東京大学
THE UNIVERSITY OF TOKYO

Global Advanced R&D Networks
- Enabler for “new generation” -

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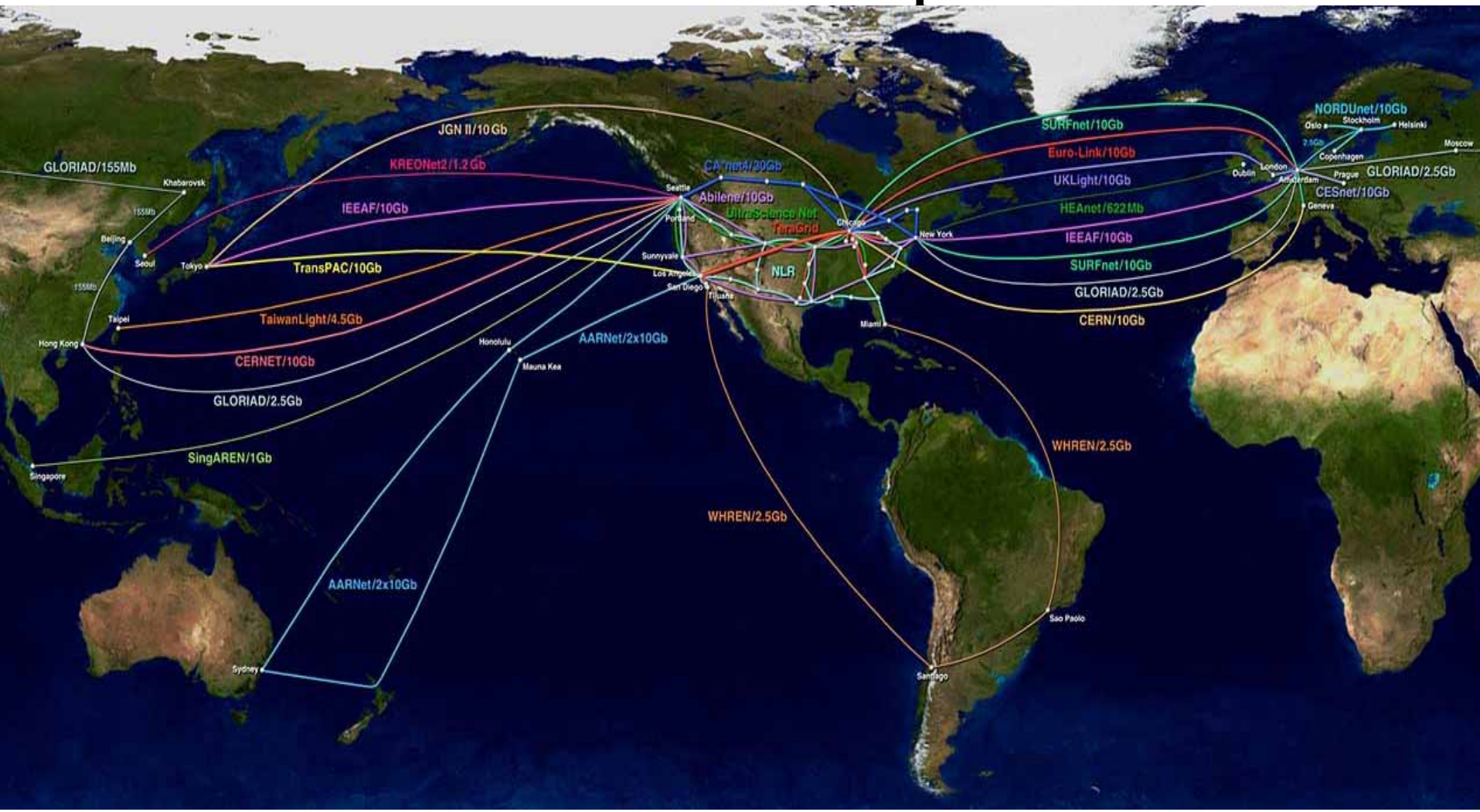
Agenda/Conclusion

Global R&D network will enable ;

1. New architectural paradigm
   - Toward global scale distributed computing
2. Education with applications on the “globe”
   - Live E! - sensor information for multiple use -
3. Business deployment
   - Establishment of technologies for global operation
     e.g., VoIP/SIP Interoperability

Global Lambda Integrated Facility
GLIF World Map – 2005



www.glif.is

Visualization by
Bob Patterson, NCSA.

IEEAF/GLIF in Asia

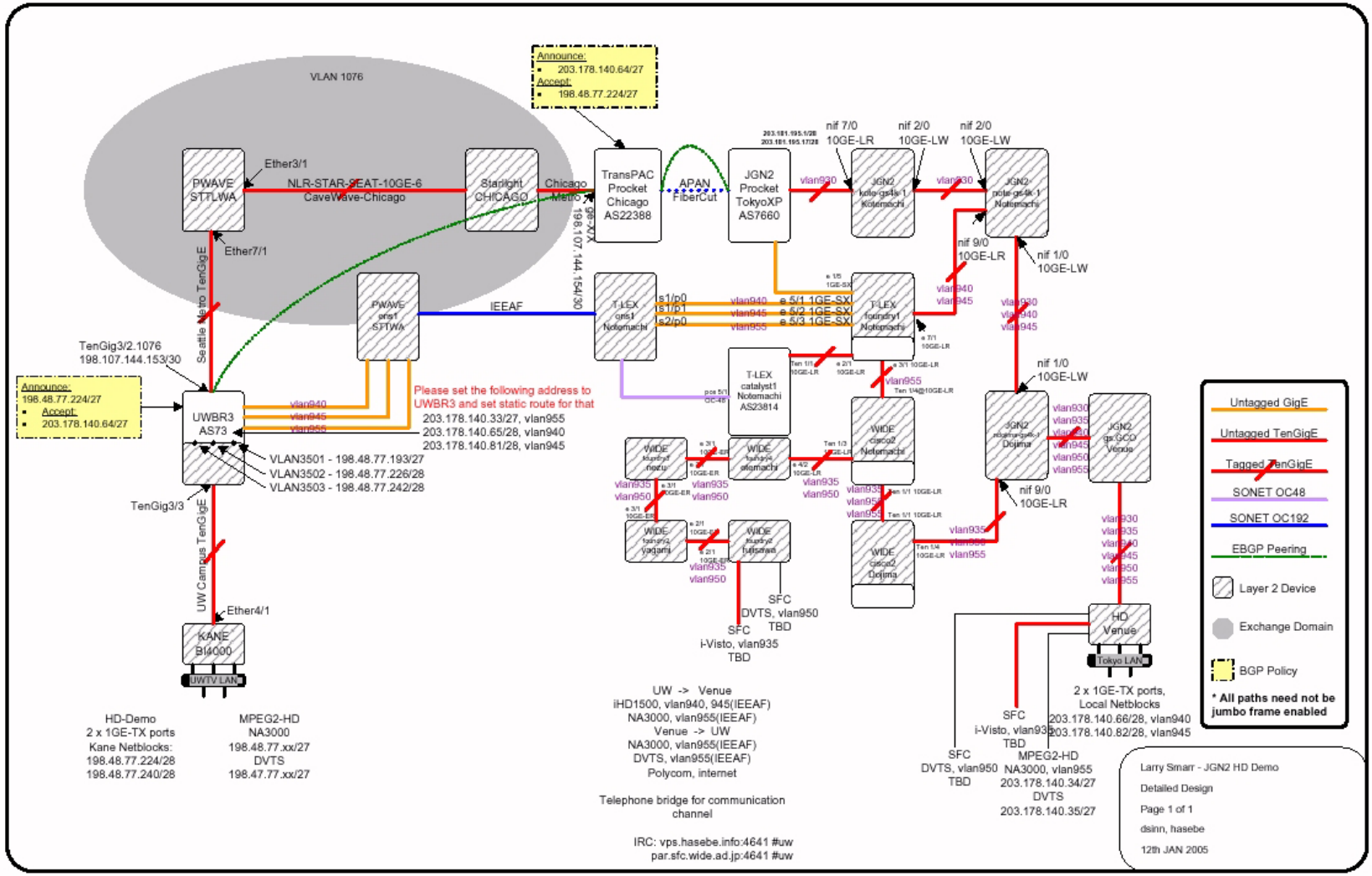
- Prof.Jun Murai of WIDE Project serves as Stewart of Asian area
- Integrating all the R&D and R&E Networks
- Key landing point candidates
  - China ; Beijing, Hong Kong, Shanghai
  - Korea ; Seoul, Pusang
  - Russia
  - Singapore
  - Thai ; Bangkok
  - India

