

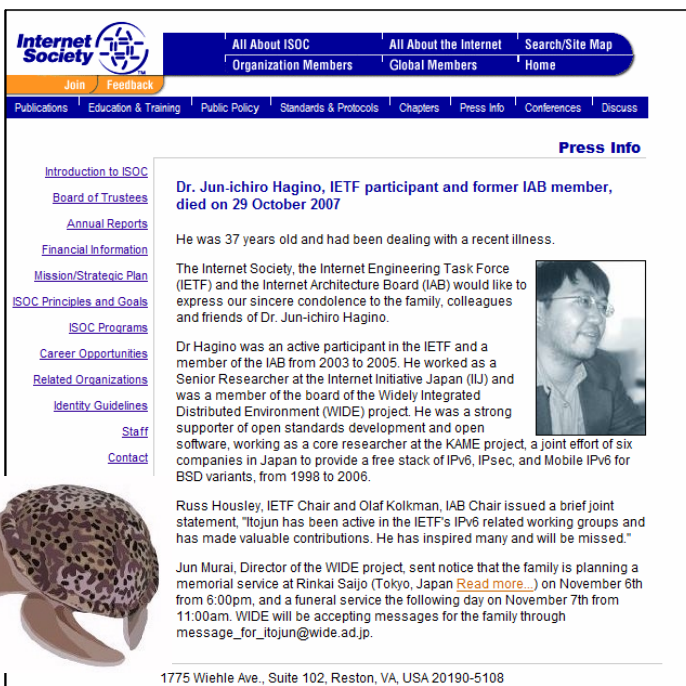
# IPv6 in Japan



Hiroshi Esaki, Ph.D.

Executive Director, IPv6 Promotion Council of Japan  
Professor, The University of Tokyo  
Board member, WIDE Project  
Board of Trustee, ISOC

“itojun” has passed away on October 29, 2007  
Millions of thanks and regards, itojun, called as  
the IPv6-samurai.  
We must promise the deployment of IPv6 to him.



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**Dr. Jun-ichiro Hagino, IETF participant and former IAB member, died on 29 October 2007**

He was 37 years old and had been dealing with a recent illness.

The Internet Society, the Internet Engineering Task Force (IETF) and the Internet Architecture Board (IAB) would like to express our sincere condolence to the family, colleagues and friends of Dr. Jun-ichiro Hagino.

Dr Hagino was an active participant in the IETF and a member of the IAB from 2003 to 2005. He worked as a Senior Researcher at the Internet Initiative Japan (IJ) and was a member of the board of the Widely Integrated Distributed Environment (WIDE) project. He was a strong supporter of open standards development and open software, working as a core researcher at the KAME project, a joint effort of six companies in Japan to provide a free stack of IPv6, IPsec, and Mobile IPv6 for BSD variants, from 1998 to 2006.

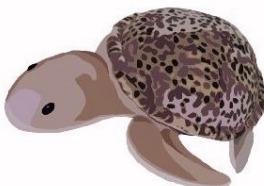
Russ Housley, IETF Chair and Olaf Kolkman, IAB Chair issued a brief joint statement, "Itojun has been active in the IETF's IPv6 related working groups and has made valuable contributions. He has inspired many and will be missed."

Jun Murai, Director of the WIDE project, sent notice that the family is planning a memorial service at Rinkai Saijo (Tokyo, Japan [Read more...](#)) on November 6th from 6:00pm, and a funeral service the following day on November 7th from 11:00am. WIDE will be accepting messages for the family through [message\\_for\\_itojun@wide.ad.jp](mailto:message_for_itojun@wide.ad.jp).

1775 Wiehle Ave., Suite 102, Reston, VA, USA 20190-5108  
Tel: +1 703 226 0000 Fax: +1 703 226 0004



Open Source (BSD)  
Global (IETF/IAB)  
IPv6 development



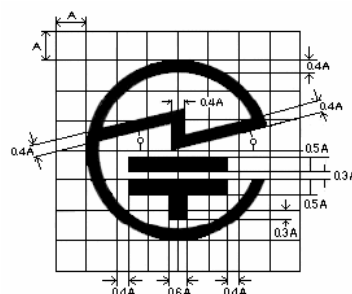
# Good News ☺

- JATE has joined to IPv6 Forum IPv6 Ready Logo Program.
  - <http://www.jate.or.jp/english/index.html>
  - Japan Approvals Institute for Telecommunications Equipment
- Lol (Letter of Intension) has been signed up between IPv6 Forum and JATE on Nov.19(Mon), 2007 at Canberra, Australia



## What is JATE ?

- Japan Approvals Institute for Telecommunications Equipment
- Established in 1984 by MPT (Minister of Posts and Telecommunications)
- Provide the compliance certifications for telecommunications terminal equipment.
- Objective and direction of JATE and Ready Logo collaboration;
  - Apply the global unique technical standardization into Japanese domestic market.

