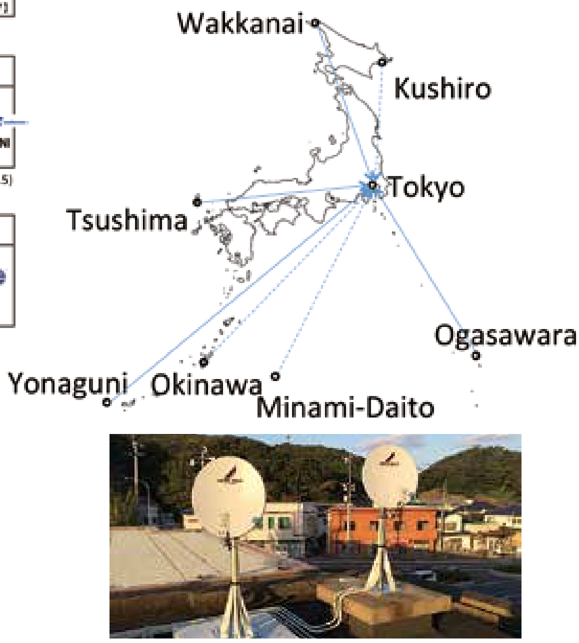
Figure 2: Third back-up station

Figure 3: Transportable back-up station

3. Toward new BS services

The Ministry of Internal Affairs and Communications of Japan announced in September 2014 that 4K UHDTV regular service will start in 2015, 8K UHDTV test broadcasting will start in 2016 and 8K UHDTV regular broadcasting will start in 2018. The new BS technical standard has been developed, including features such as 16APSK modulation, which accommodates a high bit rate for UHDTV. B-SAT will maintain its contribution to realizing BS UHDTV services in the future by implementing new satellites, utilizing new bandwidth with high performance, and facilitating new earth stations.

Figure 4: Receivers for monitoring at eight locations in Japan



= A Serial Introduction Part 3=
Winners of ITU-AJ Encouragement Awards

In May every year, the ITU Association of Japan (ITU-AJ) proudly presents ITU-AJ Encouragement Awards to people who have made outstanding contributions in the field of international standardization and have helped in the ongoing development of ICT.
These Awards are also an embodiment of our sincere desire to encourage further contributions from these individuals in the future.
If you happen to run into these winners at another meeting in the future, please say hello to them.
But first, as part of the introductory series of Award Winners in 2014, allow us to introduce some of those remarkable winners;

Kimihiko Kazui
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Video coding

H.265 standardization activity in JCT-VC

Currently I am participating in the activities of the JCT-VC, a joint organization of ITU-T Q6/16 and ISO/IEC JTC1/SC29/WG11 (MPEG), for the standardization of H.265 (a.k.a. High efficiency Video Coding, HEVC). H.265 is designed for next generation video applications such as ultra-high definition TV (4K/8K) and achieves coding efficiency twice that of its predecessor, H.264.

On this occasion, I received the 2014 ITU-AJ Encouragement Award for my contribution to H.265 standardization, and in particular, for the specification of the ultra-low latency operation mode.

Emerging real-time video applications such as remote robot operation need very low video transmission delay of less than one frame interval (e.g. 16 ms for 60 Hz video), but existing standards such as H.264 do not specify an ultra-low latency operation mode. As a result, interoperable ultra-low delay video communication has not been possible.

To solve this problem, I spent a year proposing to JCT-VC, that an ultra-low latency operation mode be supported. This operation mode was adopted in the H.265 draft in 2012.

JCT-VC is now working on an extension to H.265 for new video applications such as Virtual Desktop Infrastructure (VDI). In parallel with this extension work, activity has been launched for a future new video coding standard. This future standard is targeted for the forthcoming telecommunication environment enabled by 5G network technology, in around 2020.

I will continue my standardization work in ITU for enhancing our life through video technologies.

Takato Kawamura
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My experience in ITU-R activity and contribution to future broadcasting technology for the Tokyo Olympics and Paralympics, 2020

My international standardization activities in the field of broadcasting spectrum at the International Telecommunication Union Radiocommunication Sector (ITU-R) and World Radiocommunication Conferences (WRC) began in 2010. My contribution to ITU-R Working Party 6A on broadcasters' role in the Great East Japan Earthquake in March 2011 became a part of Report ITU-R BT.2299. It drew attention to the importance of broadcasting in emergency situations and Japanese broadcasting technologies such as the Earthquake Early Warning System and "One-seg" mobile TV, which notified people of the disaster quickly. Sharing our experience and technologies in the ITU-R was highly regarded. In addition, I was also involved in frequency sharing studies related to WRC-12 agenda items. These involved protection of the Broadcasting Auxiliary Service (WRC-12 Agenda Item 1.25) and radio microphones (WRC-12 Agenda Item 1.15).

