

地球環境への情報通信技術の貢献
 Contribution of ICT for Environment on the Earth



Hiroshi ESAKI <hiroshi@wide.ad.jp>
 Director, Otemachi Research Center
 (Professor, The University of Tokyo)

古賀先生との 最初で最後の海外出張

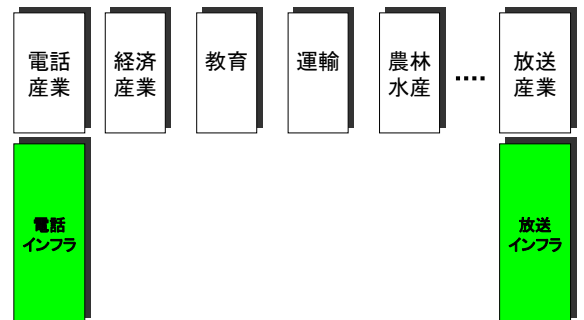
- 2002年8月11日(日)–13日(火)
 - 江崎は、そのまま、San Franciscoに 成田トランジット。。。。
 - 機内では、古賀先生と隣の席 でした。
 - はい、飛行機の中で 飛行機の話しました。
- 2002年8月12日(月)
 - TEEMA主催の IPv6ワークショップ
 - 台湾の 偉い方と Dinner Meeting

How we use the IP technology;

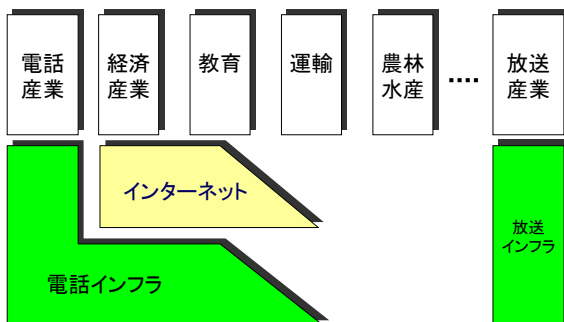
“ IP is not only for IT Section,
but is also for all digital devices”

Efficiency, possibility, opportunity and global

Analogue network



Introduction of Internet



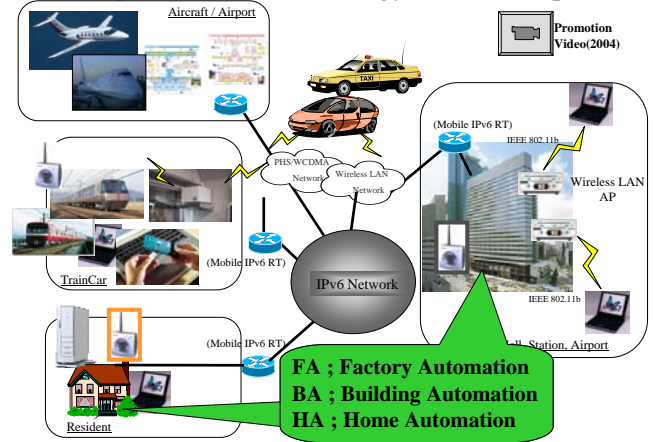
Introduction of Native Internet



Application of TCP/IP Sensor Networking Technology to Facility Networking



Integration of IP Technology with Real-Space



Example of Facility Networking with LONWORKS



New York Subway system



Dam control across the river by water department



Electricity metering



Green house project for agriculture

Home automation with LONWORKS



クラウドナイン



無線接続を使った集合住宅のファンシリティ管理 (北京)



