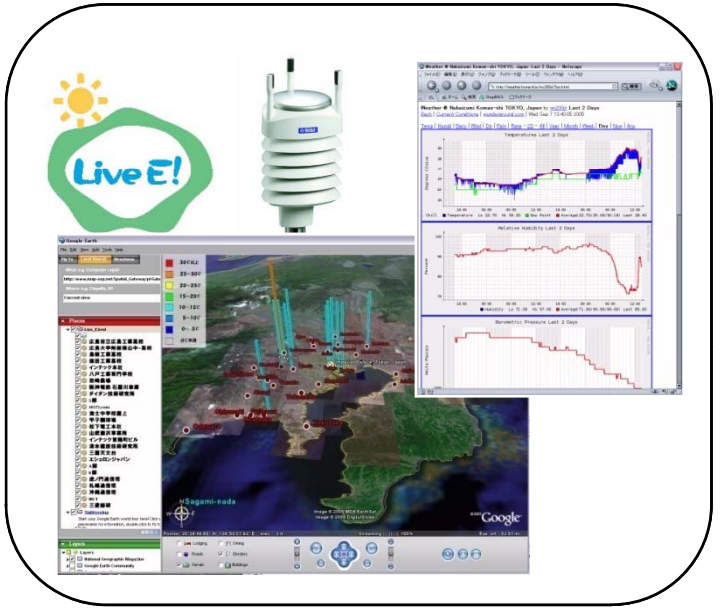
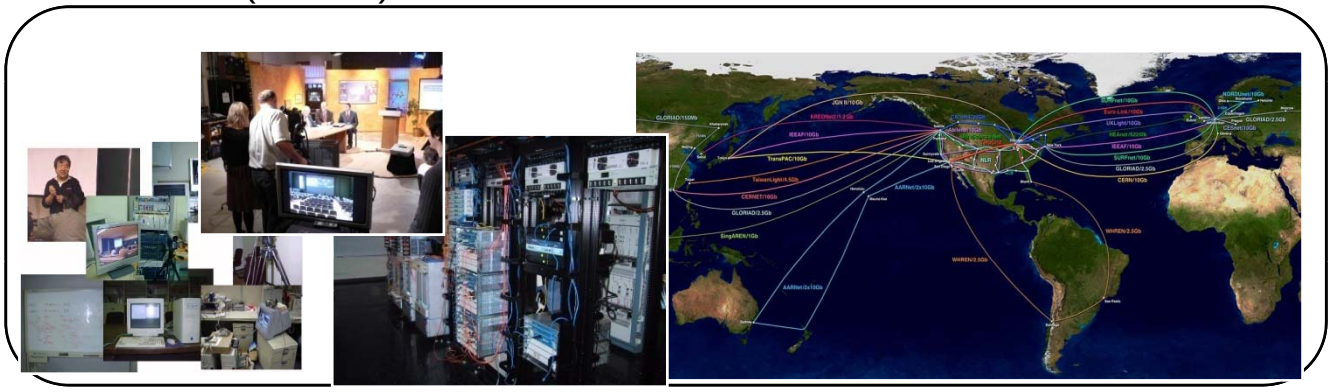
Esaki Lab., The Univ. of Tokyo

- 研究テーマ(Research Theme)
  - Next/New Generation Internet Architecture
  - Computer Networking Architecture
- 研究室の特徴 (Features of Esaki Lab.)
  - WIDE Project (WIDEプロジェクトの基幹研究室)
  - Building and Operating the Advanced R&D Network
  - Operation and Management of I情報理工&電々ネットワーク
- Recent Research Topics
  - Live E! Project
  - Facility Networking with TCP/IP (aka, Green Univ.of Tokyo)
  - Distributed Operating System
  - Mobile Ad Hoc Networking
  - Traffic measurement, analysis and applications
- 海外留学活動(Collaboration with Oversea Organizations)
  - CNRS (FR), Cambridge大学(UK)、Cornell大学(USA)、
  - HUT(Finland)



Live E! Project, www.live-e.org



GLIF(Global Lambda Integrated Facility), toward Global Computer Networking

Facility Networking with TCP/IP

Hiroshi Esaki, Ph.D

- Professor, The University of Tokyo
- Board Member, WIDE Project
- ISOC BoT(Board of Trustee)
- Representative, Live E! Project
- Steering Member, JGN2 run by NiCT/MIC
- Chair person, Facility Networking Consortium
- Representative, DISTIX (DIStributed Internet eXchenge)
- Chairperson, Commercial Internet traffic measurement task force
- Chair person, VoIP/SIP Interop Task Force run by JPNIC
- Fellow, IPv6 Forum
- Chair person, IPv6 Ready Logo Program
- Vice President, JPNIC(Japan Network Information Center)

Professional History

- 1987; Joined Toshiba Corporation
  - ATM system control technology
- 1990; Residential researcher at Bellcore (NJ, USA)
  - Member of AURORA project under Gigabit testbed, organized by Dr.Robert Kahn.
- 1994; Visiting researcher at Columbia Univ.(NY, USA)
  - Proposing CSR architecture (origin of MPLS) to IETF and to ATM Forum
- 1998; Associate Professor, The Univ. of Tokyo
  - IPv6 projects with Prof. Jun Murai (Keio Univ.)
- 2005; Professor, The Univ. of Tokyo

Esaki Lab., The University of Tokyo

Global Lambda Integrated Facility

Global

GLIF

Delay Tolerant Networking

DTN

Live E!

Routing

Green UT

Global Sensor Data Sharing Platform

Live E!

Mobile

Ubiquitous

Metropolitan /Campus Facility Networking

WIDE PROJECT

Past and Future decades of WIDE Project activities

- 1988 – 1997 (first 10 years)
  - Research: Native and Broadband Internet
  - Business: Boost up the ISPes
- 1998 - 2007 (last 10 years)
  - Research: Next Generation IP (e.g., IPv6)
  - Business: Broadband Internet
- 2008 – 2017 (nest 10 years)
  - Research : New Generation Internet
  - Business: Avoiding Fragmented IP Networks (toward the 100% Internet)

Words from WIDE 20th year book

- Everybody can propose concept, but without running system, nothing happen

- Social infrastructure/platform design and global cooperation is the native mission of university

- We must avoid the fragmentation of global information space

Students' Research Topics

- Routing
  - Traffic engineering, Wired & wireless, ad hoc
  - Inter-Domain P2P traffic control (aka P4P)
- Operating system and network architecture
  - All-IP (global) computer, Robust implementation
  - Migration technology and it's application
- Sensor & Facility networking architecture
  - Data collection and distribution, Content-Based Routing
  - Auto-configuration and management architectrure
- Ad Hoc networking
  - DTN (Delay/Disruption Tolerant Network)
  - Network protocol stack independent API
  - Potential Routing

Thesis Themes in 2008

- Ph.D Thesis
  1. Scalable and Plug and Play System Architecture for Large Scale Plant Automation Networks
- Master Thesis
  1. Live E! Sensor Network Architecture
  2. Distributed Messaging Service Migration Proxy for Disconnected AdHoc Network Operation
  3. High Speed XML Routing Architecture using the MPLS Architectural Framework
  4. Robust and Secure Remote Server Access Architecture and Protocol without Firewall Router in IPv6 Environment
- Under Graduate
  1. Routing and Traffic Engineering Architecture for Inter-Domain P2P-based CDN Systems
  2. Evaluation of IDS Technique using Sketching Framework

Thesis Themes in 2009

- Ph.D Thesis
  - QoS aware Routing Architecture based on traffic measurement
- Master Thesis
  1. QoS Improvement for small mesh-based live media P2P
  2. Pub-Sub based Message Dissemination Architecture in DTN
  3. CCDM; Central Controller-based Device Management
  4. Monitoring-based Link Evaluation in Multi-radio and Multi-hop wireless network
- Under Graduate
  1. Inter-domain Service Migration using VM System
  2. Control Architecture for embedded digital home appliances
  3. File system improving the latency for the start of application
  4. Functional migration using VM system for process management

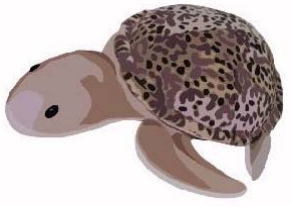
Working R&D Items, in Esaki-Lab

1. Sensor & Facility Networking
   - Data contents collection and distribution
   - Place-and-Play
   - Standardization
2. Routing architecture
   - Testbed operation with GLIF/IEEAF and JGN2
   - Inter-domain P2P traffic control
   - Potential routing for ad hoc and sensor network
3. Network Protocol Stack architecture
   - Global computing architecture
   - Software architecture for high performance
4. Traffic analysis

Grand Challenge to “Future Internet”

- Collapsing the legacy concept of OSI and Internet end-to-end architecture
- Challenging the DTN (Delay Tolerant Network) architecture
- Effective use of P2P framework
- Re-design of routing and identifier in the future computer system
- Global scale networking
- Traffic measurement and analysis

Key IPv6 Projects



- Reference code
  - 1998; KAME Project for *BSD*
  - 2000; USAGI Project for LINUX
  - 2003; Nautilus /SHISA Project for Mobile stack

- Testing and evaluation suite
  - 1998; TAHI Project leaded to IPv6 Ready Logo Program

- Sensor networking
  - 2005; Live E! Project
  - 2005; Facility Networking Consortium

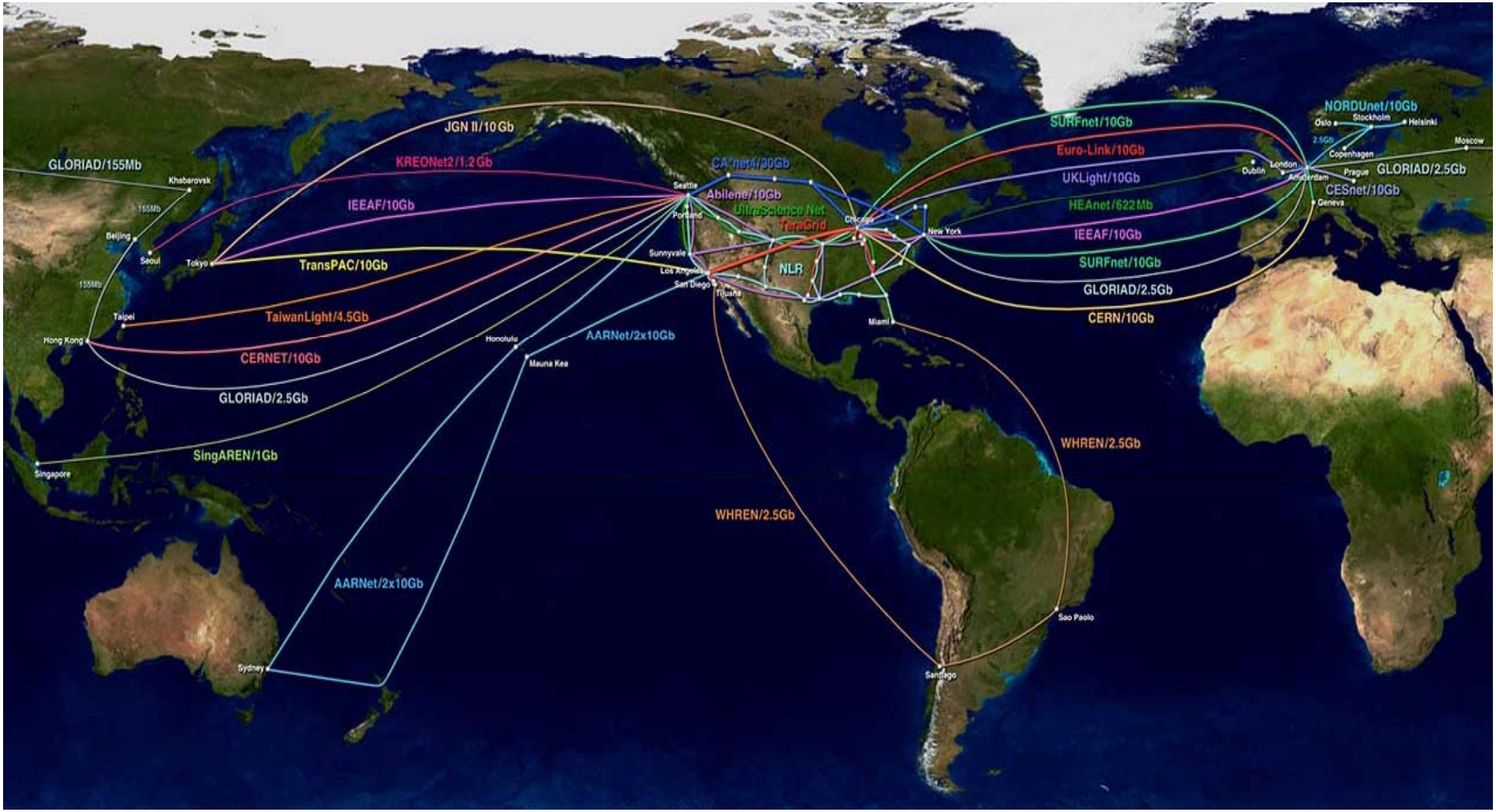
Working “Deployment” Items

- (Weather) Sensor Networking
  - Integrating with InternetCAR project run by WIDE Project
  - Local governments, i.e., Minato-ku, Kurashiki-city and Marunouchi-otemachi-yurakucho
- Facility Networking
  - Metropolis of Tokyo
  - Green University of Tokyo Project
- IEEAF/GLIF, AIII and JGN2
- Post JGN2
  - Nation-wide R&D testbed run by NiCT/MIC
- DISTIX(Distributed Internet eXchange) Network
- VoIP/SIP/IMS interop. international testbed

GLIF/IEEAF, AIII and JGN2

- GLIF; Global Lambda Integrated Facility
- IEEAF; Internet Educational Equal Access Foundation
- AIII; Asian Internet Interconenction Initiatives
- JGN2; Japan Gigabit Network 2

Global Lambda Integrated Facility
GLIF World Map – 2005



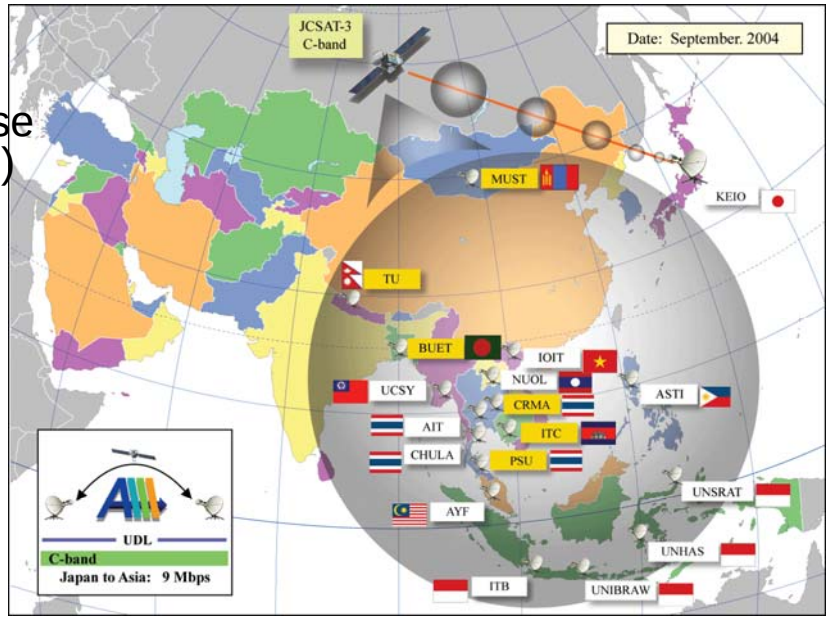
www.glif.is

Visualization by
Bob Patterson, NCSA.

School on Internet Asia

Framework for collaboration among Asian universities since 2001

- Partners
  - **20 partners in 11 Asian countries**
    - **Philippines, Mongolia, Indonesia, Malaysia, Vietnam, Laos, Cambodia, Thailand, Myanmar, Bangladesh, Nepal**
  - Consortium among Japanese Universities
    - Keio University, Tohoku University, Tokyo University of Marine Science and Technology, Japan Advanced Institute of Science and Technology (JAIST) NARA Advanced Institute of Science and Technology (NAIST)
    - Organized by Keio University
- Courses and activities
  - 17 University, Graduate school level course (some are accredited in Asian universities)
  - Special sessions and events
  - Symposiums
  - 5 IT Training Workshops for Operators
  - 3 month research stay x 2
  - Exchange students to Japanese graduate schools x several students
  - MoU between Universities x 2
  - Ph.D co-advisory program x 1



Brawijaya University,
Indonesia

Hasanuddin University,
Indonesia

Sam Ratulangi University,
Indonesia

Asian Institute of
Technology, Thailand

National University of Laos,
Laos

Advanced Science and
Technology Institute,
Philippines

University of Computer
Studies, Yangon, Myanmar

Asian Youth Fellowship,
Malaysia

Chulalonkorn University,
Thailand

Institute of Technology,
Bandung, Indonesia

Institute of
Information Technology,
Viet Nam

USM
Malaysia

Mongol University of
Science and Technology
Mongolia

Prince of Songklang
University
Thailand

Chulachomklao Royal
Military Academy
Thailand

Keio University
Shonan Fujisawa Campus,Japan

University of
Syiah Kuala
Indonesia
- Under Construction -

University of San Carlos
Philippines
- Under Construction -

Bangladesh University of
Engineering and Technology
Bangladesh

Institute of Technology of
Cambodia, Cambodia

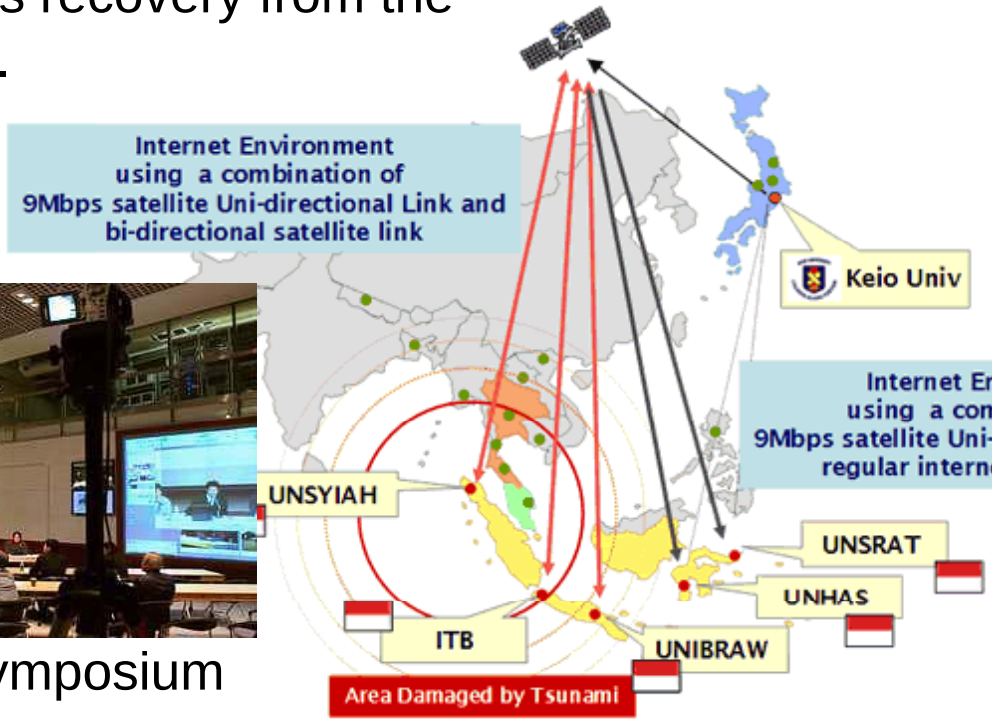
Tribhuvan University
Nepal

Understanding and Solving Real-world Problems at SOI Asia -Tsunami Disaster Recovery Project

Keio University and SOI Asia assisted Universitas Syiah Kuala, the largest national university in Indonesia, by providing distance learning during its recovery from the tsunami.