Broadcasters use wide range of radio-frequency bands, such as AM radio in medium frequency band, radio microphones in high frequency, terrestrial TV service in ultra high frequency, and satellite TV service in super high frequency. This requires us to have wide ranging knowledge regarding the various frequencies. Also, in the sharing studies in these various frequency bands between services related to the broadcasting and other services, reaching mutual understandings between experts in these services was the real challenge for me.

Japan has completed migration of television from analogue to digital. In preparation for the Tokyo Olympics and Paralympics in 2020, new challenges have just begun in the further development of broadcasting technologies such as 8K Super Hi-Vision and Hybridcast. I will devote myself to the development of these broadcasting technologies and promote the latest Japanese technology internationally through ITU activities.

Yasuji Sakaguchi

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Design and maintenance of digital terrestrial broadcasting network

Emergency Warnings, Anywhere and Anytime

— Proposal and standardization of an Emergency Warning Broadcast System (EWBS) suited to broadcasting conditions in Central and South America —

The Japanese digital terrestrial broadcasting format (ISDB-T) has been adopted by 17 countries in South and Central America and around the world. I was in Peru for three years starting in September, 2009, as a JICA expert supporting their implementation of ISDB-T. I engaged in a wide range of activities, including consolidating their frequency plan and broadcast network, and educating broadcasting technologists.

I put particular effort into supporting implementation of the Emergency Warning Broadcast System (EWBS) using digital terrestrial TV. Peru is a major earthquake country, so there is great interest in EWBS, and strong demand for my support. However, emergency bulletins on television were not common in Central and South America, so the implementation had to be customized to suit local broadcasting conditions. After a long period of surveys and studies, we proposed a simple emergency warning system using text captions. The ISDB-T International Forum, an organization of countries that have adopted ISDB-T, is conducting standardization activities to harmonize the process of implementing digital terrestrial broadcasting in the overall Central and South American region. Within it, I was the founding chairman of the EWBS working group, and completed the international agreement to use my proposed format as the international standard.

Initially, people in Peru touted ISDB-T as a magic box, that would "give us early warning of earthquakes through digital television...," but the implementation was not so simple. The format had to be customized, standardized, operating rules created, and transmitter and receiver equipment developed and introduced to market. There were many things to be done. I had to explain to the people of Peru how cooperation was necessary at each step, in order to implement the system. In spite of difficulties due to differences in language and culture and as a result of continuous and persevering activity, the EWBS standard was finally settled.

In the future, I want to continue efforts to support implementations of EWBS throughout the world, and work to promote and spread its advancement.

Hitoshi Sanei

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Standardization at ITU-R and Overseas Promotion Activities through the ABU and ARIB

In the ITU-R Working Party 6A, I did work including addition of interference protection ratios for ISDB-T and IMT to the planning criteria Recommendation for digital terrestrial broadcasting, and created new Recommendation on planning criteria for terrestrial multimedia broadcasting for mobile reception using handheld receivers such as ISDB-Tmm. In the Asia-Pacific Broadcasting Union (ABU), I was project leader for Mobile Digital Multimedia Broadcasting, a technical committee transmission topic area, and there gave reports on trends regarding One-Seg, multimedia broadcasting, and area One-Seg in Japan. In the Digital Broadcasting Experts Group (DiBEG) of the Association of Radio Industries and Businesses (ARIB), I worked on customizing technical standards and operating guidelines for countries like the Philippines and Botswana, which have recently adopted ISDB-T. On one hand, we are spreading the ISDB-T systems recommended by ITU-R overseas, but we are also working to revise ITU-R Recommendations on planning criteria for existing digital terrestrial television services, to deal with broadcast bandwidth in newly adopting countries and other broadcasting systems in neighboring countries.

Currently, I am engaged in the promoting adoption of broadcast services such as Hybridcast and 4K/8K broadcasts.

Regarding Hybridcast using HTML5, we are introducing its status in Japan, which is advanced in this area compared to other countries, through ABU-hosted workshops on operation and promotion of integrated broadcast-broadband services. We are also extending domestic services and publishing information for overseas markets.