Building Automation with LONWORKS



「六本木HILLS」



「サンビエトロ大聖堂」



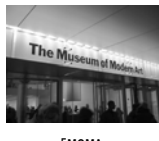
「ルーブル美術館」



「大阪 ハービスENT」

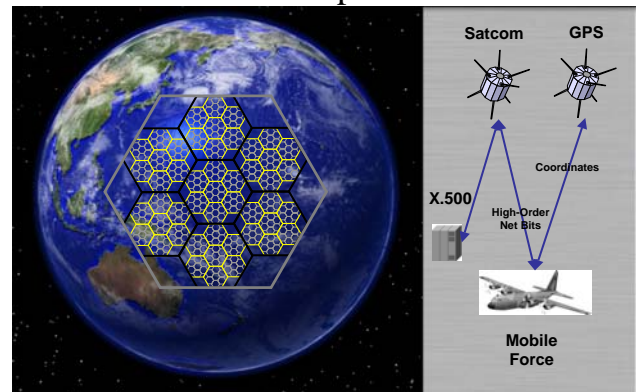


「ニューヨーク市学校」



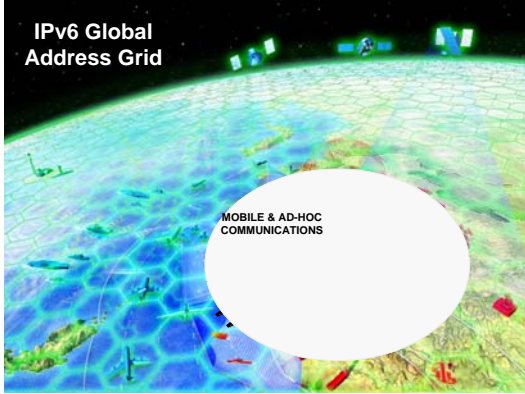
「MOMA」

How US DoD use IPv6 ? Global "Geospatial" Grid



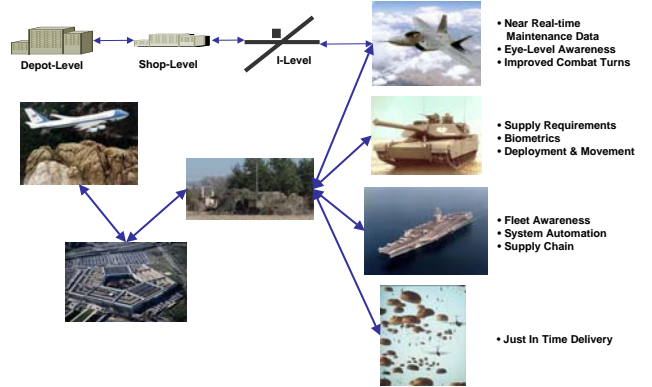
IPv6 Address Grid

Mobile & Ad-Hoc Communications



Operations & Support

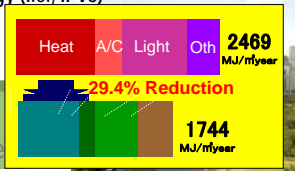
Micro-Electronic Addressing



How to use the sensor network

e.g., saving energy in building system

- Huge operational cost
 - Large energy (e.g., gas, electricity) cost
 - About 30% energy saving has achieved !
- Proprietary technologies
 - Large complex has more than 200K monitoring and controlling points
 - Each systems use different technology
 - Let it be open TCP/IP technology (i.e., IPv6)
- COP3 by United Nation
 - 10%-30% energy saving



1. Improve portfolio
2. Increase asset value

Kyoto Protocol by United Nation

京都議定書が発効

2月16日に発効する、京都議定書についての解説です。

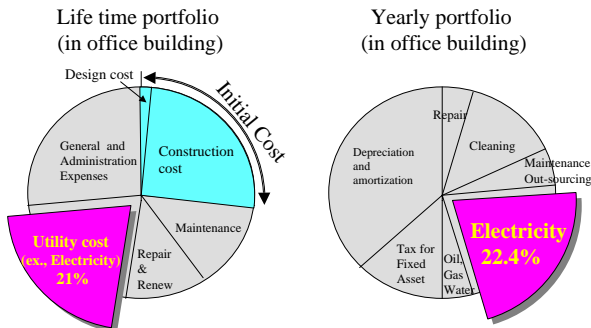
2008年2月16日 発効 京都議定書 関連イベント 関連リンク

Team minus 6%

- ①国民運動を効果的に推進するための「チーム・マイナス6%」キャンペーン
- ②政府発表の排出量見通しによると、2010年排出量は約13億1,100万トンで90年比較で6%の増加
- ③現行対策に加えてさらに約12% (1億4,800万トン)の追加排出削減が必要
- ④排出権取引市場の急速な成長
- ⑤省エネニーズへのますますの高まり

