Current Status of Smart Houses

Dec 29, 2014

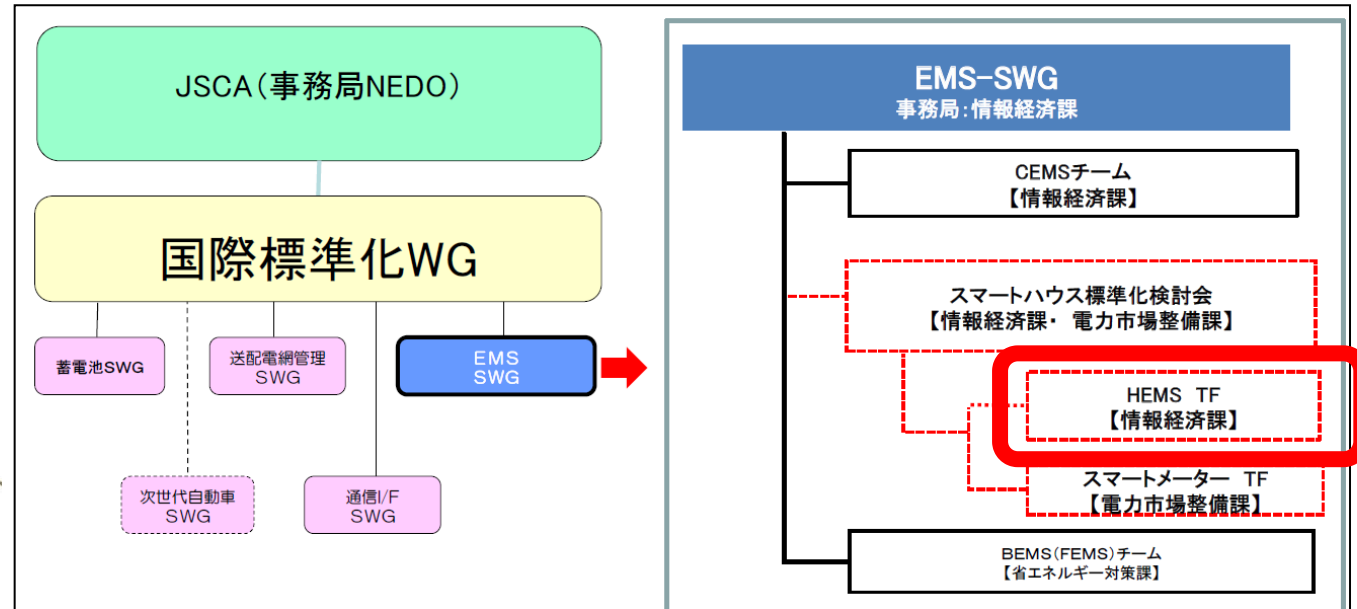Home Electronics Department, Faculty of Creative Engineering, Kanagawa Institute of Technology

Graduate School of Media and Governance of Keio University

Prof. Masao ISSHIKI

Self-introduction：My mission

To promote international standardization by supporting development and diffusion of products with ECHONET Lite, widely known standard interface in HEMS

JSCA（事務局NEDO）

国際標準化WG

蓄電池SWG　送配電網管理 SWG　EMS SWG

次世代自動車 SWG　通信I/F SWG

EMS-SWG
事務局：情報経済課

CEMSチーム【情報経済課】

スマートハウス標準化検討会【情報経済課・電力市場整備課】

HEMS TF【情報経済課】

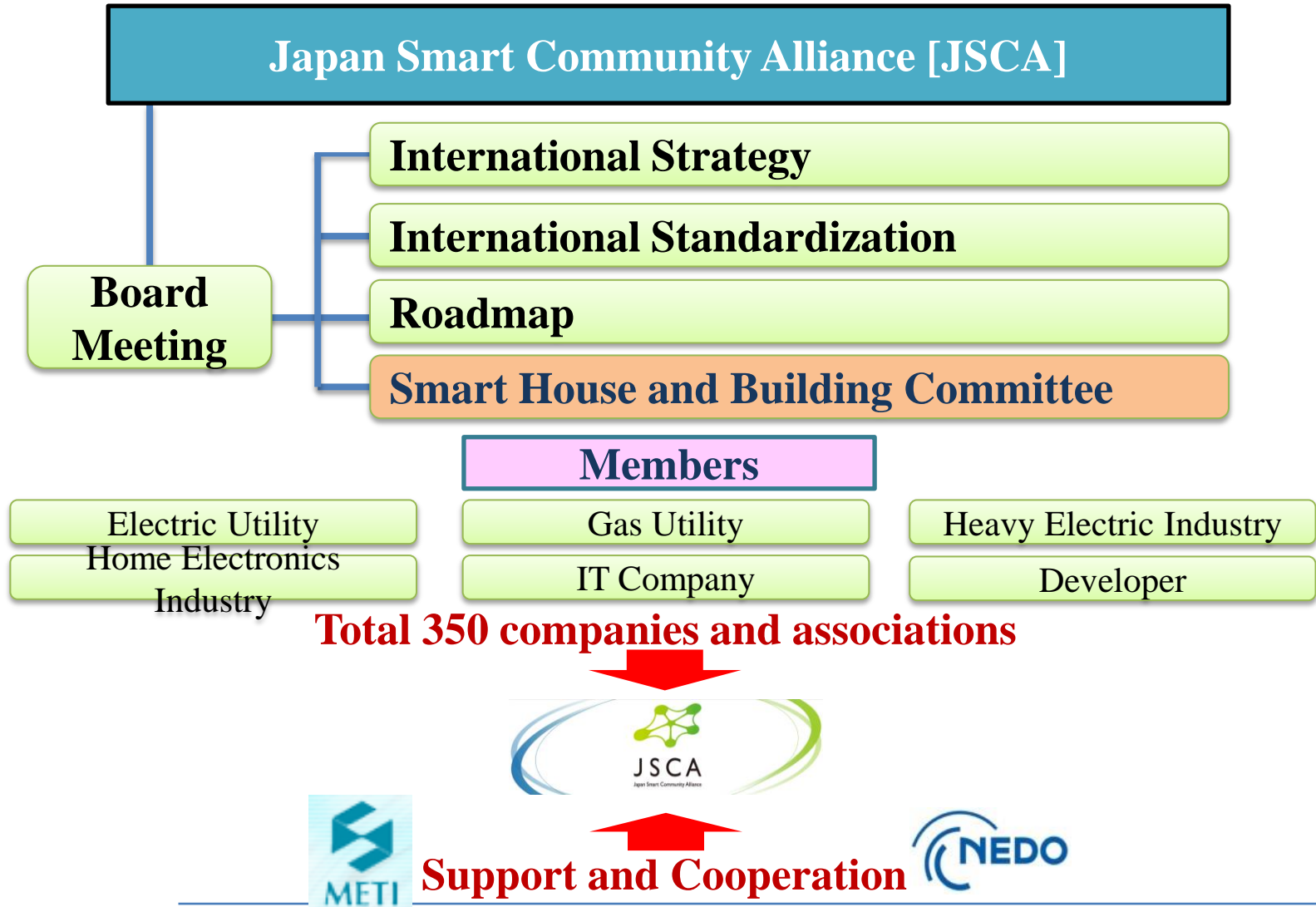スマートメーター TF【電力市場整備課】

BEMS（FEMS）チーム【省エネルギー対策課】

Professor in Home Electronics Department of
Kanagawa Institute of Technology
Project Professor in
Graduate School of Media and Governance of
Keio University
Director of HEMS Interoperability Test Center
Chairman of METI HEMS Task Force

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

JSCA is Japanese government-industry liaison, aiming at making long term collaboration with overseas

Japan Smart Community Alliance [JSCA]

International Strategy

International Standardization

Roadmap

Smart House and Building Committee

Board Meeting

Members

Electric Utility	Gas Utility	Heavy Electric Industry
Home Electronics Industry	IT Company	Developer

Total 350 companies and associations

JSCA
Japan Smart Community Alliance

METI

NEDO

Support and Cooperation

Smart-House Project at KAIT

"METI supported program
– Research of Smart House international standardization"

This project supports positive proof and education of EMS related products with ECHONET Lite in order to promote HEMS.
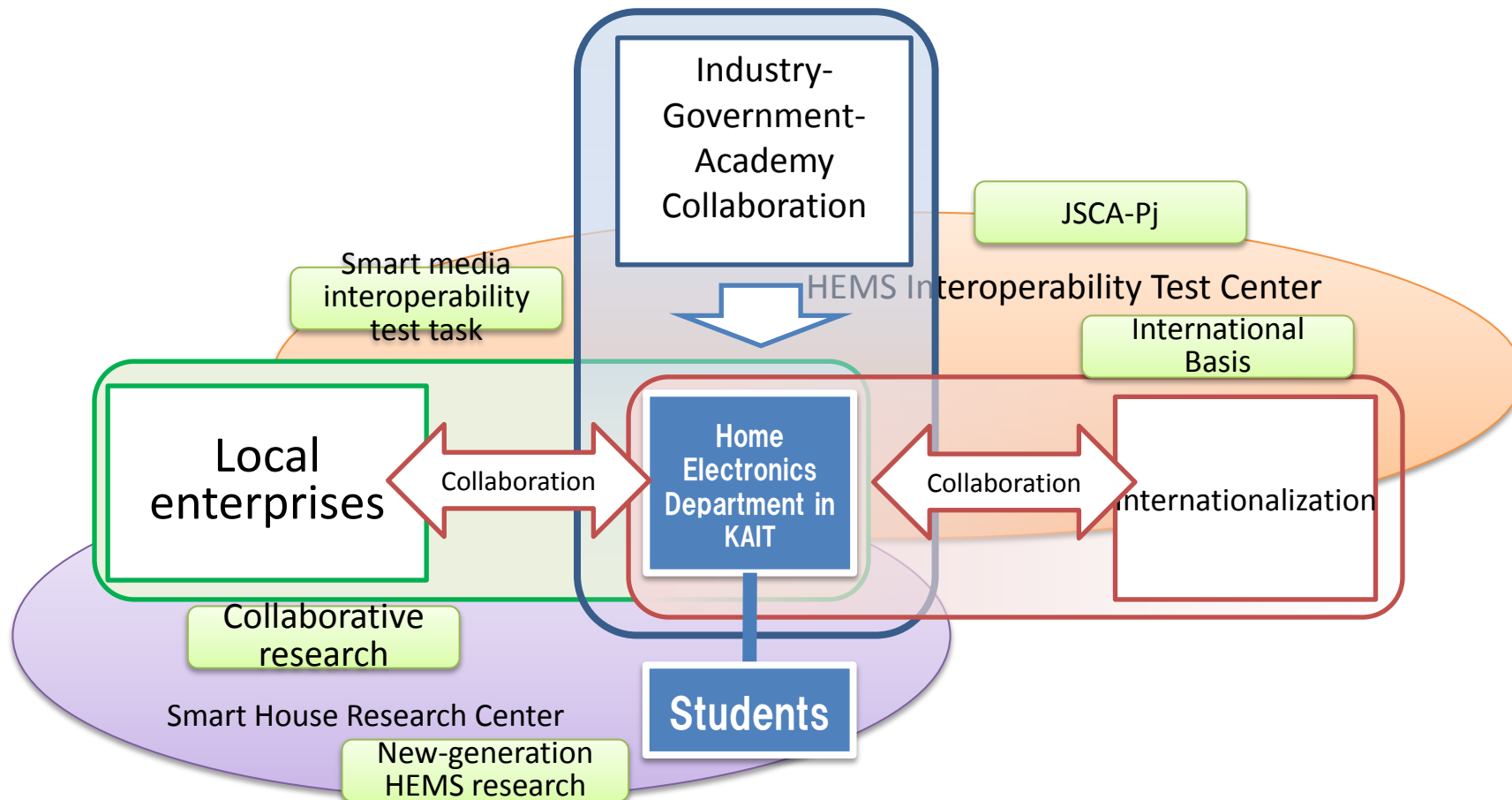
Three main activities