With 8K Super Hi-Vision, we have various initiatives to start test satellite broadcasts in 2016, start satellite broadcasts in 2018, and spread it in a major way for the 2020 Olympic Games in Tokyo, for which planning has begun. For example, we are actively holding public viewings within Japan and abroad to give more people experience ultra-realistic viewing.

By deploying these services successfully in Japan, we believe it will contribute to deploying Hybridcast and 8K Super Hi-Vision, as standardized by ITU-R, overseas as well.

Fumie Fukushima
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International Cooperation

Telecom for Humanitarian Support Activities at BHN

Since I joined BHN in 1997, I have been involved in international collaboration. I did not have much experience or specialist knowledge in information and communications technology (ICT) or international cooperation. Therefore, in my first few years of being involved in support activities, I endured many hardships with providing initial response assistance activities in disaster-hit areas and other dangerous areas. However, through wide-ranging experiences, I was truly able to learn a lot.

When providing disaster relief for earthquakes and tsunamis, it is necessary to obtain permission from the disaster-hit country's government before starting activities. Even though it is an emergency situation, permission is necessary for things like NGO registration, using transceivers, and setting up FM radio stations. Additionally, the difficulty of doing this depends on the country's disaster conditions, level of confusion, and level of acceptance of support organizations. The ability to hire local staff that have a lot of experience and good connections has a large effect on the success of such activities, so discretion is needed in hiring personnel.

At the time in which our other project involving building wireless networks in medical facilities in Afghanistan was being carried out, there were many incidents of suicide bombings, as well as kidnappings and abductions of foreign NGO staff. Therefore, extreme care was taken regarding safety measures while carrying out these life-or-death activities. Once public order was restored and on-site work could resume, we still had to be careful every day to wear the same clothing as local women, travel in vehicles with bullet-proof glass, and watch for disorder on the roads.

We put our things in order before leaving Japan, and when we arrived at a stopover such as Dubai or New Delhi on the way home, I can remember the indescribable feelings of relief and release I felt, thinking, "Well, it looks like I'll get home safely now…"

Although I have told many stories of adversity, last year we received a wonderful report that a graduate of our first human resource training session was appointed Chairman of the Uzbekistan National Committee on Information and Communication Technologies (equivalent to a Cabinet Minister in Japan). This feels like a real success after many years of hopes and efforts from past chairmen and leaders.

As BHN approaches its 25th Anniversary, those that have been involved with the work will inevitably repeat past mistakes and regrets, but our activities continue to advance as continuing training and post-project monitoring become more emphasized.

We will continue to build cooperation with many NGOs, telecommunications organizations, and organizations for international cooperation as we continue our activities. Through this, we hope to increase the number of people who care about these activities.

ITU Kaleidoscope 2015
Trust in the Information Society

The 7th ITU Kaleidoscope academic conference

Barcelona, Spain, 9-11 December 2015

Call for Papers

Kaleidoscope 2015: Trust in the Information Society is the seventh in a series of peer-reviewed academic conferences organized by ITU to bring together a wide range of views from universities, industry and research institutions. The aim of the Kaleidoscope conferences is to identify emerging developments in information and communication technologies (ICTs) and, in particular, areas in need of international standards to aid the healthy development of the Information Society.

The 'Connect 2020' framework embedded in ITU's Strategic Plan elaborates a guiding vision for the future development of the Information Society, focusing on inclusive and sustainable growth of the ICT ecosystem.

Kaleidoscope 2015: Trust in the Information Society will analyze means of building information infrastructures deserving our trust. The event will highlight ideas and research that will help ensure the Information Society's growth in inclusivity and sustainability thanks to its trusted foundations.

ICT is the common thread tying together all walks of life. It is at the heart of innovation in areas as diverse as energy management, transportation, healthcare, education and financial services, and 'always-on' network access has been a welcome driver of economic growth and social development. The ICT ecosystem has become a facility we can no longer do without, making it essential to ensure that users of ICTs may trust in the Information Society.

Concerns continue to grow around what has been dubbed the "darker side" of the Information Society. All industry sectors are expected to deploy technologies under the banner of IoT, and the interconnection of all types of objects – from vehicles to streetlights and household appliances – gives rise to unprecedented implications for data security, the reliability of critical infrastructure and the privacy and safety of the world's citizens. Given the borderless nature of the network, addressing concerns around security is not only a national priority; it is inherently global.