Examples, in 2005

- Remote lectures with uncompressed HD (Jan.15, 2005)
  - Keio SFC(Tokyo) = JGN2 Symposium (Osaka)
  - Univ.of Washington(Seattle) = JGN2 Symposium (Osaka)
- TSUNAMI Symposium (Feb.23, 2005)
  - Prime Minister Office(**首相官邸**) = Keio Univ = Tohoku Univ. = Asian Univ.'s
  - DV Quality Video from Prime Minister Office
  - Asian universities via satellite system (AI3)
- "Deep Impact" real-time multicasting (September 5, 2005)
  - Subaru in Hawaii = Tokyo
  - Provide high-vision source of "Deep Impact" to NHK
- Remote lecture from SUBARU in Hawaii (Aug.04, '05)
  - Aichi Expo venue = Subaru@Hawaii
  - Bi-directional High-vision video

JGN2 Symposium (Jan.17,18, ‘05)

- Two of uncompressed HDTV
  - University of Washington (Seattle) = Osaka
  - Keio University (Tokyo) = Osaka
- Small latency is essential for Interactive Session
- Global collaboration and cooperation
  - JGN2、WIDE、GLIF、STARLIGHT、PacificWave、IEEAF、NLR, etc



- **10 GbE VLAN across Pacific Ocean**
- **Two redundant paths**
  - **Seattle = Chicago = Tokyo = Osaka**
  - **Seattle = Tokyo = Osaka**

TSUNAMI Symposium

スマトラ沖地震によるインド洋大津波：アジアの大学から世界へ
- 今大学に何が求められているか？

Date

Feb.24, 2005

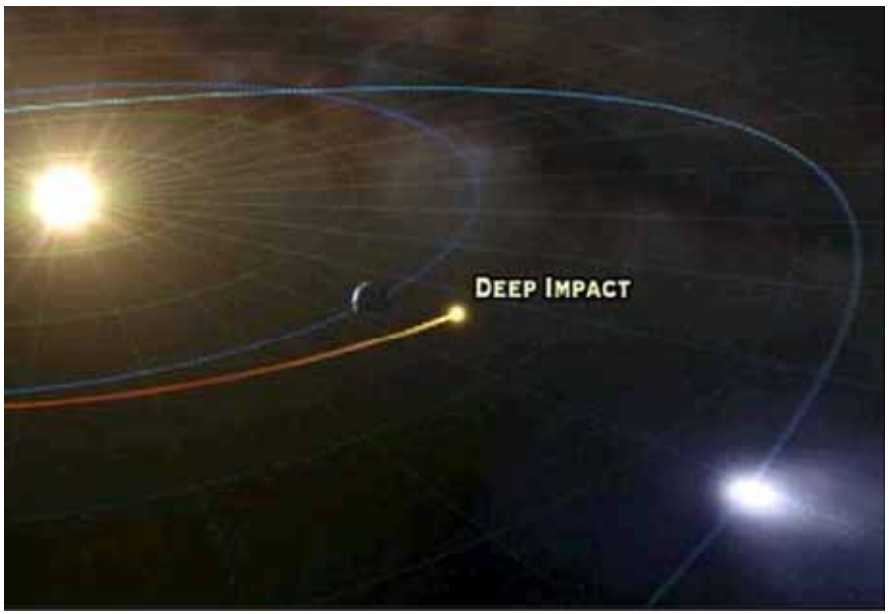
Participants

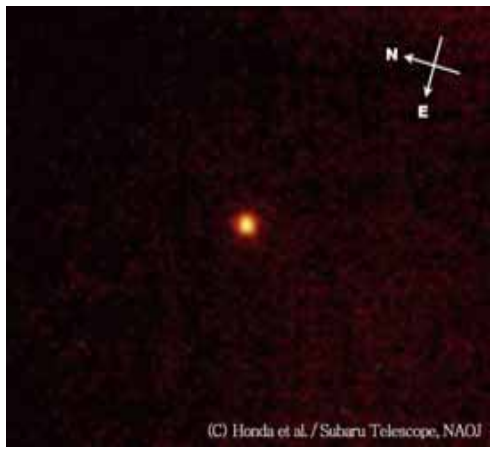
慶應義塾大学
東北大学
アジア工科大学（タイ） ※チュラロンコン大学Dr.Anatによる主催
バンドン工科大学（インドネシア）
ブラビジャヤ大学（インドネシア）

Program

16:30 - 17:00 Keynote - Prof. Jun Murai
17:00 - 17:30 Report from Japan (1)
17:30 - 18:00 Reports from Thailand
18:10 - 18:40 Report from Japan (2)
18:40 - 19:10 Report from Indonesia (1)
19:10 - 19:20 Report from Indonesia (2)
19:20 - 20:10 Panel Discussion
20:10 - 20:30 Closing