1）Preparing Inter-operability test environment of ECHONET Lite
   -Certification Support Center
2）Development of SDK for HEMS service
   -Free Software Development Kits
3）Making guidelines of HEMS services and operations
   -Guidelines for HEMS

The Center opened on Nov. 21, 2012

Promotion Outline of New-generation HEMS and Smart Houses

Today's Agenda

1. Overview of the Smart House/HEMS Market

2. Previous Studies

3. Activities of HEMS Interoperability Test Center

1. Overview of the Smart House/HEMS Market

2.Previous Studies

3.Activities of HEMS Interoperability Test Center

Technical perspective: Smart House has three functions

Past

For Saving energy in demand side

NOW

| For saving energy | ➕ | For generating energy | ➕ | For storing energy |

Innovation

Consumer has become "Prosumer"
Produce, save, and consume energy in demand side

HEMS (Home Energy Management System) ⇒ Smart house

Note: ECHONET is a communication standard among home electronics that Japan intends to be an international standard

Image of products to be supported by HEMS

ECHONET Consortium ™
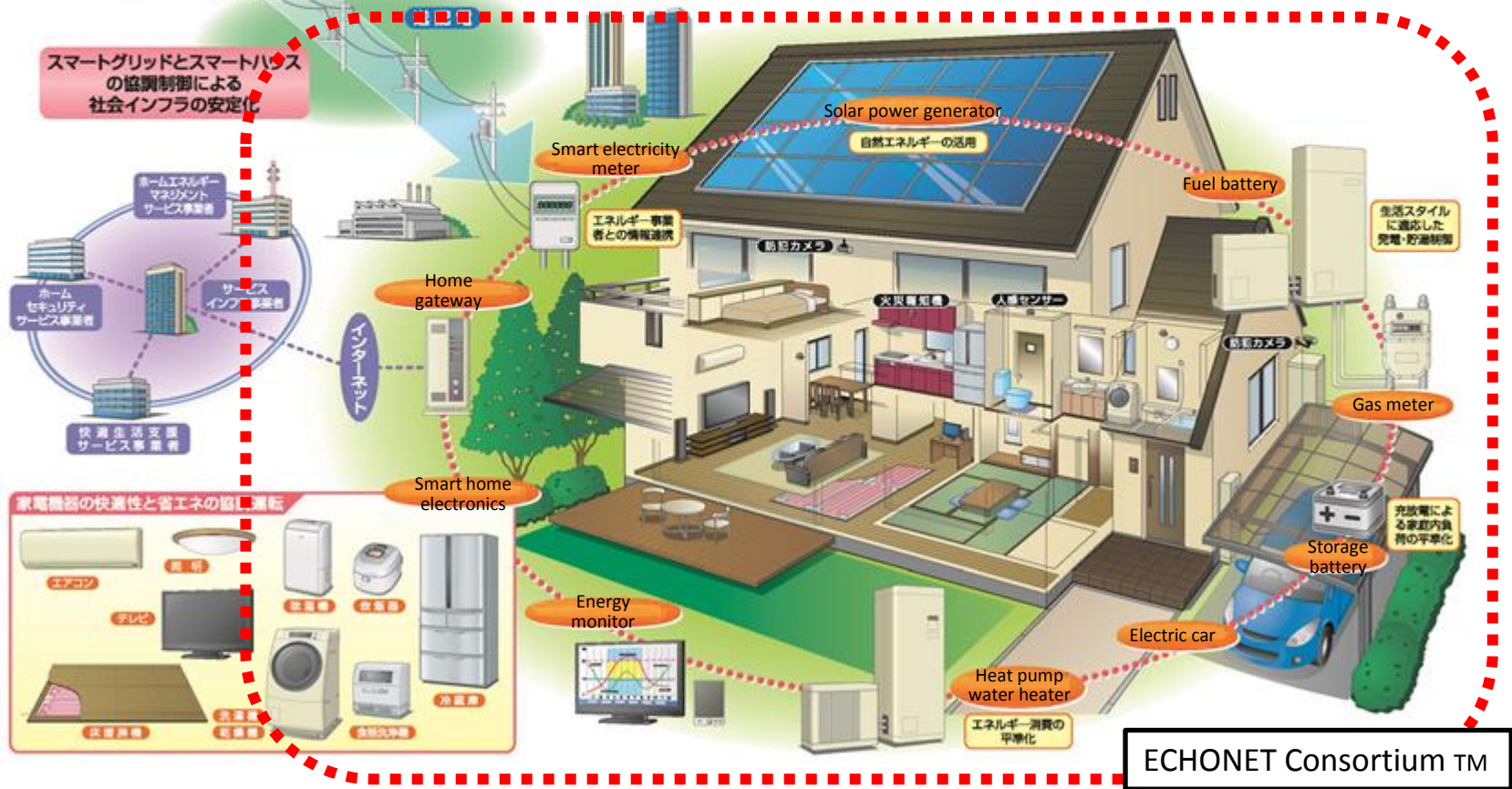
Source : ECHONET Consortium Web site   http://www.echonet.gr.jp/english/index.htm

Accomplishment:
Smart House has been commercialized -1-

Mitsui Home Group

Misawa Homes

Daiwa House

Sekisui Chemical

Example: Sekisui Heim (HEMS)

Since October 23, 2013, all-room air conditioning has been controlled under ECHONET Lite!

☐ Product name "Smart Heim Navi"

☐ Contracted 30,000 houses in total （As of August, 2014)

  ➢ ※ On order basis

The ECHONET Lite-compatible Smart Heim Navi feature allows all-room air conditioning system "Comfortable Airy" to be controlled on your tablet.
Remote operation from outside is also available.

Source: Sekisui Chemical Co., Ltd. Web site
http://www.sekisuiheim.com/info/press/20140825.html

Accomplishment:
Smart House has been commercialized -2-

Panasonic

TOSHIBA

SHARP

HITACHI

Accomplishment:
Smart House has been commercialized -3

MITSUBISHI

NEC

KYOCERA
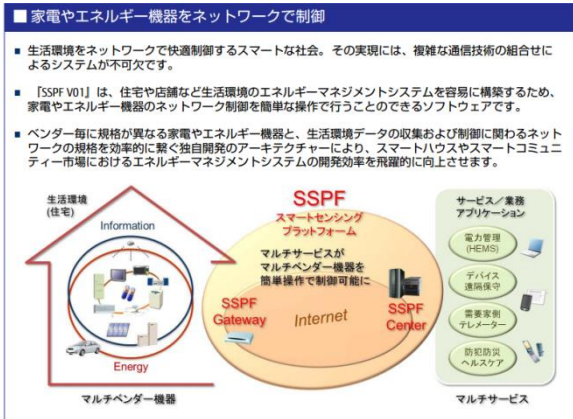
FUJITSU

1. Overview of the Smart House/HEMS Market

2.Previous Studies

3.Activities of HEMS Interoperability Test Center

Background of Studies

To promote further power/energy saving, studies have been started in order to
① secure interoperability among different manufacturers and implement "visualization" as well as automatic control and
② create various services making combined use of smart electricity meters and HEMS
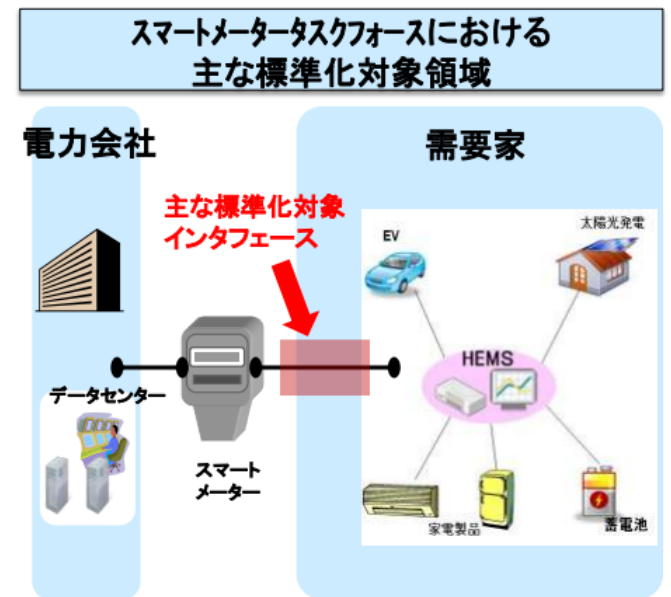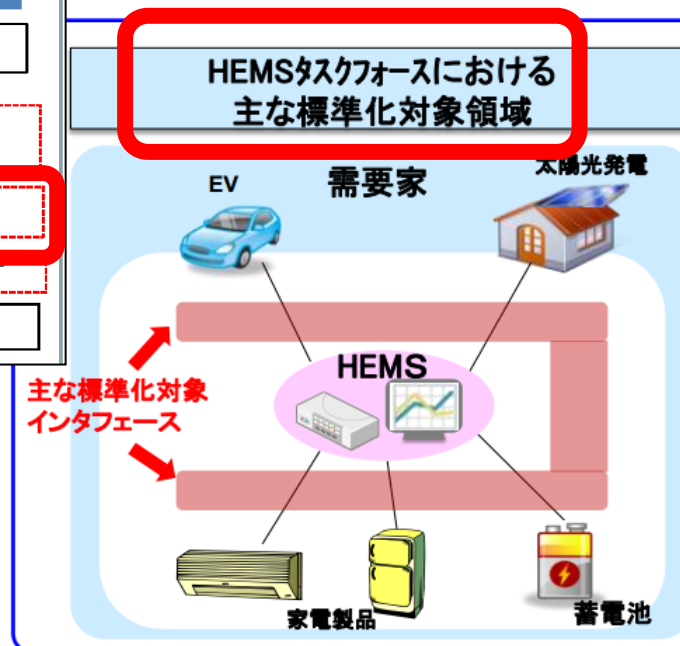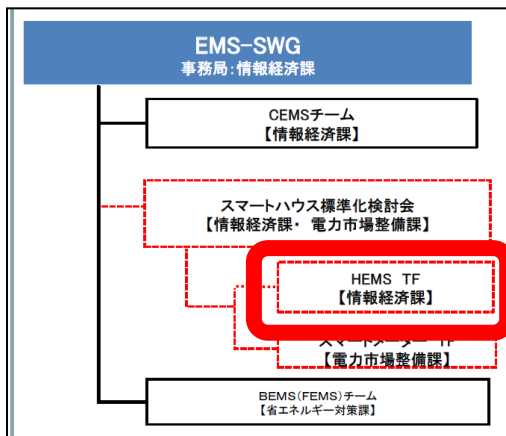
Source: Interim Report (draft) by Smart House Standardization Study Group
http://www.meti.go.jp/press/2011/02/20120224007/20120224007-2.pdf

Previous Studies（1/4）

Nov. 7, 2011	■ Smart House Standardization Study Group was established (vice chairman: Isshiki) 　Purpose: Promoting standardization of smart electricity meters and HEMS
Feb. 24, 2012	■Topics investigated by the above Study Group were publicized. http://www.meti.go.jp/press/2011/02/20120224007/20120224007.html (Main decisions) 1) Introduction of HEMS as well as recommendation of ECHONET Lite as standard interface between home electronics and HEMS/smart electricity meters 2) Diffusion in the domestic market as well as promotion of international standardization for exploration of the global market
Jun 22, 2012	■The 1st meeting of JSCA Smart House/Building Standardization and Business Promotion Study Group was held. http://www.meti.go.jp/press/2012/06/20120622010/20120622010.html 　Purpose: Scheduling implementation and investigating solutions for tasks arising from decisions made by the Smart House Standardization Study Group Five tasks (1) Identifying and improving the low level of key equipment (energy creation/storage equipment) (2) Developing an operation manual (3) Testing interoperability with other manufactures' equipment and certifying such equipment (4) Assimilating and linking with international standards (5) Researching/studying demand response technology/standards