A more comprehensive approach to security is required, taken in a view of the entire digital ecosystem. Kaleidoscope 2015 will provide a platform to analyze the notion of "trust" in the ICT context as well as innovations embedding trust into ICT ecosystems and infrastructures to bring greater certainty, confidence and predictability to our interactions within the Information Society.

Kaleidoscope 2015: Trust in the Information Society calls for original research papers offering bold, innovative approaches to the research into and development of standardized platforms for the benefit of all, in particular underserved communities and citizens of developing countries. A key point will be the identification of the main challenges still to be addressed to develop standards supporting the development of trust-worthy information infrastructures.

The 2015 edition of Kaleidoscope will contribute to the celebration of ITU's 150th anniversary, which will be a tribute to the extraordinary innovation of the global ICT community. The story of ITU is one of international cooperation among governments, industry players, civil society, academia and research institutes. ITU has a proud history as a key platform for the international community to bring cohesion to innovation in the ICT sector, and Kaleidoscope 2015 will celebrate academia's immense contribution in service of ITU's mission to 'Connect the World'.

Audience

Kaleidoscope 2015 targets specialists in the fields of ICT and socio-economic development, including researchers, academics, students, engineers, policymakers, regulators, innovators and futurists.

Date and venue

9-11 December 2015, Universitat Autònoma de Barcelona, Barcelona, Spain

Submission of papers

Prospective authors from ITU Member States are invited to submit full, original papers with a maximum length of 4,500 words. The submission should be within eight pages, including a summary and references, using the template available on the event website. All papers will go through a double-blind peer-review process. Submission must be made electronically; see **http://itu.int/go/K-2015** for more details on online submission (EDAS). Paper proposals will be evaluated according to content, originality, clarity, relevance to the conference's theme and, in particular, **significance to future standards**.

Deadlines

Submission of full paper proposals: ***6 July 2015***

Notification of paper acceptance: ***18 September 2015***

Submission of camera-ready accepted papers: ***9 October 2015***

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Publication and presentation

Accepted and presented papers will be published in the Conference Proceedings. In addition, updated versions of selected papers will be considered for publication in the International **Journal of Technology Marketing**, the **International Journal of IT Standards & Standardization Research**, or the **Journal of ICT Standardization**.

Awards

A prize fund totaling USD 10,000 will be shared among the authors of the three best papers, as judged by the Steering and Technical Programme Committees. In addition, young authors of up to 30 years of age presenting accepted papers will receive Young Author Recognition certificates.

Keywords

Information and communication technologies (ICTs), standards, standardization, technological innovation, information society, converging technologies, ubiquitous networks, internet of things, trustworthiness, security, privacy, reliability.

Suggested (non-exclusive) list of topics

Track 1: Trust in technology and network infrastructure

- Pervasive and trusted platforms and infrastructure
- Virtualization of resources including network functions virtualization and software-defined networking
- Future mobile infrastructure: 5G and beyond
- Architecture considerations for seamless mobility
- Architecture for machine-oriented communications such as M2M, IoT, sensor networks
- Security-, privacy-, and trust-enhancing technologies
- Trustworthy infrastructure for content delivery networks
- Enterprise integration and service-oriented architecture
- Human-centric, cognitive and context-aware systems and functions
- Quality of service, quality of experience, quality of security service
- Protocol architecture convergence and interoperability

Track 2: Trustworthy applications and services

- Trust in ubiquitous applications and services: connected vehicles, healthcare, homes, etc.
- Trust in cloud computing
- Privacy, trust and big data
- Trustworthiness in social networking services and social media
- Emerging video services and applications
- Trustworthy location-based services
- Digital financial services
- Artificial intelligence and deep learning
- Augmented and virtual reality
- Robots and drones

Track 3: Social, economic and policy aspects of trustworthy ICTs

- Strategies and policies enabling an information society
- Actors, value chains and business models in an information society
- Rights and responsibilities of connected citizens
- Conformance and interoperability aspects
- Deployment strategies and scenarios for trustworthy applications and services in developing countries
- Adoption of ICTs to enhance environmental sustainability
- Inclusiveness, affordability and equal access
- Harmonization strategies for international, regional and national standards and de-facto standards
- Policy issues raised by over-the-top services
- Network neutrality and trustworthiness
- Societal impact of ICTs

General Chairman:

Pilar Dellunde, Vice-Rector, Universitat Autònoma de Barcelona, Spain

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Anna Matamala, Universitat Autònoma de Barcelona, Spain

