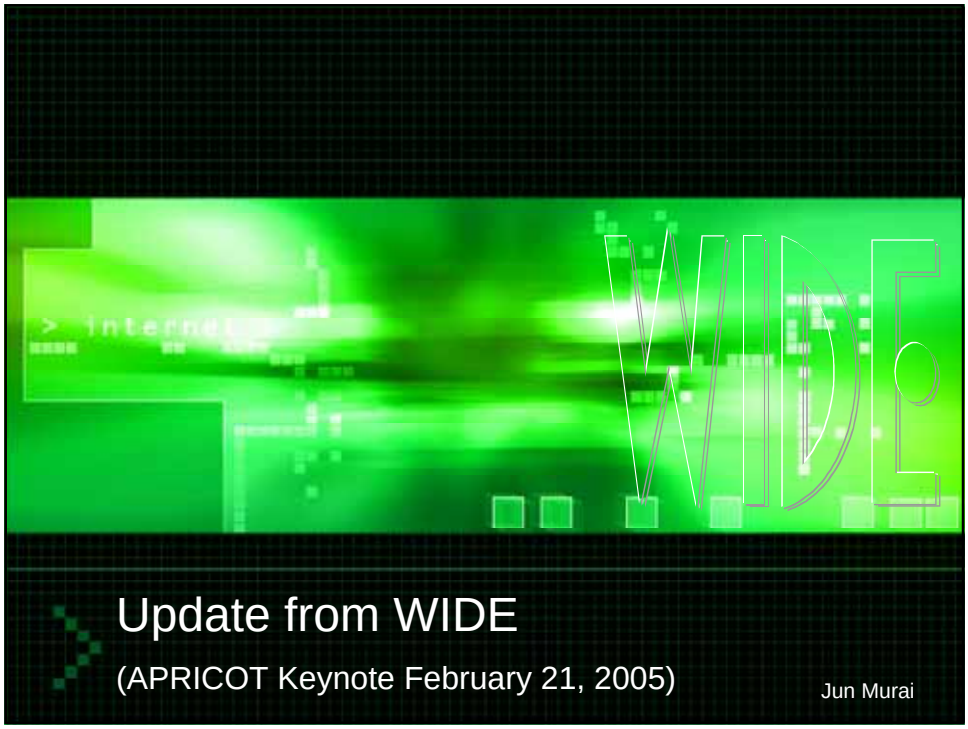


Update from WIDE

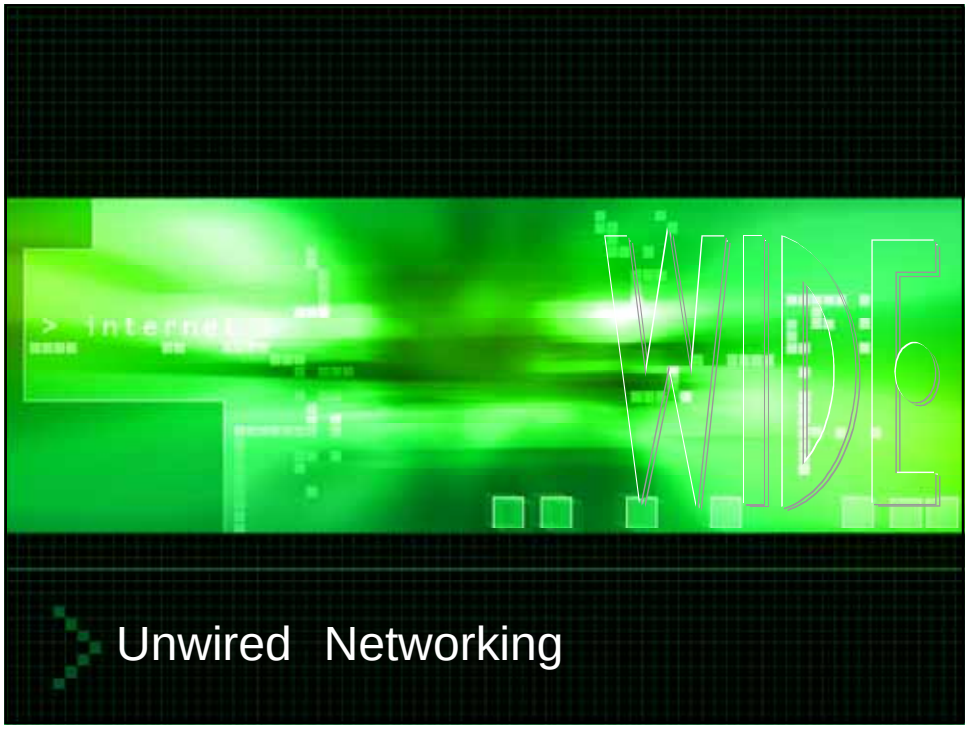
(APRICOT Keynote February 21, 2005)

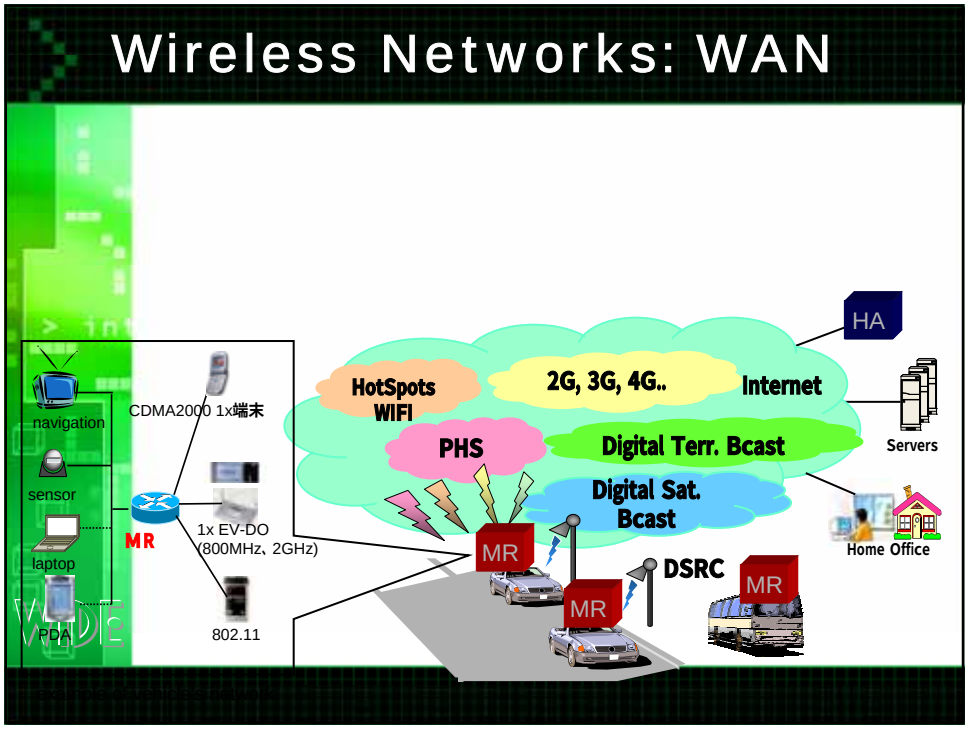
Jun Murai

Topics

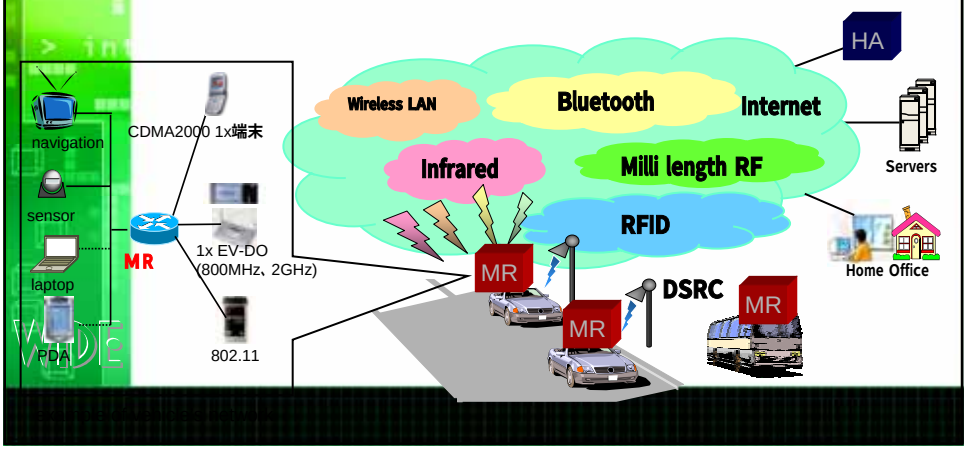
- Internet for non-PC and Mobility
- Video, Audio and Multicast
- Lambda Internet
- Latency
- Asia-Pacific Infrastructure

Some of these are not restricted to Asia-Pacific issues, but some are BIGGER issues in here..