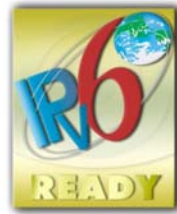


# IPv6 Ready Logo Program run by IPv6 Forum

<<http://www.ipv6ready.org>>



Phase 1 logo

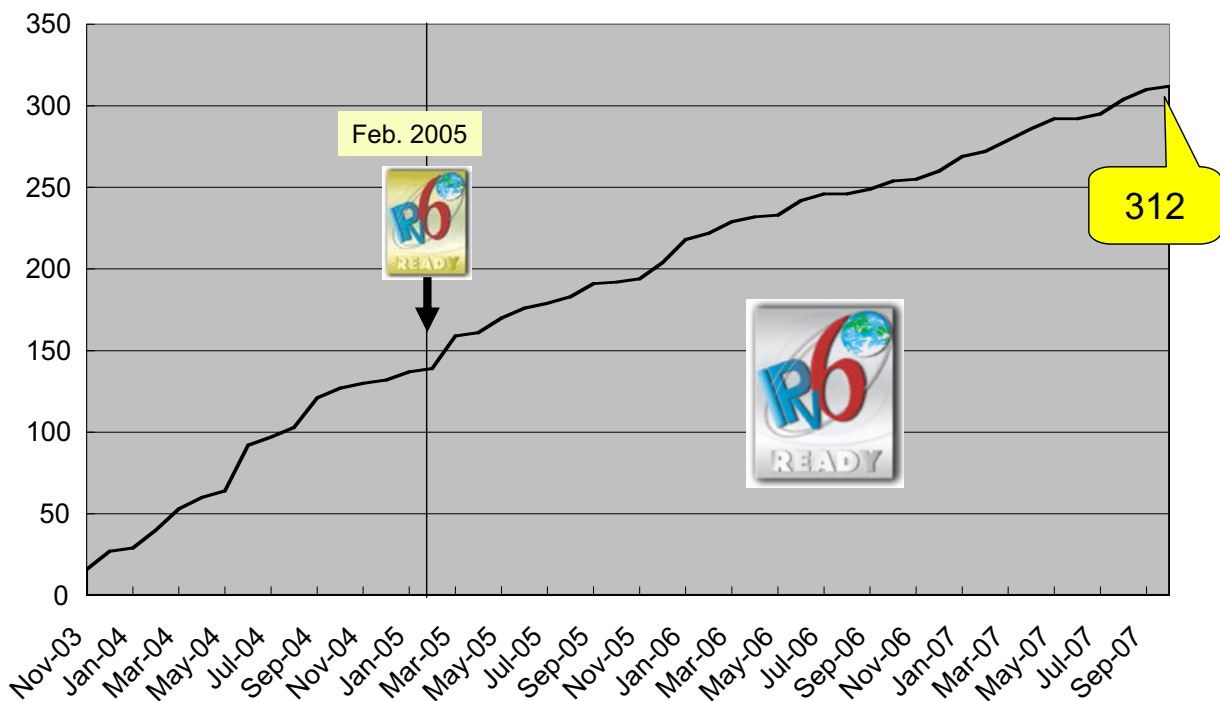


Phase 2 logo

**Phase 1 ; Started September 1, 2003**  
**Phase 2 ; Started February 16, 2005**



## Approved Devices Phase-1 Logo (as of Sep. 20th 2007)



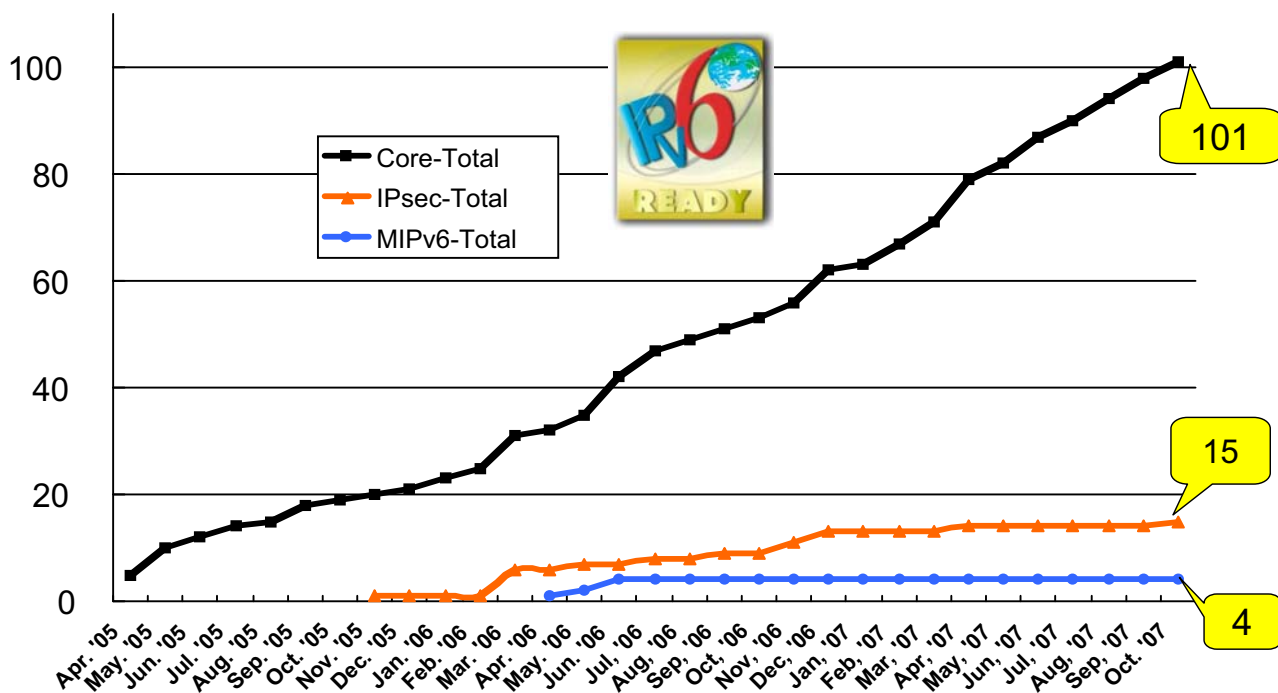


# Status of Phase 2 Program

- IPv6 core specification : available
- IPsec (including IKE) : available
- MLDv6 (multicast) : {in-progress}
- 6 to4 / NAT-PT : available(experimental)
- MIPv6/NEMO : available(April 2007)
- DHCPv6 : available(April 2007)
- SIP : available {and toward IMS/SIP}

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## Phase-2 Logo Approved Devices (as of Oct. 12th 2007)



# AGENDA

1. Application to Legacy Networks
  - Technology has been almost ready to go !
  - Public Network (i.e., ISP, ASP)
  - TV Broadcasting Network
  - Private Network (e.g., IP-PBX)
2. New Applications (Facility Networking)
  - Building Automation
  - Sensor Network
  - InternetCAR

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## IPv6 Users in JAPAN

### Users of Japanese IPv6 Service

	IPv6 Service	Provider	Number of Subscribers	Start of Service
A	FLET's	NTT EAST	3M*	2007/1/10
	FLET's	NTT WEST	2.4M*	
B	FLET's .NET	NTT EAST	4.8K	2006/3/31
	FLET's v6Appli	NTT WEST	4.9K	
	IPv6 Connectivity	OCN	?	?
	4th Media	PLALA	50K	2006/10
	On Demand TV	On Demand TV	50K	2006/4

\* RA Address provided around 2M.

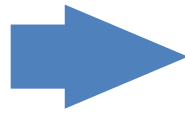
**A: IPv6 Ready >>> 5.4M\***  
(Able to provide IPv6 immediately)

**B: IPv6 Users >>> 110K**

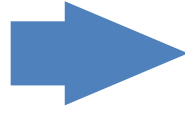
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# IPv6 Solution

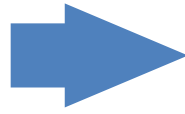
## IPv6 getting closer to the home



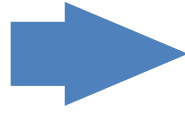
IPv6 home router, Now in Japanese major electrical store.  
Only about \$120.00 !!



IPv6 Network Camera, Also in some store.  
Only about \$480.00 !!