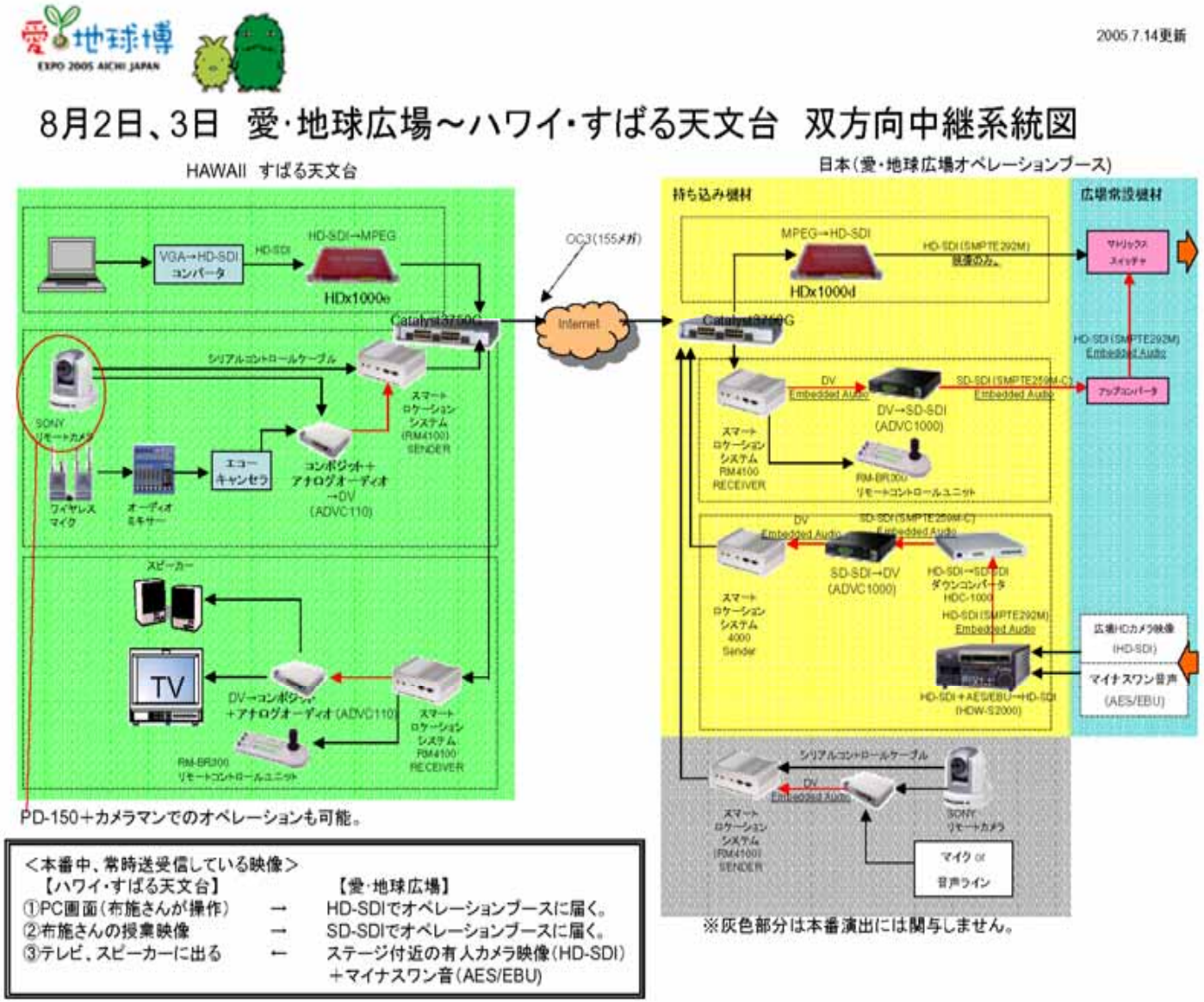
Deep Impact Project by NASA





Live images from SUBARU in Hawaii

Remote lecture from Subaru to Expo



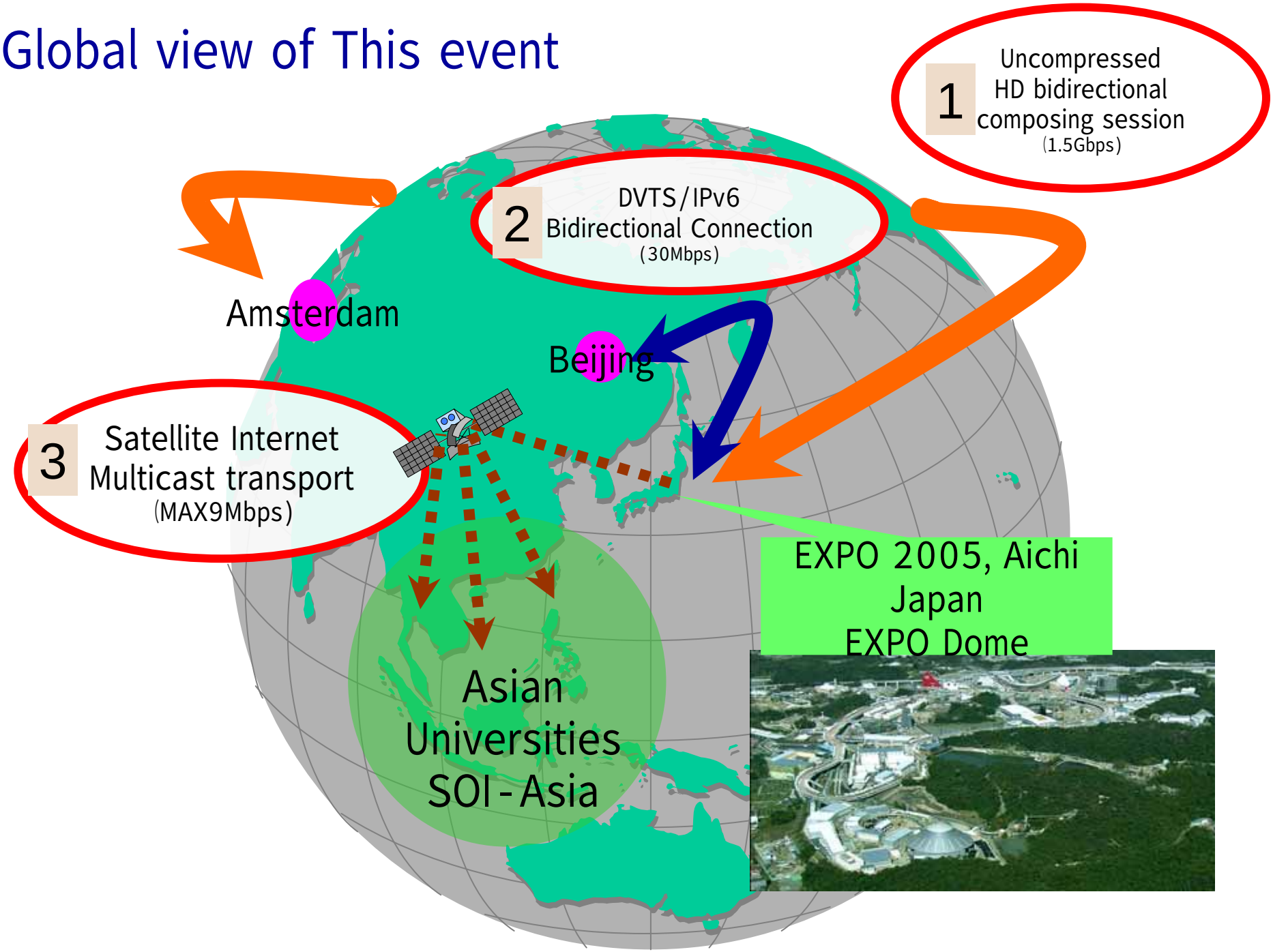
<本番中、常時送受信している映像>

【ハワイ・すばる天文台】		【愛・地球広場】
①PC画面（布施さんが操作）	→	HD-SDIでオペレーションブースに届く。
②布施さんの授業映像	→	SD-SDIでオペレーションブースに届く。
③テレビ、スピーカーに出る	←	ステージ付近の有人カメラ映像（HD-SDI）＋マイナスワン音（AES/EBU）