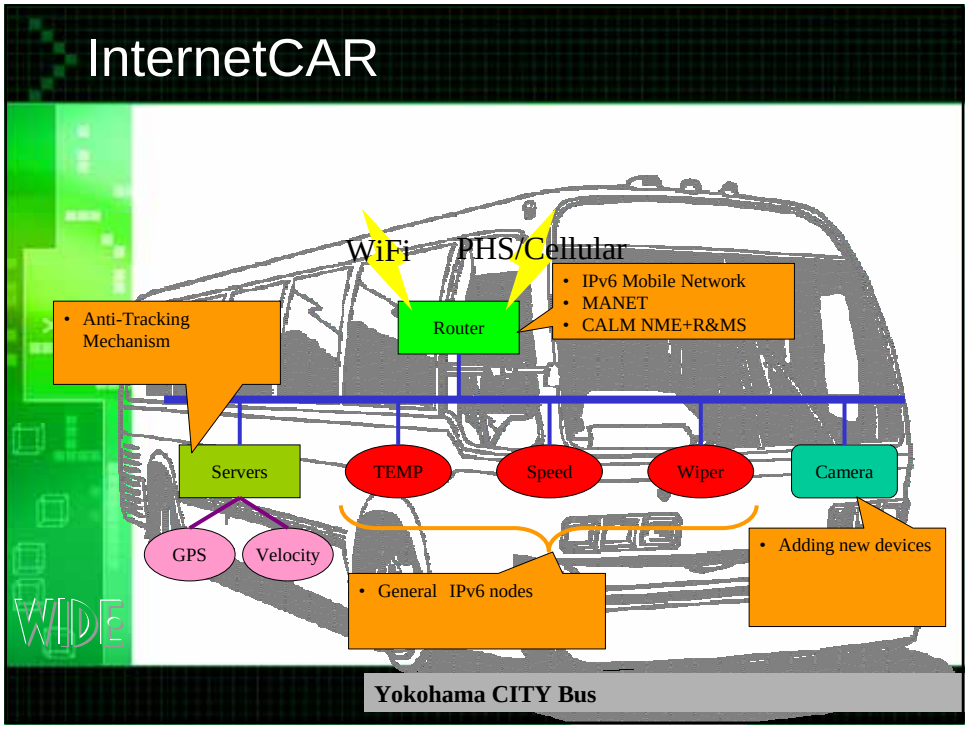

WIDE
Unwired Networking

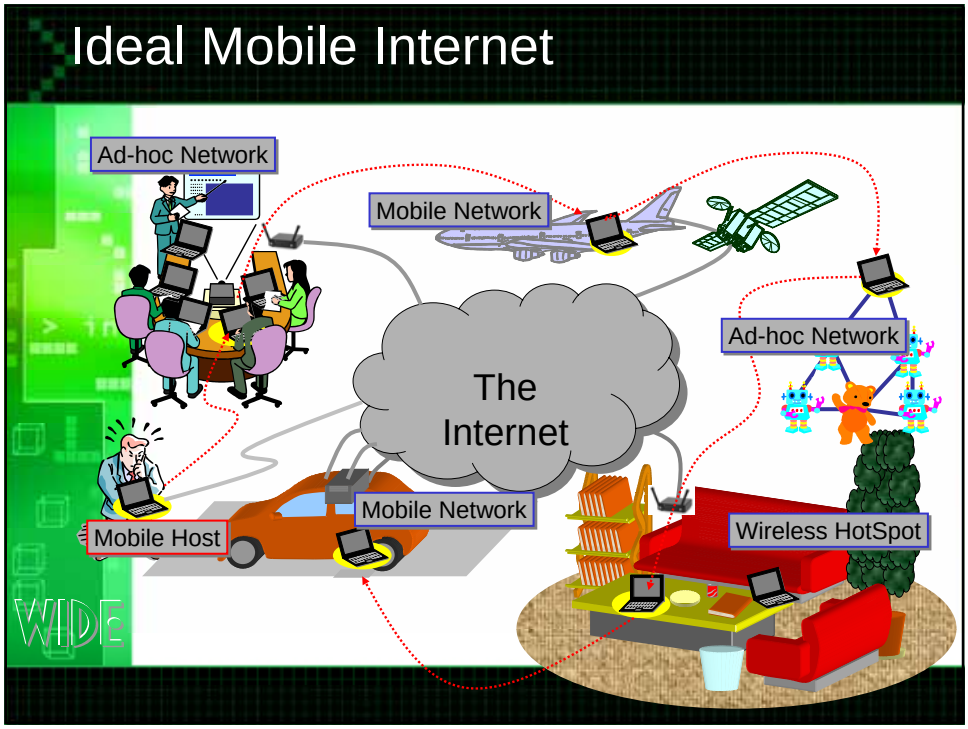

Wireless Networks: WAN
navigation
sensor
laptop
PDA
MR
CDMA2000 1x端末
1x EV-DO
(800MHz、2GHz)
802.11
HA
HotSpots
WIFI
2G, 3G, 4G..
Internet
PHS
Digital Terr. Bcast
Digital Sat.
Bcast
Servers
Home Office
MR
MR
DSRC
MR

Wireless Networks: LAN



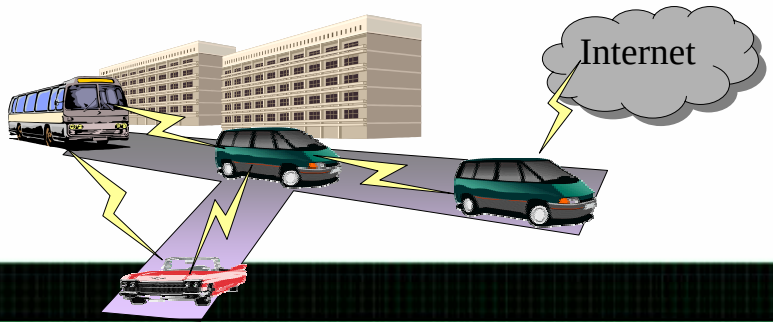
Internet Train


InternetCAR
WiFi
PHS/Cellular
• IPv6 Mobile Network
• MANET
• CALM NME+R&MS
Router
• Anti-Tracking Mechanism
Servers
TEMP
Speed
Wiper
Camera
GPS
Velocity
• General IPv6 nodes
• Adding new devices
WIDE
Yokohama CITY Bus