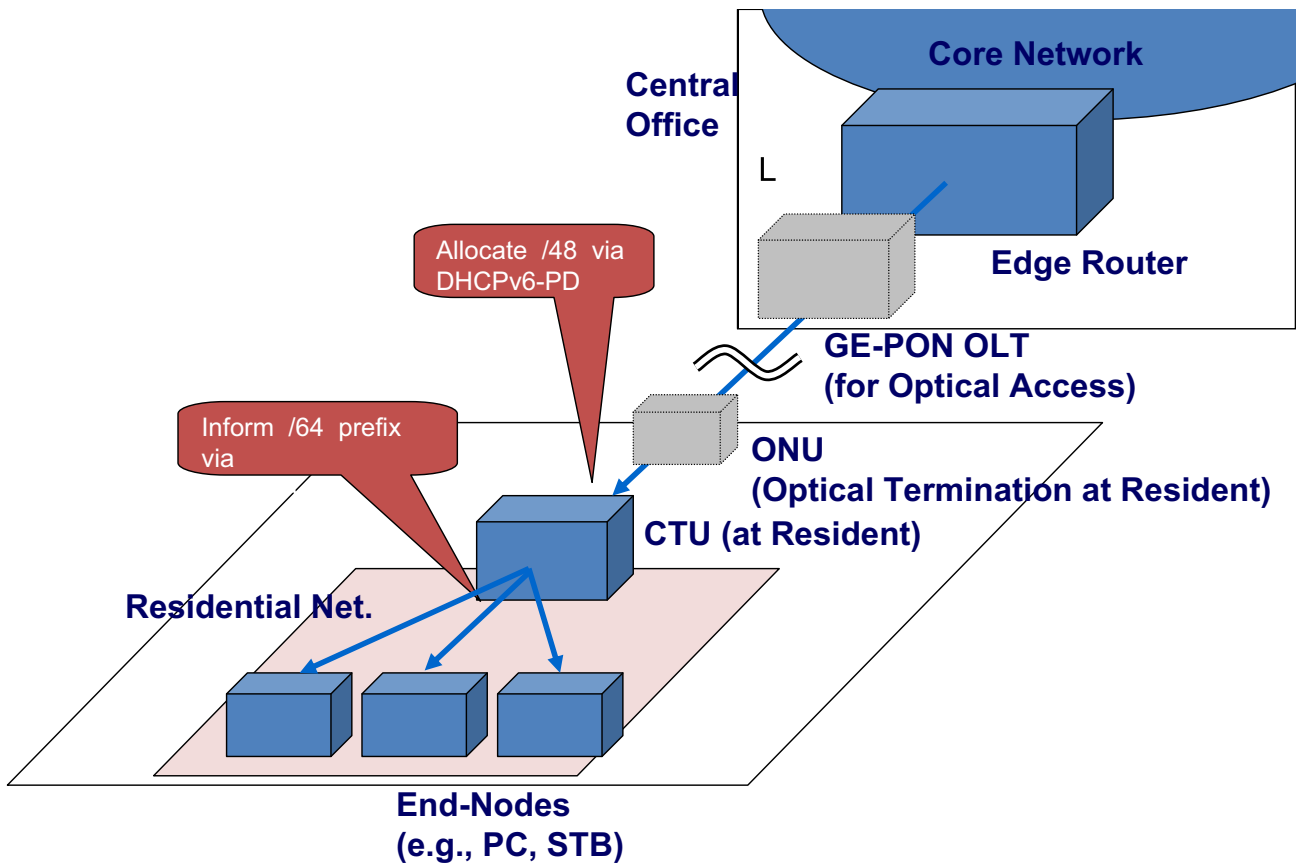


IPv6 Connectivity Option, provided by OCN.  
Only \$3.60 per month !!



IPv6 Multicast Compatible LCD HDTV, provided by Toshiba.  
Only from \$1,200.00 !!

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## Functions of CTU

### [IPv4]

IPv4 related with routing

- NAPT(include ALG) , NAT
- Unnumbered routing (for multiple IPv4 address allocation)

UPnP

DHCP Server

IP tunneling

IPv4-IPv6 translation (for special servers via http)

### [IPv6,IPv4]

Firewall, SPI

DNS proxy

### [IPv6]

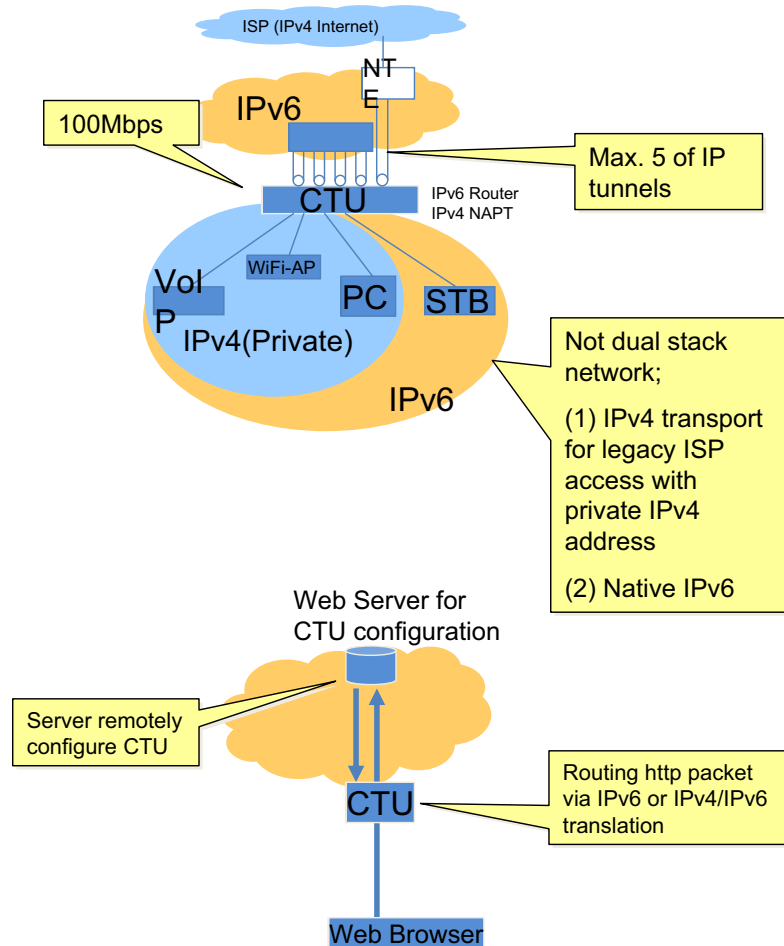
DHCP-PD

MLD-proxy

### [Others]

Firmware automatic update,

Remote monitoring



## Lessons from IPv6 Operations

- IPv6 is ready to go into professional and business operation
  - Initial cost:
    - New services;
 

Especially, when you can start some new services/ applications, the cost of IPv6 is almost same as of IPv4. Sometime, cheaper than IPv4, due to simple network design.
  - Running cost / life-time cost
    - How will you come up with merging, restructuring of organization