> Main mission of HEMS Interoperability Test Center

Previous Studies（2/4）

Sep. 28, 2012

■The 2nd meeting of JSCA Smart House/Building Standardization Business Promotion Study Group was held.
http://www.meti.go.jp/press/2012/09/20120928004/20120928004.html

Purpose: Determining the current status of five tasks and checking the schedule

Nov. 21, 2012

■HEMS(ECHONET Lite) Interoperability Test Center was opened
http://sh-center.org/shrepo/1044

Purpose: To solve task 2 & 3, providing interoperability environment and supporting development and diffusion

May 15, 2013

■The 3rd meeting of JSCA Smart House/Building Standardization Business Promotion Study Group was held.
http://www.meti.go.jp/press/2013/05/20130515004/20130515004.html

Purpose: Determining the current status of each task such as creation of guideline for smart electricity meter B route operation and checking the future schedule

Previous Studies（3/4）

Nov. 26, 2013

Dec. 4, 2013

■The 13th meeting of the Smart Meter Scheme Study Group
http://www.meti.go.jp/committee/summary/0004668/013_haifu.html

Topic: Determining problems and actions related to promoting deployment of smart electricity meters (tentative plan)

Reporting the current status of actions toward deployment of smart electricity meters
・Smart electricity meters deployment plan by each electric power company
・Report on improvement of environment for use of B route data as well as current status

■The 4th meeting of JSCA Smart House/Building Standardization Business Promotion Study Group was held.
http://www.meti.go.jp/committee/kenkyukai/shoujo/smart_house/004_haifu.html

Purpose: Determining the current status of five tasks and reporting/discussing future tasks

(1) Identifying and improving the low level of key equipment (energy creation/storage equipment)

⇒A guideline has been mostly completed. Further on, interoperability related topics will be investigated by the Business Promotion SWG.

(3) Testing interoperability with other manufactures' equipment and certify such equipment

⇒The activities of HEMS Interoperability Test Center were reported. Needs from small-to-medium sized /local enterprises were systemized.

Discussions started with local HEMS related organizations regarding creation of new business models.

(4) Assimilating to and linking with international standards

⇒ECHONET Lite was agreed as international standard in IEC TC 100.

HEMS (ECHONET Lite) Interoperability Test Center was established in National Advanced IPv6 Centre of Excellence (NAV6) in Malaysia.

Previous Studies（4/4）

Mar. 17, 2014

■The 14th meeting of the Smart Meter Scheme Study Group
http://www.meti.go.jp/committee/summary/0004668/014_haifu.html

Theme: Problems and actions in promoting implementation of smart electricity meters (Report 2013)

Main topics:

Reporting the current status of implementation of smart electricity meters

Reviewing creation of new businesses based on power usage data

Reviewing interoperability test with smart electricity meters and HEMS

Presenting review results about high voltage smart electricity meters and B route (interim report)

⇒Employment of ECHONET lite as communication protocol was decided.

Apr. 21, 2014

■HEMS Interoperability Test Center was recognized as SMA certification organization.
http://sh-center.org/hemsinfo/1755

The center started its operation as the third party certification organization for ECHONET Lite smart electricity meters

May 28, 2014

■The 5th meeting JSCA Smart House/Building Standardization Business Promotion Study Group was held.
http://www.meti.go.jp/committee/kenkyukai/shoujo/smart_house/005_haifu.html

Purpose: Determining the current status of six tasks* and reporting/discussing future tasks

* Besides five tasks as mentioned above,
【6th task: Reviewing promotion of projects using HEMS data】was added.

(2) Development of an operation manual

⇒Detailed specification study for enhancement of interoperability of seven types of key equipment other than smart electricity meters, was started.

(6) Investigation into business promotion using HEMS data

⇒The current status of investigation into 1) standardization of information base and 2) handling of privacy issues related to data usage, was reported.

Topics # Widely known standard interface for HEMS

In February 2012, METI recommended ECHONET Lite
as a widely known standard interface for HEMS
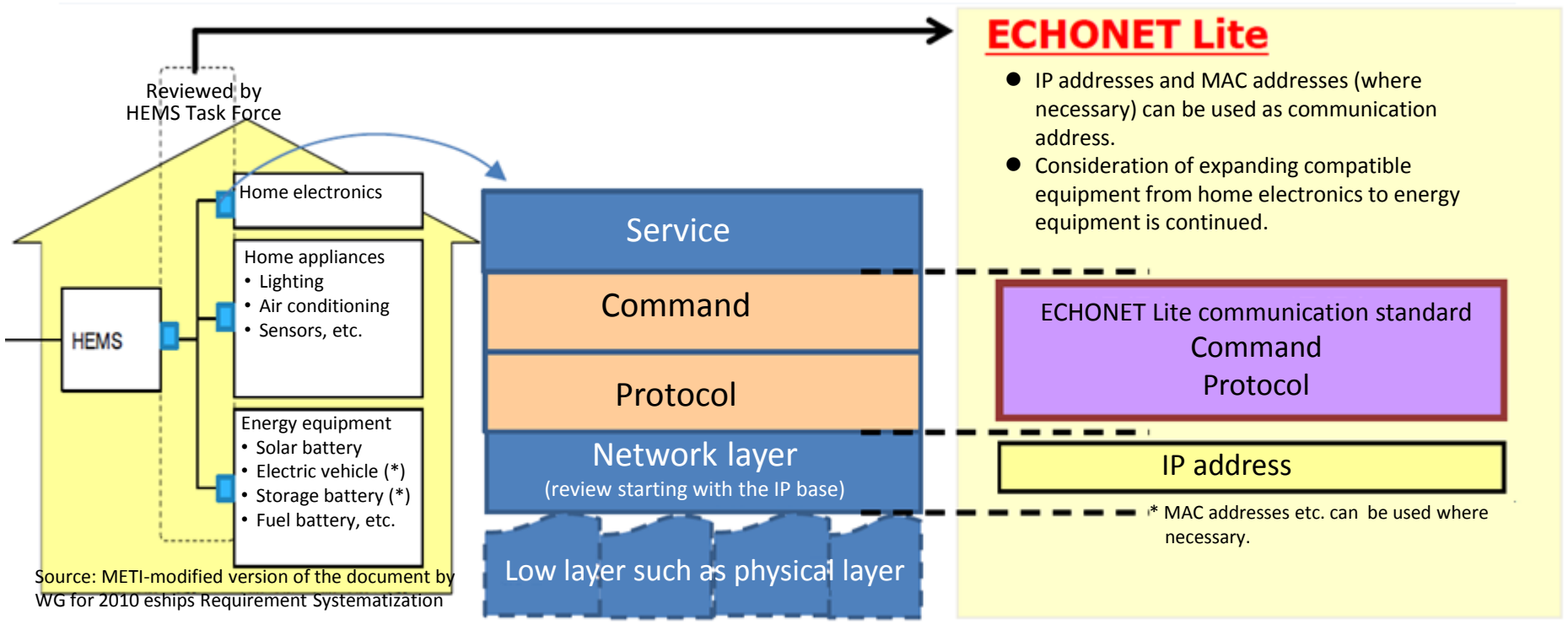
Source: Interim report (draft) by Smart House Standardization Study Group
http://www.meti.go.jp/press/2011/02/20120224007/20120224007-2.pdf

Collaboration with Other Standards

Topics

You can realize flexible EMS with ECHONET Lite, because it supports detailed functions of wide range of products. Documents are open to public through the web site. We are also collaborating with other standards worldwide.
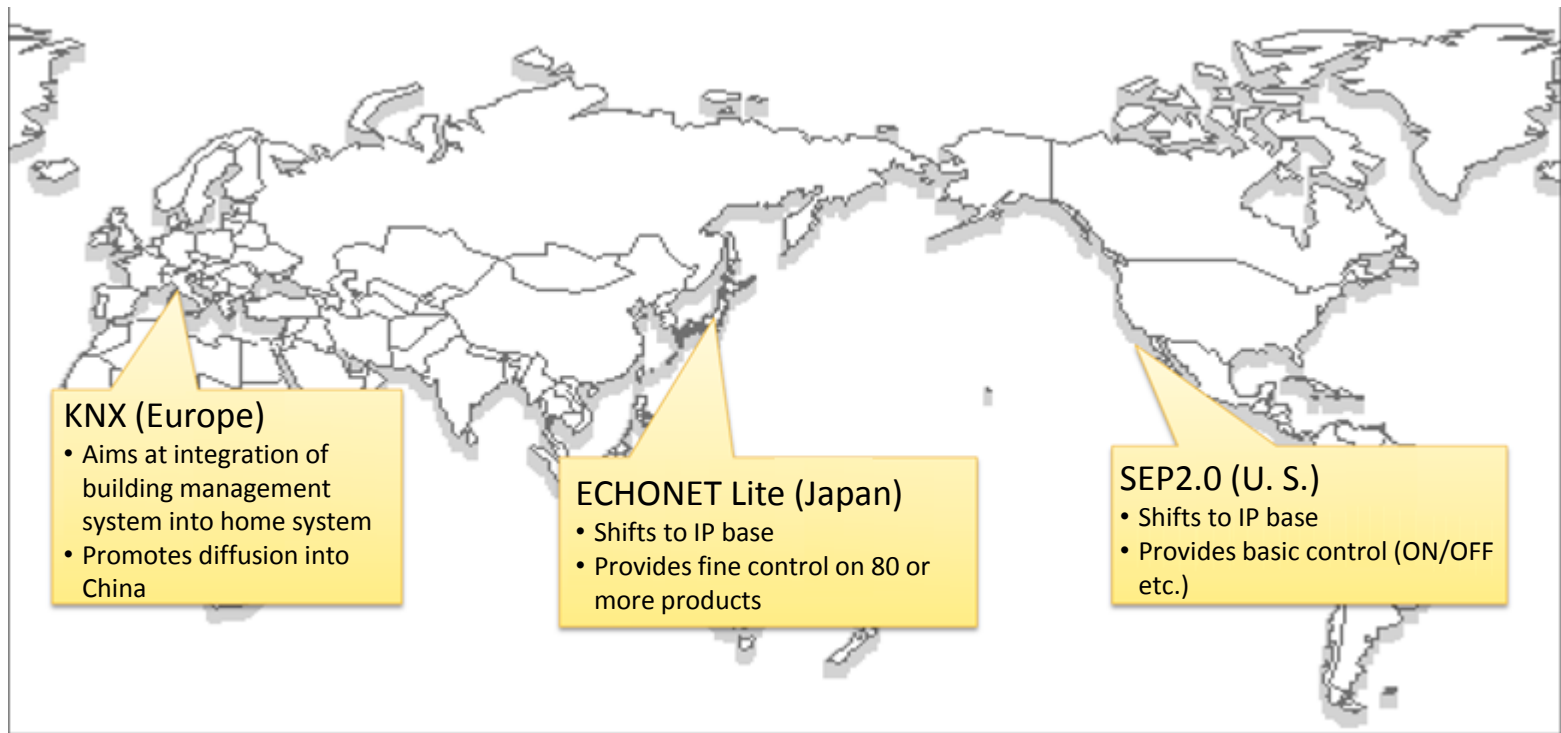
KNX (Europe)
- Aims at integration of building management system into home system
- Promotes diffusion into China

ECHONET Lite (Japan)
- Shifts to IP base
- Provides fine control on 80 or more products

SEP2.0 (U. S.)
- Shifts to IP base
- Provides basic control (ON/OFF etc.)

Kanagawa Institute of Technology, JAPAN

Current Status of International Standardization of ECHONET Lite

Now, we are promoting international standardization of ECHONET Lite (communication middleware).