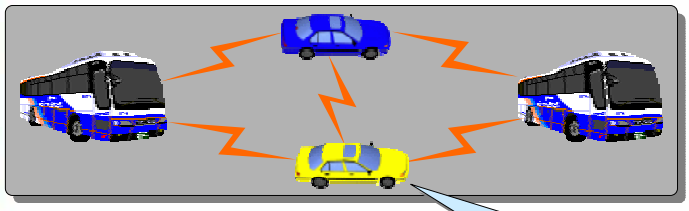

Ideal Mobile Internet
Ad-hoc Network
Mobile Network
The Internet
Ad-hoc Network
Mobile Host
Mobile Network
Wireless HotSpot
WIDE

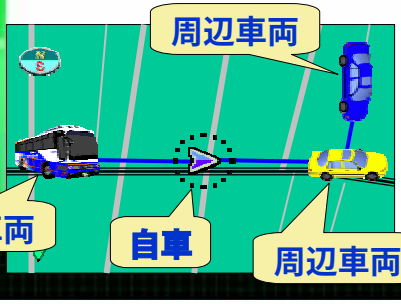
Mobile Ad-hoc Network (MANET)

- Freedom to connect your neighbors
- Your neighbor might gives you the Internet connectivity



Vehicle to Vehicle MANET Working Now

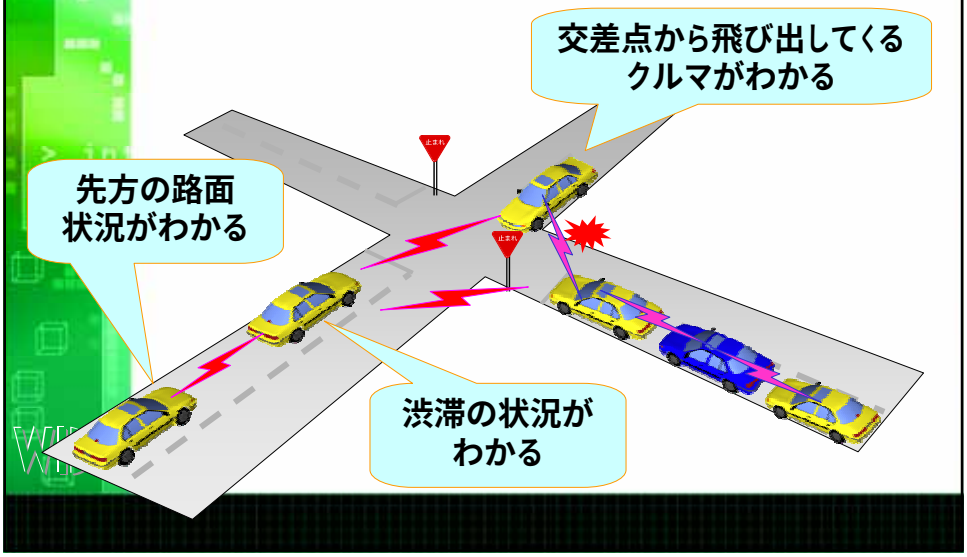




オリジナル通信装置

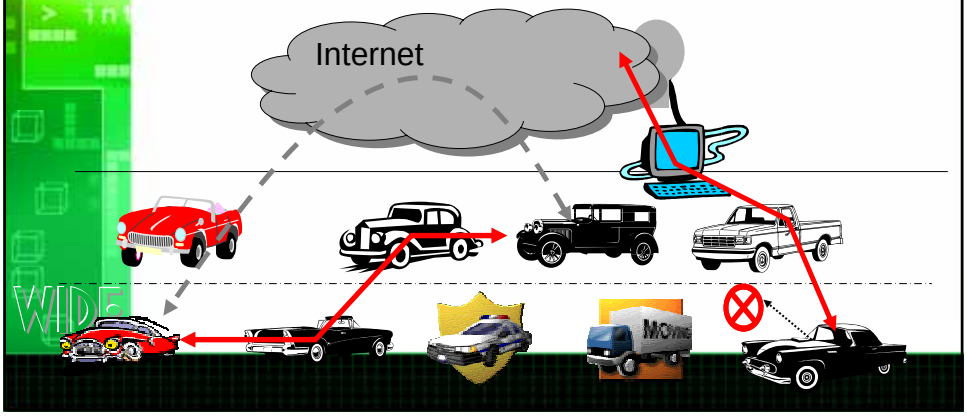
開発中

Sharing Information Among Vehicle

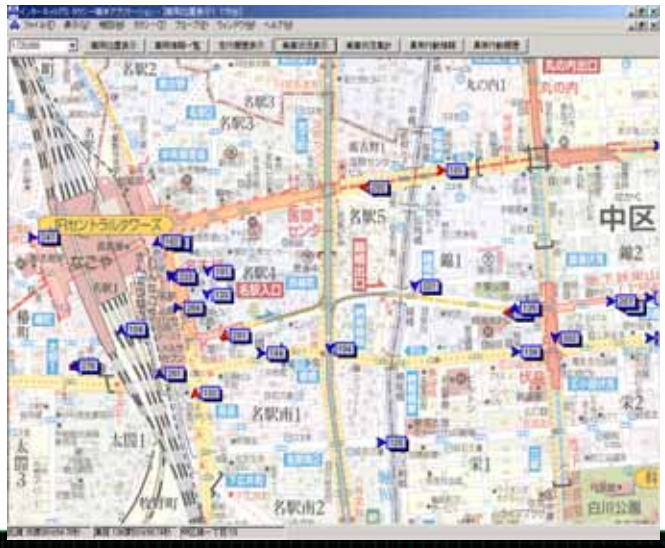


Expected Scenarios

- Direct Connectivity
  - bypass Internet and any Home Agents
- Detour Connectivity
  - access to the Internet through multihop wireless



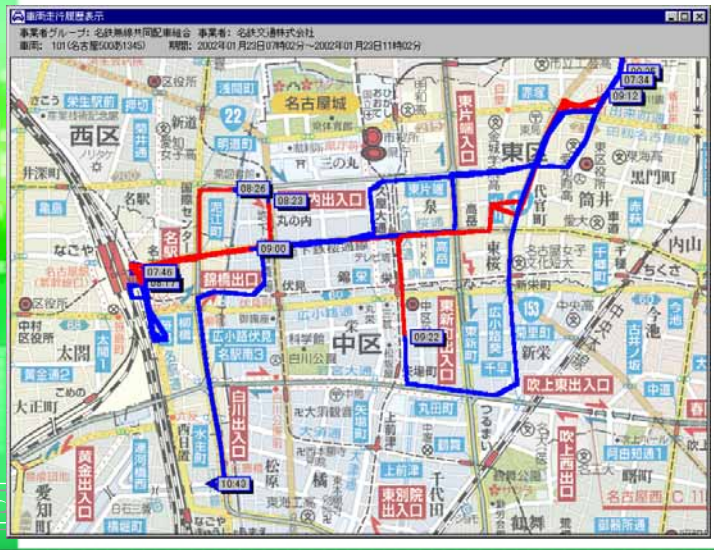
TAXI: an autonomous set of ‘sensors’



WIDE

They colllect speed, rain,

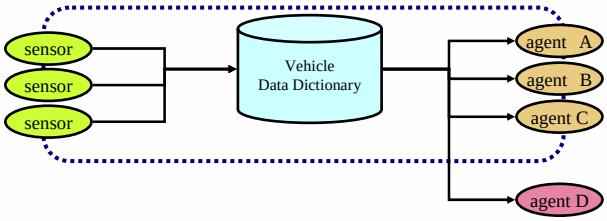
light, slip, temp, view, CO2, revolutions, weight, humidity….