# Japanese MIC formed study group

- Mission: “How to achieve smooth IPv6 introduction”
- Some interesting discussion and analysis
  1. There is no free lunch ! All must pay money on IPv6.
  2. Squeezing out the global IPv4 address from existing network looks so hard.... JPNIC had got less than 2% of address space.....
  3. IPv4 address exchanging market may generate the company accounting issue, since IPv4 address may become as an asset.
  4. Broadband Internet consumes a lot of global IP(v4) addresses
  5. RIPE is large IPv4 address consumption as well as BRICs area.
  6. The largest sacrifice is business/ service deployment for new companies and for legacy companies
  7. Contents provider and system integrator should join
  8. Translator between large clouds will not work..... Put it at the

## HOTAL Project for SIP IPv6

### - IMS/SIP Reference Code Implementation -

- Hosted by WIDE Project
- Leader; Dr.Hiroshi Esaki (Univ. of Tokyo)
- Technical Head; Dr.Masafumi Oe (NAOJ/WIDE)
- Members;
  - NTT-AT, NEC, Fujitsu, NEG-AT, NiCT, SProp, INTEC Netcore, Panasonic Communications, Softbank Telecom
- With conformance testing and interoperability testing, targeting IPv6 Forum Ready Logo
- Testbed Operation at DISTIX



# AGENDA

## 1. Application to Legacy Networks

- Public Network (i.e., ISP, ASP)
- TV Broadcasting Network
- Private Network (e.g., IP-PBX)

## 2. New Applications (Facility Networking)

- **Building Automation**
- **Sensor Network**
- **InternetCAR**

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How to use the sensor network  
e.g., saving energy in building system

- Huge operational cost

- Energy saving and preserving the Earth

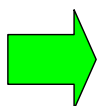
- Private companies

- while there is an economical benefit and incentive for private companies.

- Let it with open TCP/IP technology (i.e., IPv6)

- COP3 by United Nation

- 10%-30% energy saving

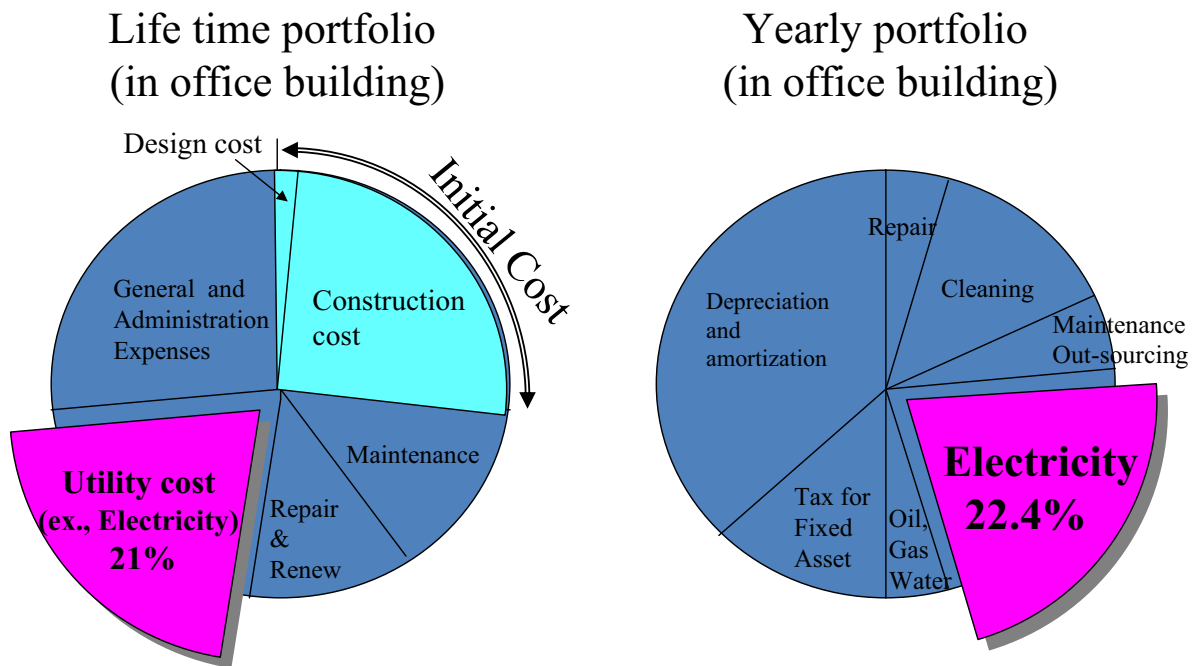


1. Improve portfolio
2. Increase asset value



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# Life-time cost in Building System



Source : <http://www.satobenec.co.jp/products/lcc/energy/concept/concept.html>

## Facility management

### IPv6 based P2P control of facilities

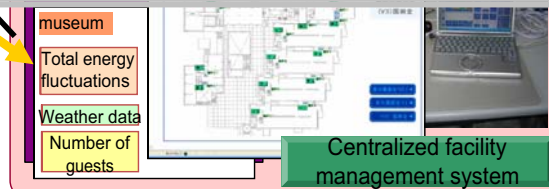
- Status of elevators, AC or ventilators, movement of guests in the museum, temperature of rooms, surveillance camera images may be monitored in a facility management center.

(1) Tokyo Metropolitan HQ Buildings Has decides to Introduce IPv6 Based Facility Controlling System

(2) Replacing Control System in Old Facilities, Which Use Inefficient "Engine" (i.e., poor fuel efficiency) Consuming a Lot of Unnecessary Energy.

Mini base facility data

Rationalizing day-to-day management of facilities using remote maintenance



# “KAIZEN” and “Saving Energy” by eliminating any un-necessities



- [www.cimx.co.jp](http://www.cimx.co.jp)
- Just let available and visible the information to any stake-holder

Success to save 12% of electricity cost, “without” any actuator, only by “monitoring” in major super-market-store (Daiei)



## Objective

Energy (Electricity) saving in their chain-stores

## Target

All facilities in their store

## What they did

Real-time displaying of volume of electricity consumption at each section

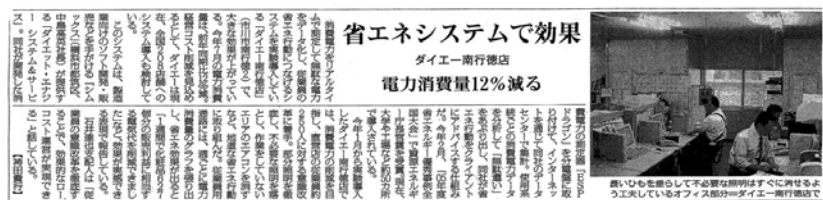
## Results

Started in January 2006

- 12% energy saving at maximum
- 1. saving amount in one week corresponds to the benefit by 627 cosmetics sales !!!
- 2. Side-effect; improve royalty of employee.