EXPO 2005 Aichi, Japan Message Event,
Closing Forum,
"Towards the Creation of a Sustainable Society"

Event: Sept 21st, 2005

Global view of This event



Uncompressed HD Bidirectional Communication

- HDTV over IP
  - i-Visto Gateway
    - Developed by NTT Communications

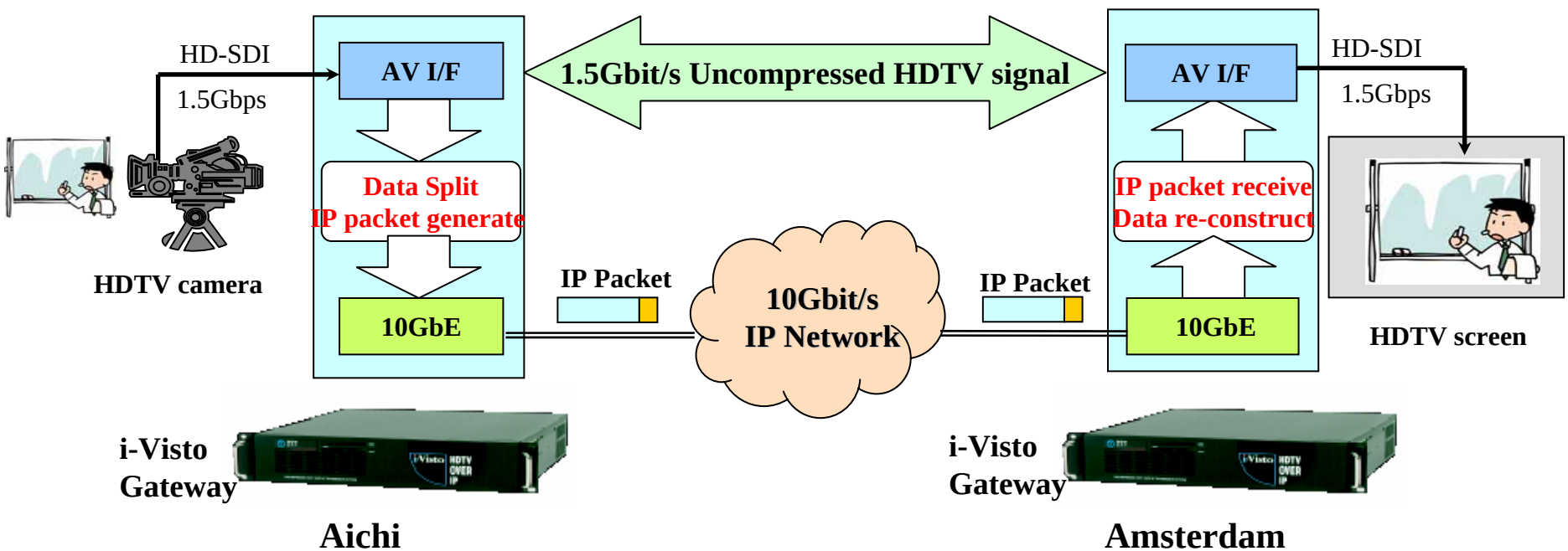
HDTV over IP： i-Visto Gateway

  - Realizing a collaborative Jam session between Japan and Netherlands

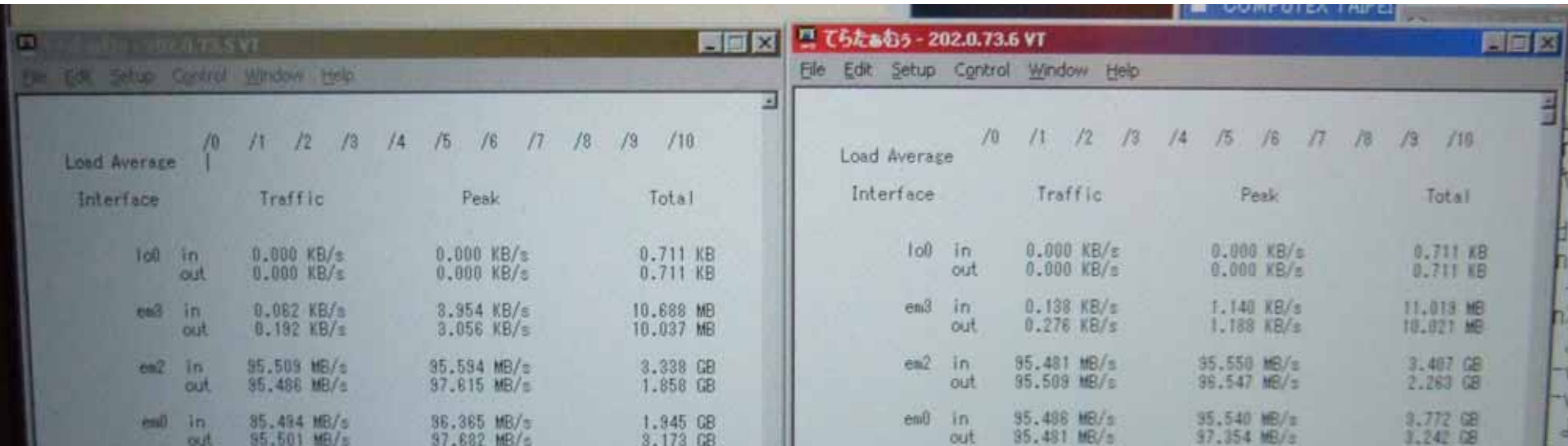
Real-time HD over IP with “**i-Visto**”

i-Visto[’aibist] : Internet video studio system for HDTV production

Real-time transport system for high quality video signal over IP network such as uncompressed HDTV (1.5Gbps), SDTV (270Mbps) between multiple points which is provided by NTT Communications



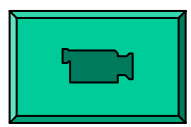
AMSTERDAM INTERNET INFRASTRUCTURE WITH i-Visto




愛・地球 会議

Many Thanks!