May 2011 Proposed as an update for IEC62394
• ECHONET Equipment object
• ECHONET Lite electronic document format

Sep 2009 Establishment of International Standard (IS) is completed
IEC62394 Ed2.0

Jun 2006 Standardization
IEC 62394

Jan 2009 Standardization
ISO/IEC 24767-1, 2

May 2008 Standardization
IEC 62480

Equipment object
For equipment maintenance

Secure communication layer
Secure communication for networked home electronics

Middleware adaptor

Sep 2012 Proposed as additional standard to ISO/IEC 14543-4-1,2
• ECHONET Lite standard (ISO/IEC 14543-4-3)

Interface

Application software

Service API
Service middleware

Basic API

Basic API

Equipment object

Service object

Upper part of middleware

May 2008 Standardization
ISO/IEC 14543-4-1, 2

ECHONET communication processing unit

OSI Layer

Certification function

Public key encryption function

Lower part of middleware

Layer 3-7

Common low level communication interface

Protocol difference absorbing processing unit

A	B	C	D	E	F	G	H
PLC	Low Pwr RF	Extended HBS	IrDA Control	LonTalk	UDP/IP Bluetooth	UDP/IP Ethernet IEEE802.3	UDP/IP IEEE802.11
PLC	Low Pwr RF	Twisted Pair	IrDA	Low Pwr RF	Bluetooth	Ethernet	WLAN

Layer 1-3

Application of TCP/IPTM to home network Networking with AV/PC equipment

Sep 2007 Standardization
IEC 62457

ECHONET standard was divided into six parts and proposed for international standard in 2002. All the proposed standards have become international standards by 2009.

4

Collaboration with overseas organizations (for international standardization)

Topics

> Overseas deployment starting with Nav6 in Malaysia
> Collaborative promotion with METI, Keio University and ECHONET Consortium

- **Deployment of HEMS (ECHONET Lite) Interoperability Test Center to overseas (Asia)**
  First step: National Advanced IPv6 Centre of Excellence (NAv6, Malasya)
- **Implementation of the logo certification program with overseas international standardization organizations**
  ZigBee Alliance, Wi-SUN Alliance
- **Development of ECHONET Lite education programs in cooperation of industry, government and academy.**

Collaboration for international deployment was agreed among relevant organizations (June 21, 2013, Diffusion Symposium)

Signing ceremony for technology transfer to Nav6 at KIT (December 16, 2013, Diffusion Symposium)
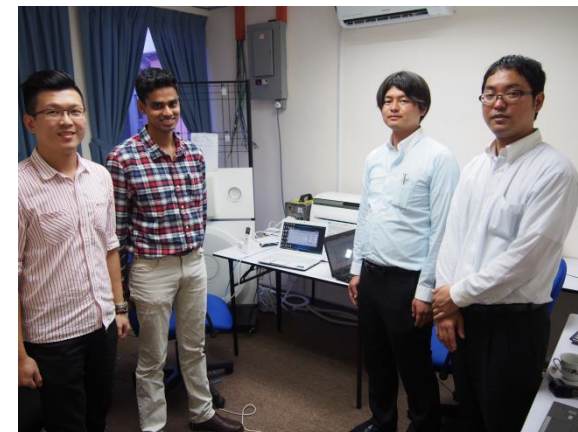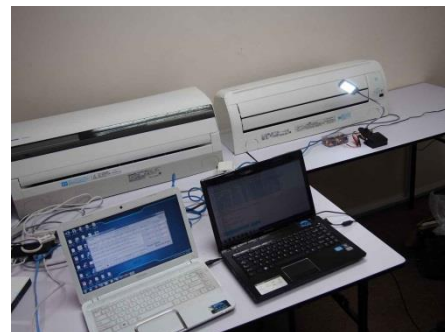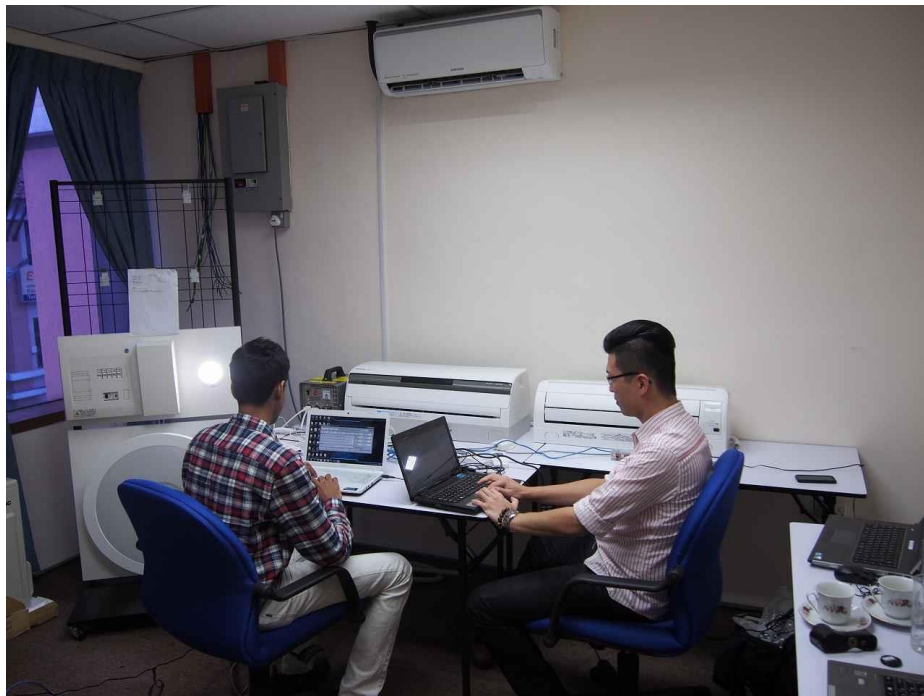

From Asia to the World

Topics Education seminar in Indonesia/Malaysia (Feb 25 to 27）

Topics

Overseas HEMS Interoperability Test Center in Malaysia

DEMAND-SIDE MANAGEMENT IN ASIA-PACIFIG （Promoted by Bloomberg＠Singapore,Oct 30to31）

http://about.bnef.com/white-papers/japans-approach-to-demand-side-management/
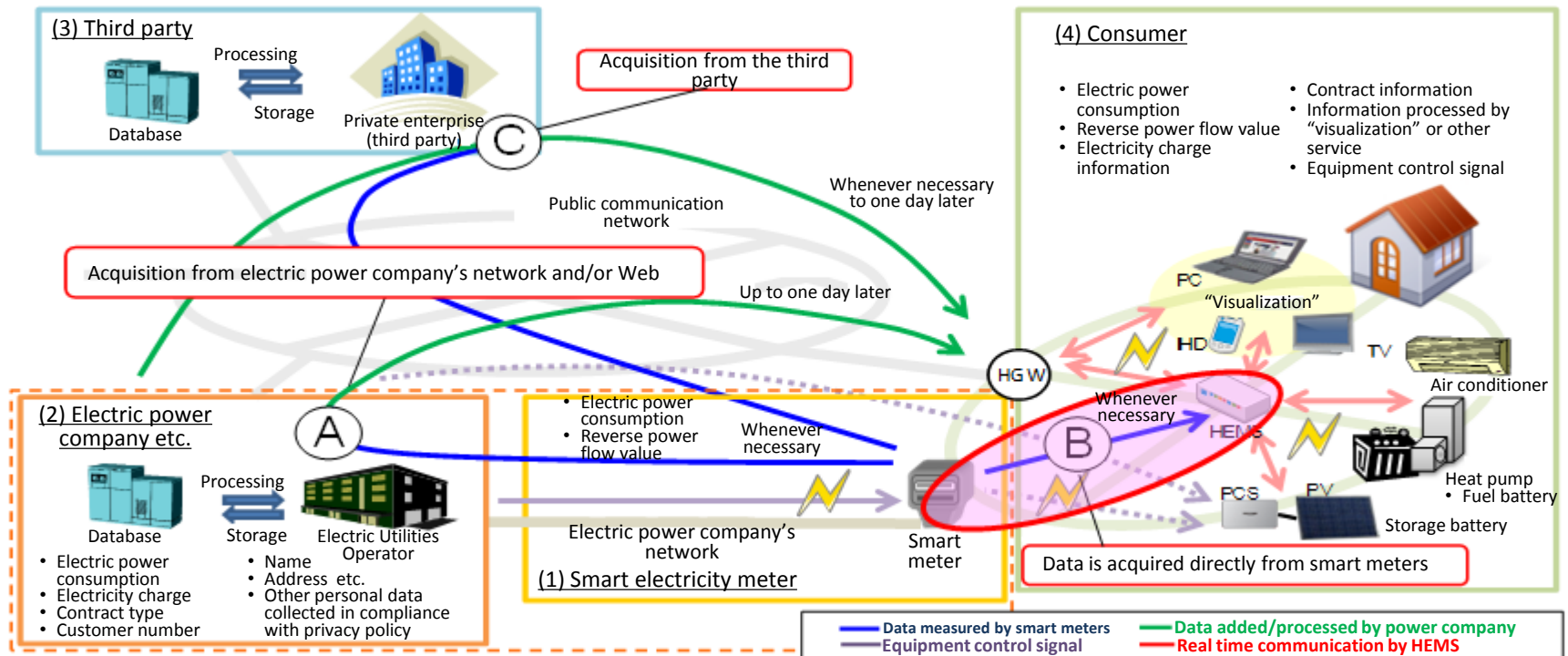
Topics — Smart electricity meter in Japan speaks ECHONET Lite

In May 15, 2013, a guideline for communication between smart electricity meters and B route was established. What can be expected now?
⇒Approx. 77 million low voltage smart electricity meters for ECHONET Lite communication will be installed.

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

Topics — Full-scale deployment of smart meters was decided

In April 2016, all of 10 electric power companies will launch B route service

◆ 各社とも、HEMS等に対して比較的円滑にリアルタイムでの情報提供が可能な「Bルート」への対応を優先して進めている。

◆ 需要家からの個別要望に応じたスマートメーター設置については、基本的にBルート対応開始時期以降対応（小売全面自由化予定時期以前にはある）。「全供給エリア対応開始」はサービス提供を本格開始する時期であり、申込受付はサービス提供の開始よりも前に余裕をもって開始できるよう、各社において計画の詳細について検討を行う

	Aルート対応開始時期		Bルート対応開始時期		条件・補足説明等
	一部対応開始	全供給エリア対応開始★1	一部対応開始	全供給エリア対応開始★2	★1 スマートメーターの検針値を、MDMSまで自動で収集し、お客さまに「見える化」サービスが提供可能となるとともに、料金システムに連係し、料金算定データとして使用可能となる時期。 ★2 お客さまからの個別要望に応じて、Bルート対応が可能となる時期。
北海道	H28年4月*1	H29年度中	H27年度中*2	H27年度中	*1 小売他社のお客さまを対象として、自動検針を開始する予定。 *2 一部地域で実施する試験導入により、業務運営を含めた検証・評価・改善を行う。
東北	H27年度下期中*3	H29年度中	H27年度下期中*3	H27年度下期中	*3 業務検証を実施し、関連するシステム・業務に問題ないことを確認の上、データ提供希望者に対して順次対応を開始する予定。
東京	H27年2月*4	H27年7月	H26年9月*5	H27年7月	*4 MDMSの先行適用（検証含む）を行うエリアに限定。 *5 スマメ先行設置エリアに限定するなど、提供対象・機能を限定（試験サービス）。
中部	H27年7月*6	H28年4月	H26年10月*7	H27年7月	*6 1：N無線方式を適用した場合に、Aルートによる電気使用状況の「見える化」及び自動検針に対応可能な時期。マルチホップ通信適用地域のお客さまについては、通信伝送路が整備され次第、順次見える化サービスの提供は可能となるが、それ以前にサービスの提供を希望されるお客さまには、個別に1：N無線方式を適用することにより対応可能。 *7 段階的設置※のため提供対象の制約はあるものの、その中で希望されるお客さまについては、Bルートの活用は可能。※段階的設置：1営業所/1支店を選び2,000台程度設置予定。全社で計12,500台程度設置予定。
北陸	−	H27年7月	−	H27年7月	
関西	現在実施中	現在実施中	H27年2月*8	H27年7月	*8 一部地域で実施する試験導入により、業務運営を含めた検証・評価・改善を行う。
中国	H28年4月*9	H29年4月	−	H28年4月	*9 スマートメーター設置を希望されるお客さまおよび他電気事業者へ契約先を変更されるお客さまに対しては、自動検針を開始する予定。
四国	H27年度中*10	H28年4月	H27年度中*10	H28年4月	*10 H27年度に実施するモデル導入において、一連のシステム・業務の最終確認ができ次第、見える化対応を開始予定
九州	−	H28年4月	H27年度下期中*11	H28年4月	*11 H27年度下期に試験導入を行い、業務運営を含めた検証・評価を行う。
沖縄	H27年度下期中*12	H28年4月	H27年度下期中*12	H28年4月	*12 H27年度下期から業務検証を実施し、関連するシステム・業務に問題ないことを確認の上、データ提供希望者に対しては順次対応を開始する予定。なお、一部対応開始期間におけるデータ提供可能な地域や対象については今後検討。

Source: Smart electricity meter B route operation guideline (Rev. 2) , 8th HEMS Task Force (Sep. 11, 2014) document

Kanagawa Institute of Technology, JAPAN

Topics   # The Center has started SMA certification

We have certified three products of "SMA" since April 2014.