WIDE

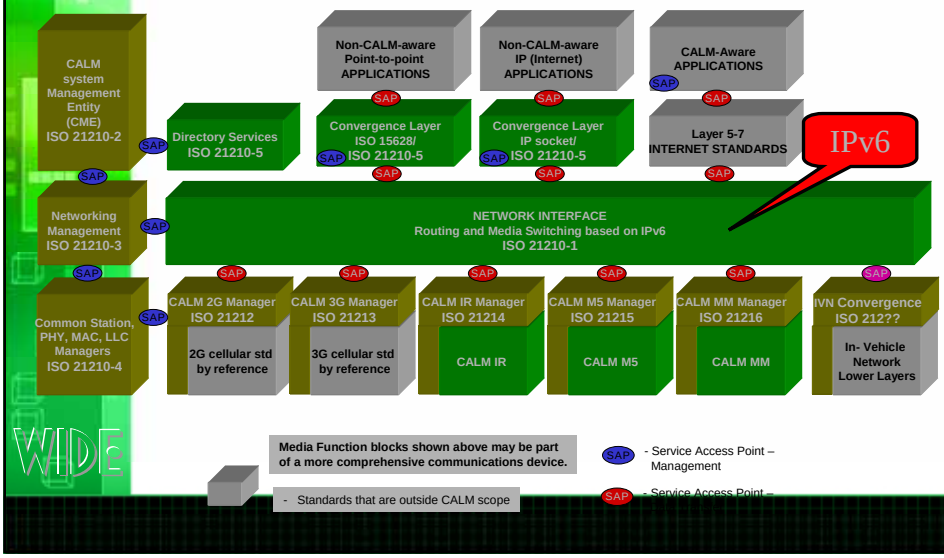
Data architecture

- ITS service platform
- Vehicle Information Interface
  - OBD-II (On-Board Diagnostic systems)
  - Unified information gathering independent of vehicle type
  - Can easy use vehicle information from the outside/inside

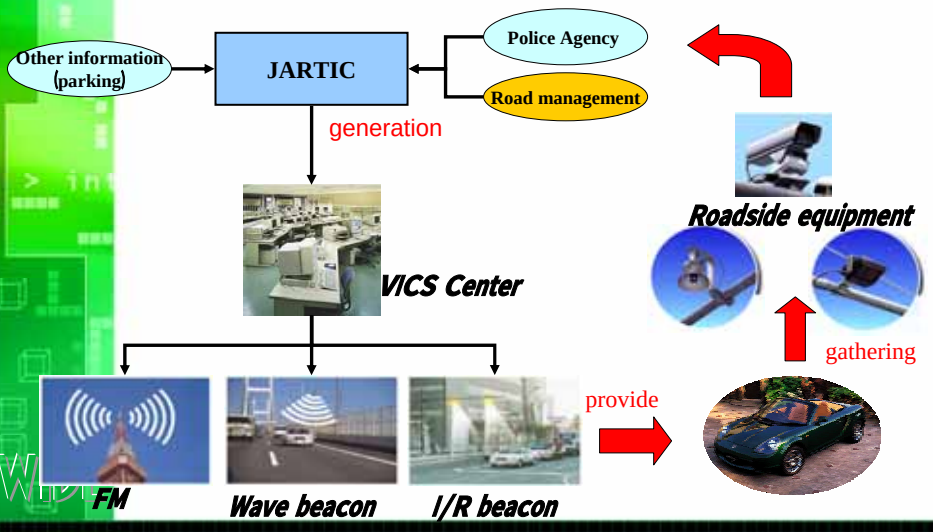


Vehicle information connector
(OBD-II)

ISO：CALM Abstract Architecture Diagram



Open /Common communication platform?



UHF (950MHz) started testing in JP

ORF Activity Score

- ORF来場者のブースへの来訪記録を可視化するアプリケーション
- 来訪記録
  - 各ブースのHF帯RFIDリーダで記録可能
- ORF Activity Score端末 (カフェ内に設置)
  - UHF帯RFIDリーダで来場者検知
  - スクリーン上に行動履歴を表示

空港のチェックイン
成田空港と関西空港に設置されるという

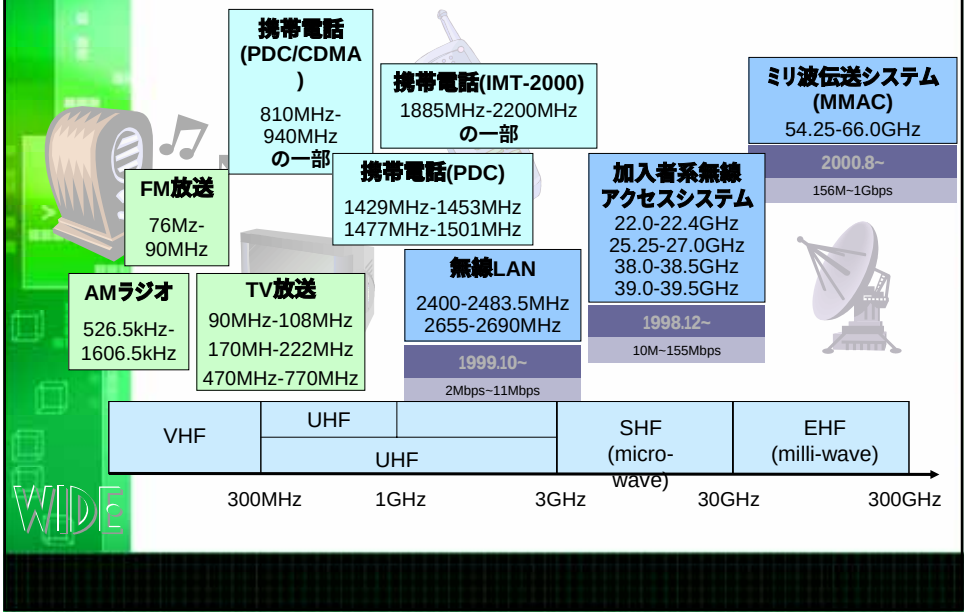
コンビニでの決済

、「プラットフォームマーク」と名付けられたマークでどこにフェリカがあるかがわかるようになっている。

ＪＣＢの企業向けサービス。
入館も携帯電話をかざすだけでできる

自動販売機もケータイで。

無線技術： ユビキタス時代への期待



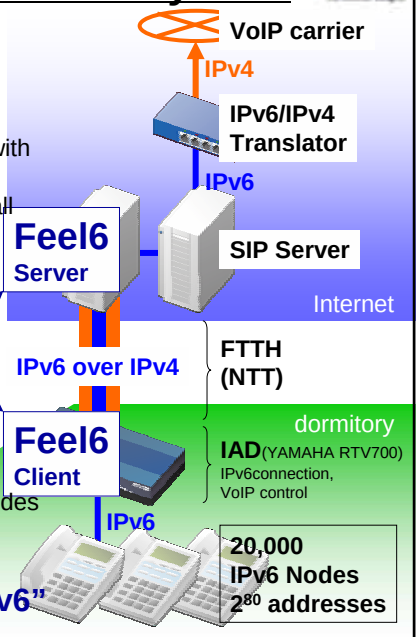
v6

Large-scale introduction of IPv6 system

- **280** sites all over Japan
- IPv6 Node as many as **20,000**

The IP Centrex service, "IP Business Phone", developed by FreeBit, has got a major contract with Kyoritsu Maintenance, a nation-wide dormitory supplier. The IPv6 phones will be installed into all of their rooms, that is as many as 20,000.