- Japan Association for the 2005 World Exposition
- NTT Communications
- China Network Communications Corp. (China Netcom)
- Asia Netcom Japan
- Global Access Ltd.
- Marubeni Corporation (Beijing)
- Matsushita Electric Industrial Co., Ltd.
- Asahi Broadcasting Corporation Cisco Systems Inc.
- Powerplay Inc.
- Japan Science and Technology Agency
- Keio University
- WIDE Project
- APAN
- TransPAC
- Abilene
- GEANT
- SARA
- SURFNet



We realize that;

- Computing resources on the “globe” will be available with large bandwidth
- We should/can (?) start the new architectural paradigm using global computing resources

AGENDA

Global R&D network will enable ;

1. New architectural paradigm
   - Global scale distributed computing
2. **Education with applications on the “globe”**
   - **Live E! - sensor information for multiple use -**
3. Business deployment
   - Establishment of technologies for global operation

   e.g., VoIP/SIP Interoperability

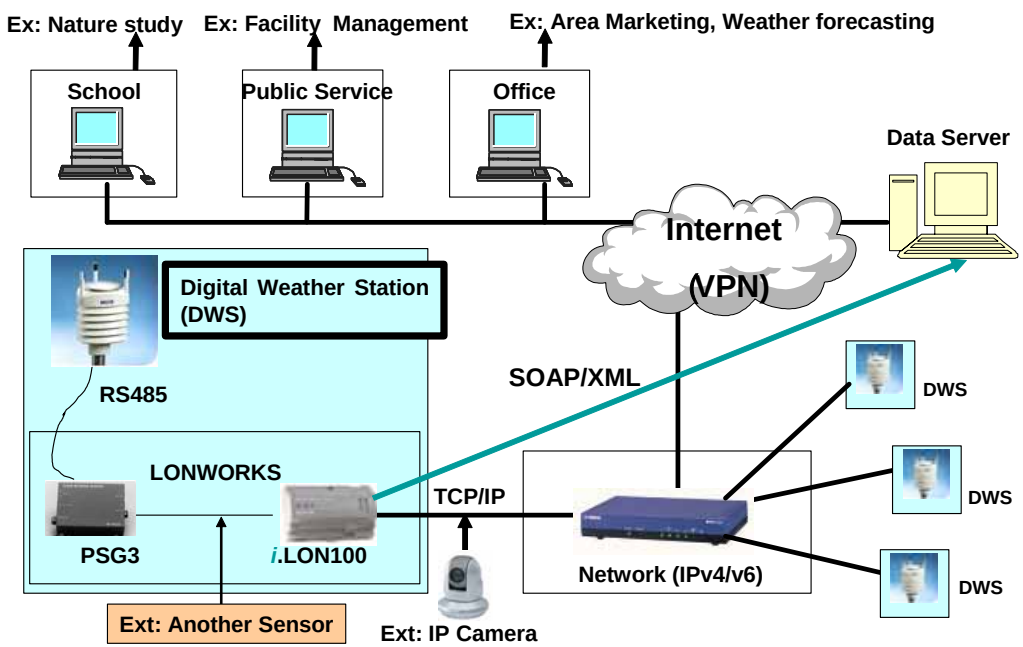
Discussion with Dr.Robert Kahn

- Internet is the logical architecture, rather than just a physical objects composed by routers or switches.

  Internet provides "commons", that handles digital objects transparently.
- "Key" of the Internet architecture is providing the "alternatives" and the "availability" of any multiple communication media.
- Just, the address length was extended, according to the number of nodes to be connected. **People need transparency for new usage/applications, i.e., "possibility"**