http://eco.goo.ne.jp/word/issue/S00061.html

Life-time cost in Building System



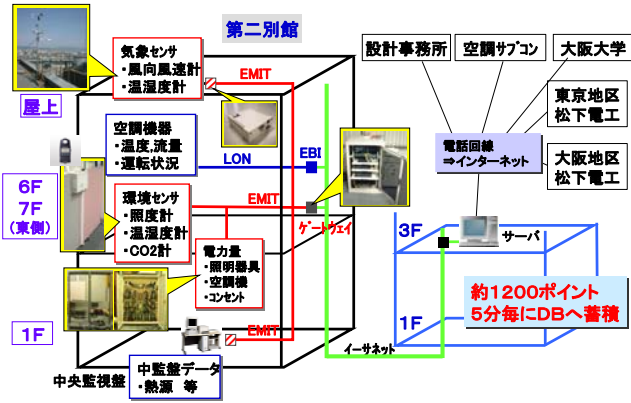
Source : <http://www.satobenec.co.jp/products/lcc/energy/concept/concept.html>

Some interesting chat with Tokyo Denryoku

- Tokyo accelerate
 - Concentrating Economy and Industries
 - Heating Island
- Japan accepted COP3 by United Nations
 - Decrease CO₂ discharging, around 30%
 - Improve energy efficiency, around 30%
- Serious accident at nuclear power plant(s)
 - Could not use nuclear plant.....

⇒ Need energy saving system !!!!
 (*) not only for COP3, but also would contribute to the improvement of their financial portfolio

Sensor Networking



Operation at Tokyo HQ Office of Matsushita Electric Works

Shiodome HQ in Tokyo



Even with a lot of glass windows !!!

	Improvement	Notes
Electricity	18%	Versus 2003/9-2004/8 Osaka HQ office : 29.4%
CO2	312t (6.1%)	2004 versus 2003

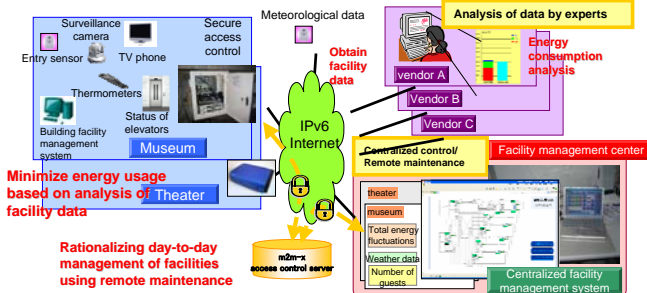
(*) In 1990, based on the Kyoto Protocol (COP3) by UN (United Nation), Japan targets and mandates **6% improvement** to prevent and improve the greenhouse effect, e.g., reduction of CO2.

Building Automation Components enabling IPv6 (now and future plan)



Facility management at Tokyo Metropolitan Office

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.
 - Shared use of networks among IP phone, Internet access and facility management.
 - Cost reduction
 - Where experts' analysis of data on the number of guests in respective rooms and temperatures are available, it is possible to minimize energy consumption.