2006年10月26日



Objective

Energy (Electricity) saving in their chain stores

Target

All facilities

What they

Real-time di

Results

Started in Ja

12% energy sav

1.saving amou

corresponds to the benefit by 627 cosmetics sales !!!

2.Side-effect; improve royalty of employe.

12% energy saving at maximum

1.saving amount in one week corresponds to the benefit by 627 cosmetics sales !!!

2.Side-effect; improve royalty of employe.



【記事】  
「省エネ」の取り組みが、店舗の稼働率を向上させた。また、省エネによるコスト削減は、従業員のモチベーションを高め、生産性を向上させた。また、省エネによるコスト削減は、従業員のモチベーションを高め、生産性を向上させた。また、省エネによるコスト削減は、従業員のモチベーションを高め、生産性を向上させた。

## FNIC; Facility Networking Interoperability Consortium

- Facility Networking includes;
  - DNS& Directory Service (including ad-hoc operation)
  - Management Objective, e.g., XML, SORP
  - Communication Protocol, e.g., DLNA, LonWorks, BACnet, Upnp, oBIX
  - Transport Protocol, e.g., IP
  - Data Link Protocol, e.g., WiMAX, ZigBee
  - PKI/IKE Protocol for security

# FNIC(Facility Net Interop)



[Founders]  
Keio Univ.  
Univ. of Tokyo  
WIDE Project  
Yokogawa  
Echelon  
Panasonic(MEW)  
Shimizu  
NTT Data  
NTT East  
NTT Facilities  
Yamatake  
Toshiba  
Daidan  
NTT Comm.  
IRI Ubiteq  
Furukawa  
Intec Netcore  
Johnson Control  
Semens Bld Tech.  
Broadband Eng.

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## Business in FY2007

- **Integration with Digital Home Appliances**
  - **TV set by Panasonic works as window for facility control and management**
  - **Panasonic, Hitachi, Toshiba, NTT Communications**
- **Demonstration at Interop Tokyo 2007**
  - Shimizu, NTT Facility, Daidan
  - YAMATAKE
  - Panasonic, Toshiba
  - IRI Ubiteq, MEW(Matsushita Electric Works), Yokogawa, Echelon

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# “Live E!” Project

-- Sensor network for the earth --



<http://www.live-e.org/>

## Environmental Information System

### Live E! Project

- Live E! is a consortium that promotes the deployment of new infrastructure that can generate, collect, process, and share all the “Environmental Information”, associated with the Earth
- As the first step, we picked up "Digital Weather Station"
- Individuals, non-commercial and commercial organization install sensor nodes, and let the information available from anyone on the Internet.
- Larger number of participation leads richer information and for all, and creates innovative applications and usage of information.
- Single information can be used multiple purposes



Digital Weather Station

Chair : Hiroshi ESAKI (Univ. of Tokyo)  
Co-Chair : Reiji AIHARA ( Hiroshima Univ. )

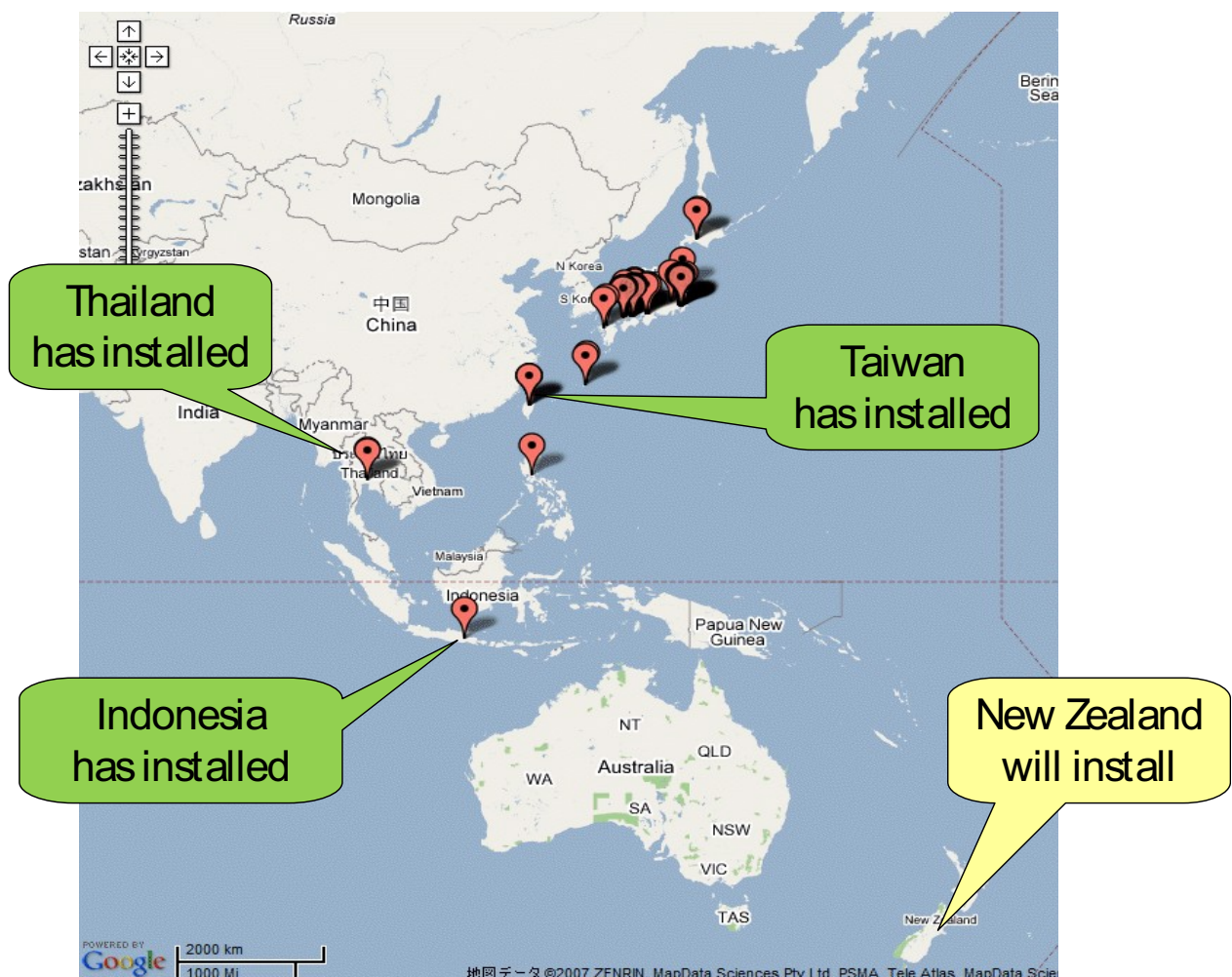
Cooperation : WIDE Project  
Organization: IPv6 Promotion Council of Japan  
U18 IPv6 u  
IRI Ubiteq, Inc. Weathernews, Inc.  
Uchida Yoko Co., Ltd. ECHELON Japan K.K.  
Cisco Systems, Inc. DAI-DAN CO., LTD.  
Net One Systems Co., Ltd.  
Nippon Telegraph and Telephone East Corporation  
Willcom Inc.  
NTT Neomeit Chugoku Corporation  
Mitsubishi Research Institute, Inc.