Xavier Ribes, Universitat Autònoma de Barcelona, Spain

Technical Programme Committee

Chairman: Kai Jakobs, RWTH Aachen University, Germany

The Technical Programme Committee is composed of over 150 subject-matter experts. Details will be available shortly at: **http://itu.int/go/K-2015-progcom**

Additional information

For additional information, please visit the conference website: **http://itu.int/go/K-2015**

Inquiries should be addressed to Alessia Magliarditi, ITU, Switzerland, at: **kaleidoscope@itu.int**

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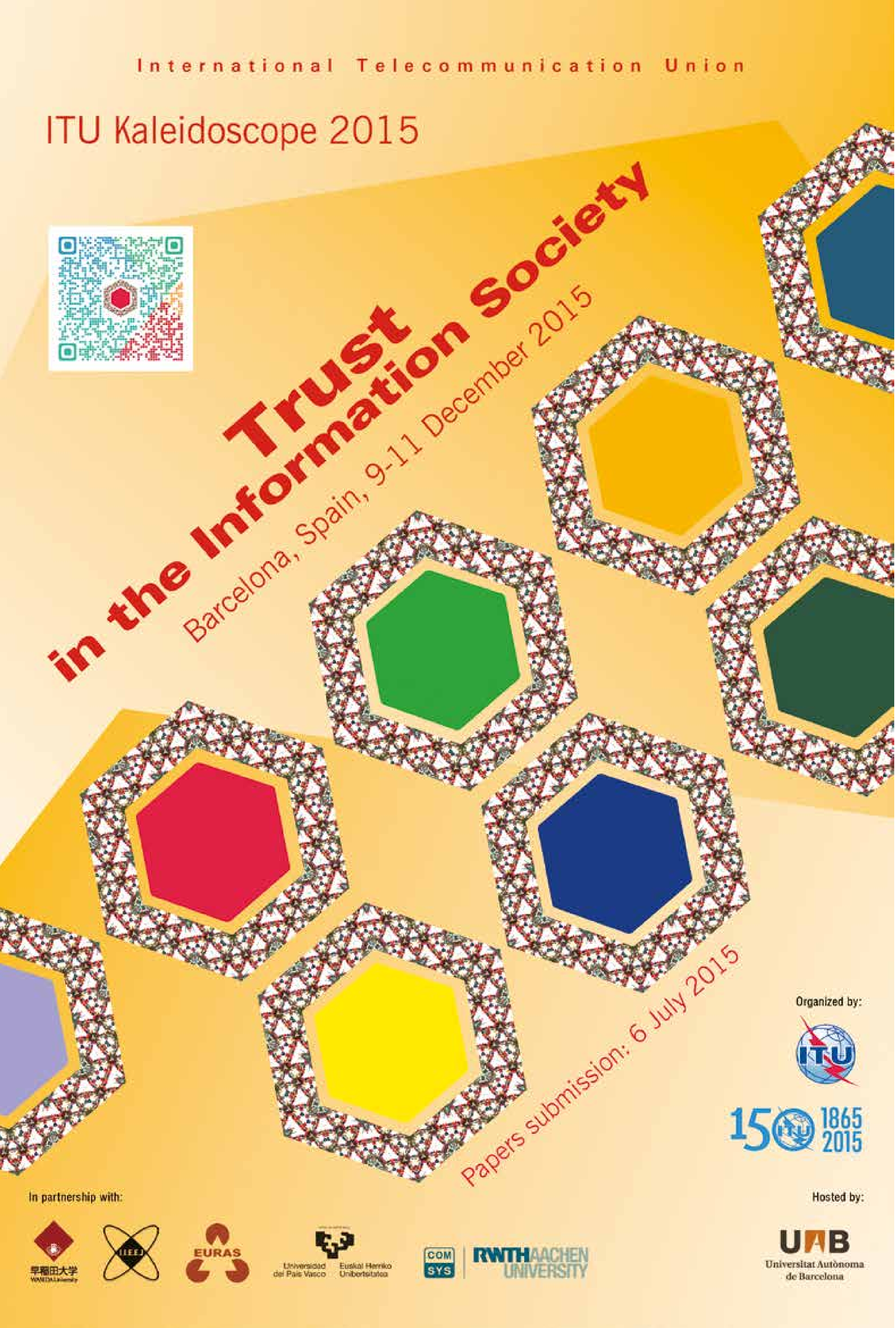

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