Photos by Chermg Talay Subdistrict Administration Office

Tsunami Symposium on SOI Asia network



DMC Institute International Symposium: Convergence: Towards A New Paradigm for Creative Society

✓All operational Global Studio locations participated in our 5th international symposium

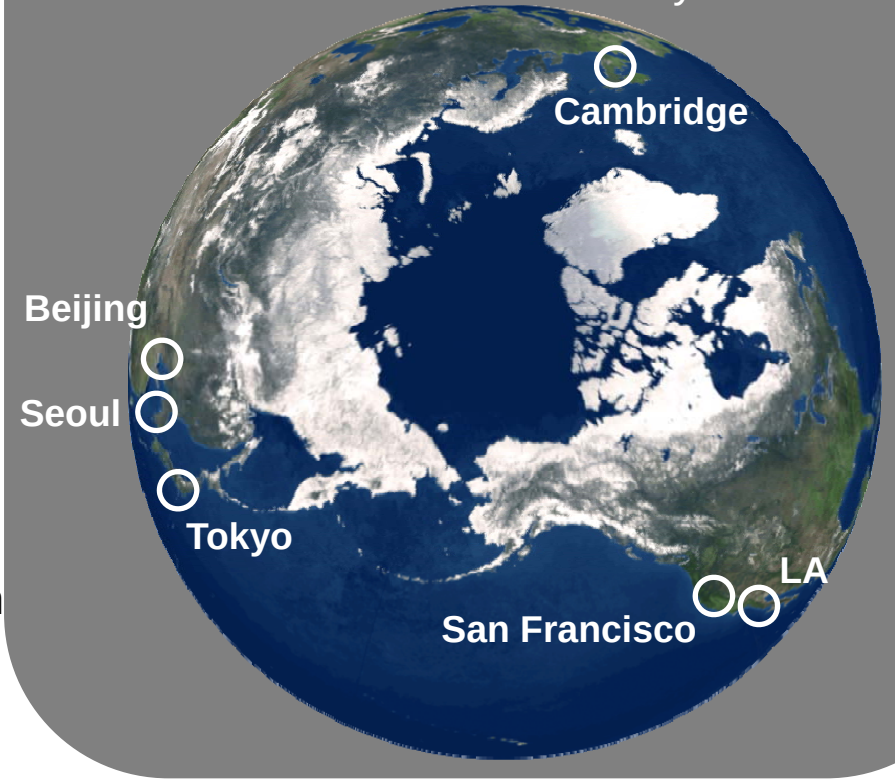
✓The symposium concluded with all participants signing the DMC Manifesto towards the Creative Society (online)

Intensive Discussion using the Global Studios

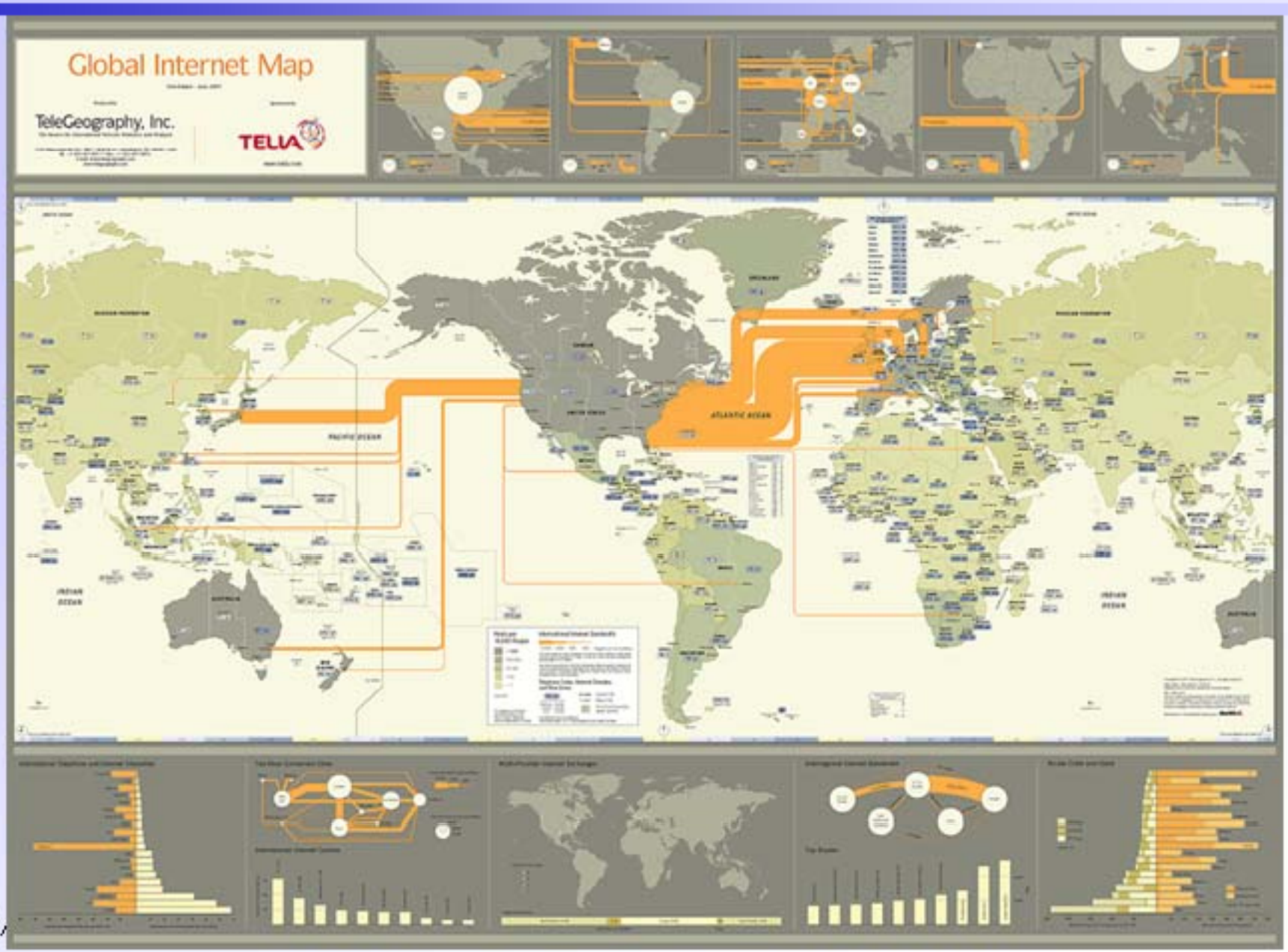
Talking Circle 1: Content design

Talking Circle 2: Media convergence in creative society

Talking Circle 3: Distributed and autonomous creative society



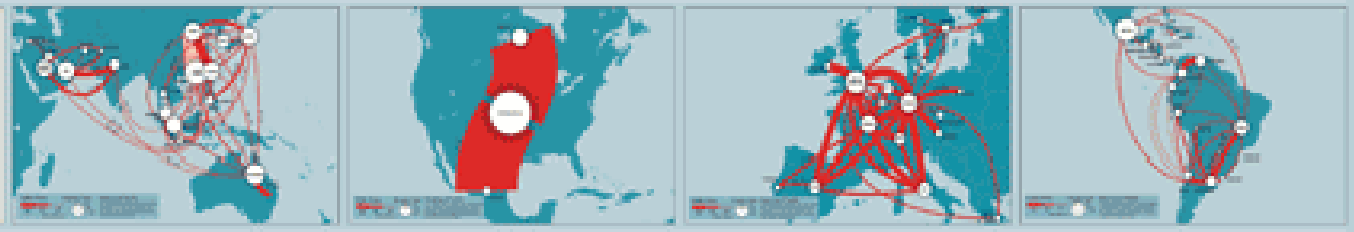
2001 InternetTraffic

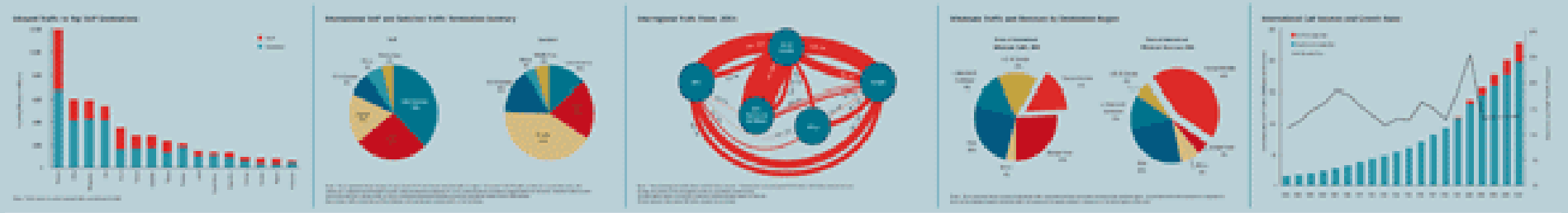


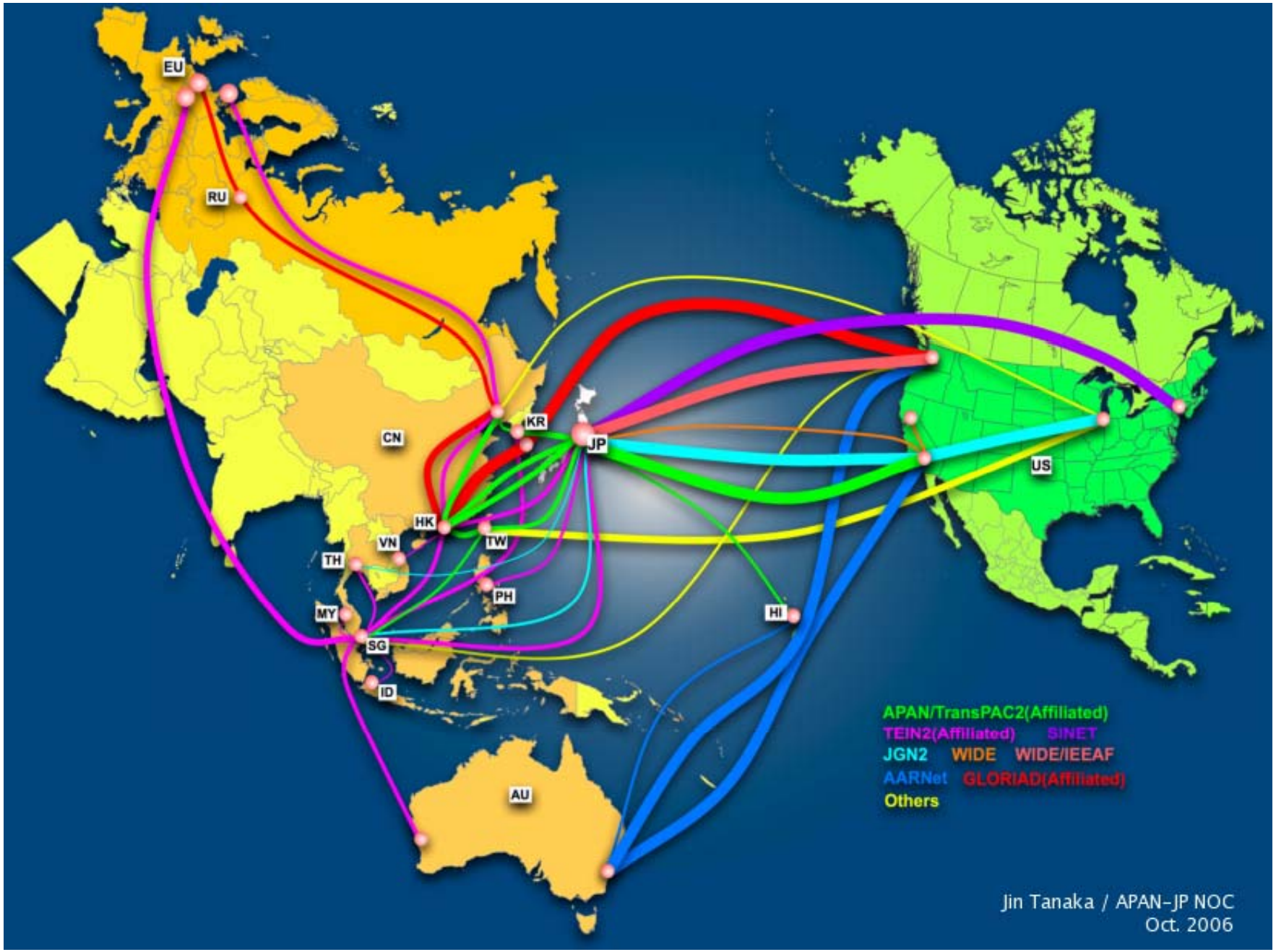
Global Communications Traffic Map 2005

TeleGeography Research

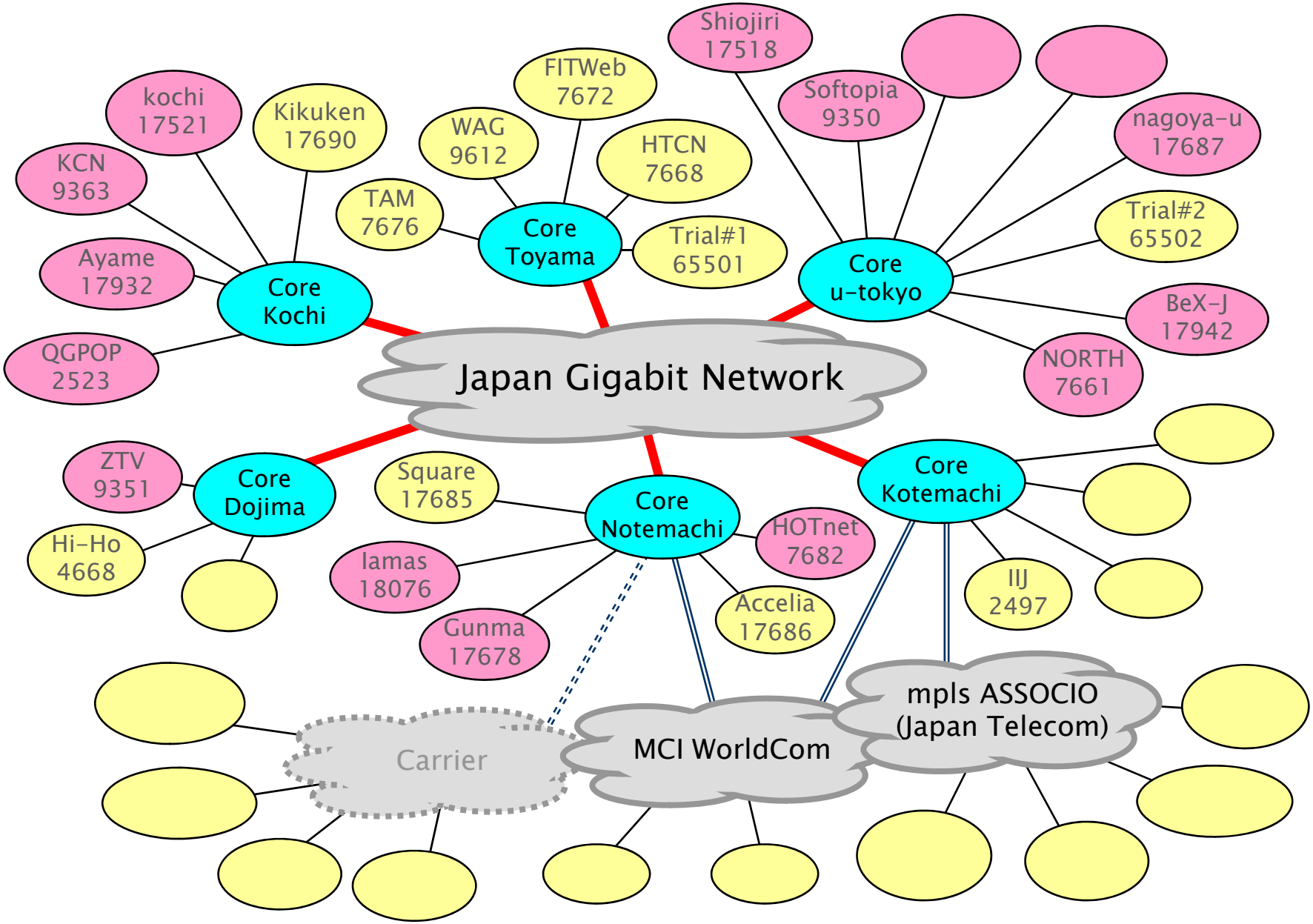
iBasis





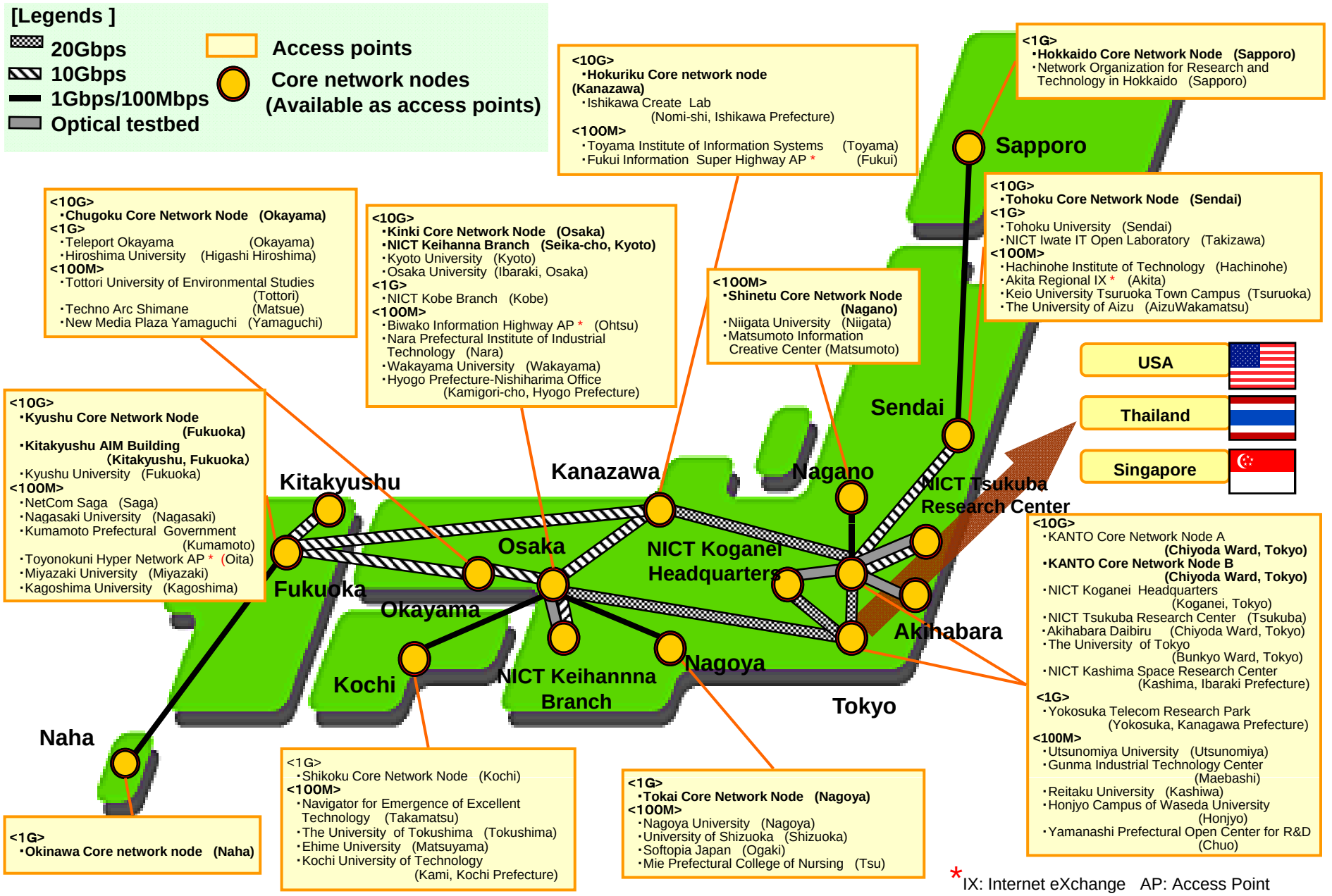

EU
RU
CN
KR
JP
US
HK
TW
VN
TH
PH
MY
SG
ID
HI
AU
APAN/TransPAC2(Affiliated)
TEIN2(Affiliated)
SINET
JGN2
WIDE
WIDE/IEEAF
AARNet
GLORIAD(Affiliated)
Others
Jin Tanaka / APAN-JP NOC
Oct. 2006