List of certified products
Source: ECHONET consortium home page (http://www.echonet.gr.jp/english/kikaku_ninsyo/list_sma/equip_srch)

SMA certification number	Product type	Communication layer	Date of certification	Manufacturer	Product Code
PZ-000001	Smart Electricity Meter	Wi-SUN (WSA 0004)	2014.04.23	Toshiba	SM-3GCOM1
PZ-000002	Smart Electricity Meter	Wi-SUN(WSA0017)	2014.07.29	Mitsubishi	FS-897F
QZ-000001	HEMS Controller	Wi-SUN (WSA 0008)	2014.06.23	Toshiba Lighting Technology	HEM-GW13A

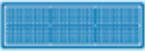■SMA Certificate of Registration

■SMA Certification Products

Kanagawa Institute of Technology, JAPAN
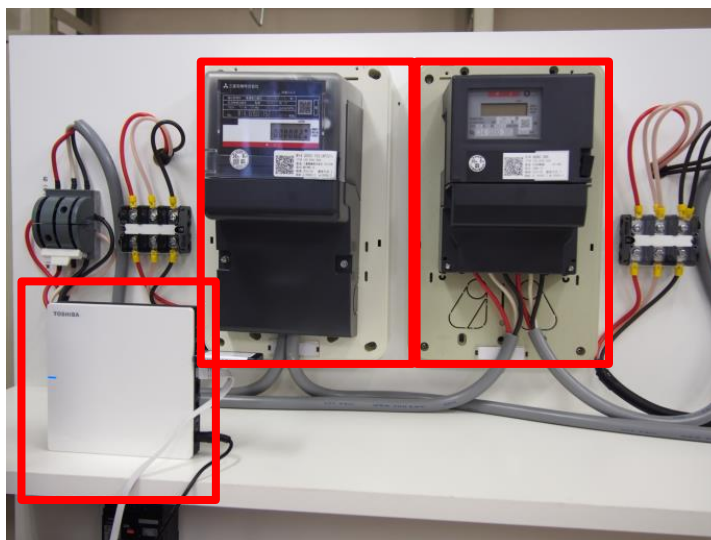
Topics

Enhanced Interoperability among ECHONET Lite Products

In addition to smart electricity meters for which third party certification has already started, detailed specifications for the remaining seven products will be studied by organizations in relevant industries

Smart electricity meter

Solar power generator

Storage battery

Fuel battery

Electric car/
Plug-in hybrid car

Air conditioner

Lighting equipment

Water heater

List of industry associations conducting detailed ECHONET Lite specification studies for 8 types of key equipment

Key equipment	Industry associations studying ECHONET Lite detailed specifications
Smart electricity meter	電気事業連合会
Solar power generator	一般社団法人　太陽光発電協会 一般社団法人　日本電機工業会
Storage battery	一般社団法人　電池工業会 一般社団法人　日本電機工業会
Charging unit for electric car	一般社団法人 電動車両用電力供給システム協議会
Fuel battery	燃料電池実用化推進協議会
Gas/oil-fueled water heater	一般社団法人　日本ガス石油機器工業会
Lighting equipment	一般社団法人　日本冷凍空調工業会 一般社団法人　日本電機工業会
	一般社団法人　日本照明工業会

Source: the 5th meeting of JSCA Smart House/Building Standardization Business Promotion Study Group
http://www.meti.go.jp/committee/kenkyukai/shoujo/smart_house/pdf/005_s03_00.pdf

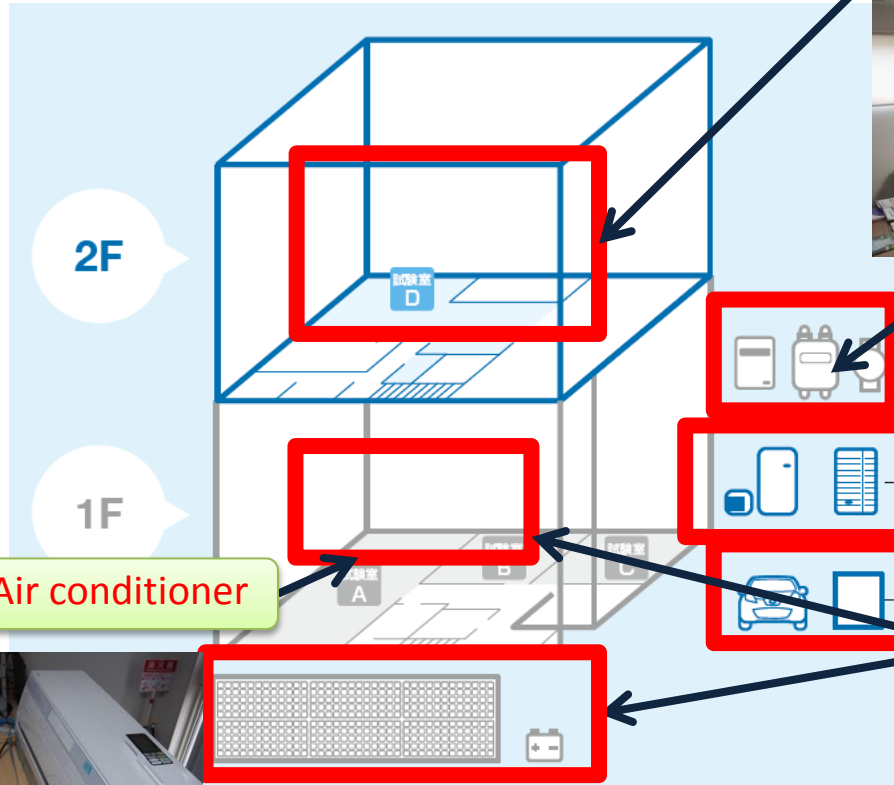1. Overview of the Smart House/HEMS Market

2. Previous Studies

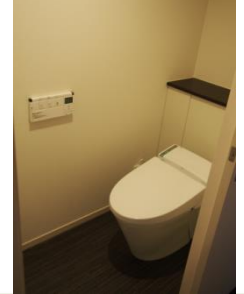# 3. Activities of HEMS Interoperability Test Center

Products Installed at Our Center
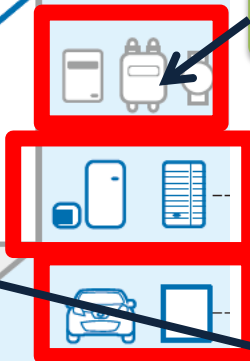
Layout of the whole center

Various HEMS products are exhibited on the second floor.

2F

1F

Smart electricity meter

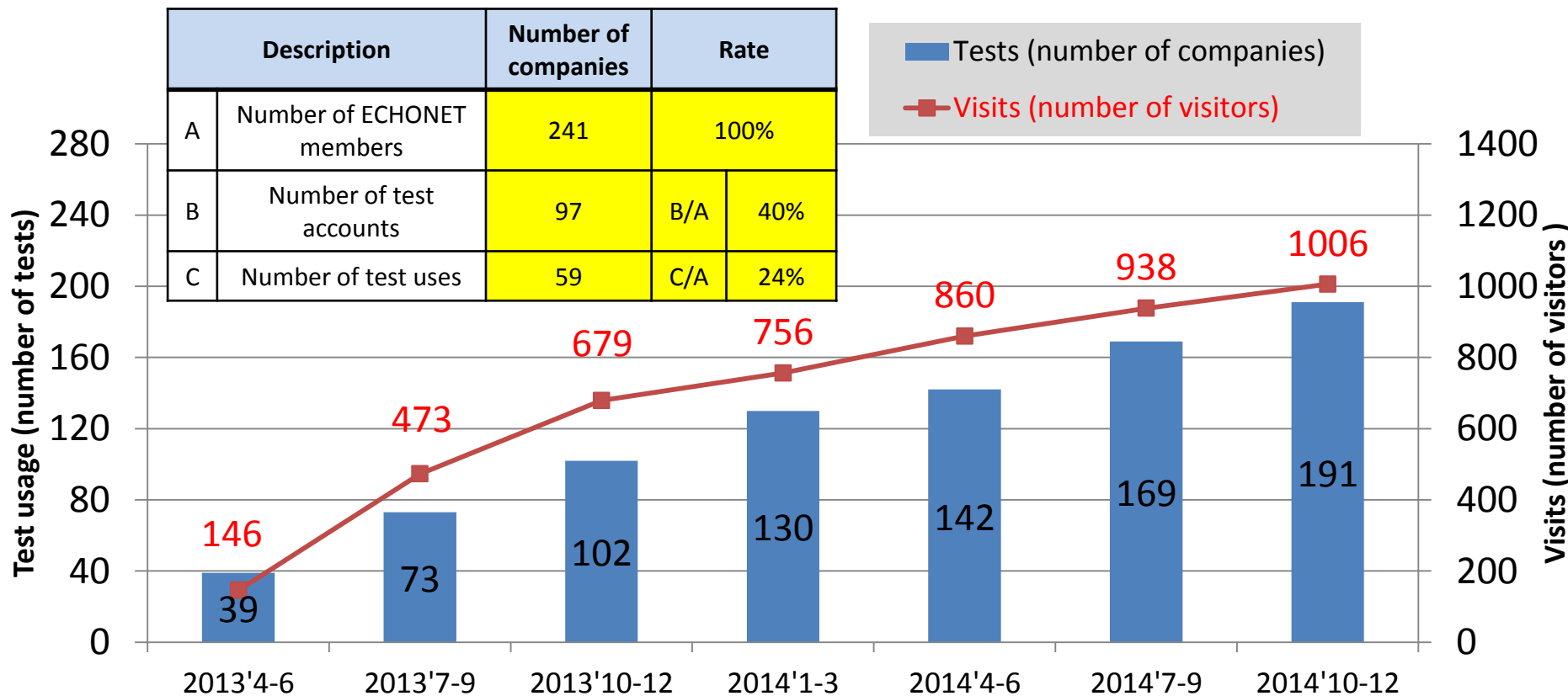Water heater, fuel cell

Electric car & V2H system

Air conditioner

Solar power generation, storage battery

Usage Status of HEMS Interoperability Test Center
(April 2013 to September 2014)

Our test rooms were used 191 times by over 1000 visitors to the Center.
The center is open to public two or three times a month, everyone is welcomed.