Utilize a technology called, **"Feel6"**, which enables secured IPv6 network over existing IPv4 network



- Easiness to design the address management scheme regardless the tremendous number of nodes
- Management of terminal versions by achieving the reachability to each terminal over Internet

"Realized the cost reduction by IPv6"

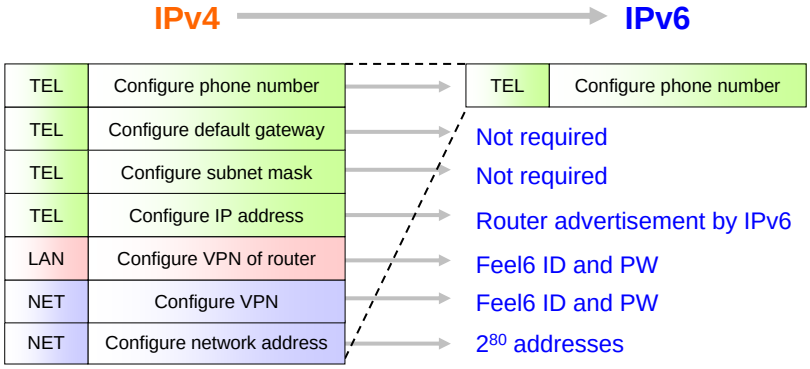
Note) Information as of 2005/Feb

Cost reduction made possible by IPv6

	Design phase	Installation phase	Maintenance phase
IPv4	Necessary to design the address range carefully	Necessary to configure the subnet mask and default gateway to each node	Difficult to identify the nodes in trouble from the operation center
	Specific address design for each environment necessary	Possibility to make mistakes in settings	Delayed trouble shooting
IPv6	Possession of abundant addresses and hierarchical design possible	Auto-generation of IPv6 address upon reception of router advertisement	Easy to identify the nodes in trouble, and re-configure remotely with help of IPv6
	Specific address design for each environment not necessary	No special knowledge necessary to installer	Reduced complexity of maintenance

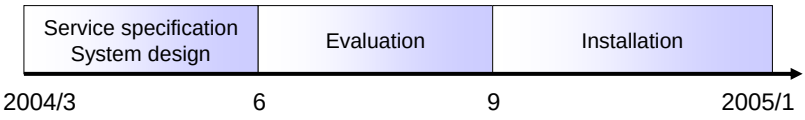
FreeBit Co., Ltd.

Significant reduction of network design steps



FreeBit Co., Ltd.

Launch of 20,000 nodes in a very short term



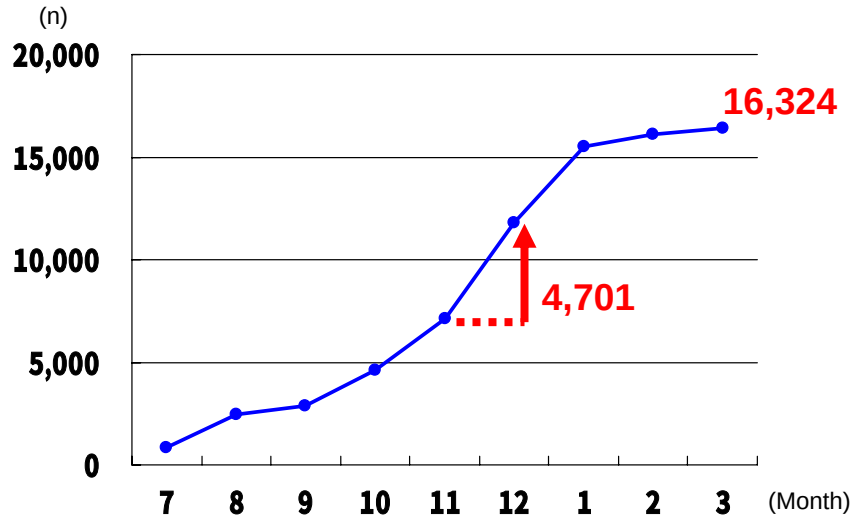
Abstraction of installation procedure into 3 patterns depending on the number of rooms, made possible by the easiness in IPv6 address design

Easy installation due to the auto-generation of IPv6 address

Realization of remote monitoring and quick maintenance of the nodes, made possible by fixed IPv6 addresses

FreeBit Co., Ltd.

The number of IPv6 Nodes



FreeBit Co., Ltd.

Hotel says 'Uninstall V6!'

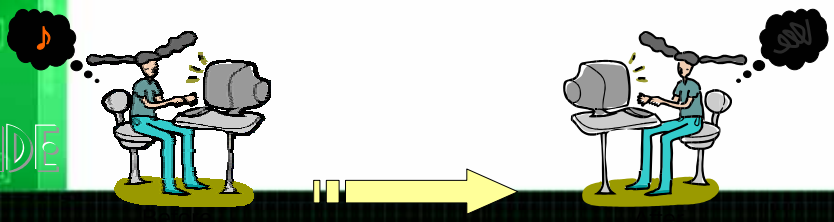
- あるホテルで Windows XP をインターネットにつないだ
- IPv4 アドレスは取れる
- ブラウザでページにアクセスできない
- ホテルに問い合わせたら、"ipv6 unstall" しろと言われた

DNS Server Issues

BIND9 V4 fast, V6 slow issue

- ある ISP で BIND9(defaultでIPv6対応) をサービスに投入した
- ユーザからブラウザの「サクサク感」がなくなったと苦情が来た

Solved!

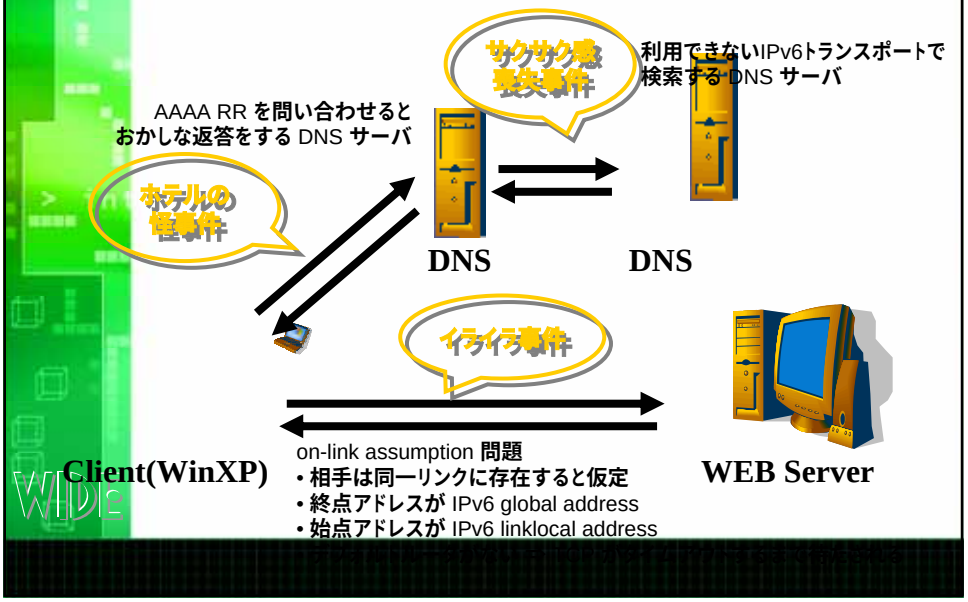


ケース3：イライラ事件

- Fedora core 2 上の Mozilla1.7で、
  あるページにアクセスすると随分待たされる
- Mozilla1.7のリリースノートには、カーネルのIPv6の機能を停止しろと書かれている

IPv6 の仕様の問題

Why?