DISTIX network topology as of 2005



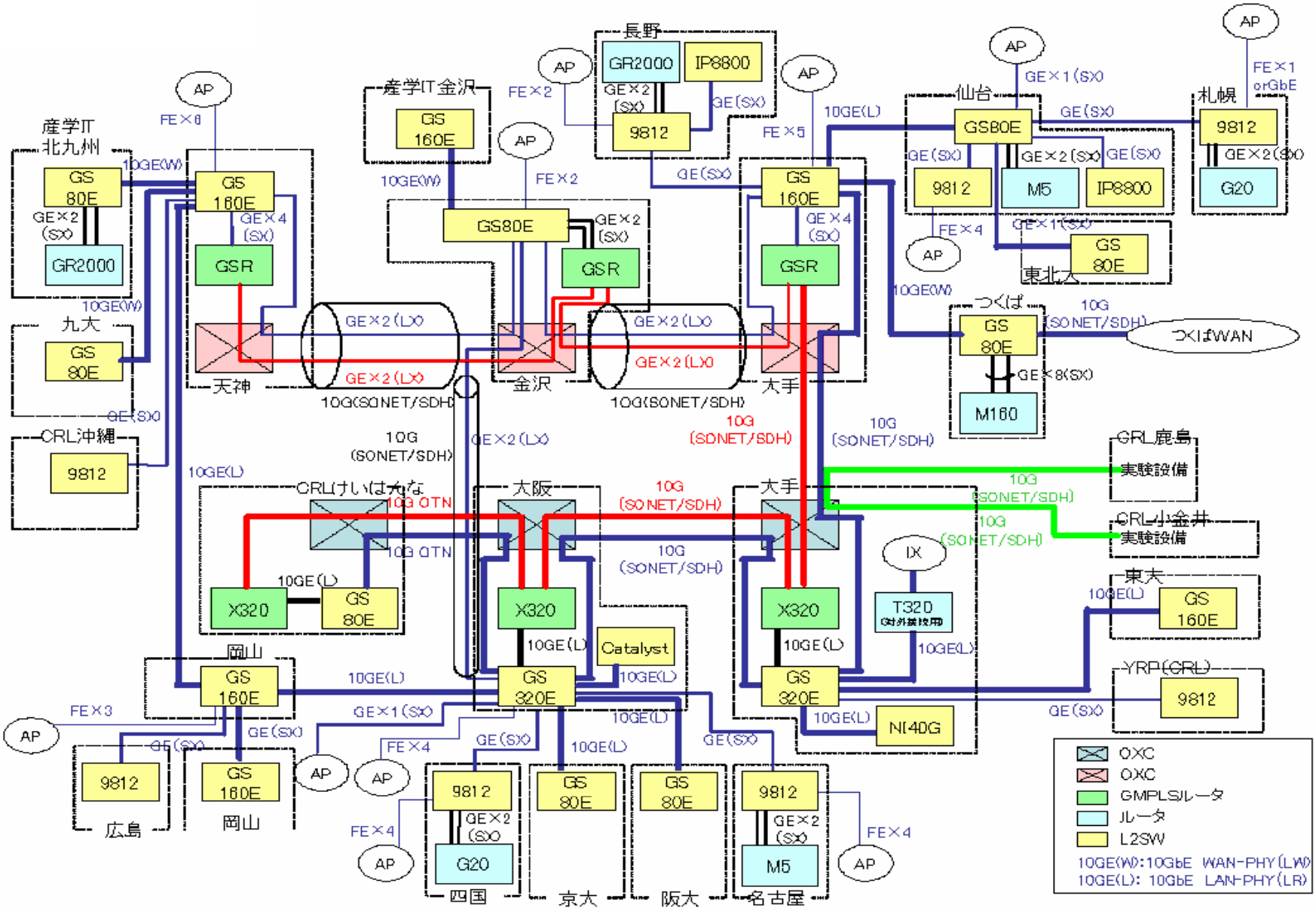
Outline of JGN2 Network

May 24, 2006



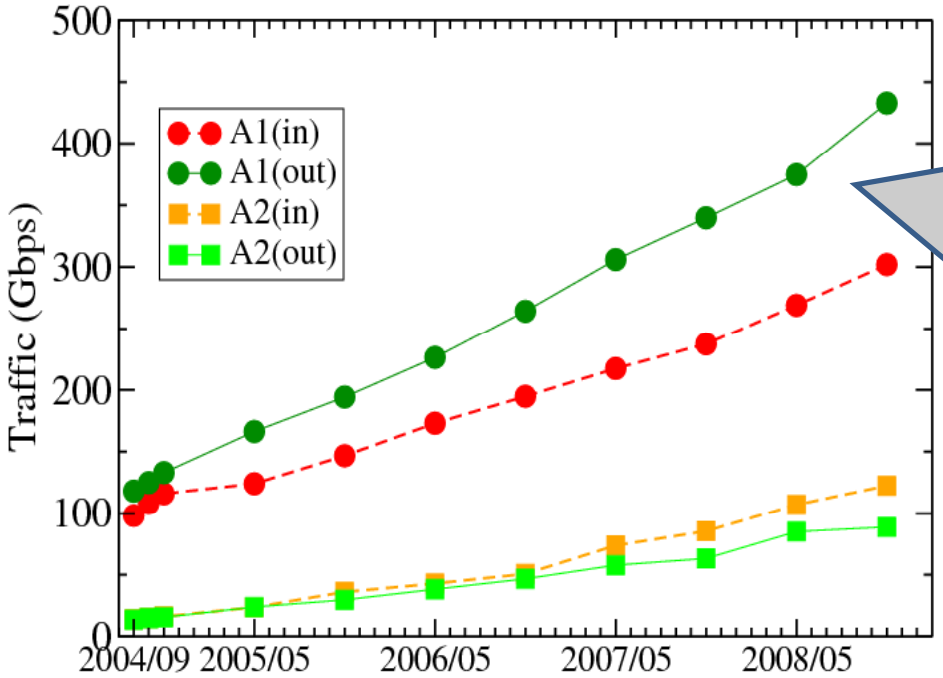
*IX: Internet eXchange AP: Access Point

JGNII backbone network configuration



Traffic measurement and analysis of Japanese commercial ISP Traffic

(*) Seven major ISPes in Japan has been collaborated with us, i.e., OCN, KDDI, Yahoo BB!, K-Opticom, Softbank Telecom, IIJ(Internet Initiative Japan).



Total residential customer traffic

(1) Large contribution by residential customer traffic, small contribution by corporate networks

(2) Total traffic volume in Japan (2007)

Internet ➔ Home : 998.4 Gbps

Home ➔ Internet : 689.5 Gbps

International Incoming traffic is exception; steep increase

[note]

A=Residential customers

A1: Broadband users

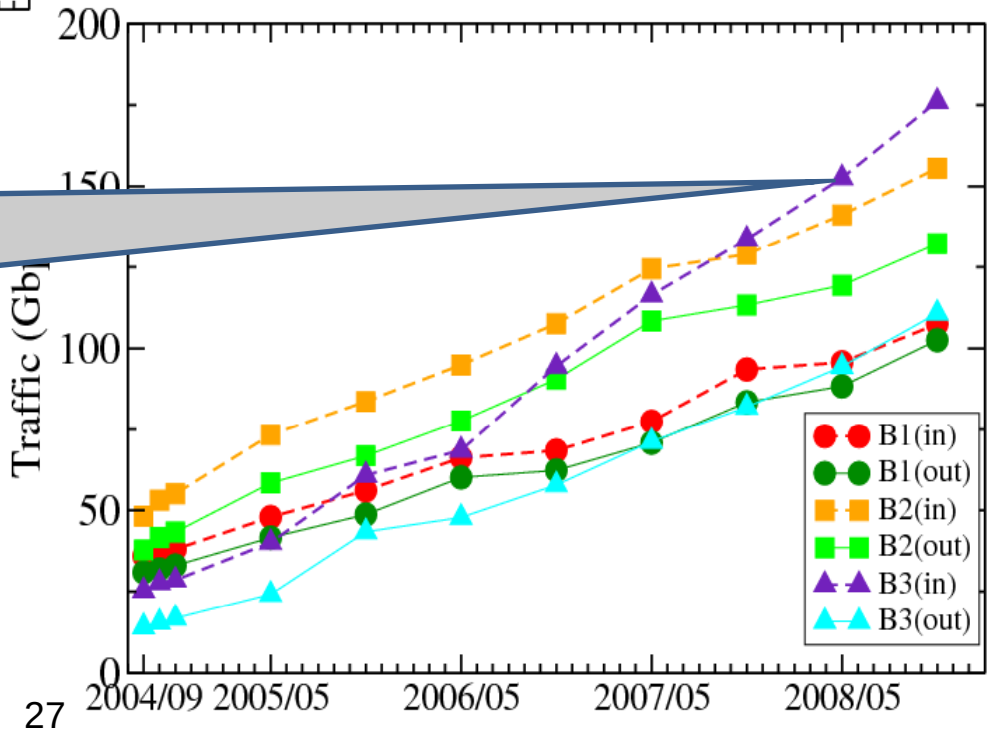
A2: Non-Broadband users

B=Non-residential customers

B1: Traffic exchanged through IXes

B2: Traffic exchanged private peerings

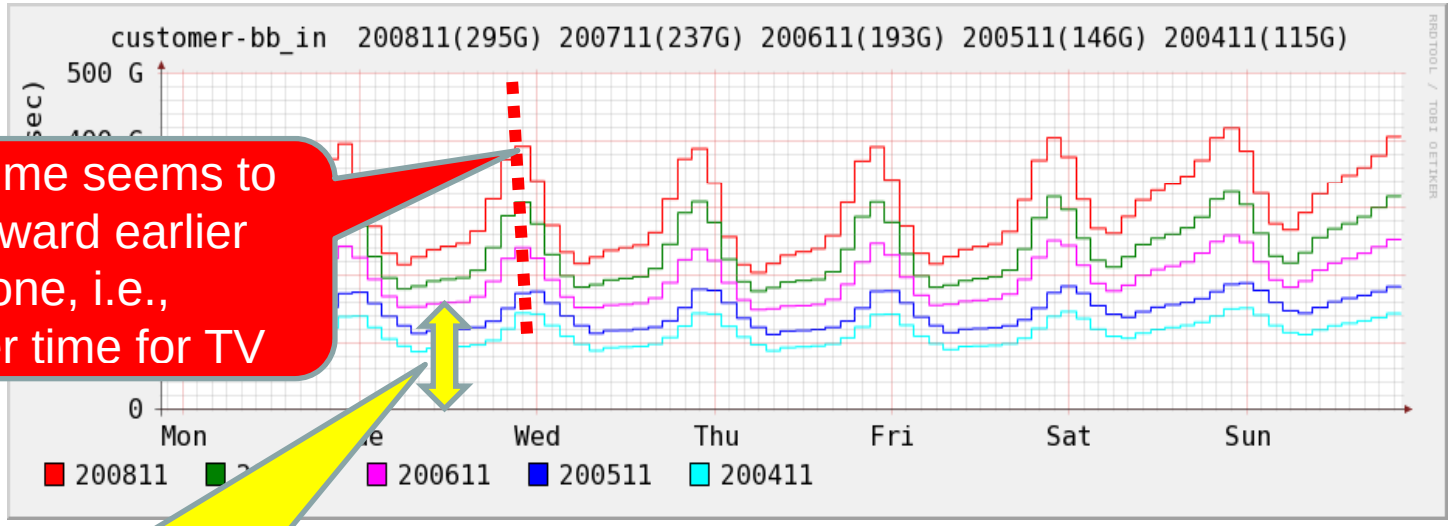
B3: Oversea traffic



Non-residential customer traffic

27

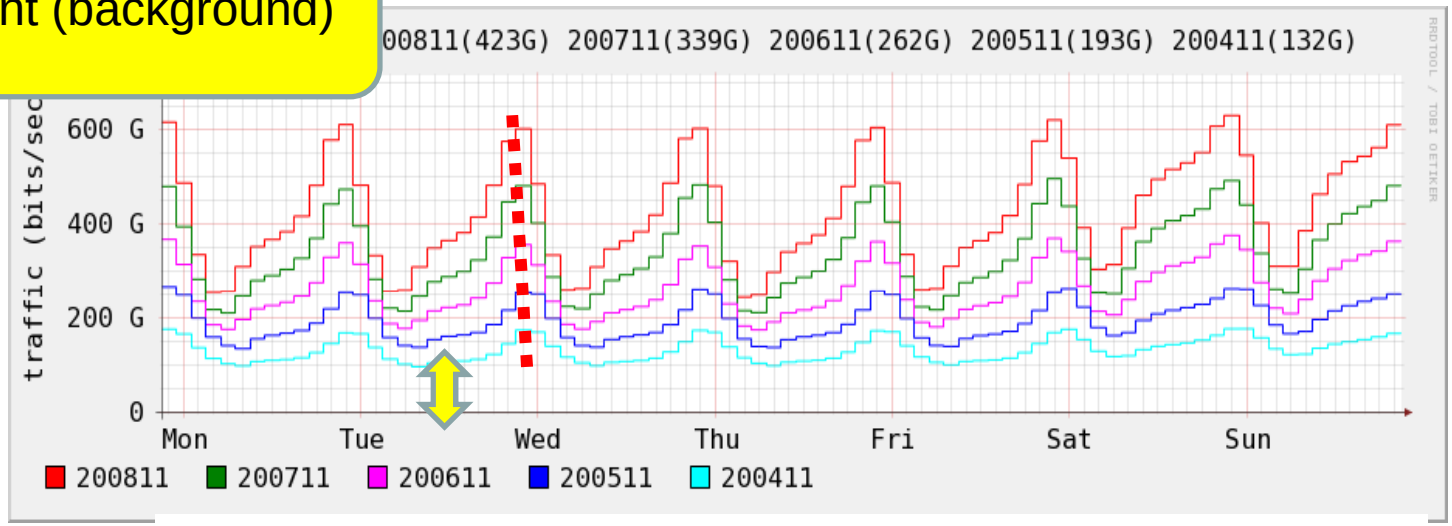
Weekly Broadband customer traffic for three years



Peak time seems to shift toward earlier time-zone, i.e., premier time for TV

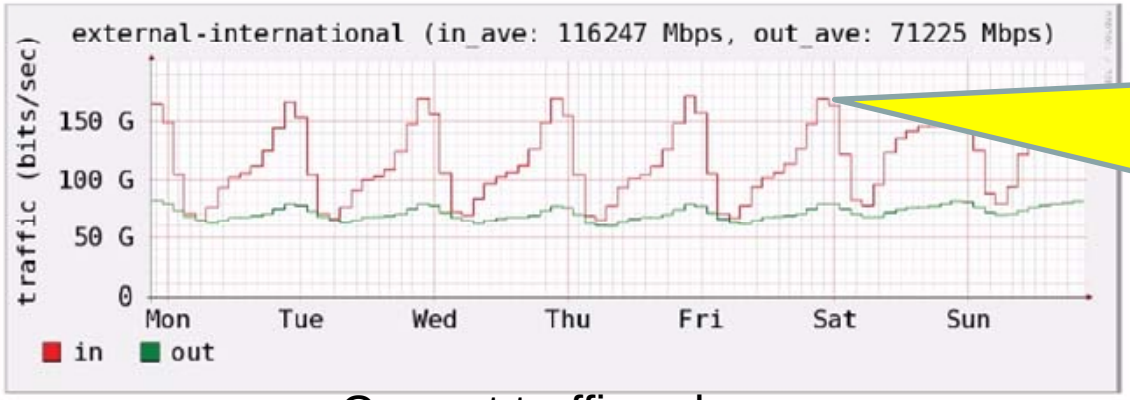
Large volume of ambient (background) traffic

<< Uploading traffic : Customer ➔ Network >>



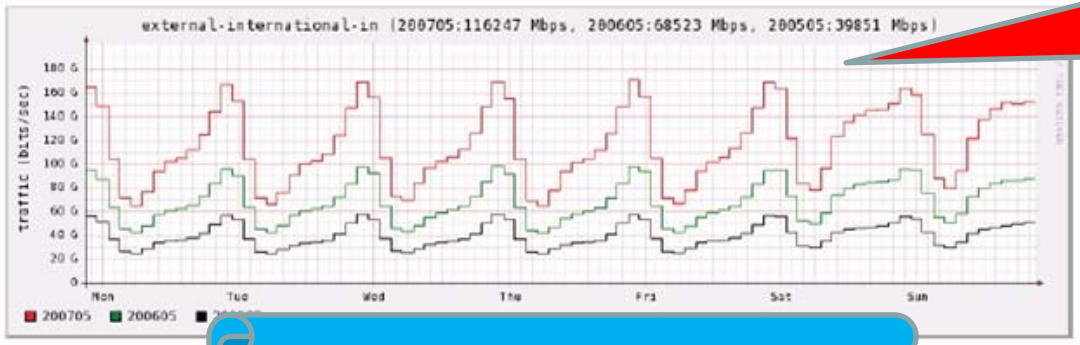
<< Downloading traffic : Network ➔ Customer >>

Weekly International Traffic Volume for three years



<< Current traffic volume >>

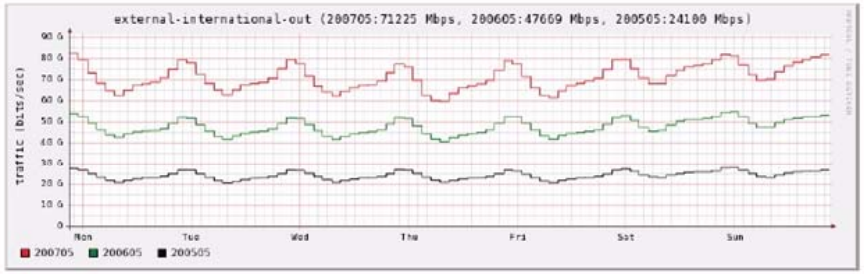
1. Incoming(import) traffic dominates outgoing(export) traffic
2. Large variation in incoming, i.e., interactive traffic



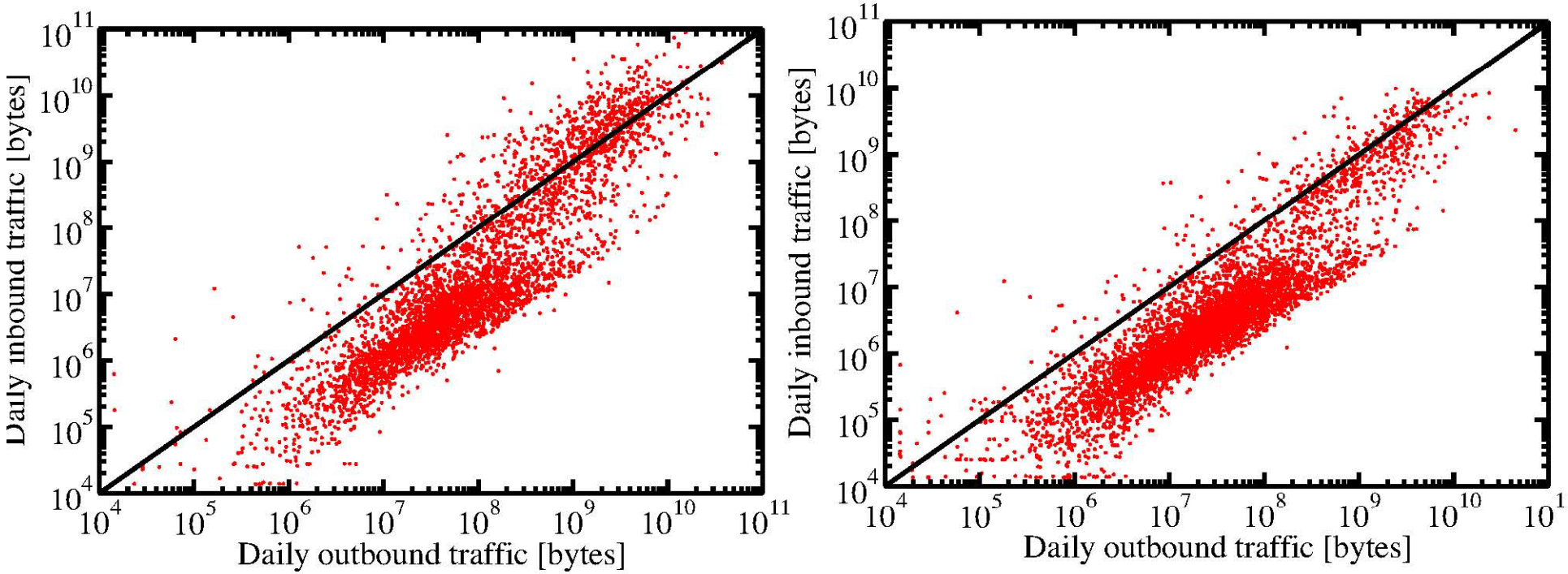
<< Inco as

Variation amplitude increases significantly.
Due to interactive traffic ?