	Description	Number of companies	Rate	
A	Number of ECHONET members	241	100%	
B	Number of test accounts	97	B/A	40%
C	Number of test uses	59	C/A	24%

- Tests (number of companies)
- Visits (number of visitors)

	2013'4-6	2013'7-9	2013'10-12	2014'1-3	2014'4-6	2014'7-9	2014'10-12
Tests	39	73	102	130	142	169	191
Visits	146	473	679	756	860	938	1006

Data as of Dec. 12, 2014 ("Visits" data is the aggregate number of visitors and "test usage" data is calculated as test rooms x number of test days)

Information on actual equipment exhibited at our Center is released to the public

A list of products that can be connected with actual equipment
at our Center is released and updated appropriately

http://smarthouse-center.org/upload/available_facilities.pdf

List of equipment provided at HEMS Interoperability Test Center

New products will be available soon.

最終更新：2014.03.18 三浦：機器設置場所情報追加

No	メーカ	機器名(品名)	型番	製造 年月
1	GWソーラー	AC計測器 （オプション：PV直流計測器）	GW-PV-HEMS-1	2013
2	サンデン株式会社	デモ機 （リモコン＆制御機器，LANケーブル）	EDK-90RA	2013 （展示開始
3	シャープ	見える化システム （タブレット端末[RM-T107]， 中継器[JH-AG01]，プラグ[JH-AP01]）	JH-RTP2	記載なし
4	シャープ	プラズマクラスターエアコン	AY-D22SX-W HW-CA1	2013
5	ダイキン	ダイキンエアコン 無線LAN接続アダプター	F25PTRXS-W BRP051A	2013.9
6	東芝	マルチカラーLEDシーリングライト	LEDH82010YXLC-LT1	2013
7	東芝	家庭用ヒートポンプ給湯機	HWH-FB372CT	2012
8	東芝ホームアプライアンス	東芝ルームエアコンディショナ 東芝エアコン用アダプタ	RAS-632NDR1 HEM-AC11A	2012
9	東芝ホームアプライアンス	東芝ルームエアコンディショナ（室内機のみ） 東芝エアコン用アダプタ	RAS-221EDR(W) HEM-AC12A	2012
10	東芝ホームアプライアンス	電気洗濯乾燥機 ミドルウェアアダプタ	TW-Z96X1L HNW-ADB1	2013
11	東芝ホームアプライアンス	冷凍冷蔵庫 ミドルウェアアダプタ	GR-G51FVX HNW-ADB1	2013
12	東芝ライテック	ITアクセスポイント	BTR-4010AZ	記載なし
13	東芝ライテック	LEDダウンライト	LEDD85001-LT1	2013
14	東芝ライテック	蓄電池システム用分電盤	ENG-PB3062K-2N4D	2013.01
15	東芝ライテック	定置式蓄電システムENEGOON 蓄電池コントローラ（LANインターフェース付）	ENG-B6630A1 ENG-C20A1	2012.9

For ECHONET Lite compatible refrigerators and washing machines, interconnection test with actual equipment is also possible.

ECHONET Lite SDK [Free!!!]
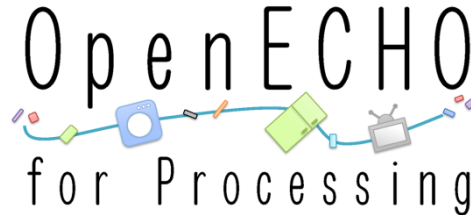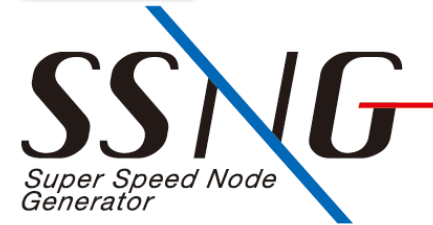
No.1

No.2

No.3

IDE	
Maker：NISSIN SYSTEMS	
Programming Language	C
Target OS	Linux
Target CPU	INTEL×86

IDE	
Maker：SONY　CSL	
Programming Language	Java(Processing)
Target OS	Linux, Windows, Mac
Target CPU	INTEL×86

IDE	
Maker：KAIT　students	
Programming Language	LabVIEW2013
Target OS	Windows
Target CPU	PentiumⅢ /Celeron866MHZLevel

Change of the number of SDK downloads

Total number of downloads exceeds 1100,
with the number of accounts over 300! (registration is free)

■ KAIT-EL　■ OpenECHO　■ SSNG (English version)
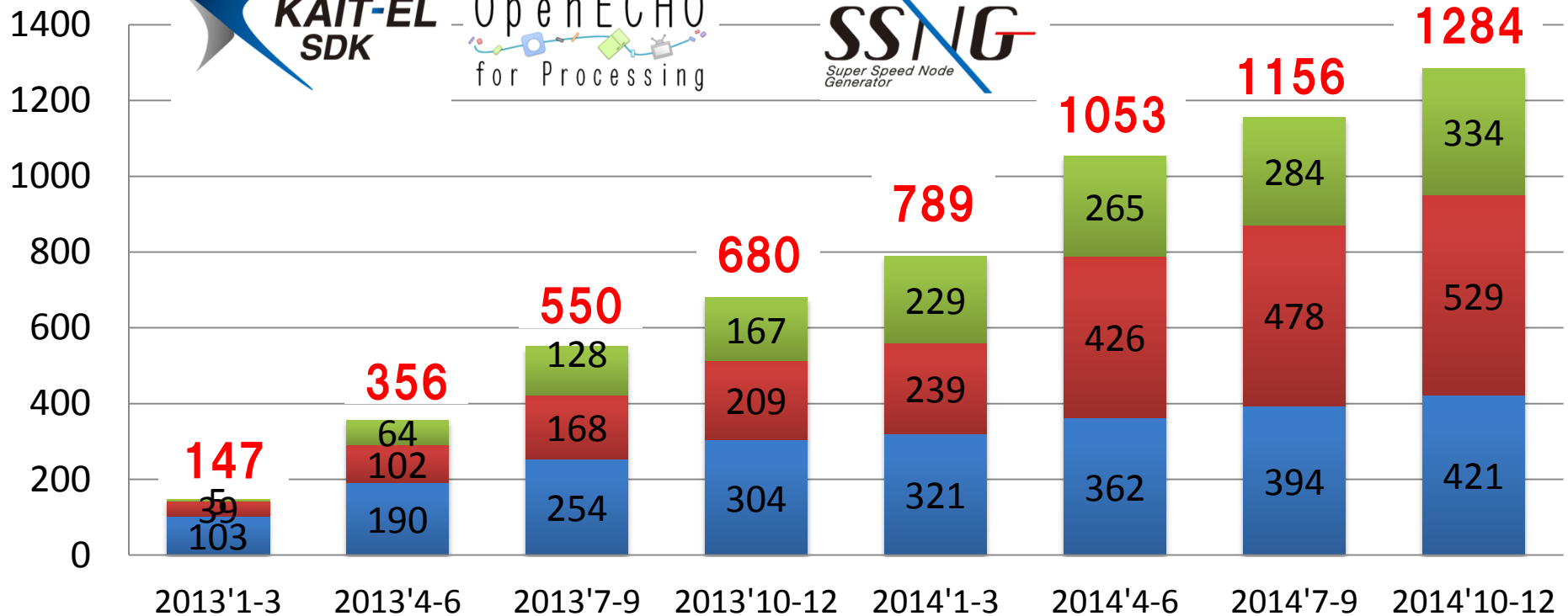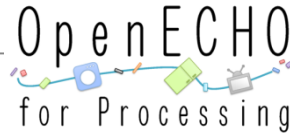
As of Dec. 12, 2014

Future Smart House Business

ECHONET Lite as application platform

Image of the smart phone business

Image of the smart house business

ICT industry

App (App Store)	App (Google Play Store)
OS (iOS)	OS (Android)

Carrier

Mobile phone manufacture

ICT industry

House builder/ constructor

Home electronics/ housing equipment manufacturer

App (To be provided)

Application platform (ECHONET Lite)

★Various features are Integrated
Mobile phone, music player, schedule notebook, voice recorder, map, digital camera, etc.

★Various equipment will be interconnected (in future)
Housing equipment, home electronics, energy creation/saving equipment, sensors, etc.

New SDK: KAIT-4S（for Service）

New SDK facilitates development in this field.

Controller service

Home Energy Management System（HEMS）

LAN/HAN

SMA smart electricity meter

B route

Water heater

Fuel battery

Storage battery

Lighting equipment

Air conditioner

Solar power generator

Electric car

SMA HEMS controller

Eight key equipment for ECHONET Lite
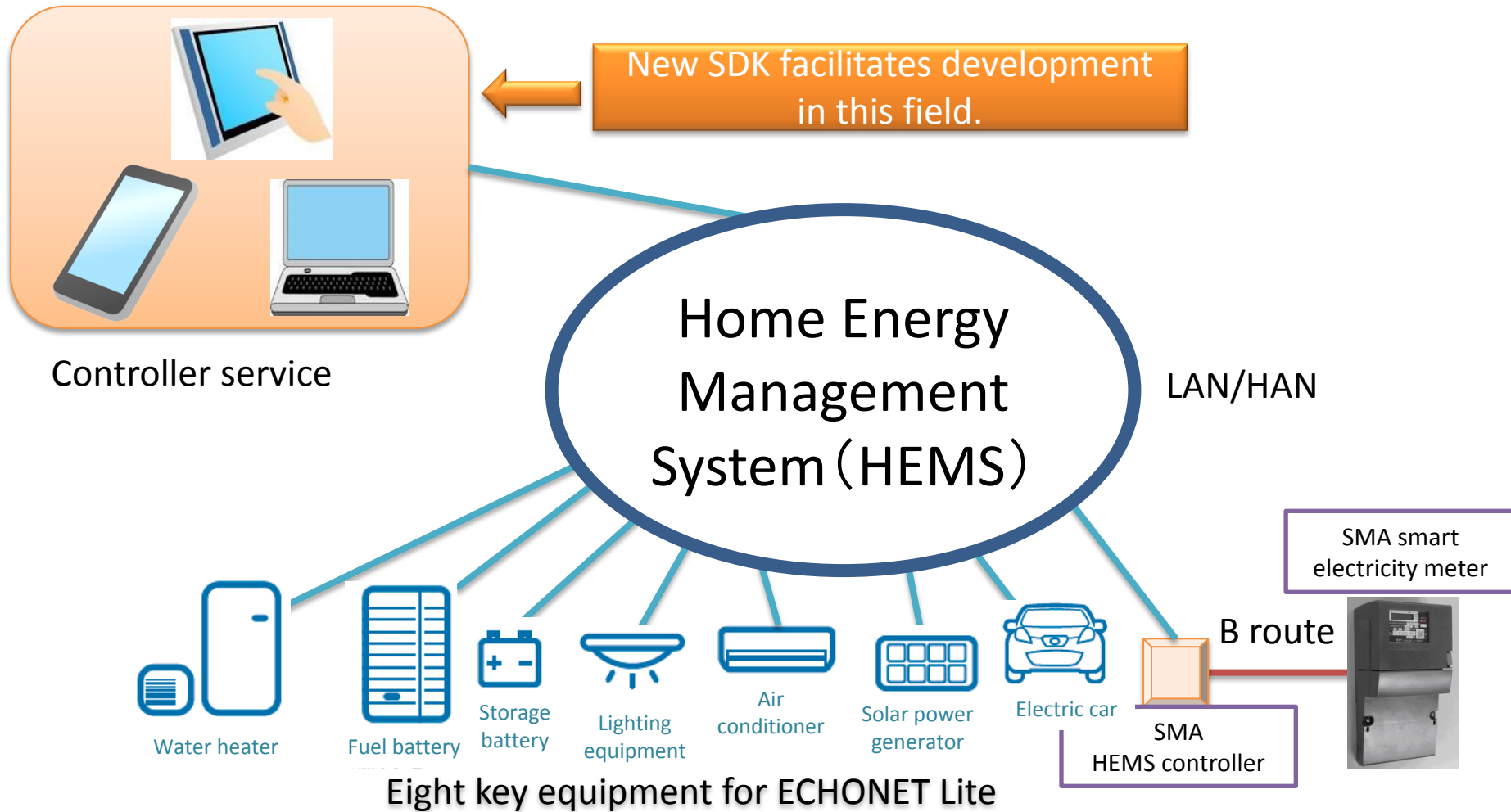
SDK for development of ECHONET Lite service