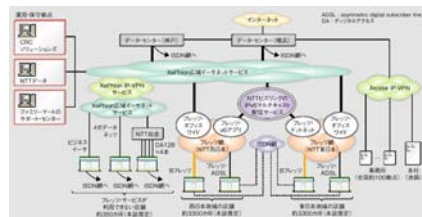
7,000 Family Mart Stores enable IPv6

Released in August 2006

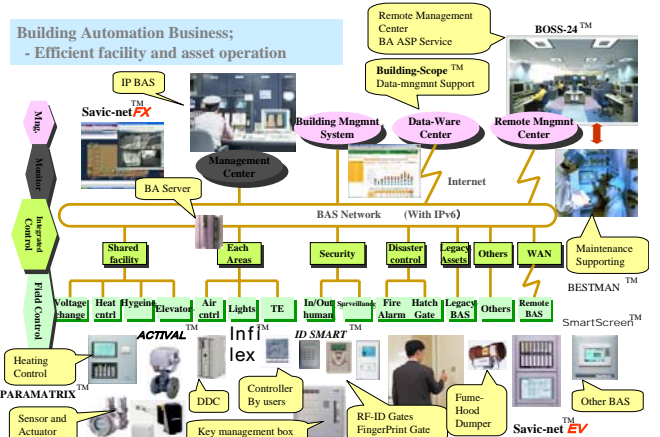


7,000 stores in nation-wide Japan

- Installation starting from February 2007
- 80 stores installation per day
- Multicasting service
- ISDN → Broadband Internet with B-Flets



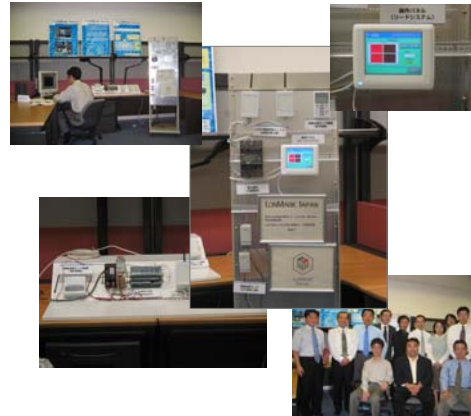
YAMATAKE Corporation, www.yamatake.com



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

Just open the FNIC Lab.



[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.

“Live E!” Project



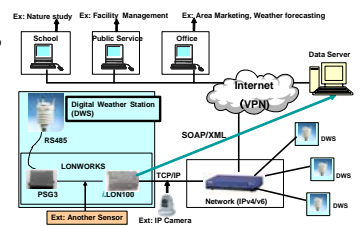
<http://www.live-e.org/>

Live E! Project

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



- Live E! is a project establish a network infrastructure that can generate, collect, transmit, process, and share digitized “Environmental Information”.
- “Environmental Information” is generated and available from anywhere on the global Internet by “Digital Weather Station”, or by any other sensor devices, such as IP camera, that are installed by individuals and by organizations.
- “Digital Weather Station” generates the weather information with low cost and provides the information to any node on the global Internet
- By the installation of larger number of “Digital Weather Station”, the environmental information can be richer and finer, i.e., connectivity (installation) is own rewards.
- It has been recognized that the applications of Live E! project contents can be for education, public service and for business cases.

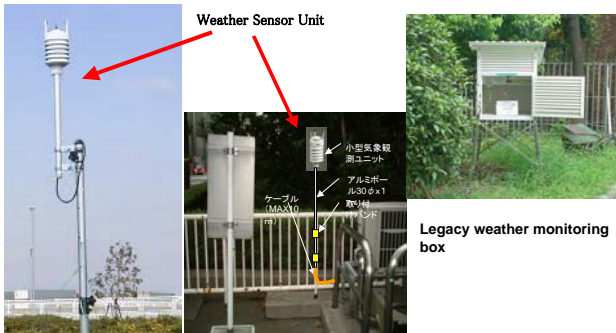


Initiated “Live E!” project.

- install weather sensor units
- let information available for anyone
- targeting mile-mesh network
- three applications
 1. Educational material
 2. Public service
 3. Business use



Installation example of sensor node



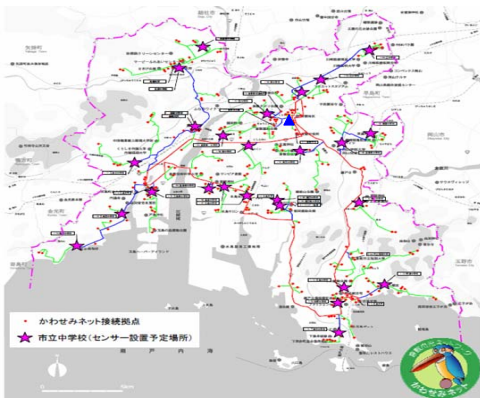
Source: Mr. Yamamoto of Tokyo Metropolitan (Minato-ku)