Mirroring or caching in Japan may improve this situation



<< Outgoing traffic ; Japan ➔ Overseas >>

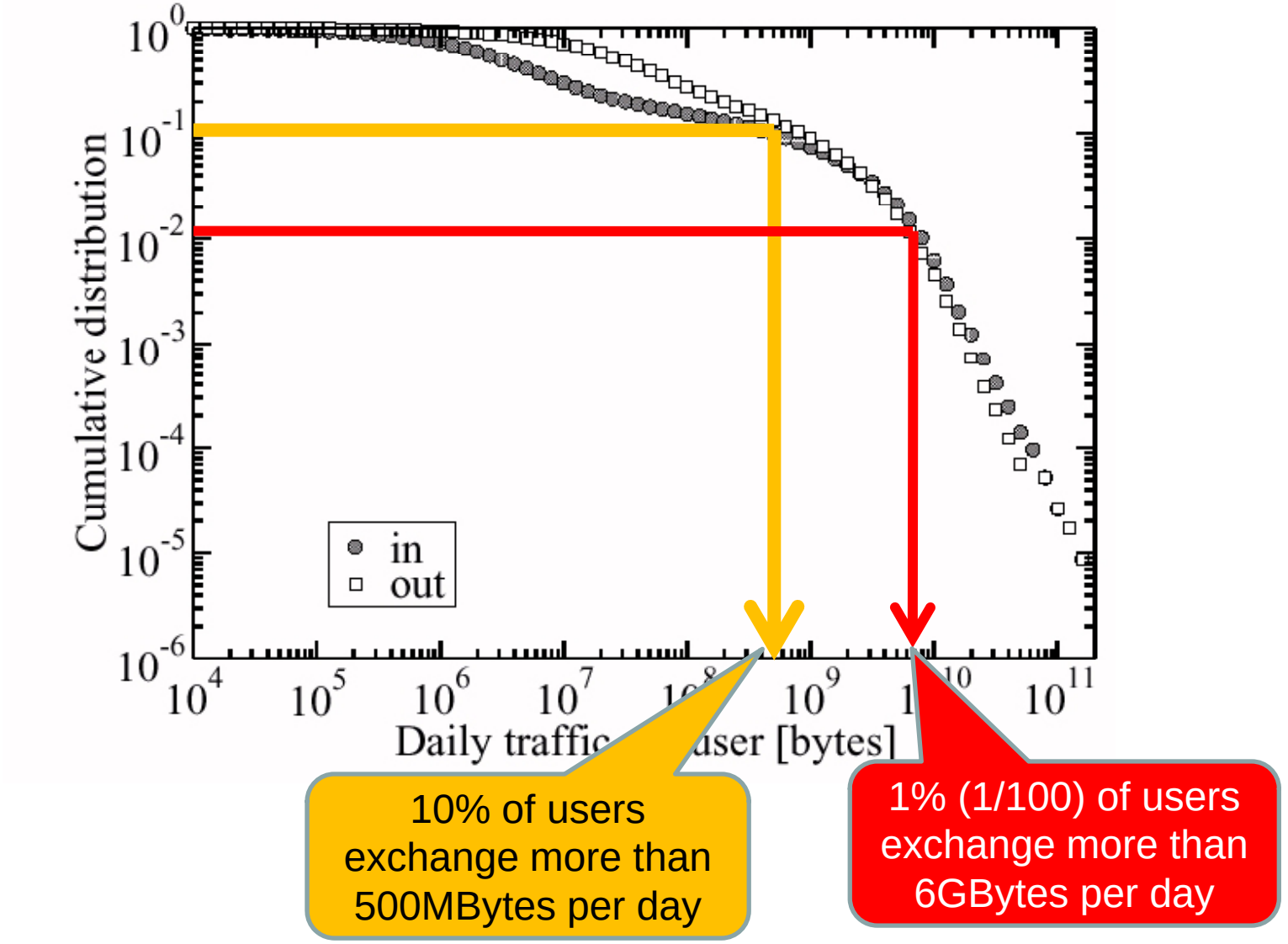


fiber DSL

daily per-user inbound/outbound volumes

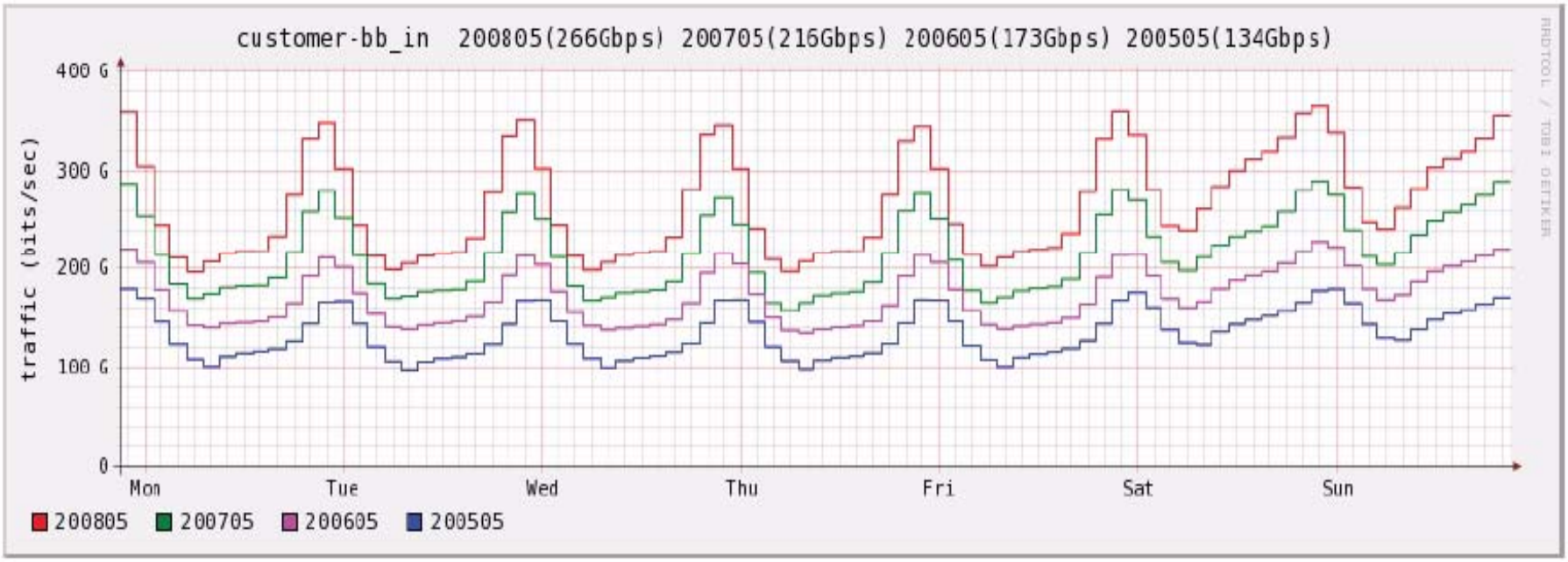
Daily traffic volume per customer

Cumulative distribution for total traffic per customer



Recent discussion with ISPes;

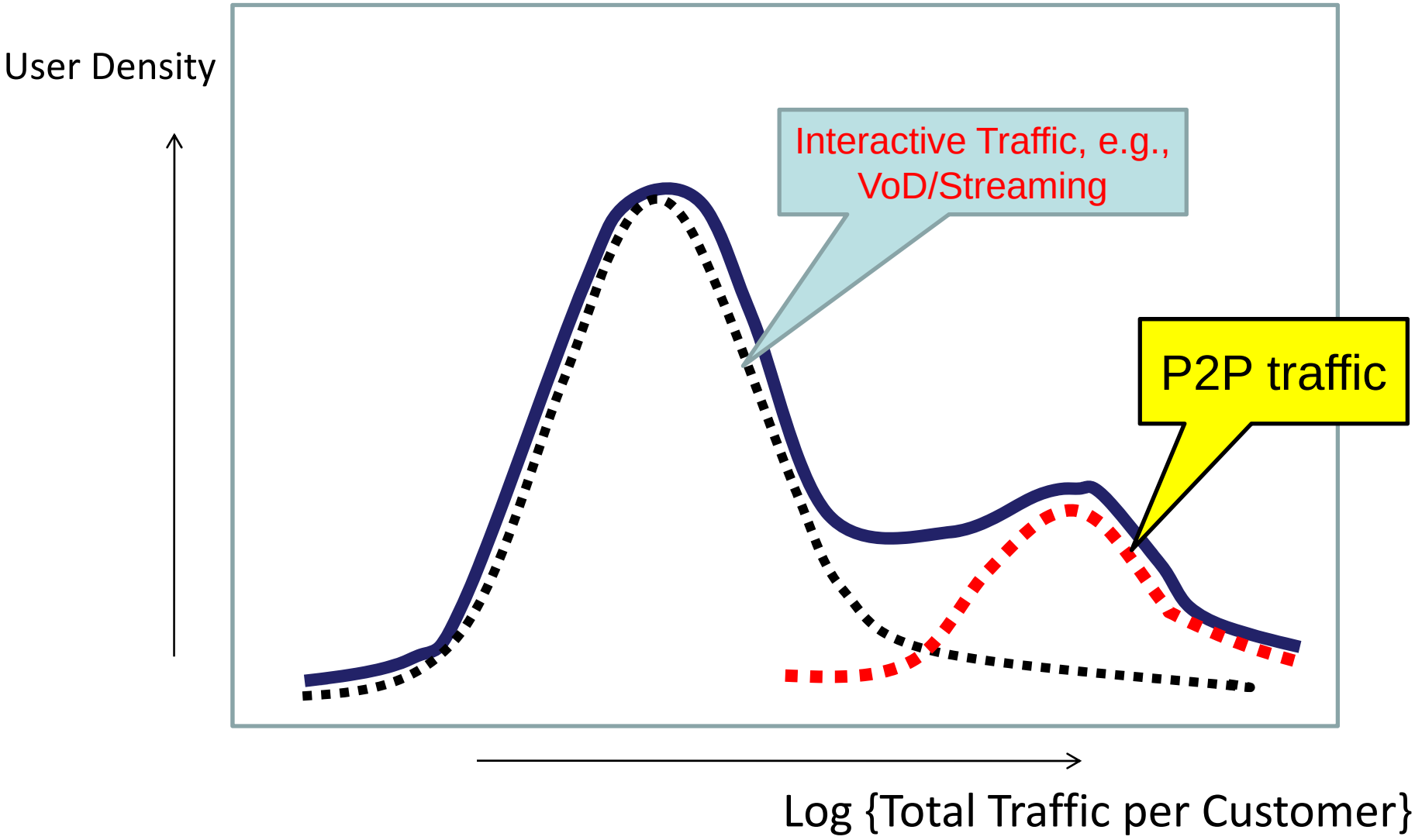
Which is a headache for ISP, P2P or Interactive Video ?



- P2P wave seems to have small amplitude
- Amplitude of wave by interactive traffic seems to be larger

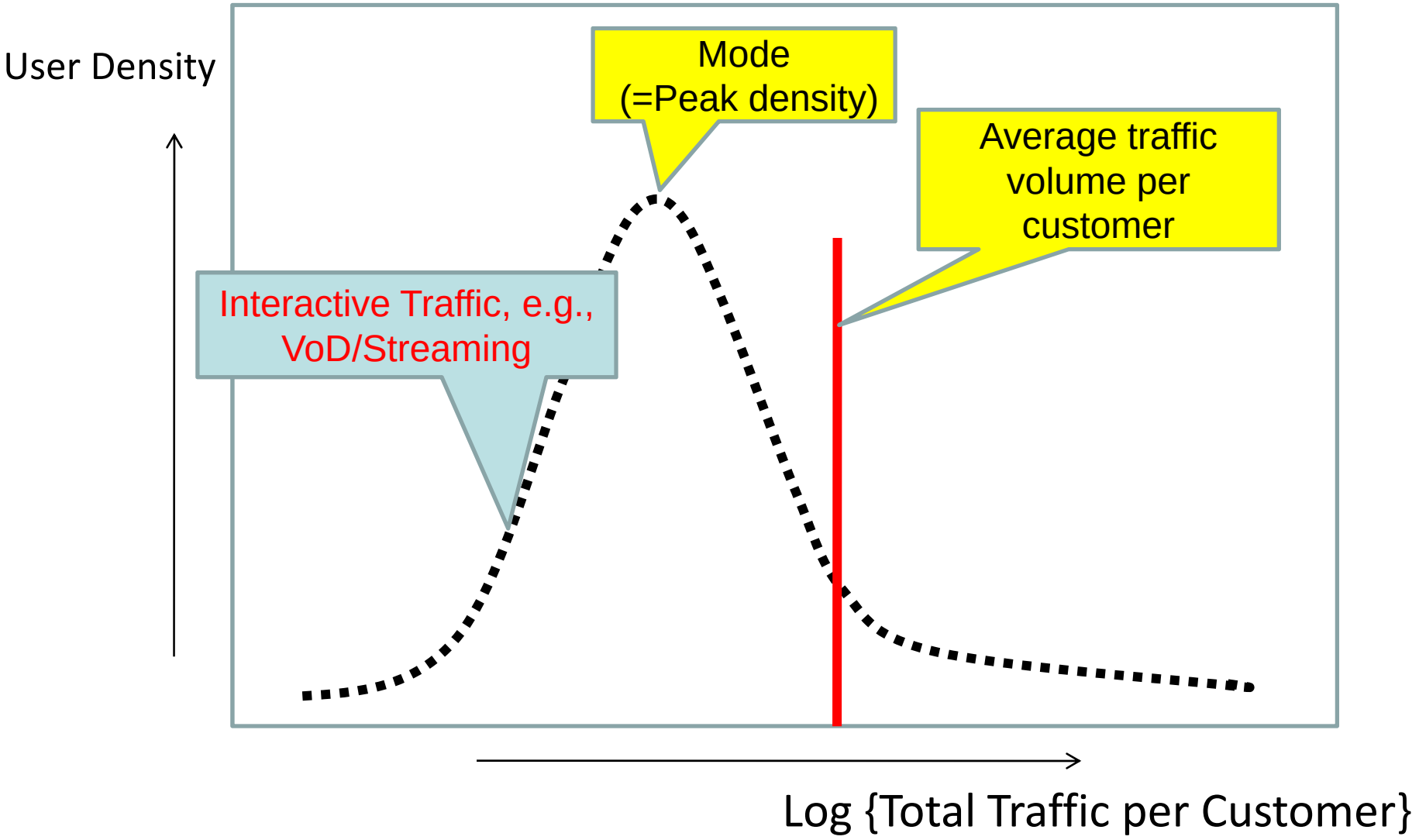
Appeared at CoNEXT2008

User Density versus Total Traffic Volume per Customer



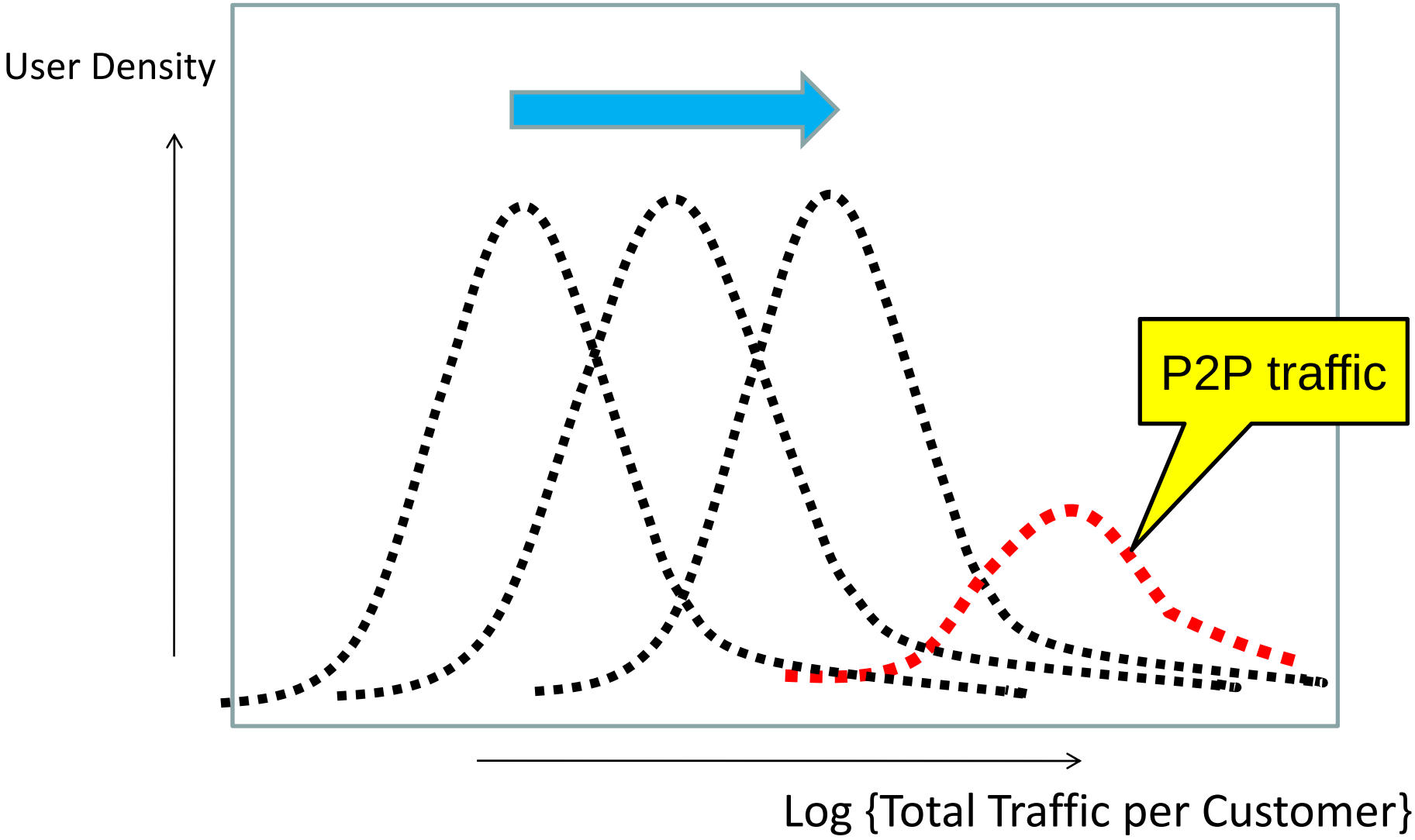
Appeared at CoNEXT2008

User Density versus Total Traffic Volume per Customer



Appeared at CoNEXT2008

User Density versus Total Traffic Volume per Customer



Downloads vs Uploads

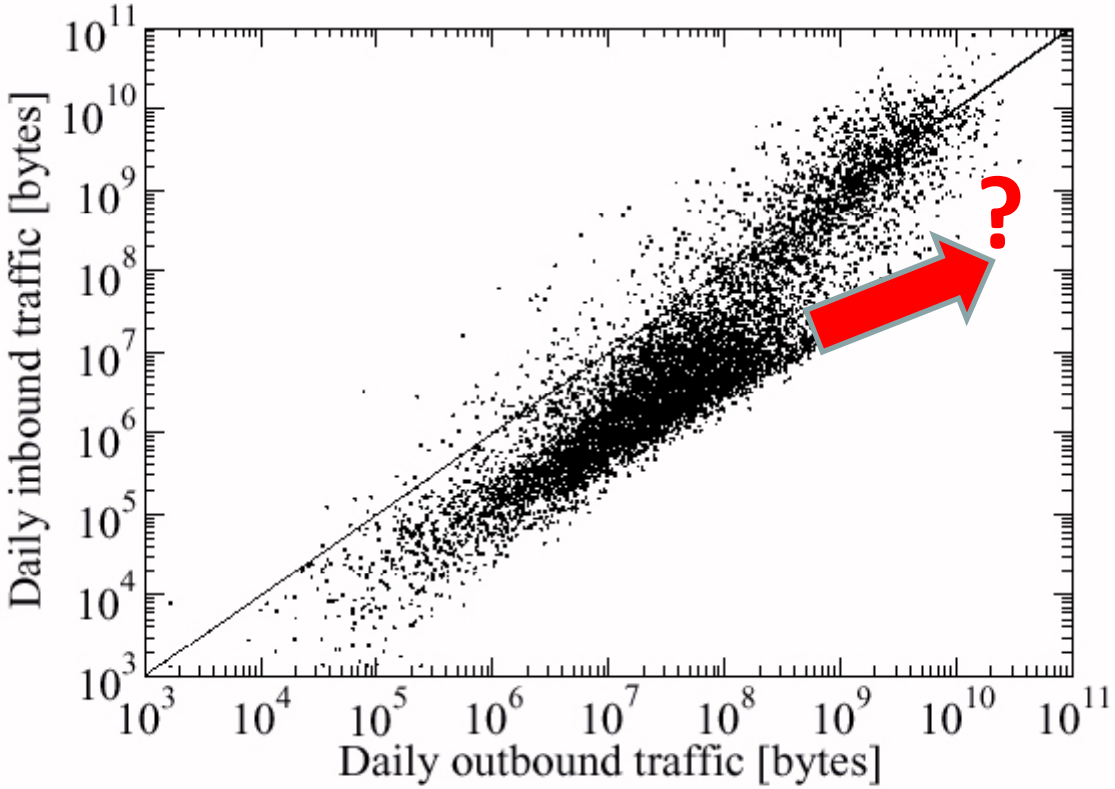


Figure 14: Correlation of inbound and outbound traffic volumes in one metropolitan prefecture

protocols/ports ranking

classify client-type/peer-type with thr

More than 80% of TCP session does not use Well-Known Port ……

protocol port	2005 total (%)	2005 client type	2005 peer type	2008 total (%)	2008 client type	2008 peer type
TCP *	**97.43**	**94.93**	**97.66**	**96.00**	**95.51**	**96.06**
(< 1024)	*13.99*	*58.93*	*8.66*	*17.98*	*76.16*	*11.35*
80 (http)	9.32	50.78	5.54	14.06	64.96	8.26
554 (rtsp)	0.38	2.44	0.19	1.36	8.21	0.58
443 (https)	0.30	1.45	0.19	0.58	1.63	0.46
20 (ftp-data)	0.93	1.25	0.90	0.24	0.17	0.25
(>= 1024)	*83.44*	*36.00*	*89.00*	*78.02*	*19.35*	*84.71*
6346 (gnutella)	0.92	0.84	0.93	0.94	0.67	0.97
GRE	0.07	0.12	0.06	0.09	0.08	0.09
ICMP	0.01	0.05	0.01	0.02	0.05	0.02

Yet, another important fact is; large number of TCP /UDP connections are established by every single end-station

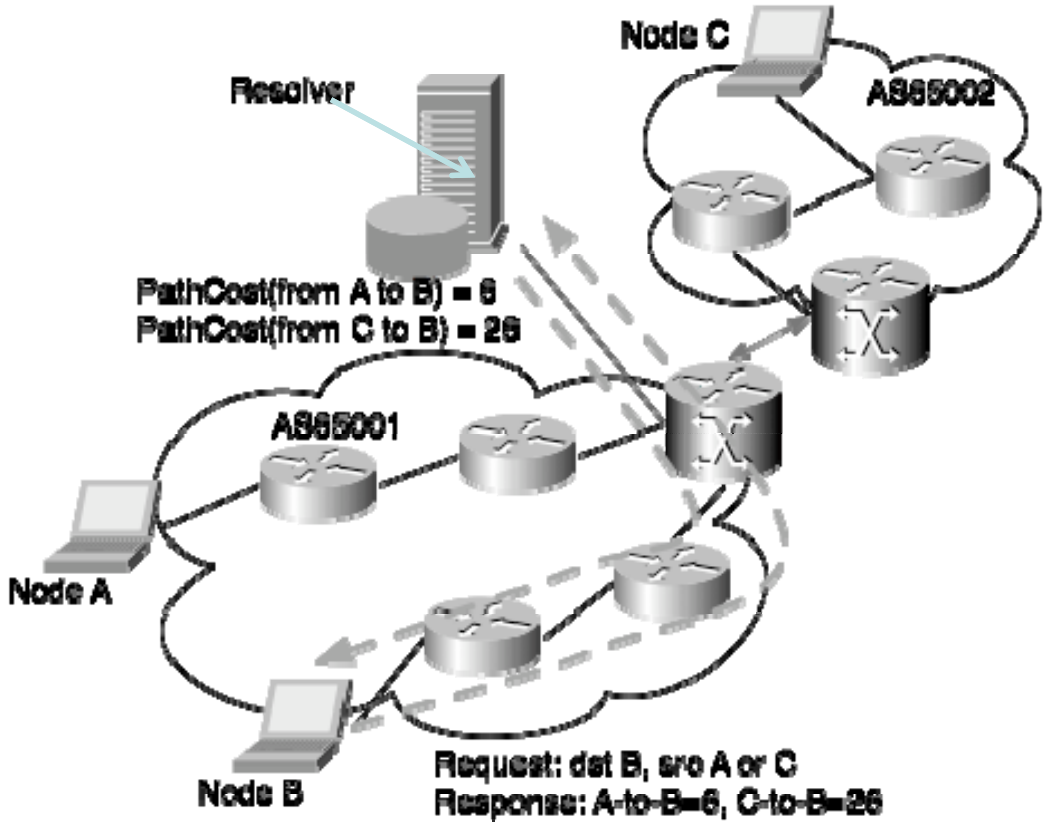
Challenge on P2P deployed in ISP

- Traffic engineering on P2P system
  - –Intra-domain
    - ➔ P4P ?
  - –Inter-domain
    - ➔ new routing matrix