SDK for smart phone service apps was developed

Currently available SDK
(for development of ECHONET Lite equipment)

New SDK now under development (for development of ECHONET Lite service)

New

KAIT-EL SDK

Development environment	
Development language	C
Target OS	Linux
Target CPU	INTEL×86

OpenECHO for Processing
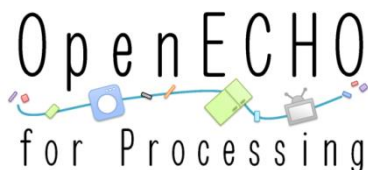
Development environment	
Development language	Java(Processing)
Target OS	Linux,Windows,Mac
Target CPU	INTEL×86系

SSNG Super Speed Node Generator
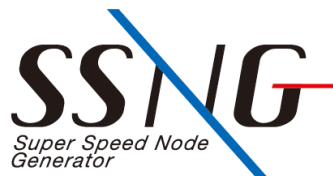
Development environment	
Development language	LabVIEW2013
Target OS	Windows
Target CPU	PentiumⅢ/Celeron86 6MHz or its equivalent

+

KAIT-4S (for Service) series

KAIT-4S～EZ～

・Multi-development tool based on the standard database (SQLite)
Allows for development of apps for both iOS and Android

KAIT-4S～CANVAS～

・Visual programing tool for ECHONET Lite
Treats each command as a part just like in a puzzle and allows for development of coordinative service only by combining some desired parts.

KAIT-4S～HA～

・Development tool for apps supporting iOS HomeKit

https://smarthouse-center.org/sdk/download/

KAIT-4S -EZ-

SQL DB can be used to develop apps for both iOS and Android
without special consideration for ECHONET Lite

ECHONET Lite

WiFi

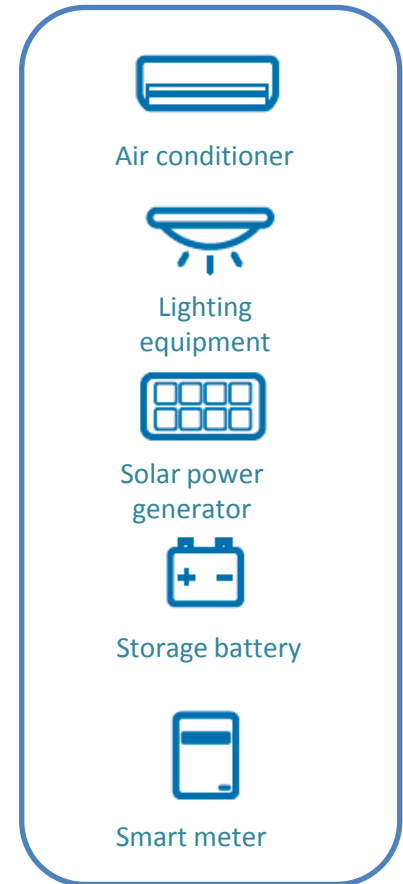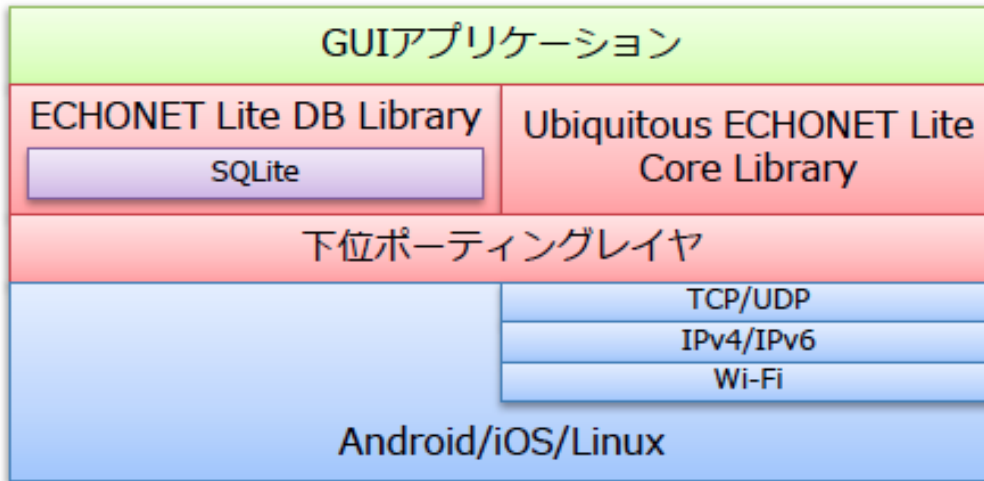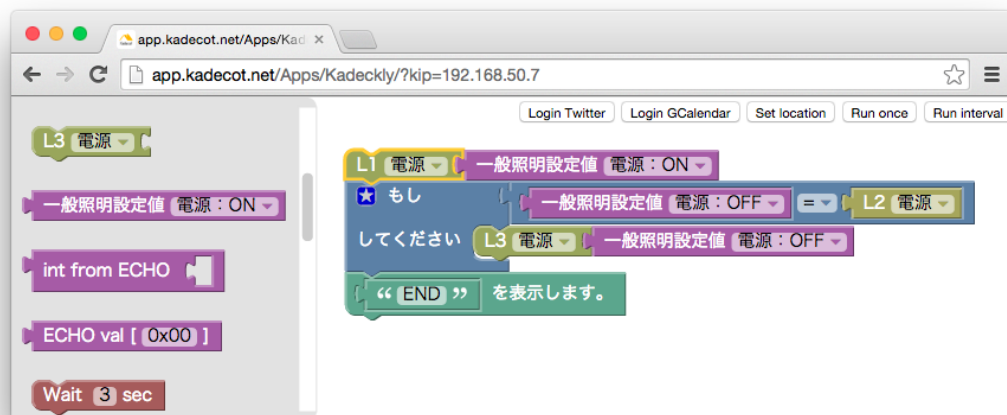iOS: Objective-C
Android: Java

GUIアプリケーション	
ECHONET Lite DB Library	Ubiquitous ECHONET Lite Core Library
SQLite	
下位ポーティングレイヤ	
	TCP/UDP
	IPv4/IPv6
	Wi-Fi
Android/iOS/Linux	

Air conditioner

Lighting equipment

Solar power generator

Storage battery

Smart meter

KAIT-4S -Canvas-

Visual programming allows for prototyping of control logic for ECHONET Lite products.

Web API
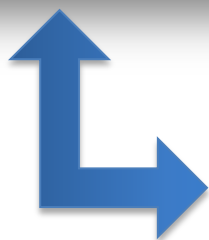
ECHONET Lite

WiFi

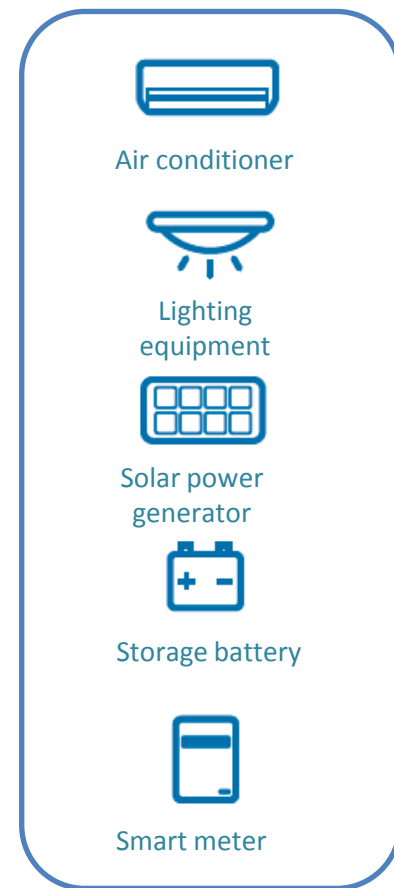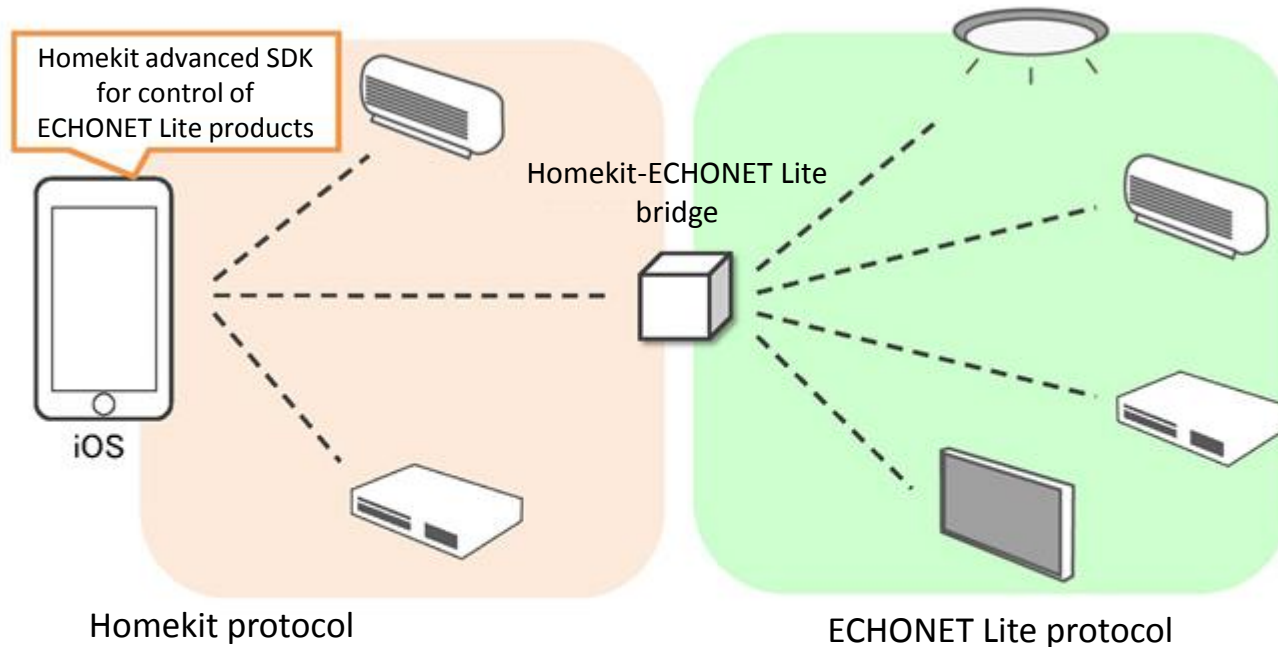Kadecot Server
on Android device

Air conditioner

Lighting
equipment

Solar power
generator

Storage battery

Smart meter

KAIT-4S -HA-

iOS Homekit framework can be used to develop control apps for ECHONET Lite products.

Homekit advanced SDK
for control of
ECHONET Lite products

Homekit-ECHONET Lite
bridge

iOS

Homekit protocol

ECHONET Lite protocol

- Homekit protocol, which has been adopted for iOS8 by Apple, is used to develop a bridge device (prototype) for controlling ECHONET Lite products.
- API with which ECHONET Lite products can be operated via the bridge device is provided as Homekit advanced SDK.