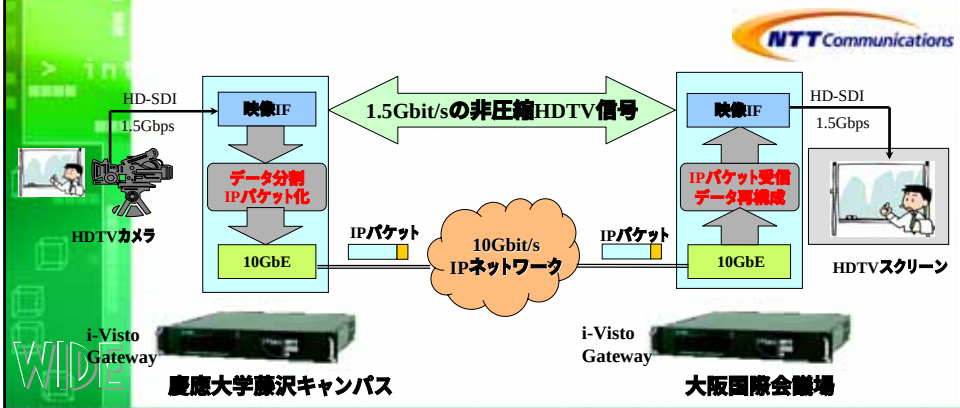

サクサク感
喪失事件
利用できないIPv6トランスポートで
検索する DNS サーバ
AAAA RR を問い合わせると
おかしな返答をする DNS サーバ
ホテルの
宿事件
DNS
DNS
イライラ事件
Client(WinXP)
WEB Server
on-link assumption 問題
• 相手は同一リンクに存在すると仮定
• 終点アドレスが IPv6 global address
• 始点アドレスが IPv6 linklocal address

Video and Audio

Real-time HD over IP with “i-Visto”

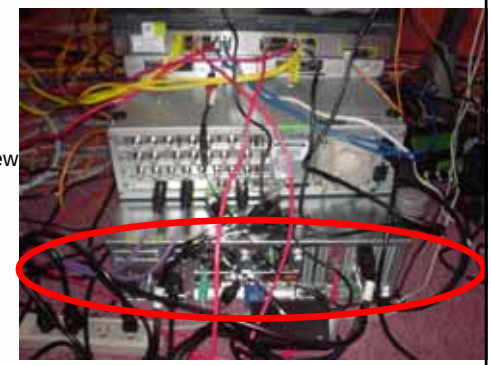
i-Visto（アイビスト）：Internet video studio system for HDTV production

NTTコミュニケーションズが提供する非圧縮HDTV(1.5Gbps),SDTV(270Mbps)等の高品質な映像信号をIPネットワーク上の複数の拠点間でリアルタイムに伝送する装置



iHD1500

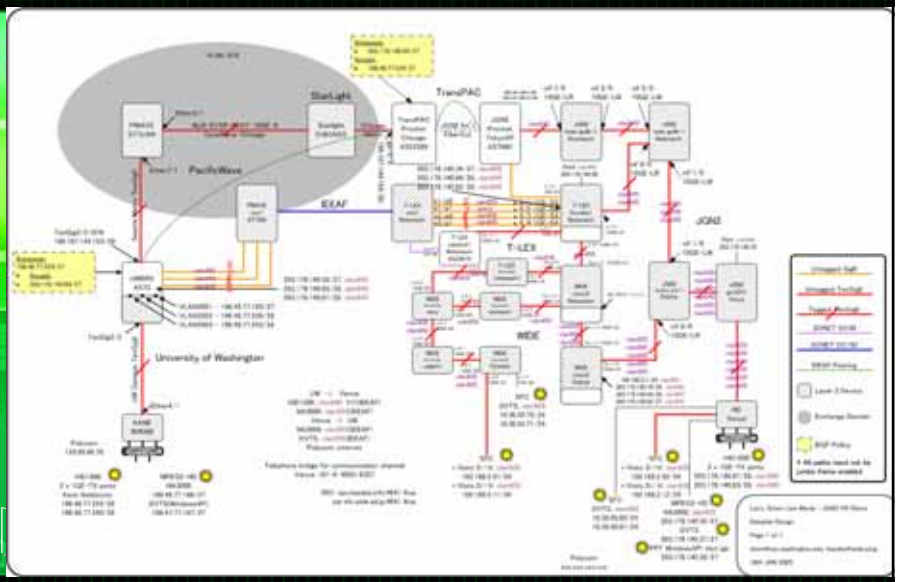
- UWTV(Research Channel)がAJAと協力して作成した非圧縮HDTVをIP上でリアルタイムに伝送する装置
  - Intel Xeon 3.2GHz * 2
  - SCSI RAID5
  - 2GB MEM
  - Intel PRO/1000 MT Dual
  - AJA Video XENA DXT (New Rev)
  - Windows XP Pro
  - cygwin



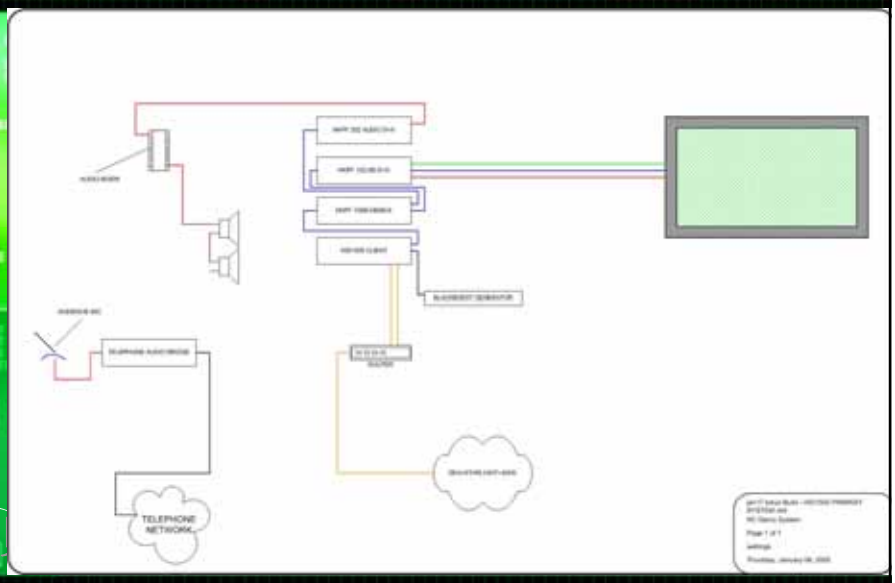
NA3000/HE1000/HD1000

- NTT**エレクトロニクス製**MPEG-2/HD**映像伝送装置**
  - NA3000
    - **最大**4**本の**MPEG-2**ストリームを**IP**で伝送**
    - **伝送は**RTP/UDP、unicast/multicast**対応**
    - **パケットサイズは**32KByte**まで可変**
    - MPEG-2**入出力は**DVB-ASI**を利用し、エンコーダ、デコーダと接続**
    - MPEG-2**入力はパケット方式及びバースト方式(出力:パケット方式)**
  - HE1000
    - **映像入力フォーマット**:HD-SDI(SMPTE292M)
    - **映像プロファイル、レベル**:MP@HL、422P@HL
    - **映像フォーマット**:1080i(1920x1080,29.97fps)、720p(1280x720,59.94fps)**に対応**
    - **信号フォーマット**:4:2:0、4:2:2**の圧縮が可能**
    - **音声入力方式**:AES/EBU
    - MUX**機能**
  - HD1000
    - **映像出力フォーマット**:HD-SDI、Y,Pb,Pr
    - **映像プロファイル、レベル**:MP@HL、422P@HL
    - **音声出力方式**:AES/EBU
    - DEMUX**機能**
    - **映像フォーマット**:1080i、720p、480i(**ダウンコンバート可能**)