Collaborating with P2P Promotion Council
http://www.fmmc.or.jp/p2p_web/index.html

Inter-Domain P2P Traffic Engineering

Each AS registers all their link cost to the resolver database



Reduce of Inter-Domain Traffic

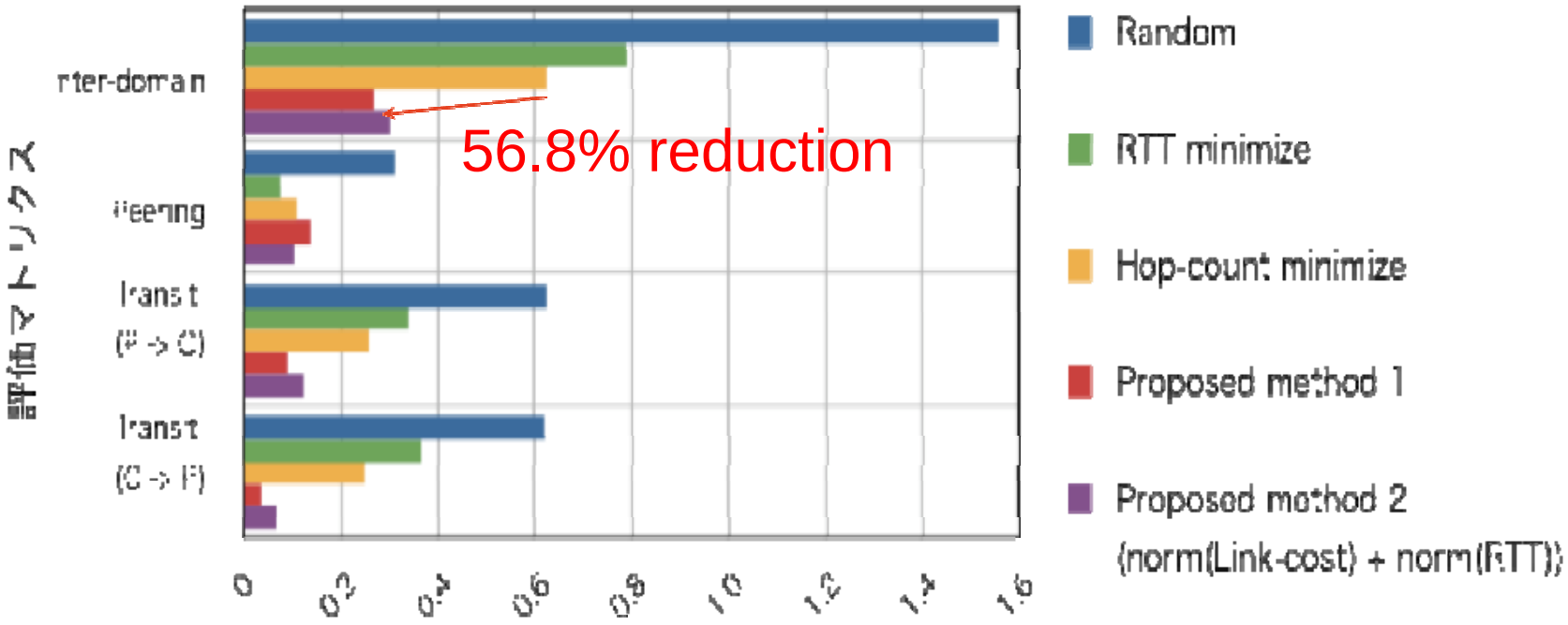
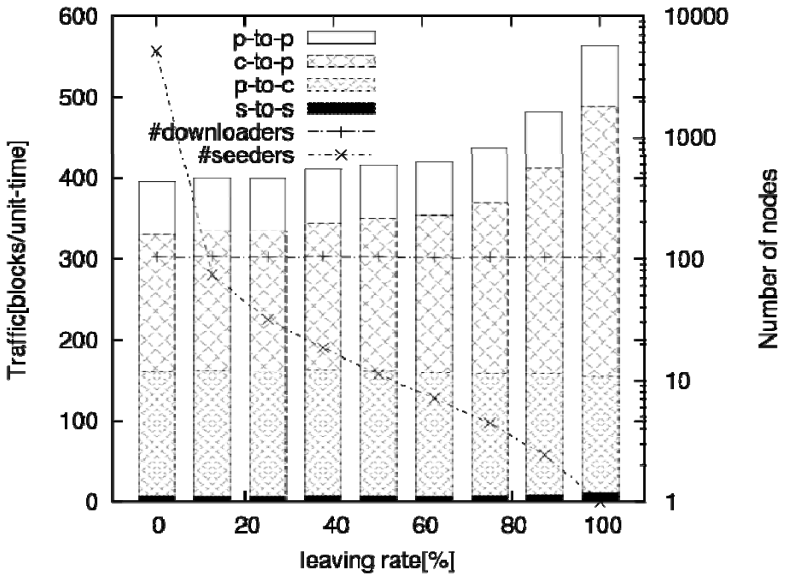
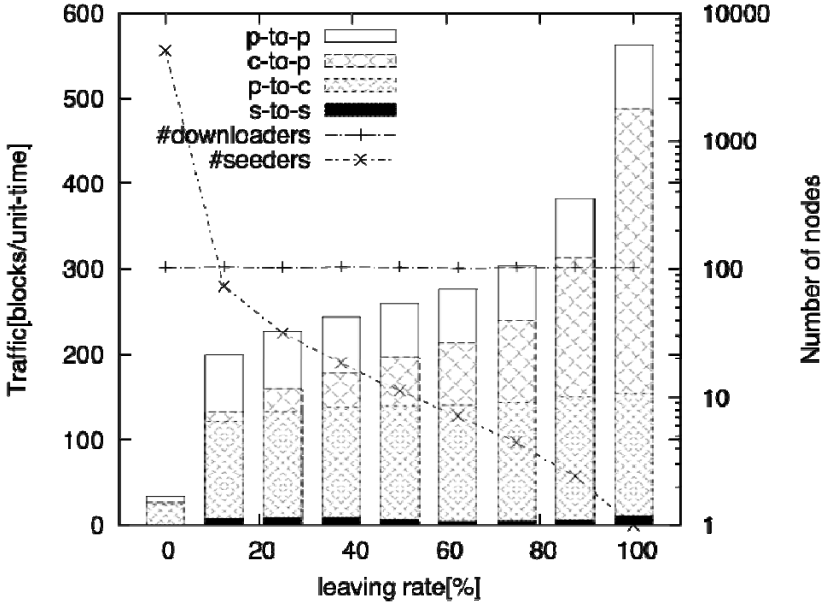


Fig. Inter-domain traffic

Evaluation using CAIDA's AS relationship Dataset (*)



Random selection



Proposed method

(*) http://www.caida.org/data/active/as-relationships/

Flagship Projects

1. Facility Networking for energy saving
2. Live E! ; Weather Sensor Network

Live E!

1. Let available any digital information computing device or resource on the earth for any device on the earth, for other usage
2. We should not leads the restraint of human and social activity by energy saving, but we achieve the less energy consumption through increased efficiency and innovation.
3. Build the infrastructure, that invite and explore the innovation and evolutions

東京大学
THE UNIVERSITY OF TOKYO

Green Campus Project empowered by ICT

“Green University of Tokyo Project”

http://www.v6pc.jp/jp/ut2eco/

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

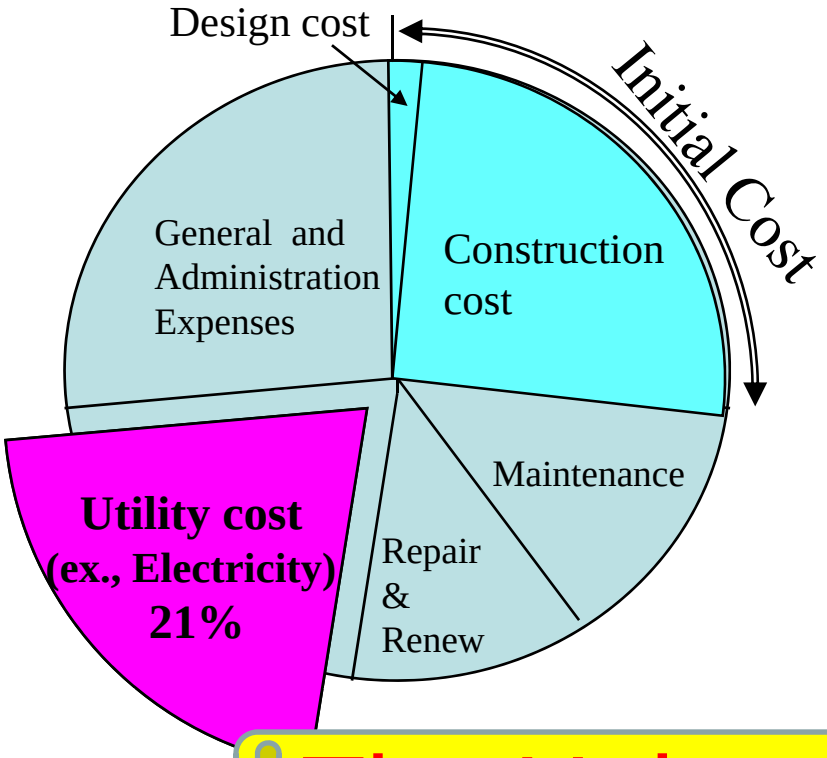
1. Energy saving and preserving the Earth is now “Global” agenda, while there is an economical benefit and incentive for private companies.
2. Integration of separated sub-systems, e.g., Air-conditioning, lightening, security, IT.

- H
  - –
  - –
- P
  - –
  - –
    - pen TCP/IP technology (i.e., IPv6)
- C
  - – 10

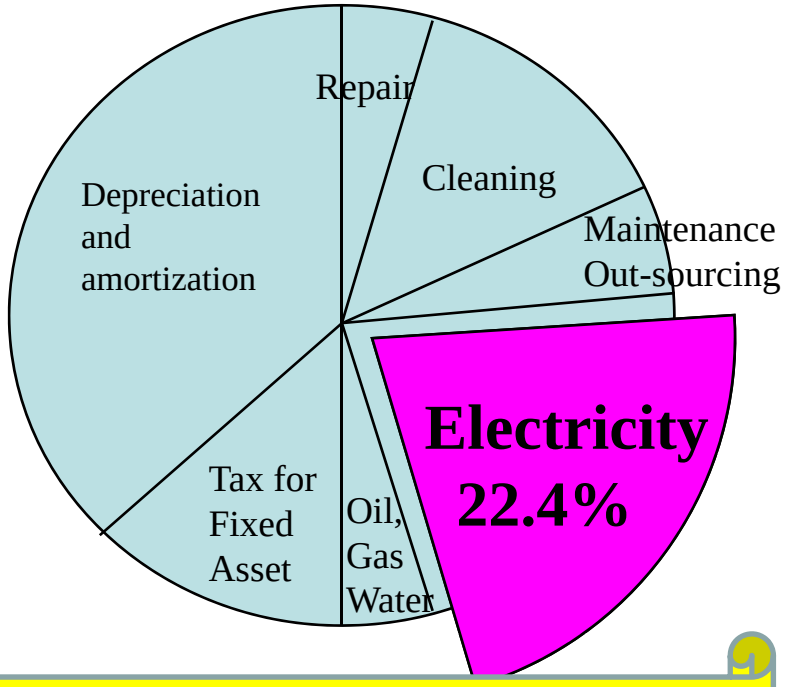
Large number of sensors/actuators, and they has not cooperated…… People start to realize the benefit of open system, i.e., IP.

Life-time cost in Building System

Life time portfolio
(in office building)



Yearly portfolio
(in office building)



The University of Tokyo pays **$60M/year** on Electricity !!!

Facility management

IPv6 based P2P control of facilities

- Status of elevators, AC or ventilators, movement of guests in the museum, temp
  surveillance camera images may be monitored in a facility management center.
- Shared use of networks among IP phone, Internet access and facility managem
- Cost reduction
- V
  a

(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.

E

ter

Min
bas
faci

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

m2m-x access control server

Total energy fluctuations

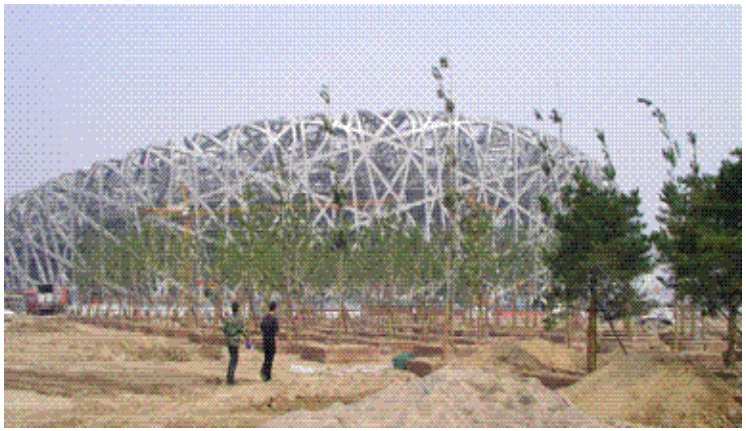
Weather data

Number of guests

Centralized facility management system

Beijing Olympic 2008 Main Stadium District
Lighting System Control by IPv6 Facility Manage & Control

Operated by Matsushita Electric Works (MEW)
http://www.mew.co.jp/e/corp/index.html



Lightening Management & Control
- Using IPv6 based Facility Networking
- Area Management System, i.e., not single facility but multiple facilities
- 1.4kmx2.4km with 18,000 lights
- 340 IPv6-based control nodes
- 10% Energy saving

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

1. Energy saving and preserving the Earth is now “Global” agenda, while there is an economical benefit and incentive for private companies.
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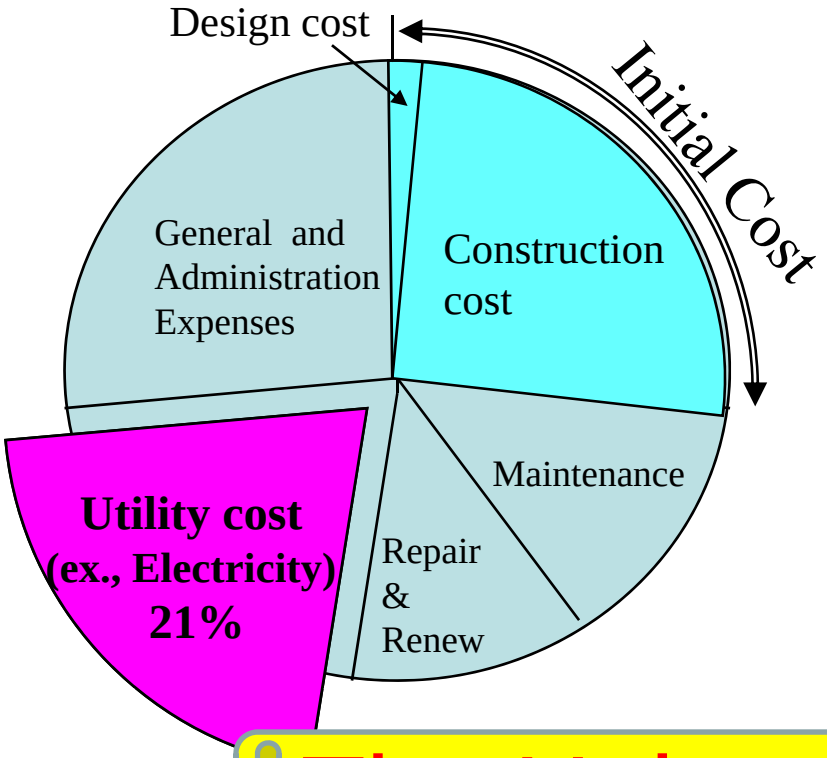

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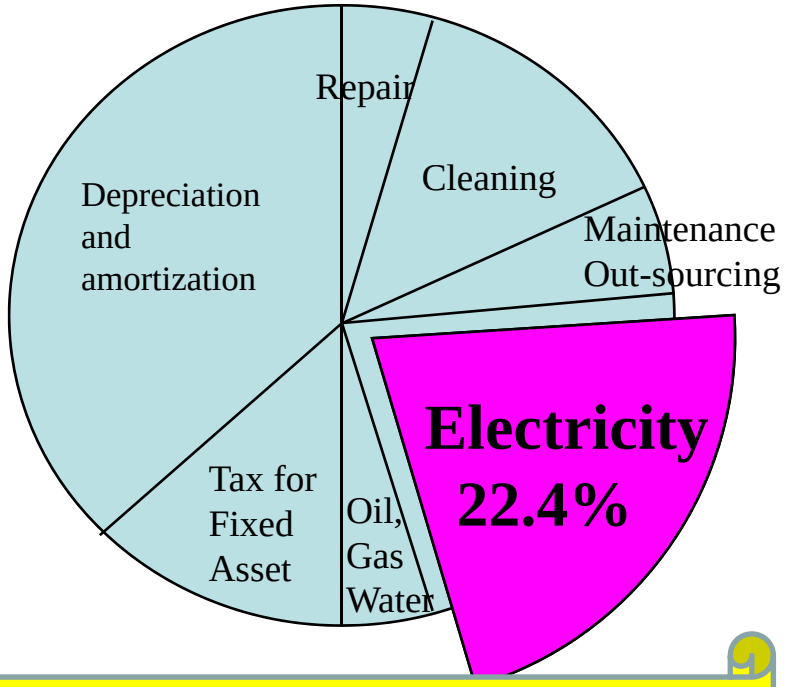

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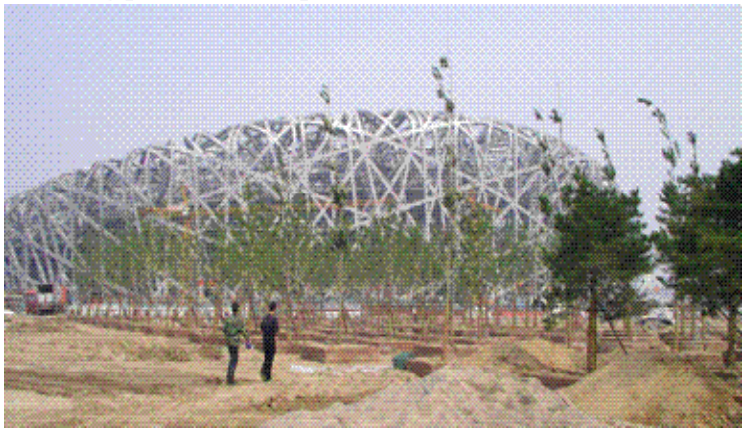

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- 340 IPv6-based control nodes
- 10% Energy saving

Special Project at the Univ. of Tokyo "Green ICT Building"

- Building No.2, Hongo Campus
  - Targeted reduction;
    - **15%=$4M USD (in 2012), 50%=$30M USD (in 2030)**
  - 12 floor high, R&D and R&E activities
  - Established October 2005, Start of Operation in March of 2006
  - More than saving energy
  - Forming R&D consortium

東京大学
THE UNIVERSITY OF TOKYO

Mission Statement

1. Contribution to TSCP (Todai Sustainable Campus Project)
   - 15% reduction in 2012, 50% reduction in 2030.
2. Green IT campus
   - Reduce power consumption by ICT equipments
   - Contribution to Environmental issues of our Earth
   - New operation and design model of campus
3. Testbed operation for the evaluation and establishment of Green facility networking and controlling, at the flag-ship facility in Metropolitan TOKYO.
   - Cooperative facility networking
   - Explore the new business
4. Referenced procurement specification for campus
5. Specification of Benchmarking and RoI for saving energy

Participants

Kicked-off on June 09, 2008

- アイビー テクノス 株式会社
- 株式会社インターネット総合研究所
- 株式会社 ウィルコム (WILCOM)
- 株式会社 NTTファシリティーズ
- 鹿島建設 株式会社
- 清水建設株式会社
- CiTRIX SYSTEMS JAPAN 株式会社
- シムックス 株式会社
- ダイダン 株式会社
- 株式会社 竹中工務店
- 株式会社 デジタル
- T&Y 松本コーポレーション
- 株式会社 ディー・エス・アイ
- 株式会社 東芝
- 株式会社 日本アジルテック
- 日本AMD株式会社
- 日本電気 株式会社
- 株式会社 日立製作所
- 富士通 株式会社
- 松下電器産業 株式会社
- 松下電工 株式会社
- 株式会社 三菱総合研
- 三菱商事株式会社
- 株式会社 山武
- 株式会社 ユビテック
- 横河電機 株式会社
- リコー株式会社
- 渡辺電機工業 株式会社

- LONMARK JAPAN
- 東京都環境科学研究所

New Comers
- Fuji Xerox
- Daikin (Air-conditioning)
- KOKUYO (office utility)
- OMRON (FA, sensor)
- IBM