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-District in Tokyo



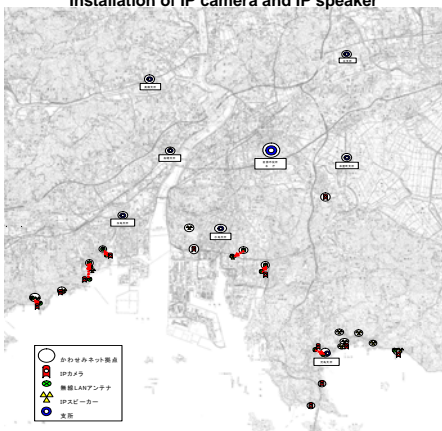
Installation of Live E! Sensor nodes in Kurashiki City



Rain Fall in Kurashiki City, Okayama



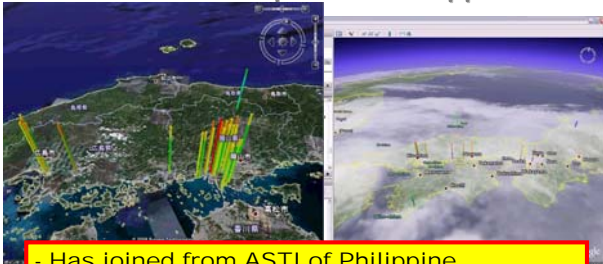
Installation of IP camera and IP speaker



Installation of Live E! Sensor node at KUSA



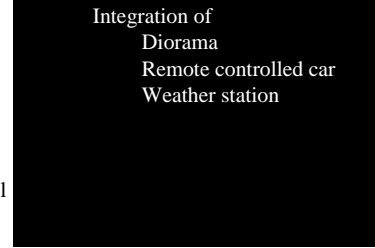
LIVE EI ; example of user application



- Has joined from ASTI of Philippine, PSU of Thailand and other locations (e.g., Taiwan and Malaysia) in Asian countries, collaborating with APAN and A13.
 - Integrating with other information systems, e.g., hurricane warning system

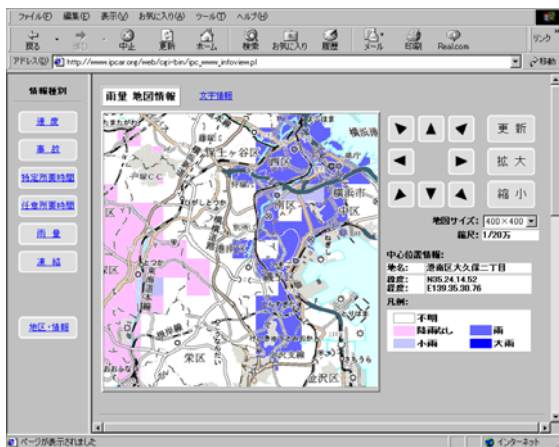
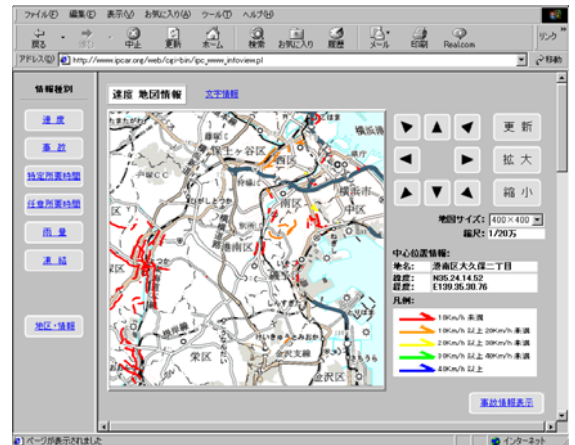
Integration of Real-space and Cyber-space - Application by high school students -

- 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



(*) Supported by NICT's IPv6 development and deployment program

Integration of Automobiles



IPv6への限らない期待



Network covering our “Globe”



We may realize that;

- All the computing resources on the “globe” will be available with large bandwidth
- Role of us, against globe
- What we can do for our Earth ?