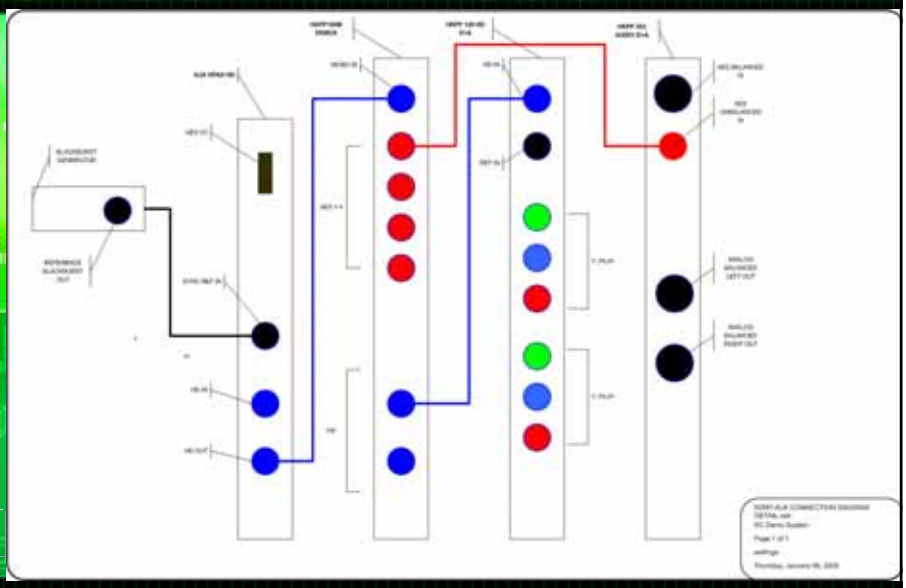
Network Diagram



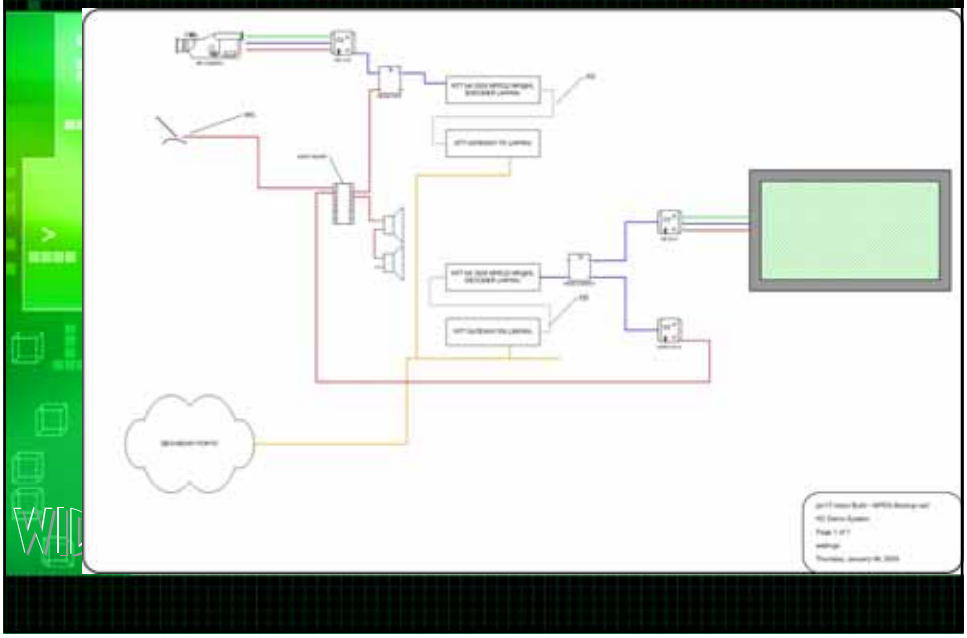
AV Connection Diagram



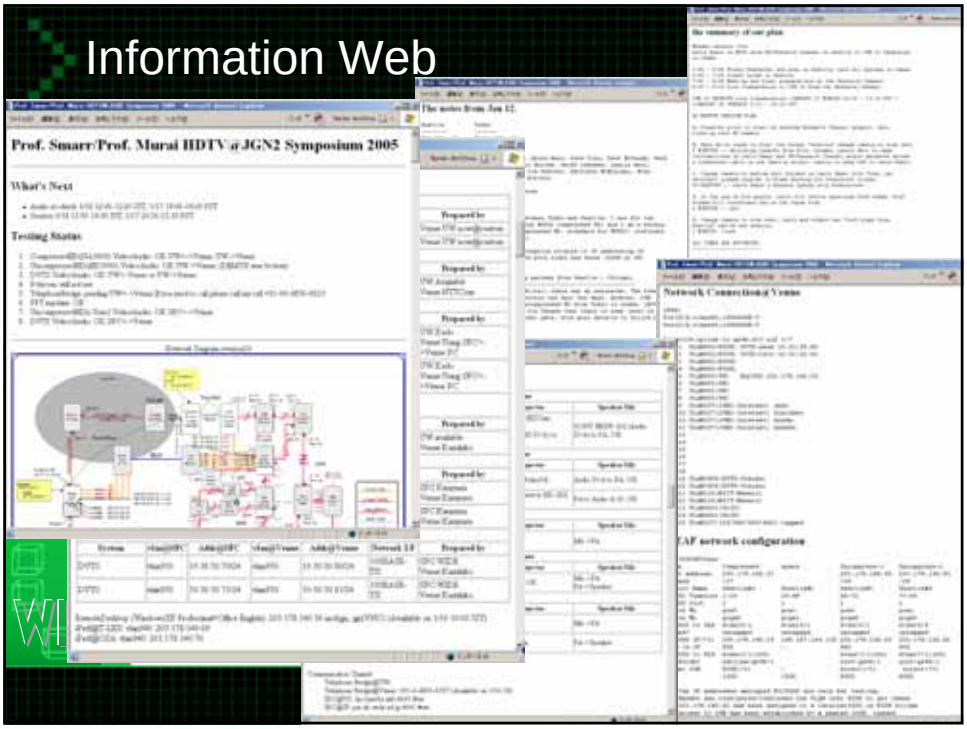
AV Connection Diagram



AV Connection Diagram



Information Web



AV Equipment

i-Visto

Barco DLP Projector

iHD1500/NA3000/DVTS

AV Control

UW

NA3000

iHD1500

AV Control room