- 東京大学

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- 株式会社 ウィルコム (WILCOM)
- 松下電工 株式
- 株式会社 三菱総合
- 三菱商事株式会社

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- 株式会社インターネット総合研究所
- 株式
- 株式
- 鹿島
- 清水
- CiTR
- シム
- ダイ
- 株式
- 株式
- T&Y
- 株式
- 株式
- 株式
- 日本
- 日本
- 株式
- 富士
- 松下電器産業 株式会社
- 松下電工 株式
- 株式会社 三菱総
- 東京大学

Stakeholders on Facility Business,

- Developer, e.g., landlord
- General Contractor/Con”s”tractor
- System Integrator
- System Designer
- ICT Vendor
- Component vendor, e.g., sensor
- Standardization Body
- R&D organization, e.g., University
- Local government, e.g., Tokyo

Integration of legacy systems

Visualization

Analysis

Reaction / control

中央変電室

I/F

ルータ

ルータ

Web配信

端末

学生

端末

教授

端末

施設

端末

Data Center

IPv4/6

キャンパスネットワーク

BACnet /WS

LON

BX

PC

WEB

CSV

Savic 山武

EHP 三菱電機

GHP 三菱重工

N-MAST 松下電工

集中検針 愛知時計

動力監視制御
代表EHP監視、
電力計量

Air Condition
(EHP)

Air-Condition
(GHP)

Lightening

電力量
水道量

DU

DU

DU

CT

電流
(200V)

BCRN

BCRN

BCRN

PLC

コンセント

電力監視
電源制御
(100V)

動態サーバ

無線LAN

AP

AP

AP

AP

ID

ID

ID

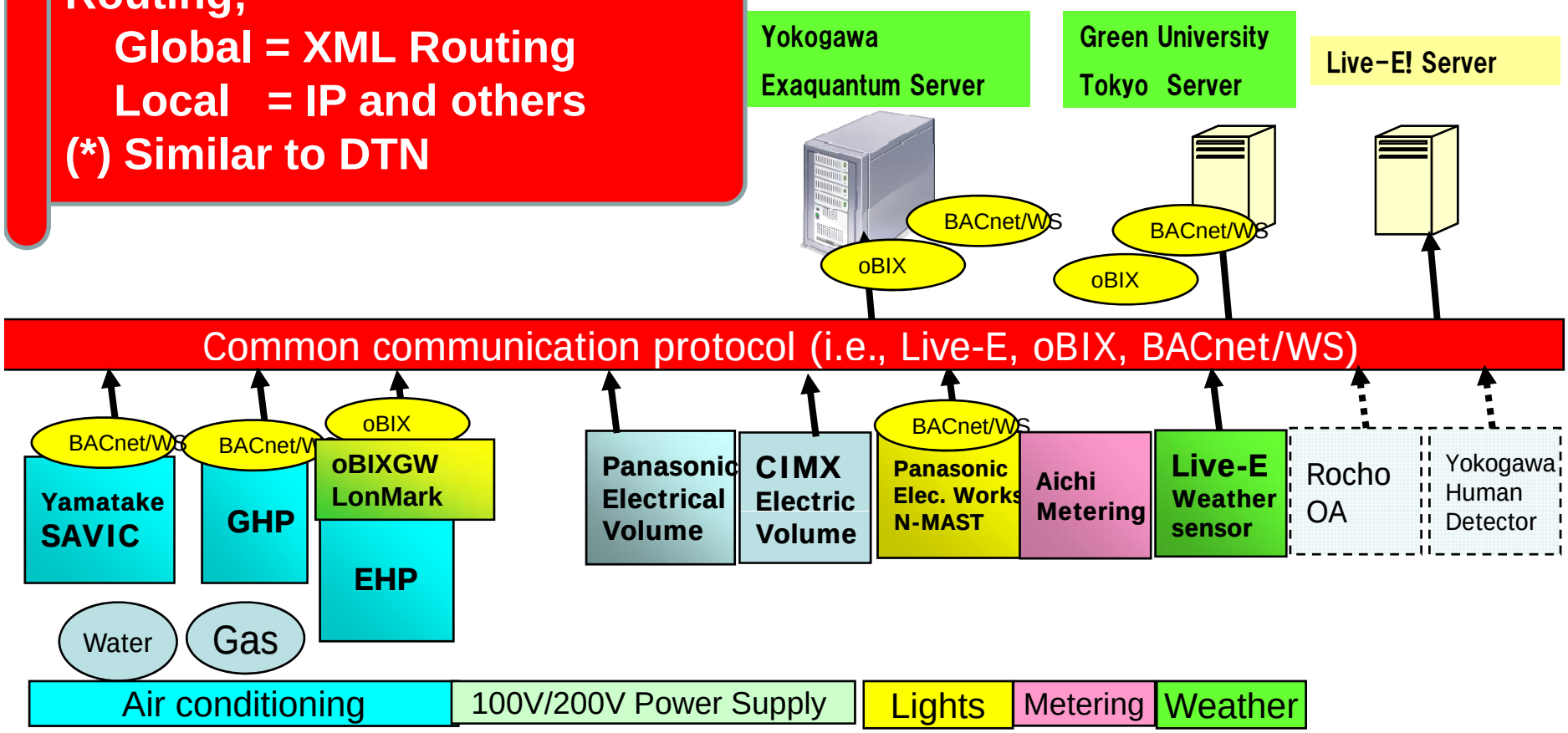
動態管理
入退室管理(セキュリティ)

Integration with IP

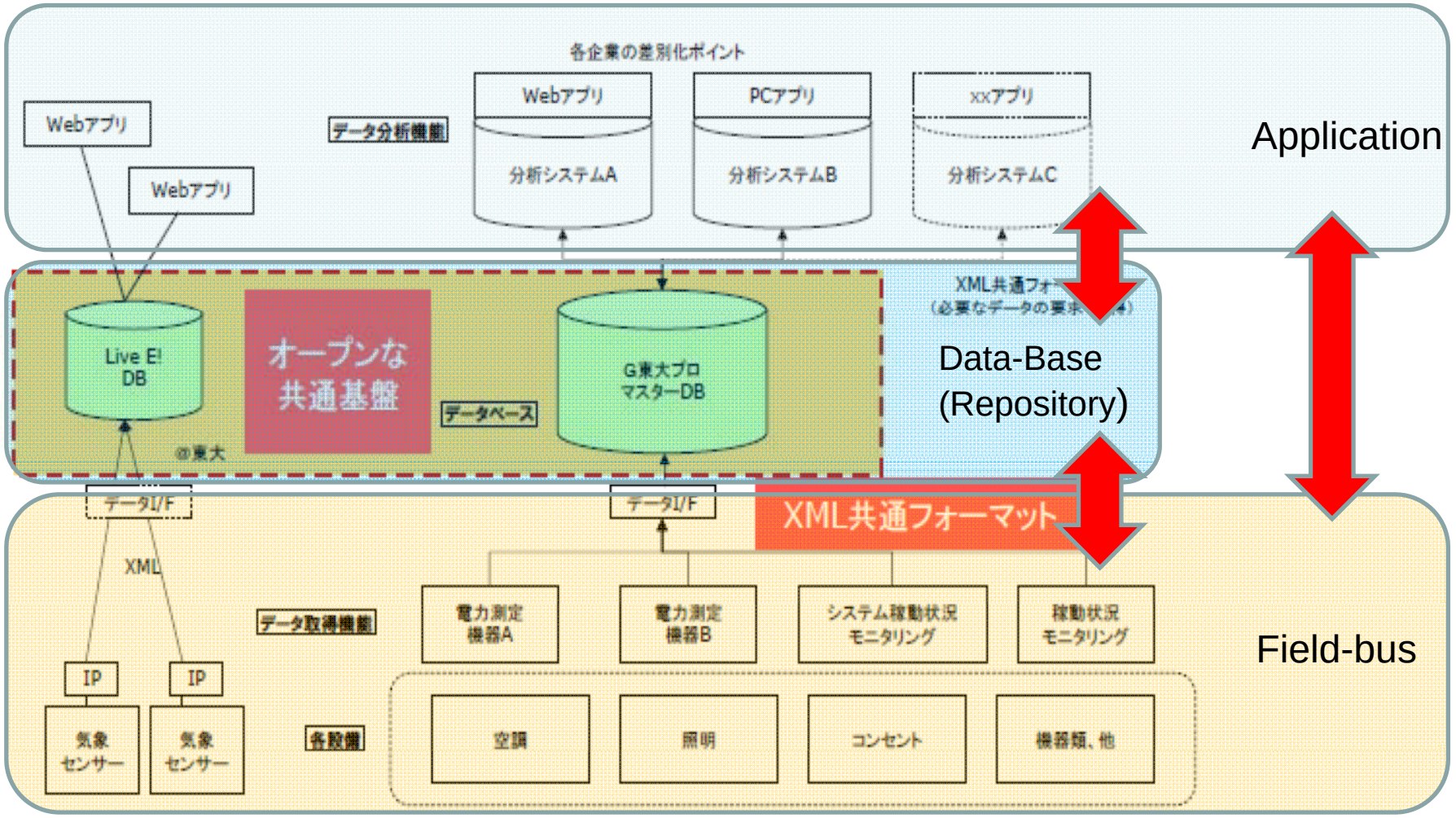
Additional System

Security System

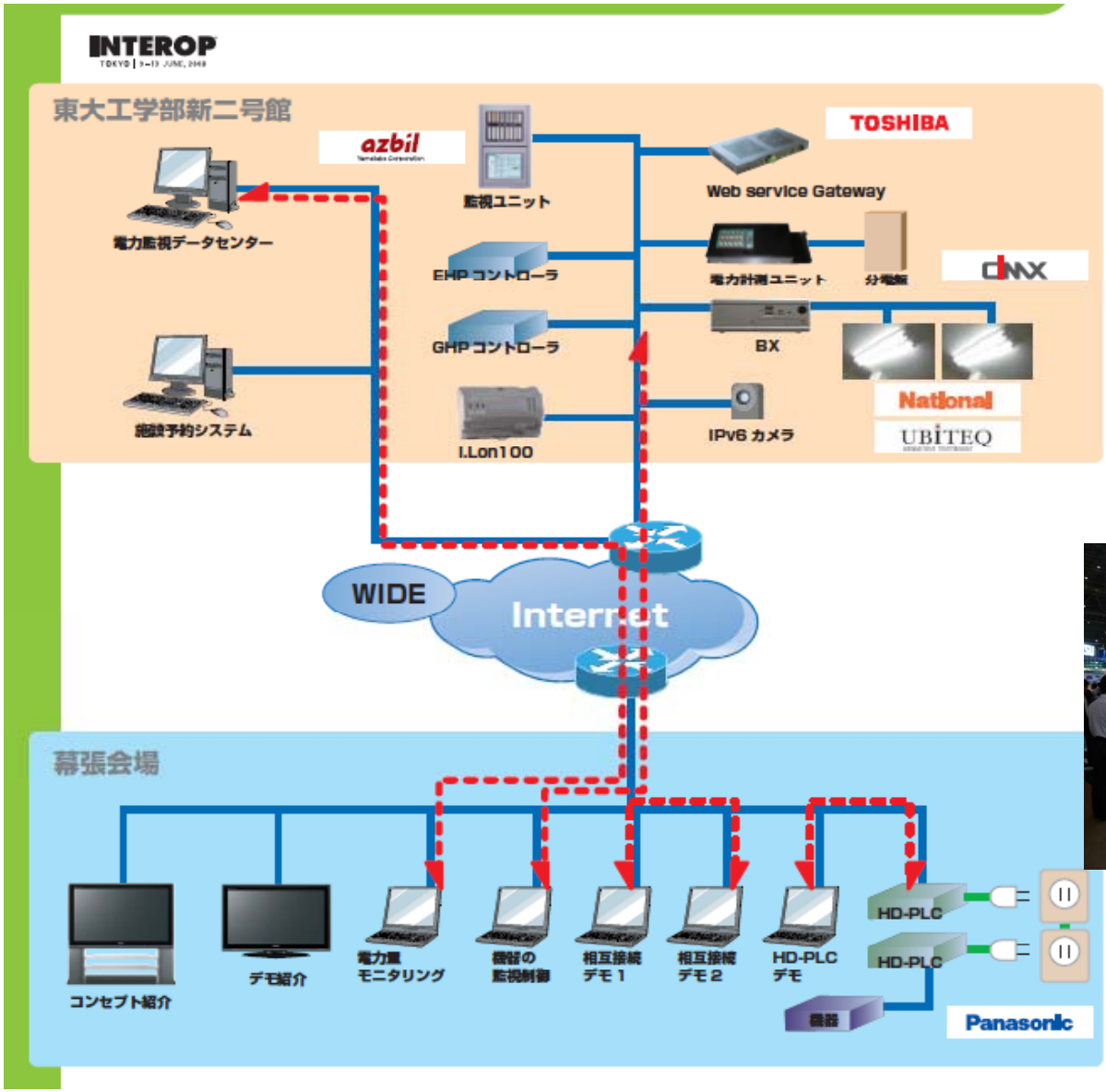
Routing;
Global = XML Routing
Local = IP and others
(*) Similar to DTN

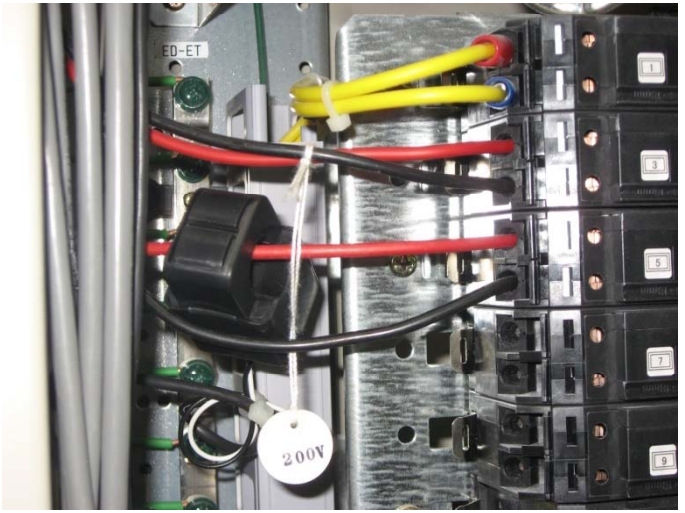


Referenced System Architecture for standardization



INTEROP Tokyo 2008 (June 11-13)



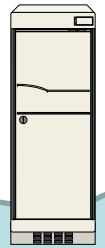


Real-time monitoring of Electric Power Consumption with CIMX Inc.

Lights Control and Monitoring by Messenger

Available commands
- Get address
- Get state
- Turn on/off

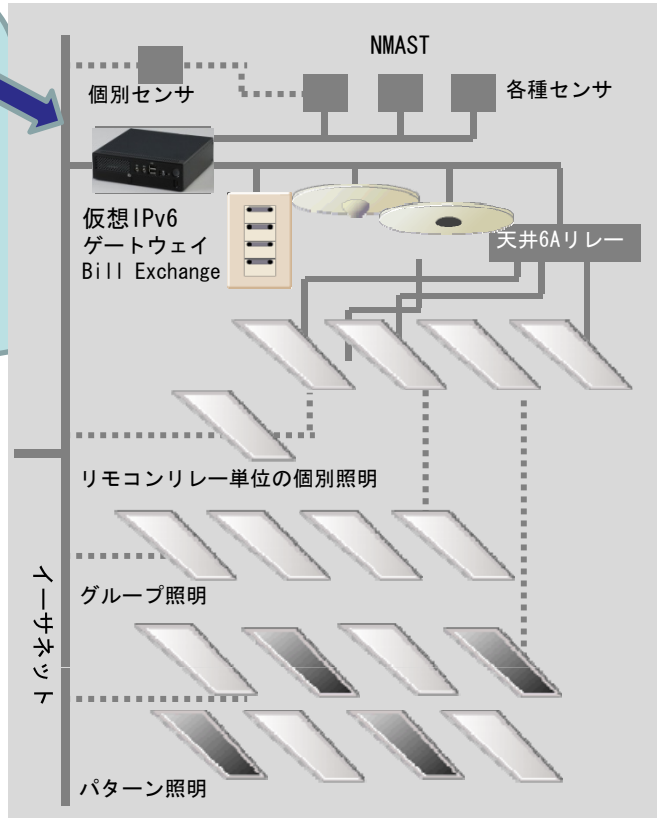
Anywhere
On any platform



IM-BX Translator
(Installed at MEW Tokyo HQ)