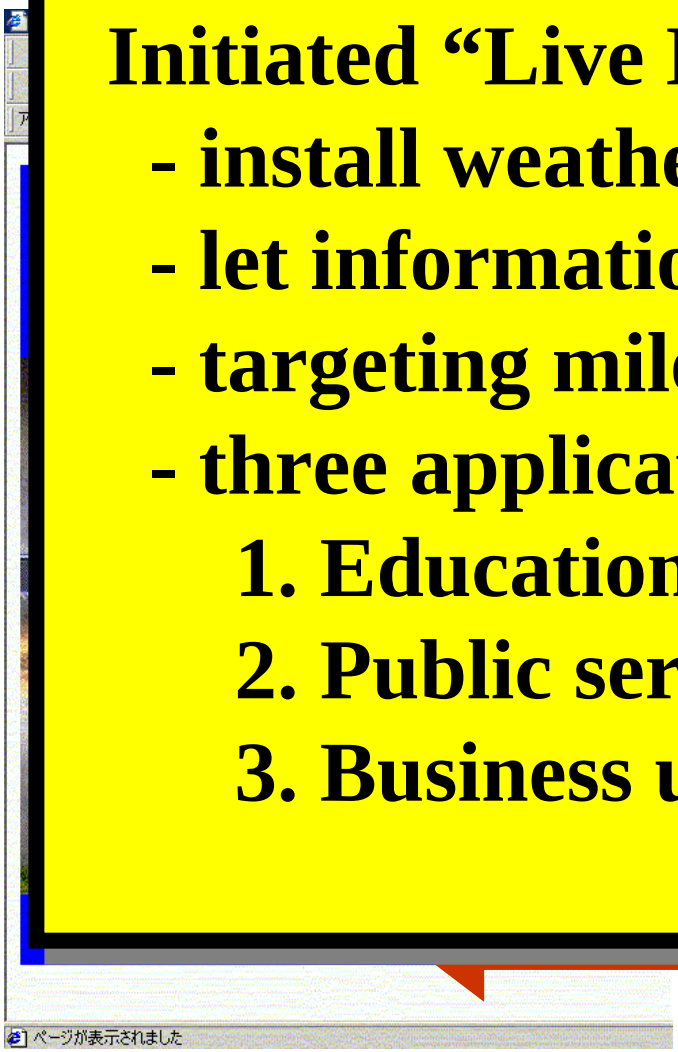
Live E! Project
http://www.live-e.org/

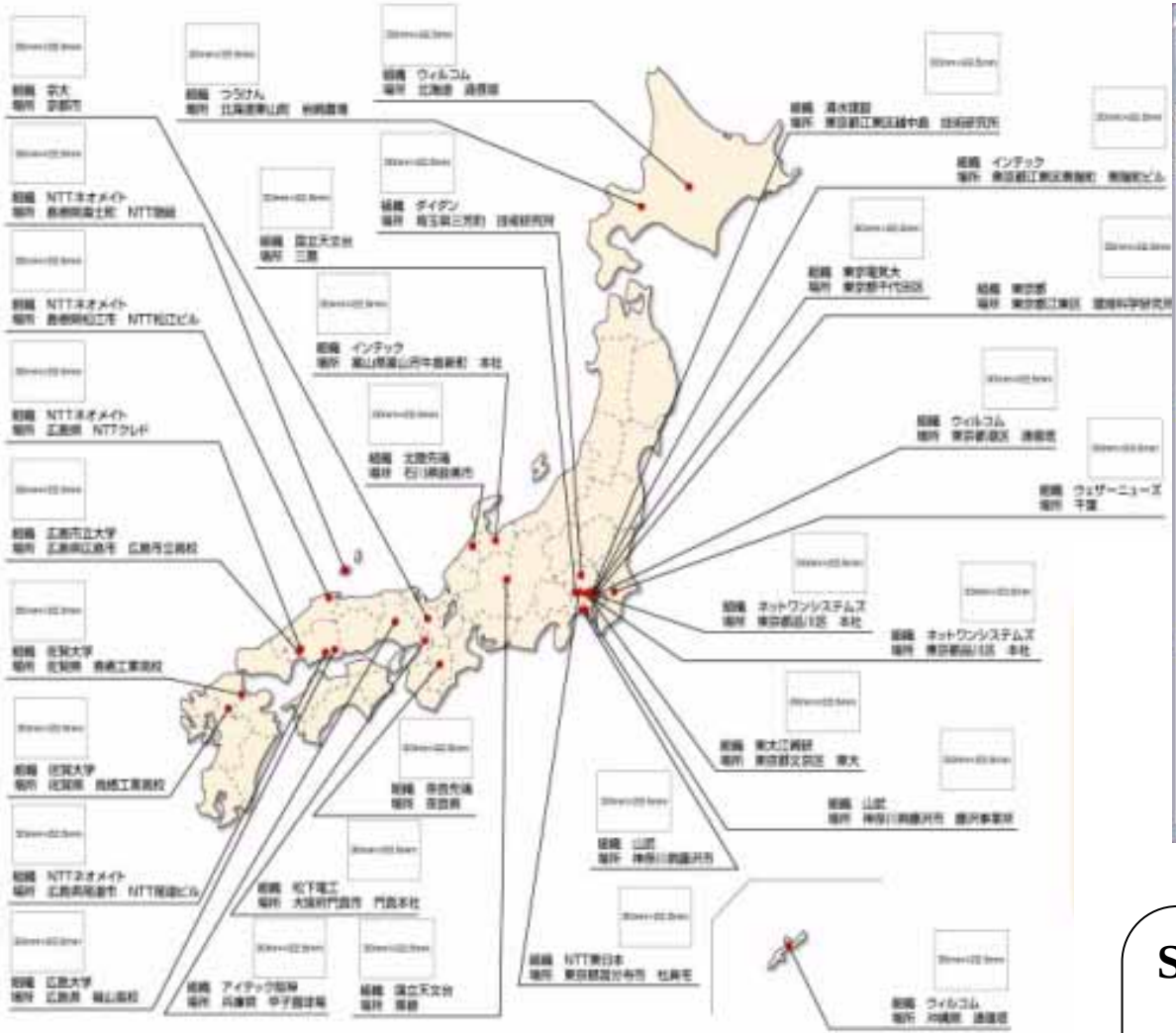
- Live E! is a approach that aims at the achievement of the infrastructure construction that can use, process, and share “Environmental Information”.
- “Environmental Information” is collected by "Digital Weather Station“, IP Camera, etc. that are set up by the individual and the organization voluntarily.
- “Digital Weather Station” acquire the weather information with low cost and send the information to the data server via the Internet and JGN2(Japan Gigabit Network).
- By the installation of a lot of “Digital Weather Station”, the environmental information can be utilized much more.
- The development of a new activity is assumed in an education, public service and the business cases.

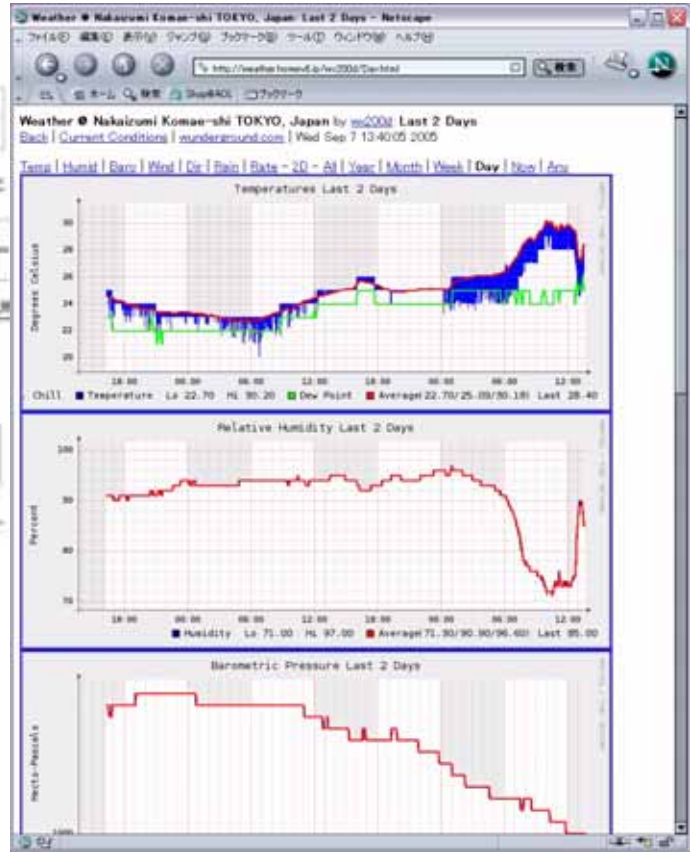


Initiated “Live E!” project.

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

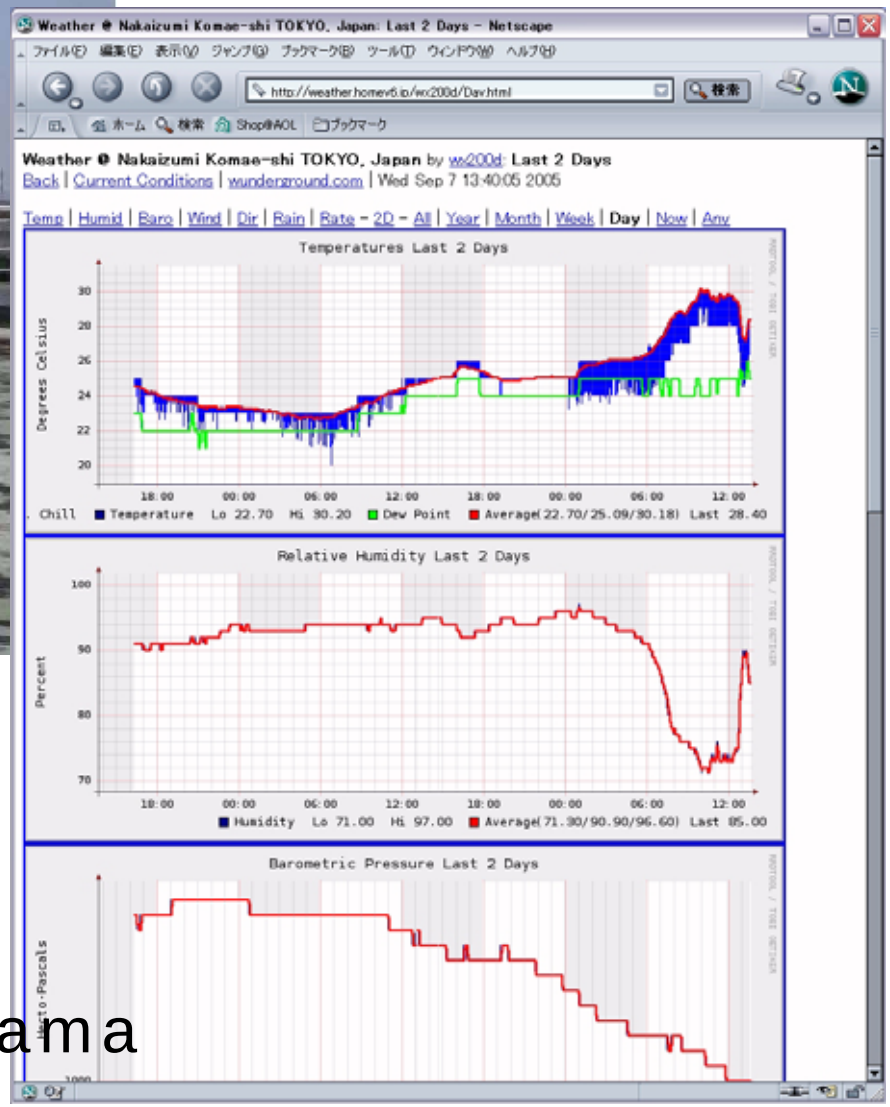






Sponsors:

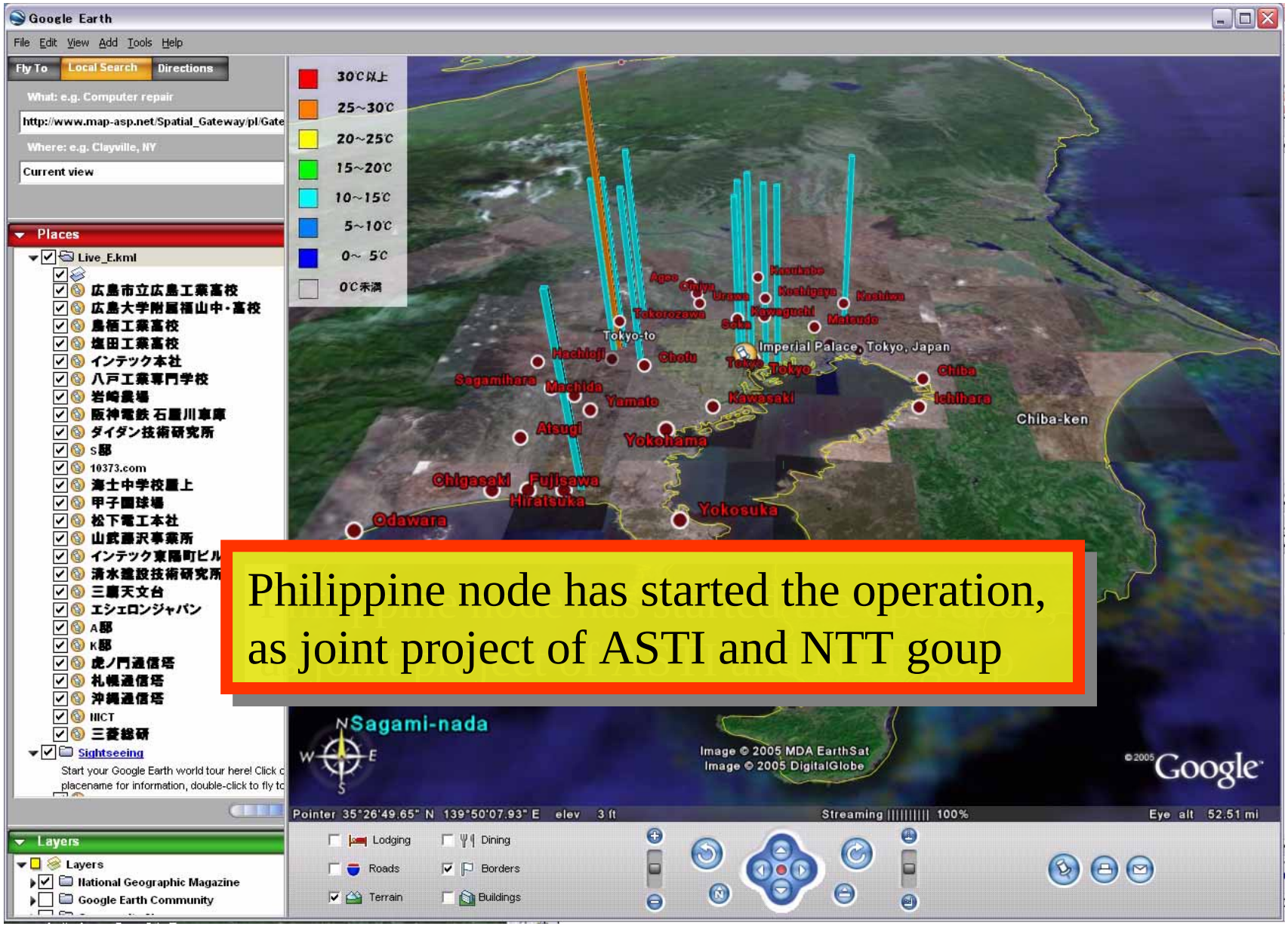
NetOne Sytems, WILLCOM, NTT-Neo-Mate-Chugku, WeatherNews, IRI UBITEQ, Echelon, Daidan, Univ.of Tokyo



Dense installation areas
(in planning)

1. Minato-ku in Tokyo
2. Kurashiki-city in Okayama
3. Mitaka-city in Tokyo

LIVE E! ; example of user application



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3. **Business deployment**
   - Establishment of technologies for global operation

   e.g., VoIP/SIP Interoperability

VoIP Japan
VoIP System Interoperability Task Force

Why we started Task Force ?

VoIP Japan
VoIP System Interoperability Task Force

- Huge number (10M+) of IP-Phone installation in Japan
  - Triggered by Yahoo BB, using the terrestrial phone numbers
  - NTT group, KDDI and Fusion Comm.
  - PBX migration in the corporate networks
- Going to develop/deploy in Asian countries
- **But,,,,,,**
  - **Insufficient interoperability among ISPes….**
  - **Insufficient consideration on Inter-Domain**
- Started VoIP/SIP Interoperability Task Force
  - Run by JPNIC
  - Technical supporting by JGN2
  - Global collab. With SIP Forum/SIPit, MSF, IPCC
  - Welcome participation from Asian countries