#### multiple purposes

- ① Education Materials
- ② Public Services
- ③ Business applications

# How works Live E! Project

- Targeting under 18 years old
  - Technical support by University
- Multiple applications and middleware developments using single data sources (sensor nodes), i.e., let information available to everyone
- International collaboration
- Introducing the “real” IP networking technology to non-legacy ICT area, e.g., agriculture



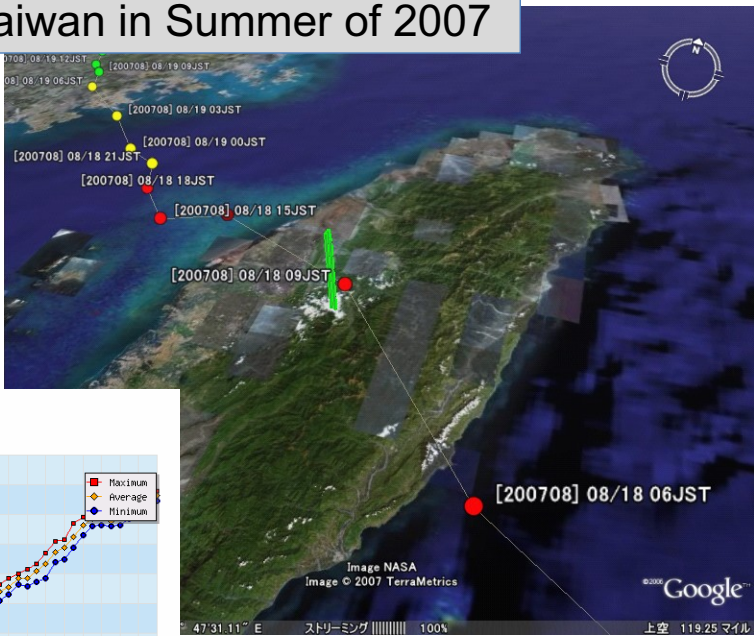
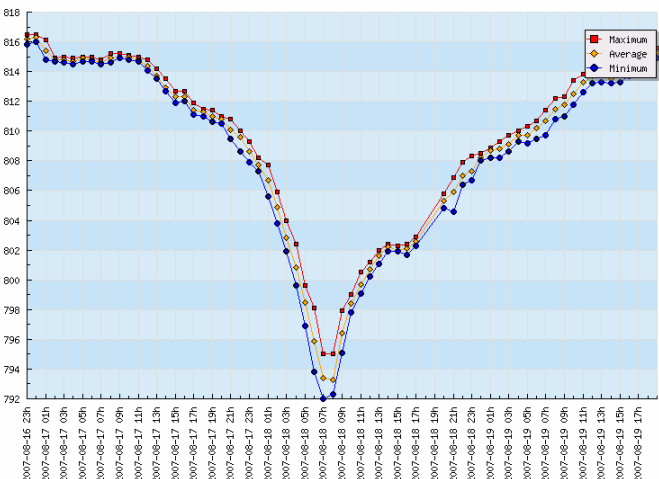
# Four Sensor Nodes installed in Taiwan



# Hurricane has passed Taiwan in Summer of 2007

## Pressure

live-e.org/WXT510/0300000485c2/Pressure





# Integration of Real-space and Cyber-space - Application by high school students -

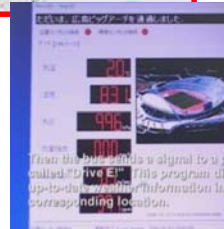
- Integration of

- Diorama
- Remote controlled car
- Weather station



- Project institutions

- Hiroshima City Technical High School
- Fukuyama High & Junior High School
- Hiroshima City University
- Hiroshima University



- Diorama system

- Hiroshima City Technical High School

- Remote Classes

- ✓ Kasetsert High School at Thailand, focusing on environment



## Dense Installation Areas

- Minato-ku in Metropolitan Tokyo

- Education for elementary schools
- Public service, e.g., against heat-island phenomenon or evacuation guide for earthquake



- Kurashiki City in Okayama

- Disaster protection (against flooding by heavy rain)
- Education for elementary and junior high schools



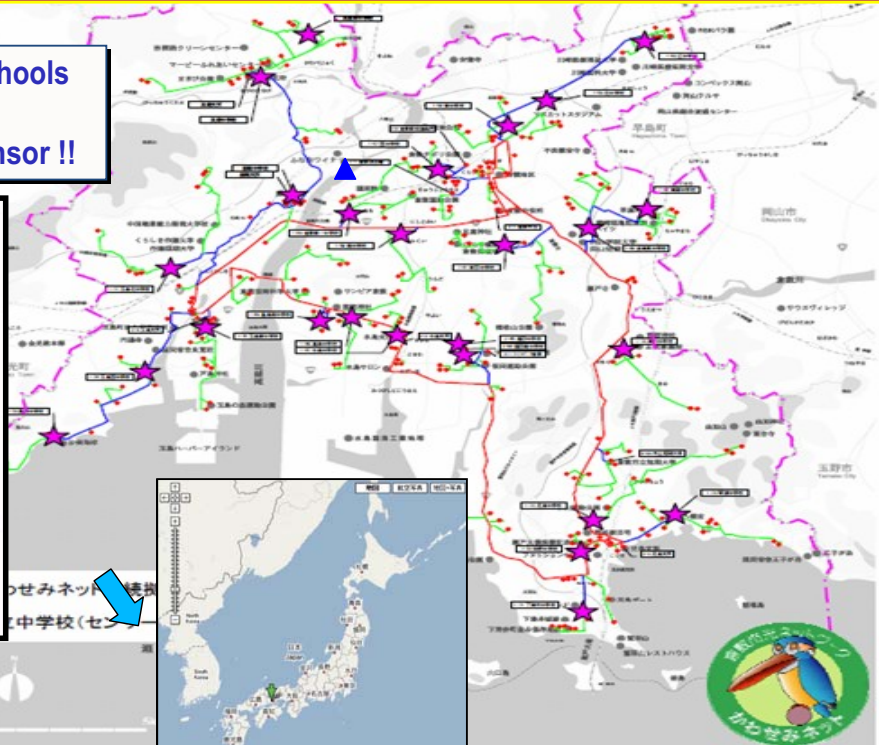
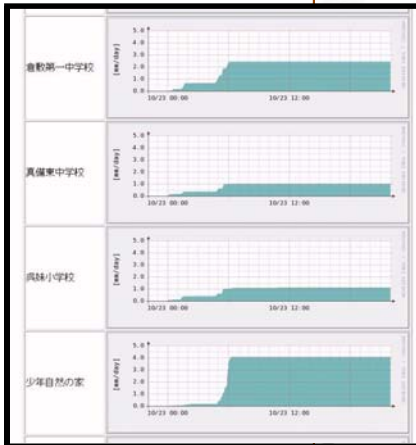
- Marunouchi-Otemachi-Yurakucho