KAIT SDKs

SDK / Tool	Version	Availability	Development Environment	Language	Target	Comment
SSNG (Super Speed Node Generator)	2.1.4-E	now	Windows	N/A	Windows	A tool to send/receive ECHONET Lite commands
KAIT-EL	2.0.0	now	Linux (32bit)	C	Linux (32bit)	SDK to develop embedded devices
OpenECHO for Processing	2014.07.25	now	Windows, Mac, Linux	Java	Windows, Mac, Linux	SDK to develop controllers or devices (incl. emulator)
KAIT-4S -EZ-	1.0	2015 Feb	Windows, Mac	Java, Objective-C	Android, iOS	SDK to develop controller apps for Android or iOS
KAIT-4S -Canvas-	1.0	2015 Feb	Windows, Linux	Blockly	Windows, Linux, Android	SDK to develop controller apps for Android
KAIT-4S -HA-	1.0	2015 Feb	Mac	Objective-C	iOS	SDK to develop controller apps for iOS utilizing Homekit Accessory framework

Demo Video -1

SSNG(*) controls an air conditioner

http://youtu.be/R7hHVkCie6g

[SSNG Tutorial 001] SSNGによるECHONET Lite機器操作 -エアコンの電源ON/OFF-

Demo Video -2

Demonstrated with a smartphone at ENEX2014

http://t.co/ELhNr6pQxn

Kadecotで様々な機器を動かすデモ

2014年1月 ENEX
HEMS認証センターブースにて

Sony CSL

Android App (HEMS Controller) controls water heater, air conditioner, light and window shade by variety of manufacturers

スライダーで角度を調整できます。すごい!

Kanagawa Institute of Technology, JAPAN

Demo Video -3

CG girl RAY-chan controls a light with ECHONET Lite

http://www.youtube.com/watch?v=TTbMXyG1JQ8
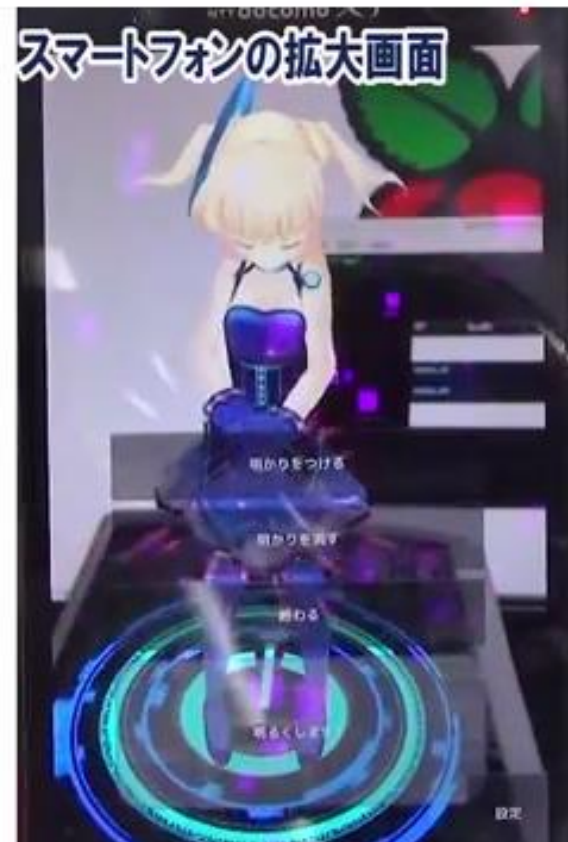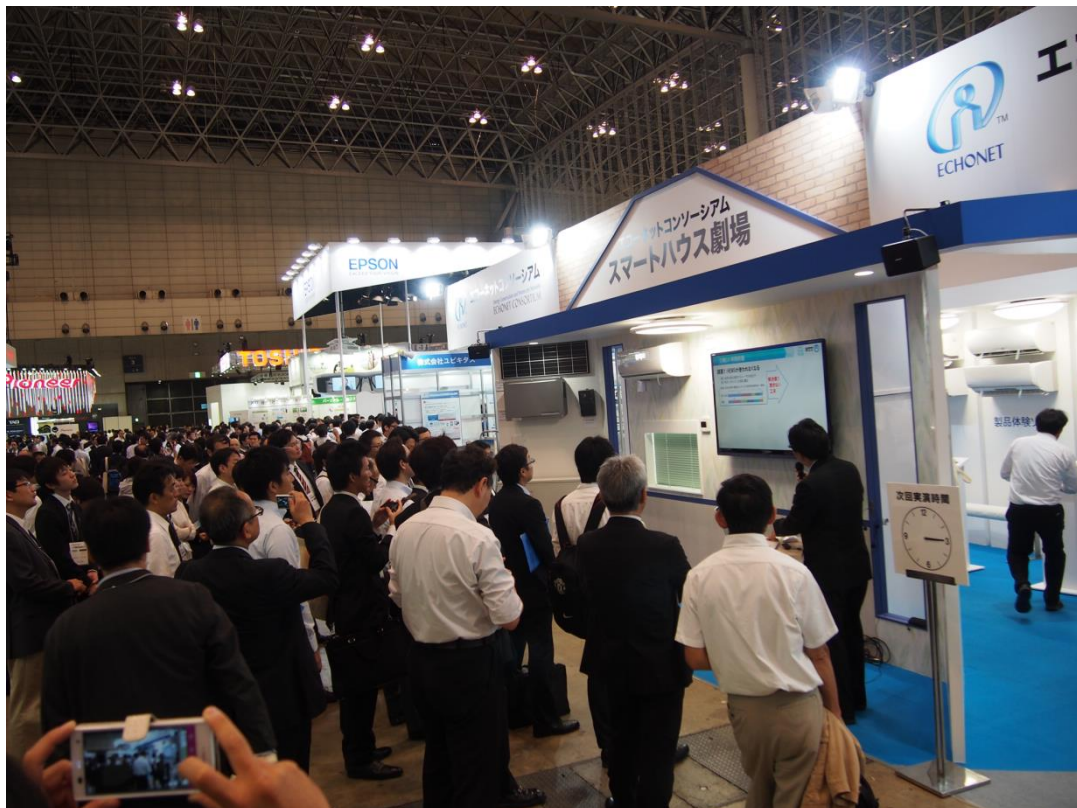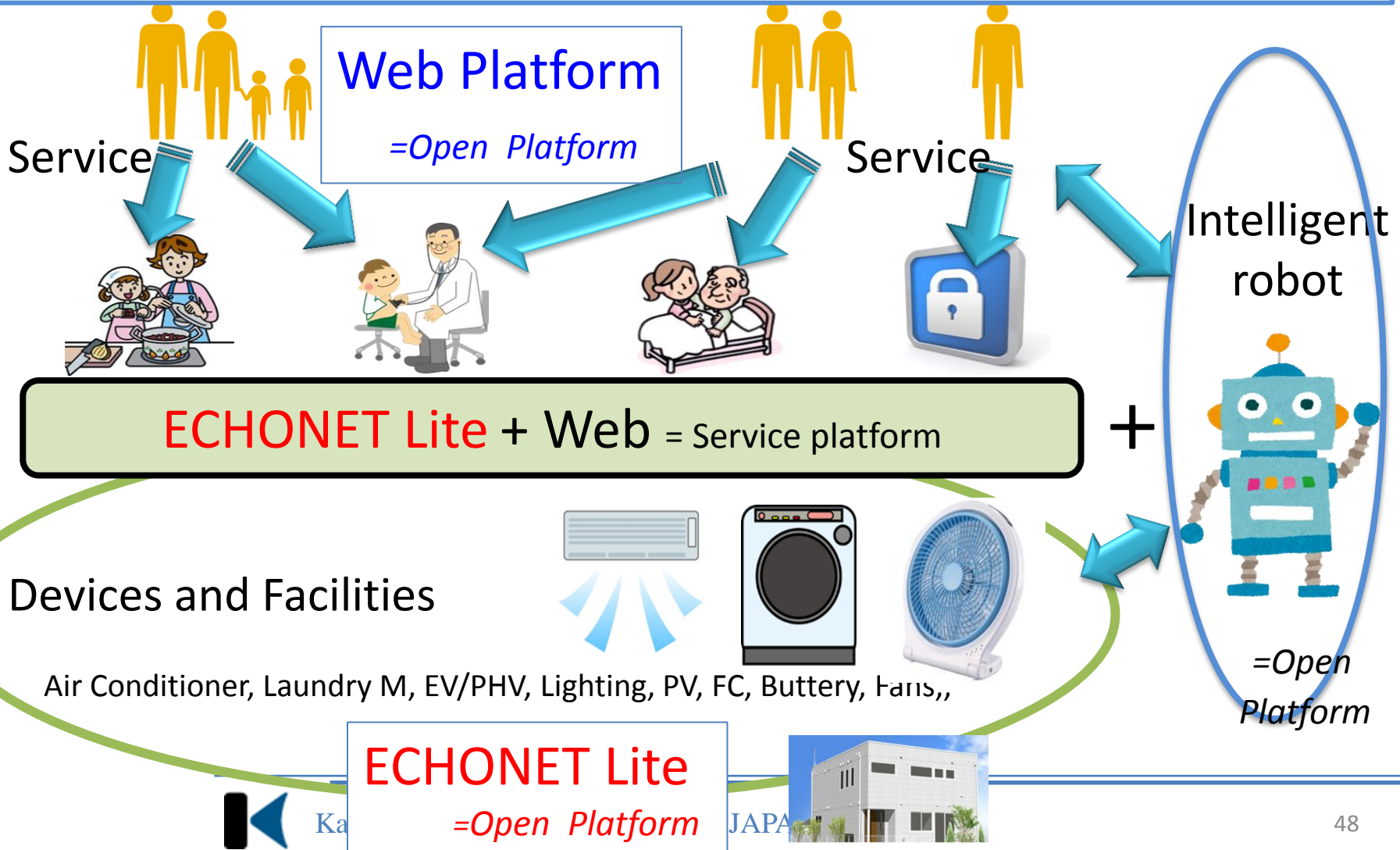
Presentation at Exhibition（CEATECJAPAN2014）

Open Platform Creates the World

"ECHONET Lite + Web + Intelligent robot" creates the future of HEMS

Web Platform

=Open Platform

Service

Service

Intelligent robot

ECHONET Lite + Web = Service platform

+

Devices and Facilities

Air Conditioner, Laundry M, EV/PHV, Lighting, PV, FC, Buttery, Fans,,

=Open Platform

ECHONET Lite

=Open Platform

The Key to Smart House

People who live in the house take charge!

&

（Smart）
For people who live in the   House

Concluding Remarks

1) Feel free to visit our center. Everyone is welcome!
2) Register as ECHONET academic member (free of charge) and join our activities!
3) Community-based services are desired. Develop them with us!

http://sh-center.org/

For detailed materials or booking a Center tour, access the above URL.

Reference

LINK（Demo Videos）

Smart house experience demo　by　CEATEC　JAPAN2013

https://www.youtube.com/watch?v=SB-W3e-Tsgo

Introduction of HEMS Interoperability Test Center

http://youtu.be/rbENYEMN15s

Scenes of the center tour

http://youtu.be/orDKivSlvgA

[SSNG Tutorial 001] Air conditioner　ON/OFF

http://youtu.be/R7hHVkCie6g

[SSNG Tutorial 002] Air conditioner　Mode　change

http://youtu.be/5y_7933KBVw/

[SSNG Tutorial 003] light　ON/OFF etc

http://youtu.be/oxabIQ3oE0Y

Light　ON/OFF by Kadecot (AR-chan）

http://www.youtube.com/watch?v=TTbMXyG1JQ8

Reference

LINK（Related organizations）

HEMS Interoperability Test Center Web site

http://sh-center.org/

Kanagawa Institute of Technology (KAIT)

http://www.kait.jp/

ECHONET Consortium

http://www.echonet.gr.jp/

Ministry of Economy, Trade and Industry (METI)

http://www.meti.go.jp/

Materials of the 1st through 4th meetings of Smart House/Building Standardization Business Promotion Study Group
http://www.meti.go.jp/committee/kenkyukai/shoujo/smart_house/004_haifu.html

Japan Smart Community Alliance (JSCA)
https://www.smart-japan.org/