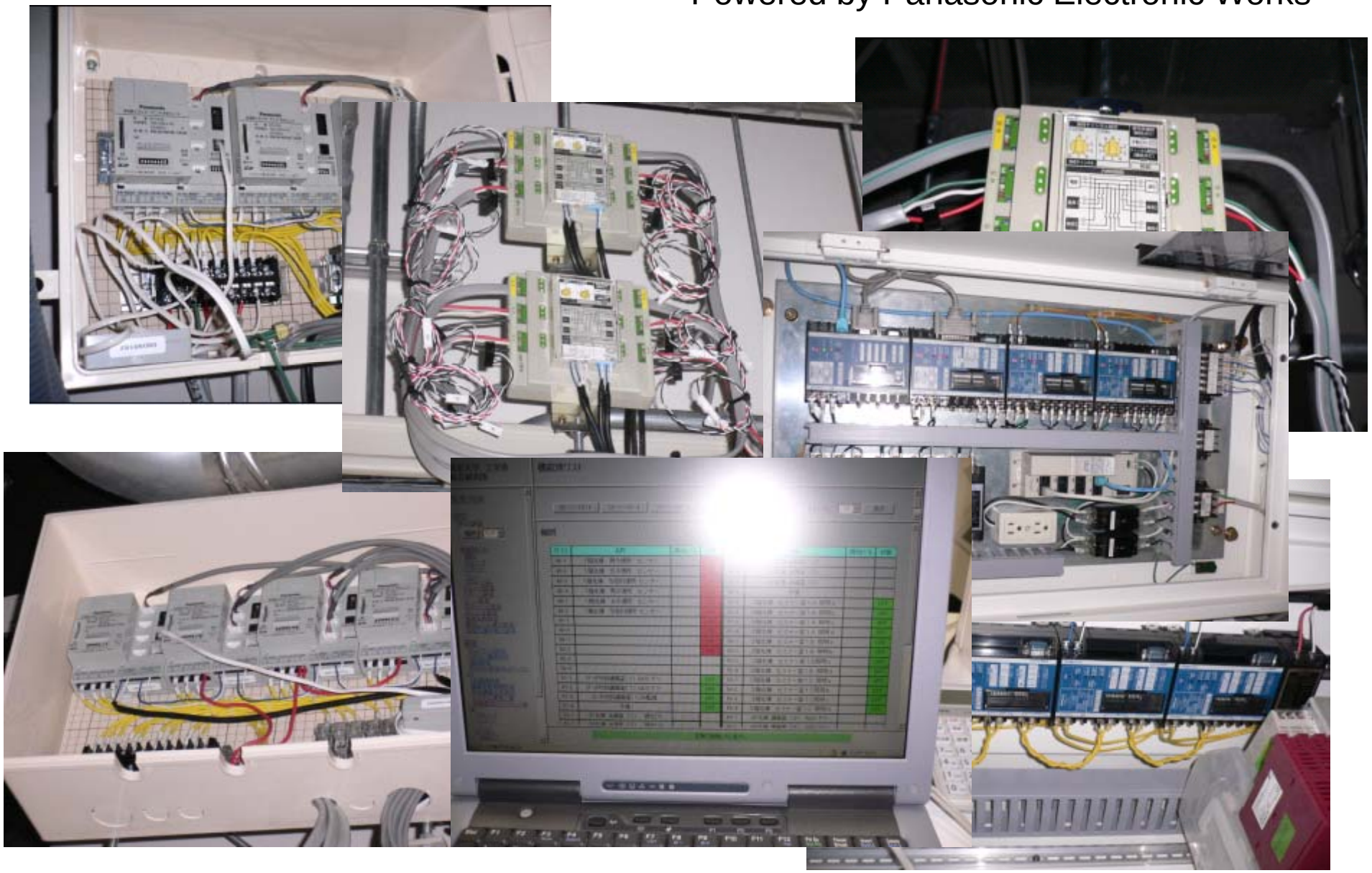
Internet
IPv6/IPv4

Univ. of Tokyo@Hongo



Lightening System Installation

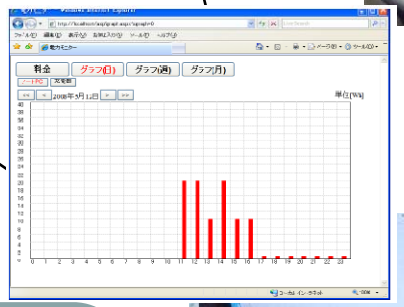
Powered by Panasonic Electronic Works



Measurement via PLC for 100V appliances

HD-PLC

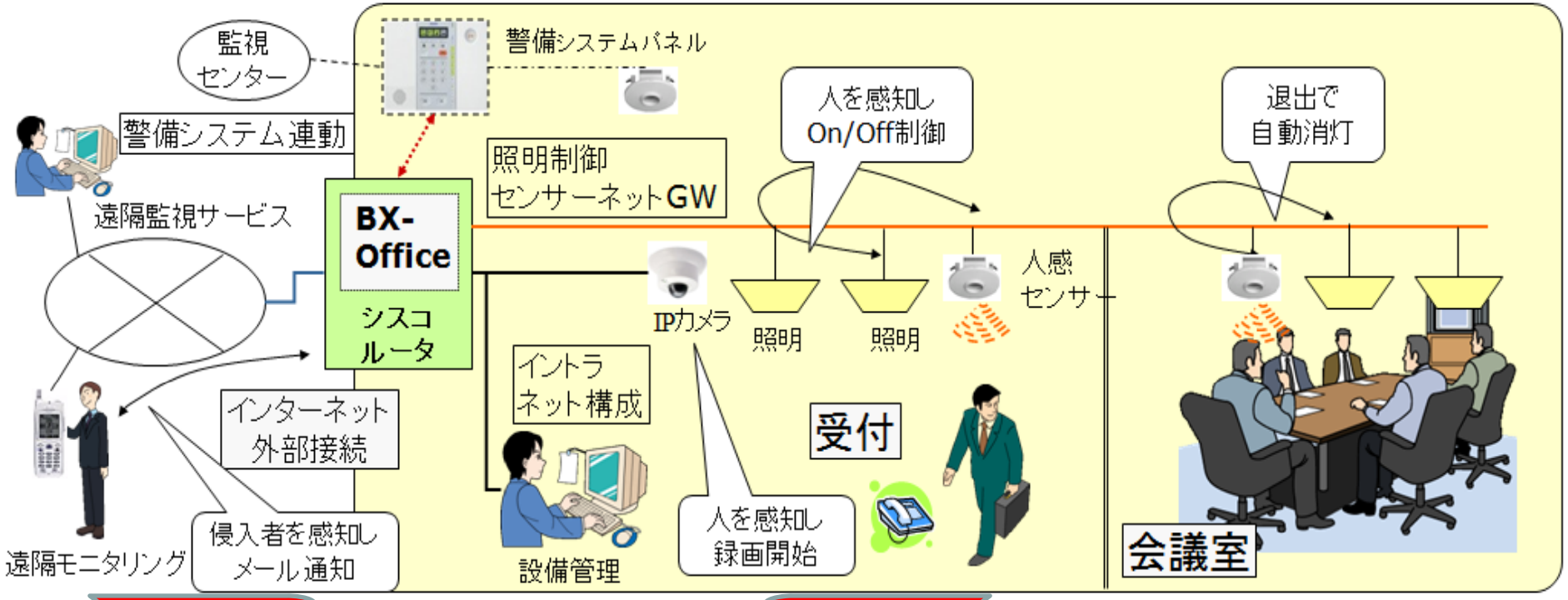
Powered by Panasonic ideas for life



Experimental operation

UBITEQ, Panasonic EW, Cisco Systems, {Yamatake}

◆システム構成



In operation since Nov.15,2008

UBITEQ
UBIQUITOUS TECHNOLOGY

On Going R&D

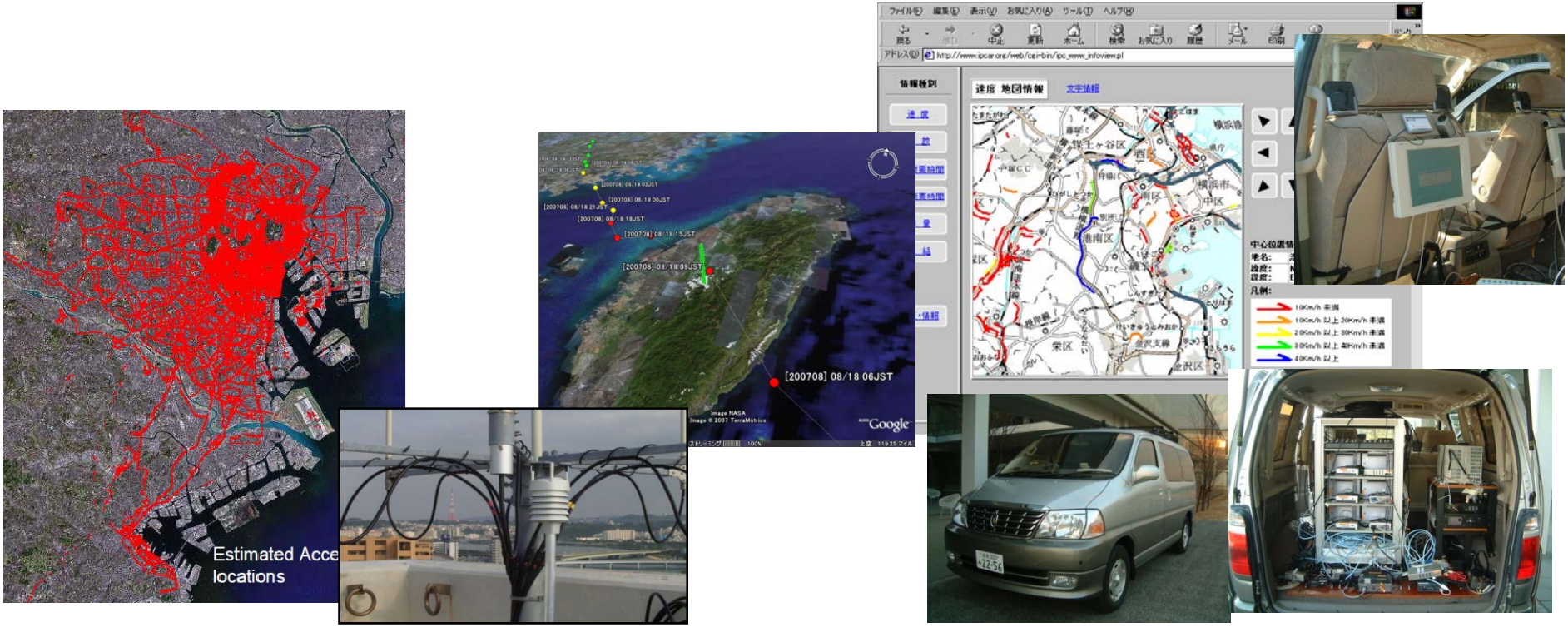
1. VM migration based on Xen platform in Esaki-Lab PCs (30+ PCs) {with NEC & CiTRIX}
2. Integration of local field-bus's into UBITEQ box
   - BACnet, LonWorks, PanasonicEW-light, Yamatake
   - Cisco System (Japan) has joined
3. Integration with Live E! system (=Sensor Network)
4. PC activity management and control with Big-FIX
5. Collaboration with
   a. Chunghwa Telecom at Taiwan
   b. ADB(Asian Development Bank) HQ in Manila
   c. EU's project
6. Challenge to do;
   - Standardization ➔ NIST@USA , ASHRE, IETF(with Cisco)

Yet, Another On Going R&D

- Green IT Project Leaded by METI Japan
  - Green Data Center (with IBM Japan)
  - Japan Data Center Forum (with Softbank IDC)

Live E!
～ 活きた地球の環境情報 ～

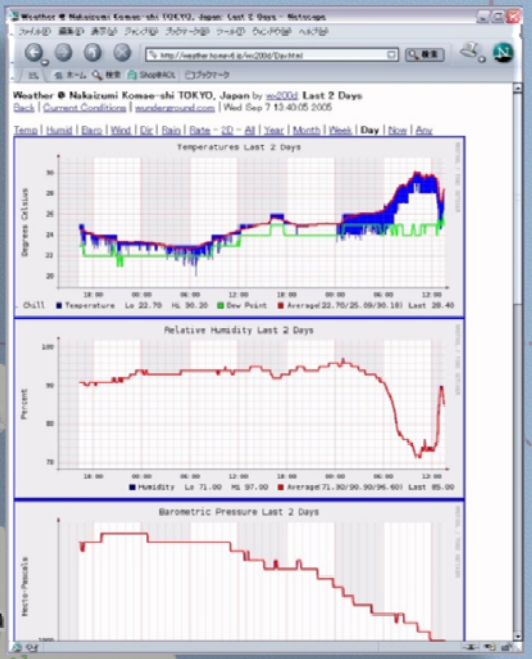
ディジタル環境情報の自由で自律的な
生成/流通/加工/共有に向けて



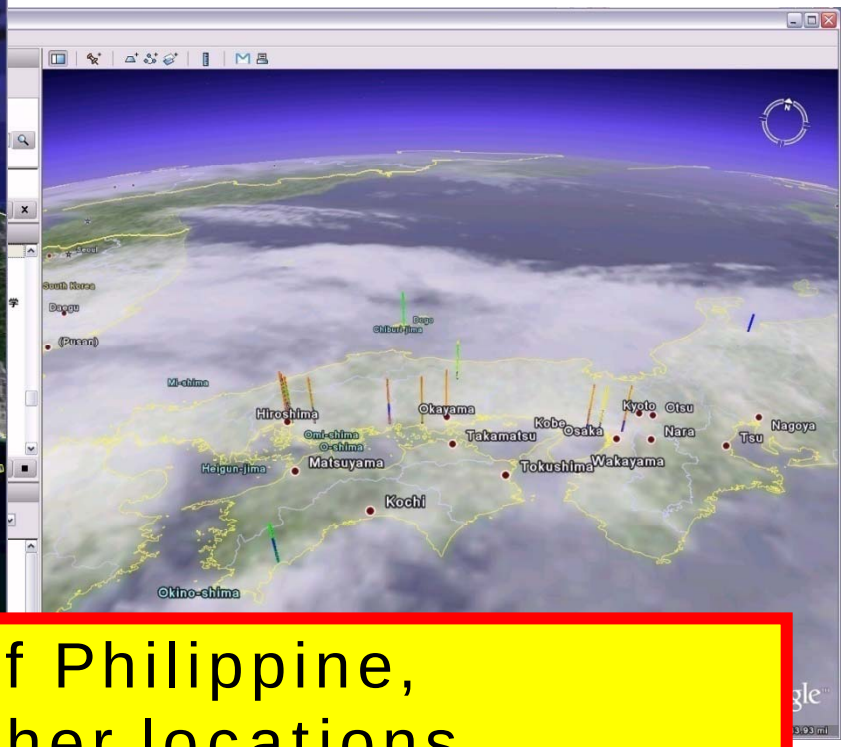
1. Let available any digital information computing device or resource on the earth for any device on the earth, for other usage

2. Single resource (platform), for multiple uses.

Deployment in Asian Countries



LIVE E! ; example of user application



- Has joined from ASTI of Philippine, PSU of Thailand and other locations (e.g., Taiwan, Malaysia) in Asian Pacific countries, collaborating with APAN and AI3.
- Integrating with other information systems, e.g., hurricane warning system

Live E! Sensor Deployment Status

as of December 2008

Europe & Africa

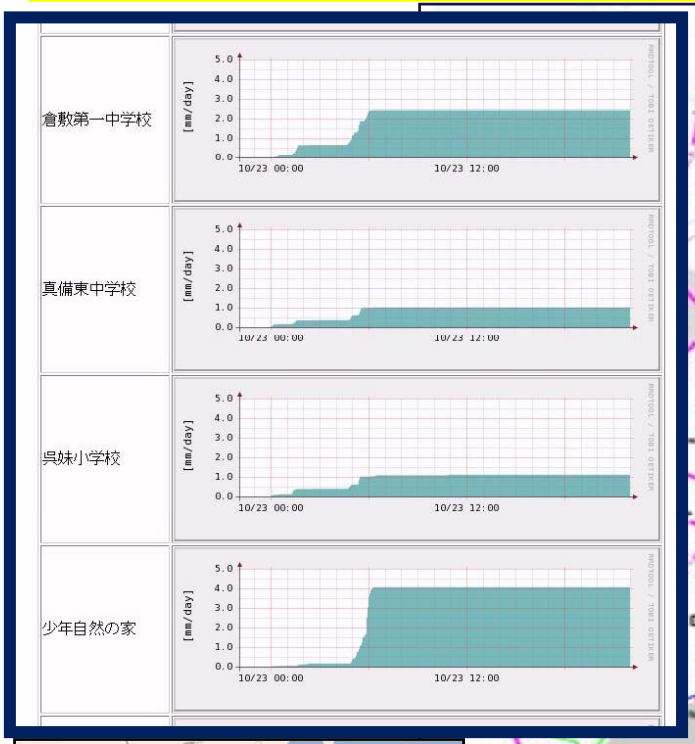
North America

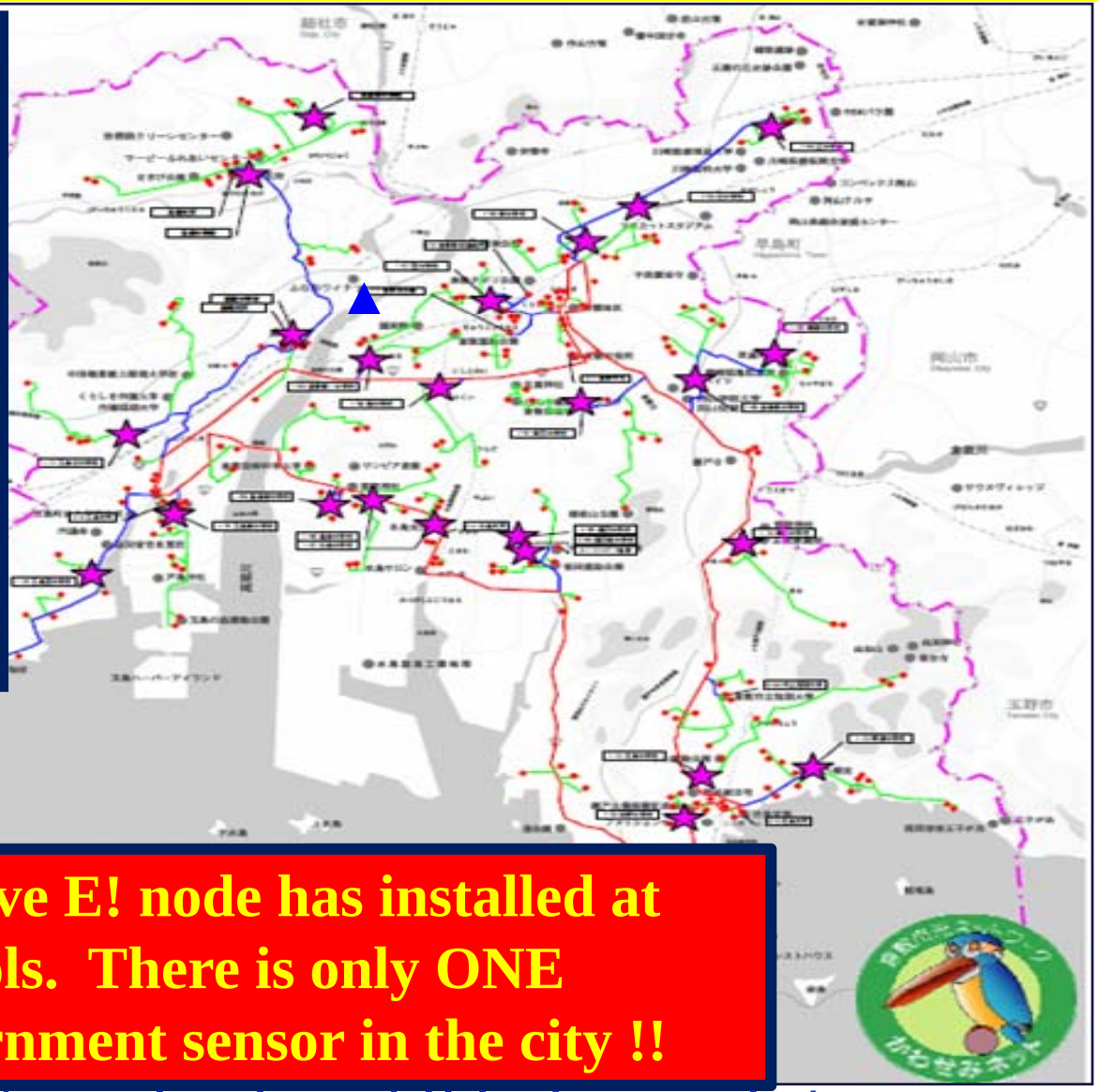
Asia

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 activity of district

Warning system for citizen, in the case of heavy rain, as a professional public service (in Kurashiki City)

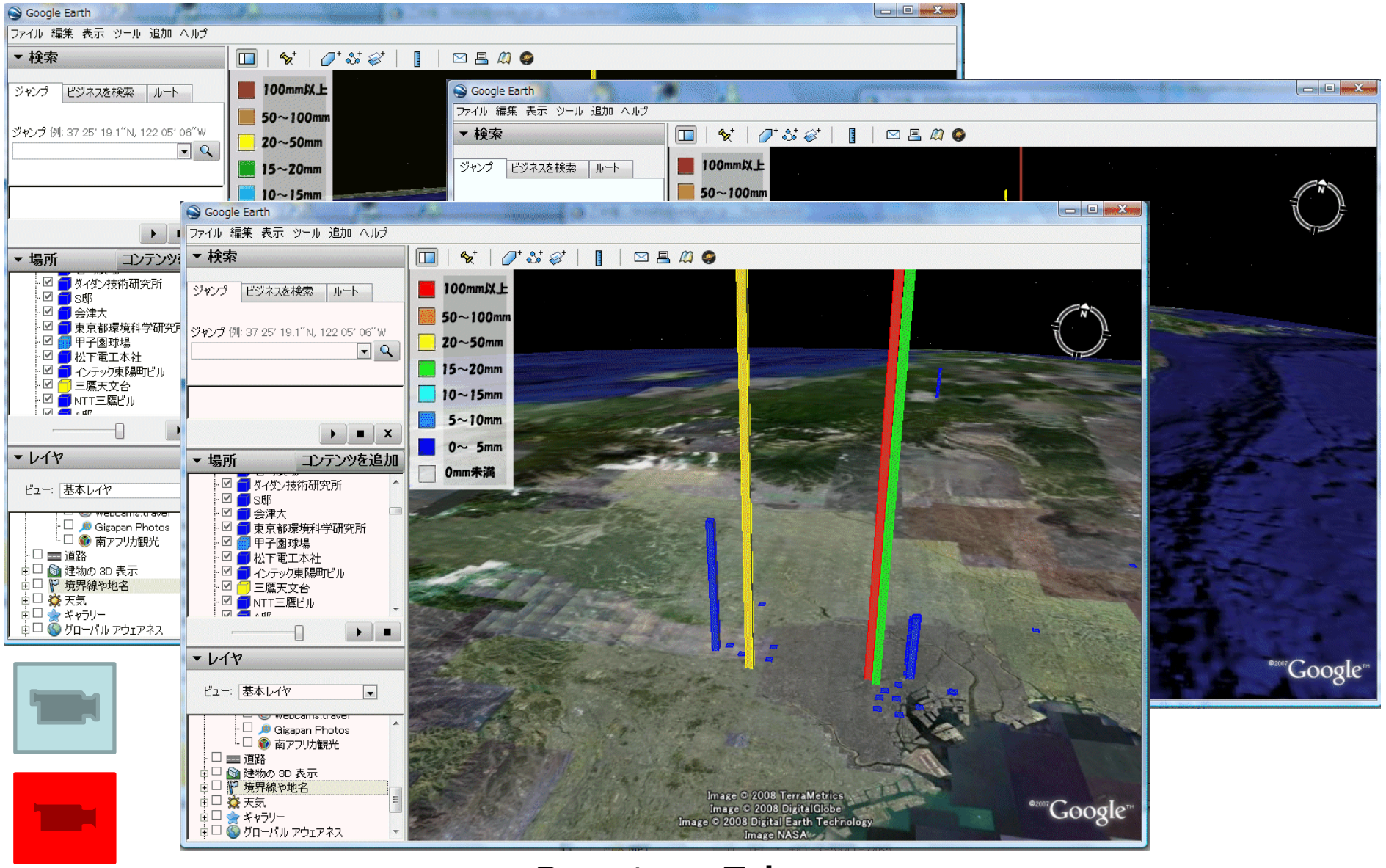




27 Live E! node has installed at schools. There is only ONE government sensor in the city !!

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

Heavy Rain in Tokyo, Aug.29, 2008



Downtown Tokyo

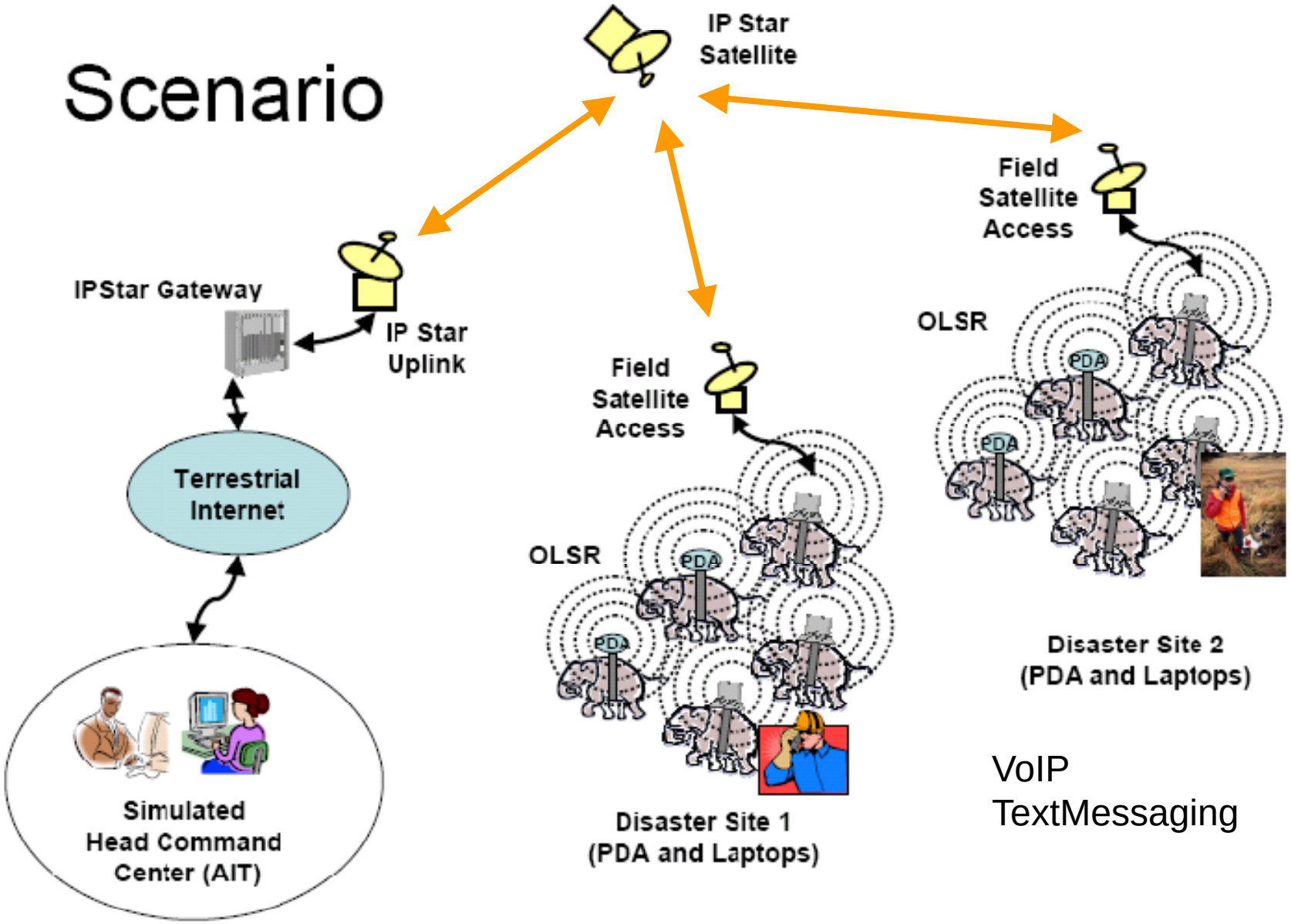
DUMBO with AIT@th

- Digital Ubiquitous Mobile Broadband OLSR
- Bangkok & Phuket, Thailand
- December 1st 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.