- Sense and control the activity of district



# Live E! Sensor Deployment in "Kurashiki City", to Provide Warning and Evacuation Guide for Flooding due to Heavy Rain, entering into the professional/ business operation

27 Sensors at Junior High Schools  
500K population  
Only "one" Government Sensor !!



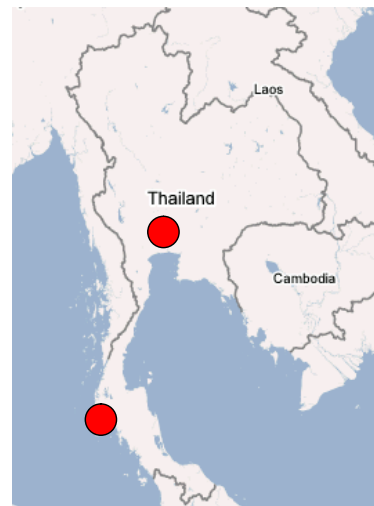
<http://www.city.kurashiki.okayama.jp/>

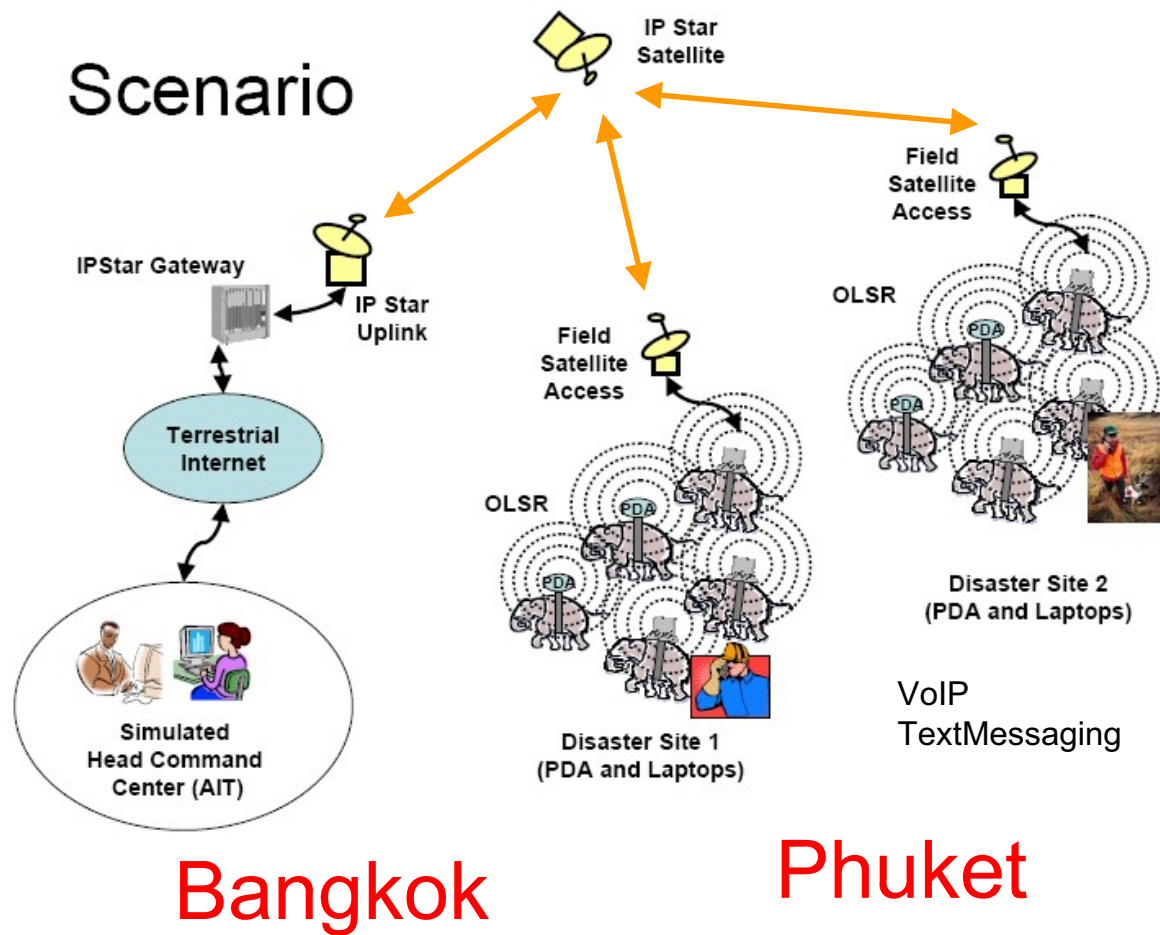
## DUMBO with AIT@th

- Digital Ubiquitous Mobile Broadband OLSR
- Bangkok & Phuket, Thailand
- December 1<sup>st</sup> 2006 (14:00 – 16:30)

### Problem Statement

- In disaster-affected fields, a hybrid mobile ad-hoc & satellite communication technology can be used together to provide broadband communication to aid search & rescue teams.
  - We are investigating an actual framework that integrate MANET (OLSR), satellite IP technology, and customized applications to potentially allow broadband communication applications among few disaster sites and a head command center.