JPNIC

JGNII

WIDE PROJECT

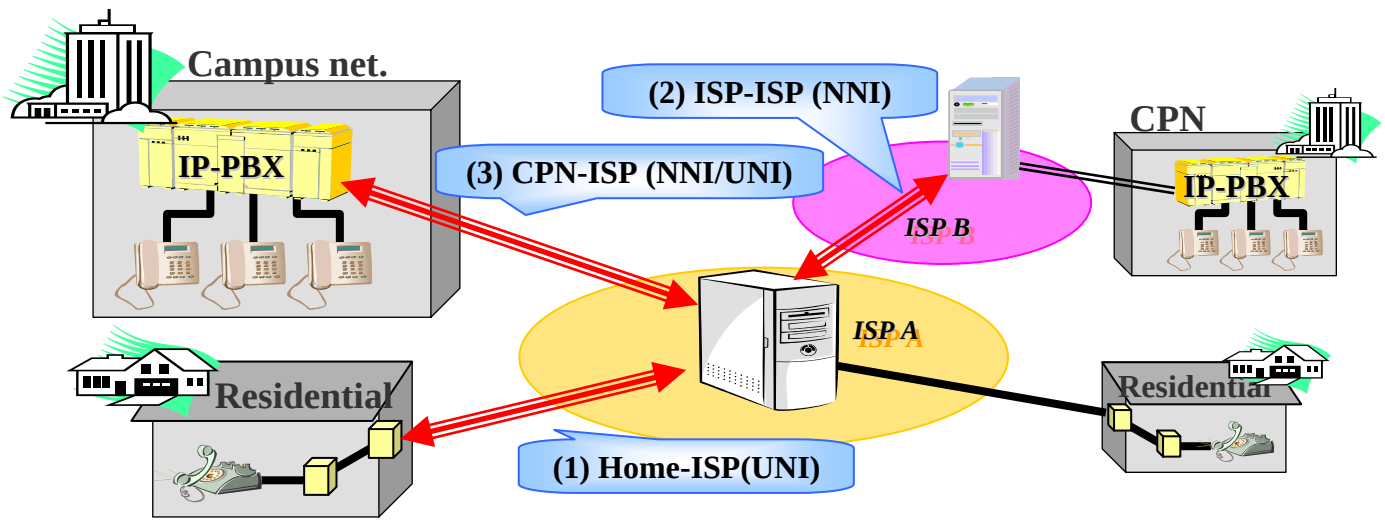
Founders

- IPv6普及･高度化推進協議会(v6PC)
- 株式会社アズジェント
- ENUMトライアルジャパン(ETJP)
- 岩崎通信機株式会社
- インテック･ウェブ･アンド･ゲノム･インフォマティクス株式会社
- エヌ･ティ･ティ･アドバンステクノロジ株式会社
- エヌ･ティ･ティ･コミュニケーションズ株式会社
- エヌ･ティ･ティ レゾナント株式会社
- 沖電気工業株式会社
- KDDI株式会社
- サンテレホン株式会社
- 伊藤忠テクノサイエンス株式会社
- シスコシステムズ株式会社
- 社団法人情報通信技術委員会(TTC)
- 情報通信ネットワーク産業協会(CIAJ)
  高度通信システム相互接続推進会議(HATS推進会議)
- 砂原秀樹(奈良先端科学技術大学院大学)
- ソフトバンクBB株式会社
- 株式会社ソフトフロント
- 社団法人テレコムサービス協会
  VoIP推進協議会、
- 株式会社東芝
- 中村修(慶應義塾大学)
- 西日本電信電話株式会社
- 日本テレコム株式会社
- 日本電気株式会社
- 社団法人日本ネットワークインフォメーションセンター(JPNIC)
- NPO 日本VoIPフォーラム(VFJ)
- 株式会社日本レジストリサービス
- 株式会社ネットマークス
- 東日本電信電話株式会社
- 株式会社日立製作所
- 富士通株式会社
- フュージョン･コミュニケーションズ株式会社
- 株式会社三菱総合研究所
- 三菱電機情報ネットワーク株式会社
- ヤマハ株式会社
- WIDEプロジェクト　(以上、36社/団体/個人)

VoIP/SIP Interoperability Task Force

Objectives and Targets

1. Establish interoperability among VoIP/SIP systemsSIP
    i. Multi-vendor
    ii. Multi-Provider
2. Establish environments for interoperability testing
    i. Publish specification (conformance and interoperability)
    ii. Provide self-testing software
    iii. Operate testbed and test-event
3. Collaboration with related organizations

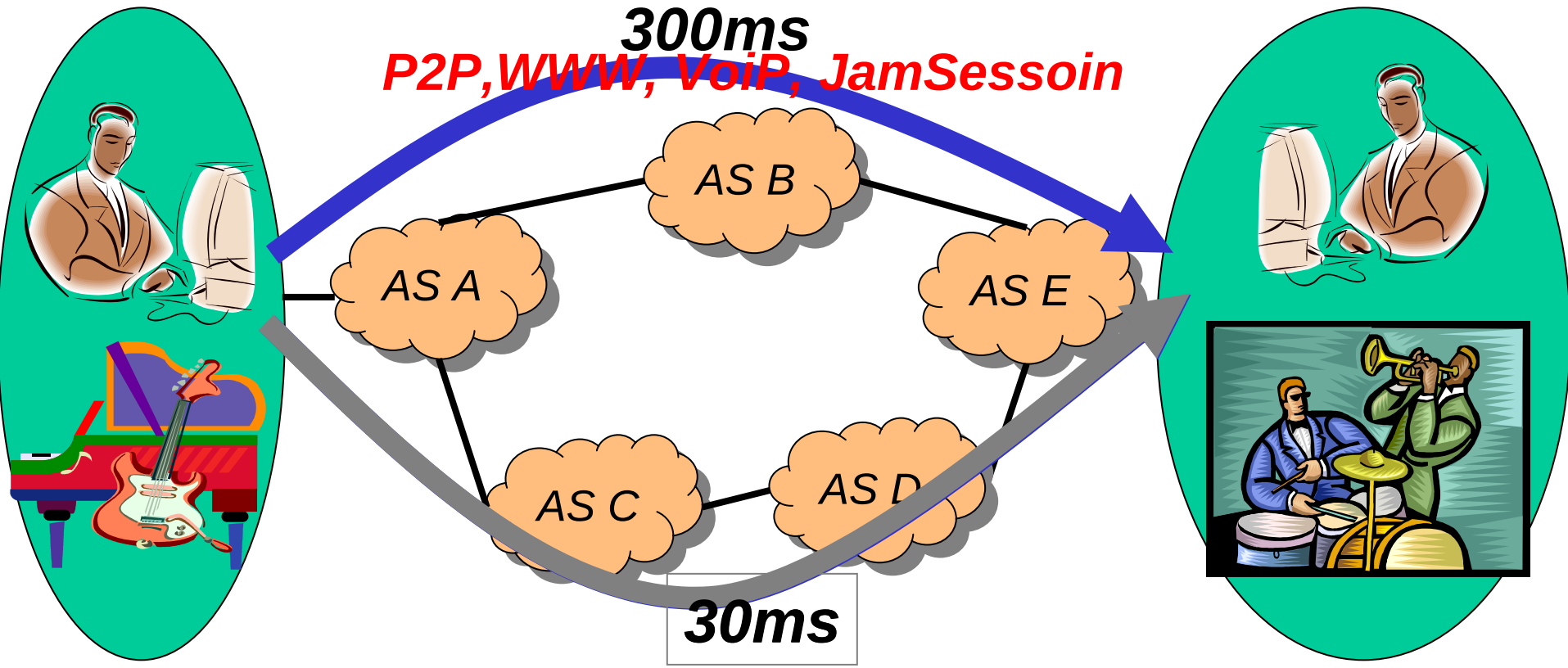


VoIP Japan
VoIP System Interoperability Task Force

Current Routing System

- **Not-aware of Latency**
  - A ➔ B ➔ E = 3 < A ➔ C ➔ D ➔ E =4
- **We need some tunneling technologies, e.g., MPLS, IP-in-IP, with policy routing….**

➔ **We need new(?) routing architecture or operational configuration ?**



Lessons and challenges from VoIP/SIP acticity

- Contribution and responsibility from R&D community to business deployment
  - Implementation
  - Operation
  - Governance (e.g., address)
- Essential technical challenge on Routing Architecture to come up with physical “globe”

Summary

- *Responsibilities of "Global" R&D Network* -

"Enabler" for next generation;

1. New architectural paradigm (innovation)
   - e.g., R&D on Global scale distributed computing
2. Education with applications on the "globe", to generate innovation gears
   - e.g., Live E! - sensor information for multiple use -
3. Business deployment
   - Establishment of technologies for global operation
     e.g., VoIP/SIP Interoperability