Scenario



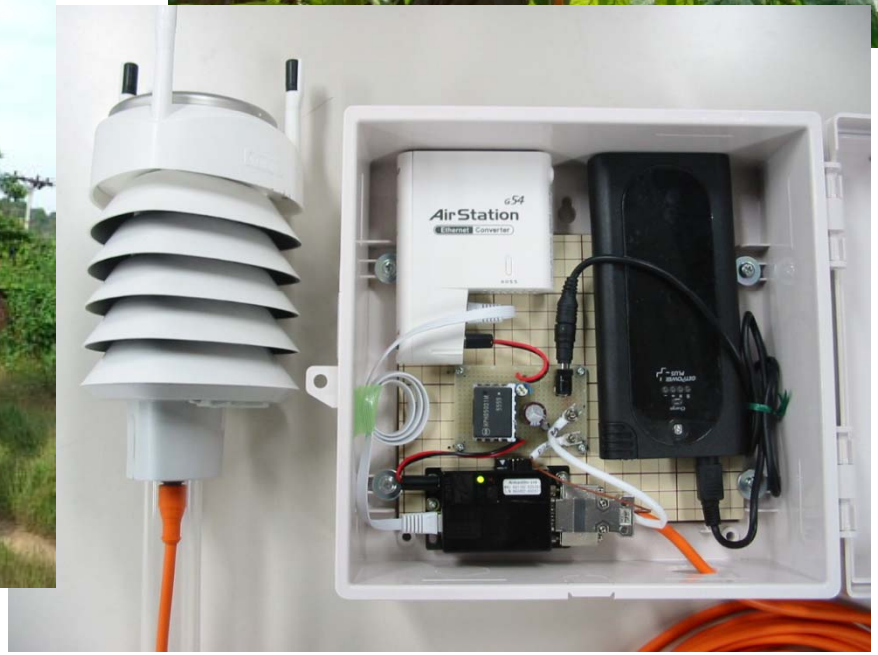
VoIP
TextMessaging

Bangkok

Phuket

DUMBO Project at Thailand

- Emergency Responding
- Live-e sensor in OLSR



Live E! Project Expand to Aisia

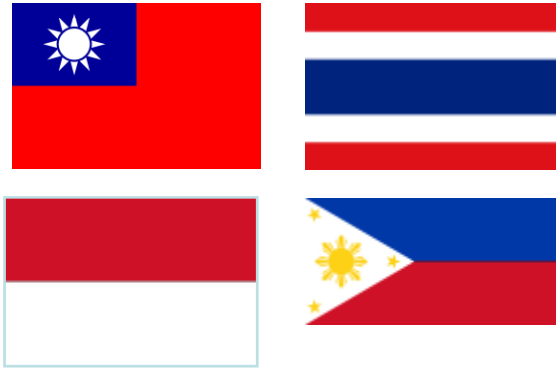

ASIA PACIFIC NETWORKING GROUP
10th Camp 2008
August 11-15 2008
Asian Institute of Technology, Klong Luang, Pathumthani 12120, Thailand


MANAGEMENT AND SERVICE DELIVER
16TH–29TH AUGUST 2008
ORGANIZED BY AIT EXTENSION IN CLOSE COLLABORATION
10th CAMP 2008
ICT VISION FROM, BY AND FOR NEXT GENERATION
August 11-19, 2008


Login to router

[Existing Installation]

- Chinese Taipei
- Thailand
- Indonesia
- Philippine

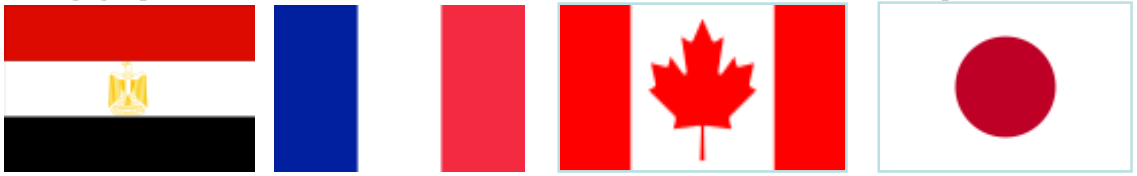


[New Installation]

- Malaysia
- Fiji
- Vietnam
- Sri Lanka
- Pakistan
- China
- India
- Myanmar
- Bangladesh
- New Zealand
- Cambodia

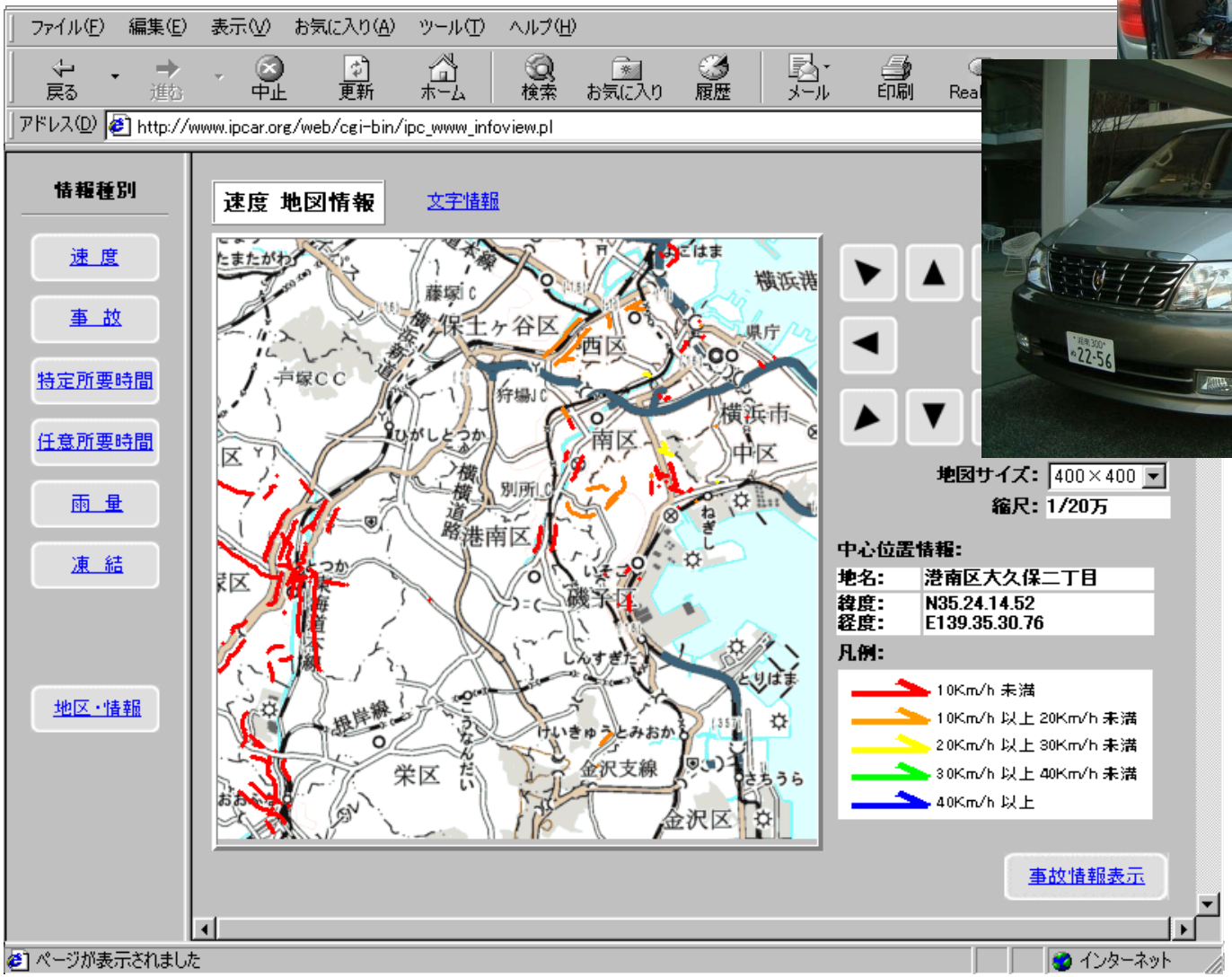
[Other Installation]

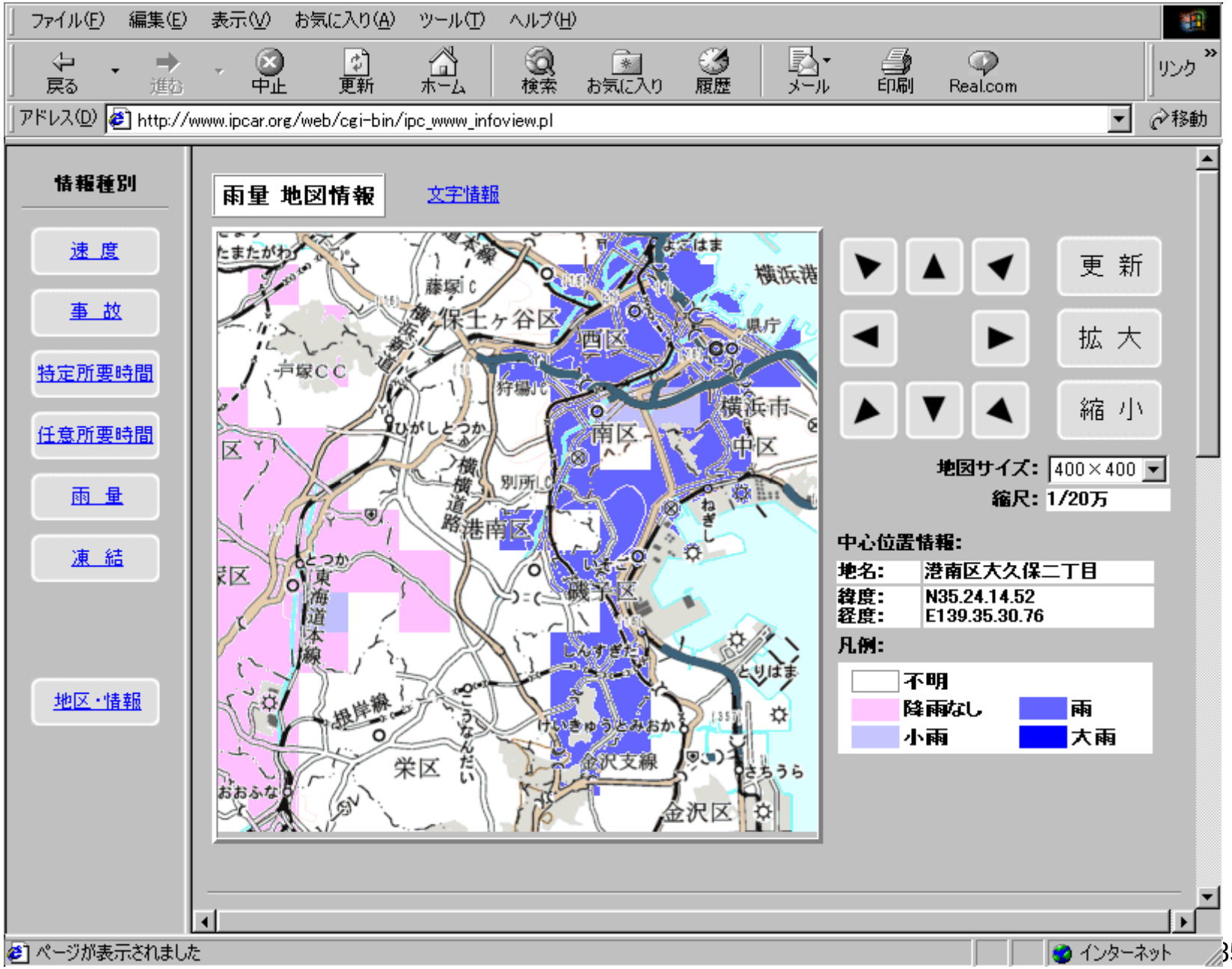
- Egypt, France, Canada, Japan



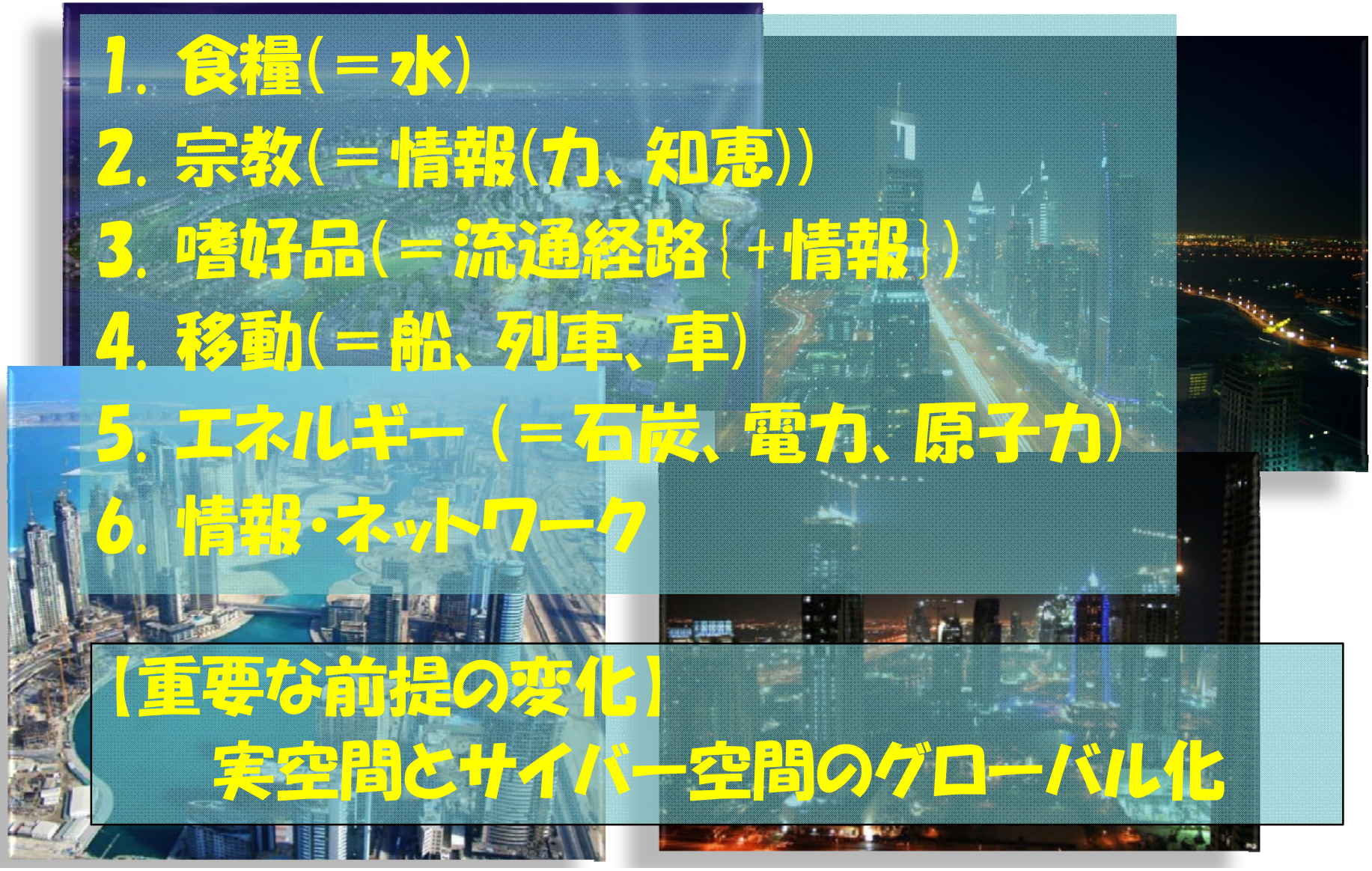

ストリートビュー
その他...
地図
航空写真
地形
Ελλάς
Greece
Türkiye
Turkey
Syria
Iraq
Iran
Uzbekistan
Kyrgyzstan
Turkmenistan
Afghanistan
Pakistan
India
中国
China
N Korea
S Korea
日本
Japan
Egypt
Saudi Arabia
Oman
Yemen
Sudan
Ethiopia
Somalia
Kenya
DR Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
South Africa
Madagascar
Indian Ocean
Vietnam
Malaysia
Papua New Guinea
Australia
NT
QLD
WA
SA
NSW
VIC
TAS
New Zealand
2000 km
1000 マイル
©2008 Google - 地図データ ©2008 ZENRIN, Tele Atlas, AND, Europa Technologies - 利用規約

Integration of Automobiles




ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)
戻る 進む 中止 更新 ホーム 検索 お気に入り 履歴 メール 印刷 Real.com リンク
アドレス(D) http://www.ipcar.org/web/cgi-bin/ipc_www_infoview.pl 移動
情報種別
速 度
事 故
特定所要時間
任意所要時間
雨 量
凍 結
地区・情報
雨量 地図情報
文字情報
保土ヶ谷区
西区
南区
中区
横浜市
港南区
栄区
金沢区
横浜港
戸塚CC
狩場IC
藤塚IC
別所IC
磯子区
金沢支線
更 新
拡 大
縮 小
地図サイズ: 400×400
縮尺: 1/20万
中心位置情報:
地名: 港南区大久保二丁目
緯度: N35.24.14.52
経度: E139.35.30.76
凡例:
不明
降雨なし
雨
小雨
大雨
ページが表示されました
インターネット

都市設計のパラダイムシフト



1. 食糧(＝水)
2. 宗教(＝情報(力、知恵))
3. 嗜好品(＝流通経路{＋情報})
4. 移動(＝船、列車、車)
5. エネルギー（＝石炭、電力、原子力）
6. 情報・ネットワーク

【重要な前提の変化】
実空間とサイバー空間のグローバル化

What is the impact/implication of Electronic Car ?

- Communication among car
  - Avoiding the traffic congestion
  - Virtual car-train

- Remove the combustion engine
  - Why car need long distance driving capacity ?
  - Car can be into the living room
  - Car does not need to use wheel
  - Car can be small enough

Innovation of Metropolitan Design Principle

Past requirements:

- Agriculture (river, canal)
- Manufacturing (logistics=train, road)

Future:

Control of "Energy and information flow" with ubiquitous energy sources

→ SCM of energy flow

What we (really) expected ?

- Win-Win relationship between Environment /Energy-saving and Ubiquitous networking

Step.1 Mandatory components

1. Sensors and actuators network
2. Collaborative operation among individual components

Step.2 Ubiquitous digital space sharing all the digital information

(*) Each equipments and components are already paid-off !!

St[illegible]ption and innovation for new

This is the ”internet End-to-End Model”

Referenced Sites

- WIDE Project, <www.wide.ad.jp>
- Live E! Project <www.live-e.org>
- ISOC <www.isoc.org>
- JGN2 <www.jgn.nict.go.jp>
- GLIF <www.glif.is>
- AIII <www.aiii.net>
- Facility Networking Consortium <www.v6pc.jp>
- DISTIX (DIStributed Internet eXchenge) <www.distix.net >
- JPNIC <www.nic.ad.jp>
- VoIP/SIP Interoperability Task Force <www.nic.ad.jp/ja/voip-sip-tf/index.html>
- IPv6 Ready Logo Program <www.ipv6ready.org/frames.html>
- IPv6 Forum <www.ipv6forum.com>

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  http://hiroshi1.hongo.wide.ad.jp/hiroshi/index.html