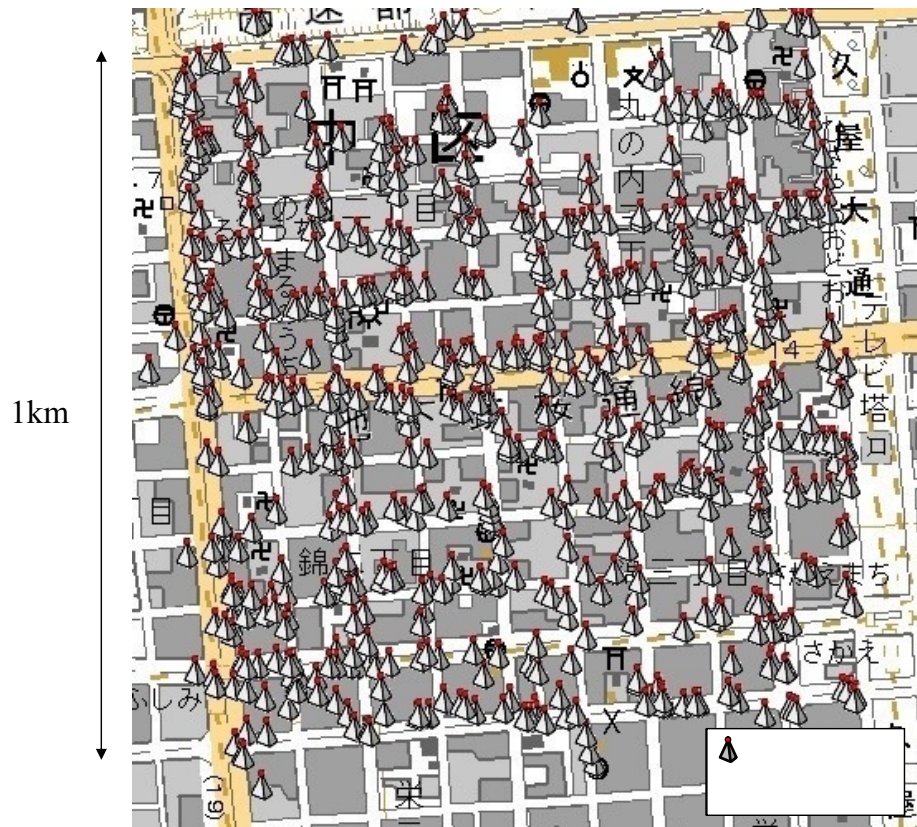


## DUMBO Project in Thailand with AIT

- Emergency Responding
- Live-e sensor in OLSR



**WiL: WIDE Internet Lighthouse (City View)**  
( WiL=Locky + PlaceEngine )



Total 878  
for 1 square km



1. Even work under-ground
2. No-cost, i.e., already paying-off by end-users'

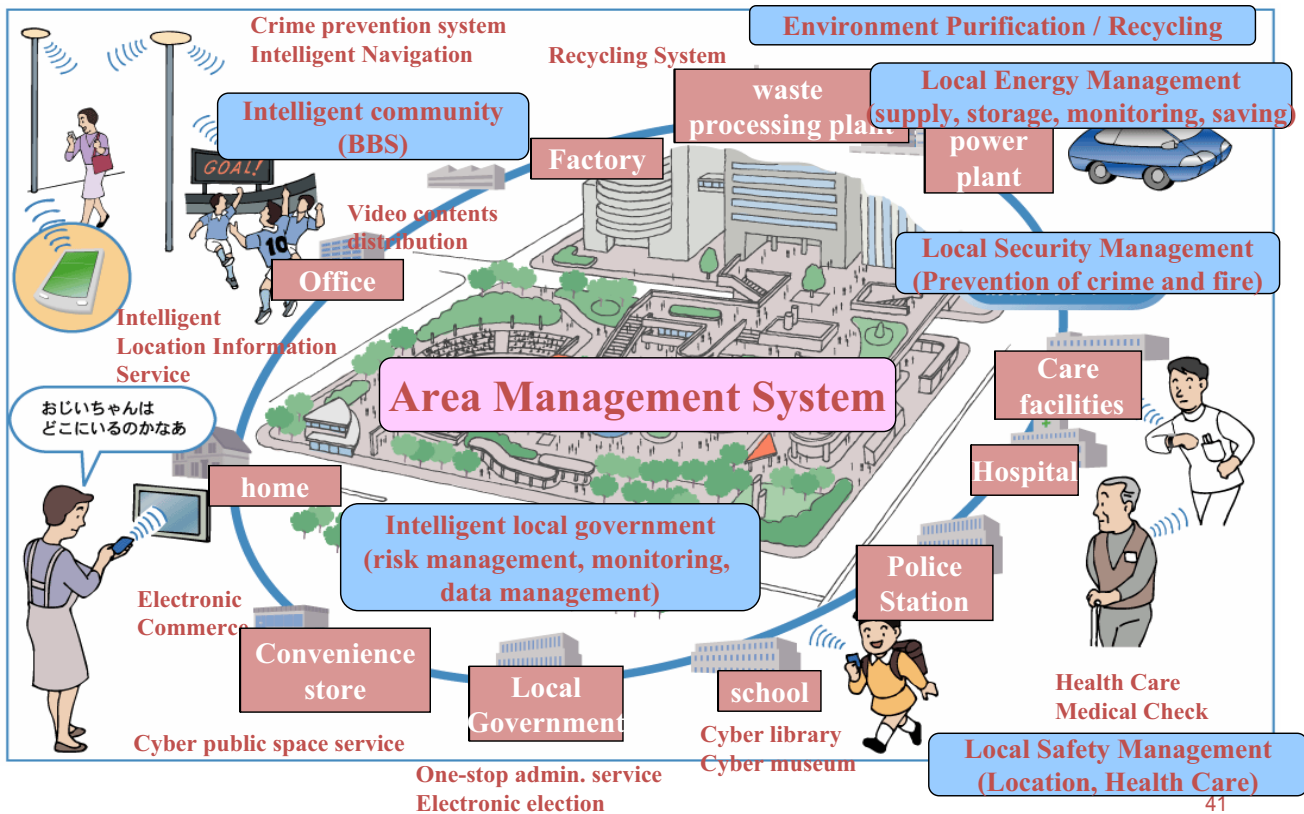
What we need;

1. Shared Infrastructure
2. Social consensus

Downtown Tokyo, Japan

# Metropolitan designing; Real-Space Internet with IPv6

Source: Matsushita Electric Works



## We may realize that;

1. Contribution and responsibility of ICT Technology to our "Earth"
2. Building the network by single entity is so expensive, but by multiple entities may be cheap for each entity.
3. Let available any computing device or resource on the earth for any device on the earth
4. Challenging to theme of physics, economics and mathematics, via electronics and networking technology





[www.wide.ad.jp](http://www.wide.ad.jp)

# Thank you



**IPv6 Promotion Council of Japan:**  
<http://www.v6pc.jp/en/index.html>  
[e-mail: info@v6pc.jp](mailto:info@v6pc.jp)



**Live E! Project**  
<http://www.live-e.org/>  
[e-mail: live-e-info@mri.co.jp](mailto:live-e-info@mri.co.jp)