SDTV from Venue

Venue

From SFC

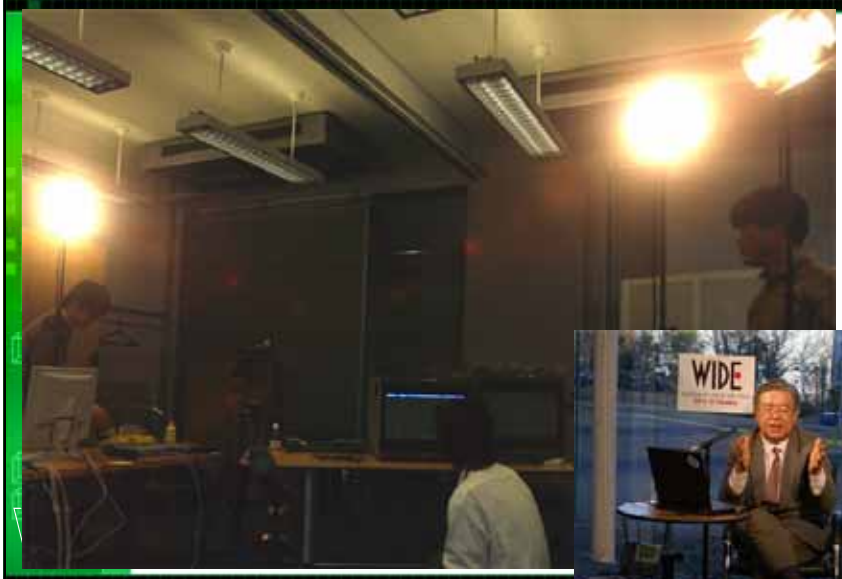
From UW

UW studio

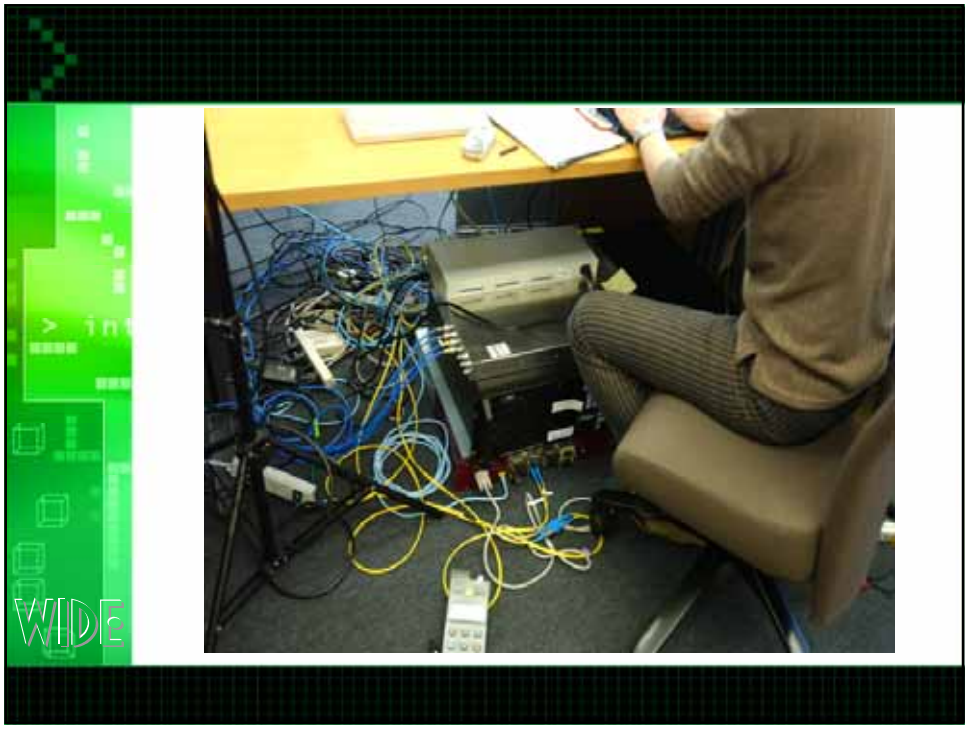
UW member

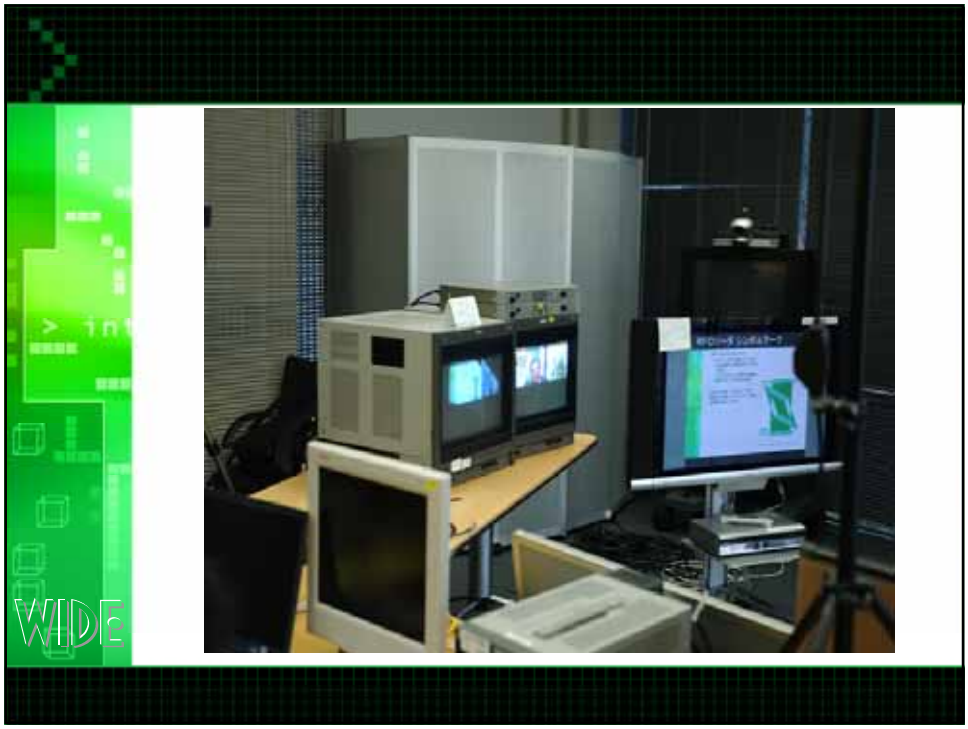
i-Visto team @venue

SFC/KEIO

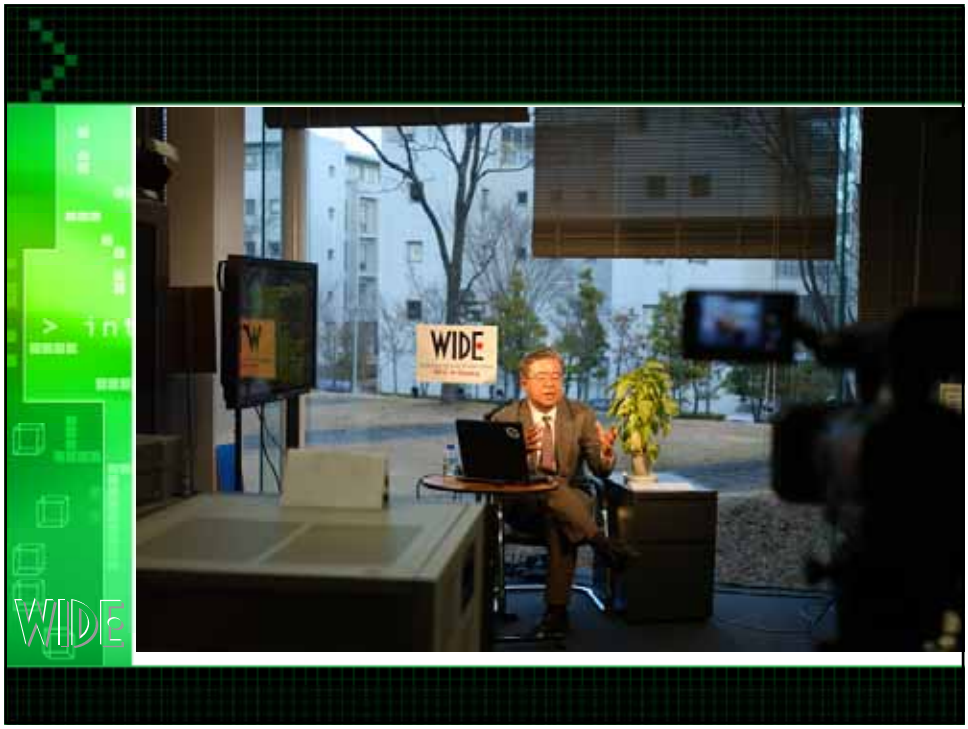


SFC, KEIO Univ

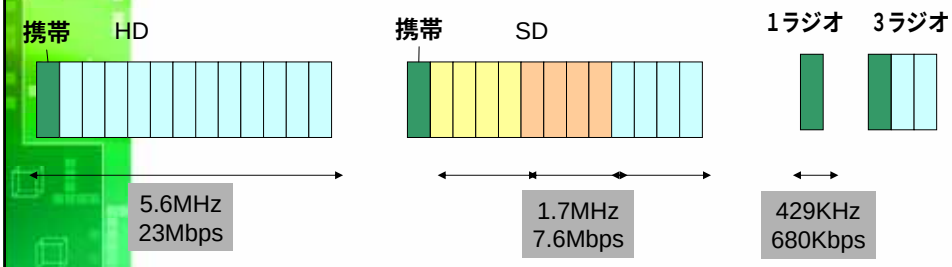

WIDE


WIDE

WIDE


WIDE
WIDE

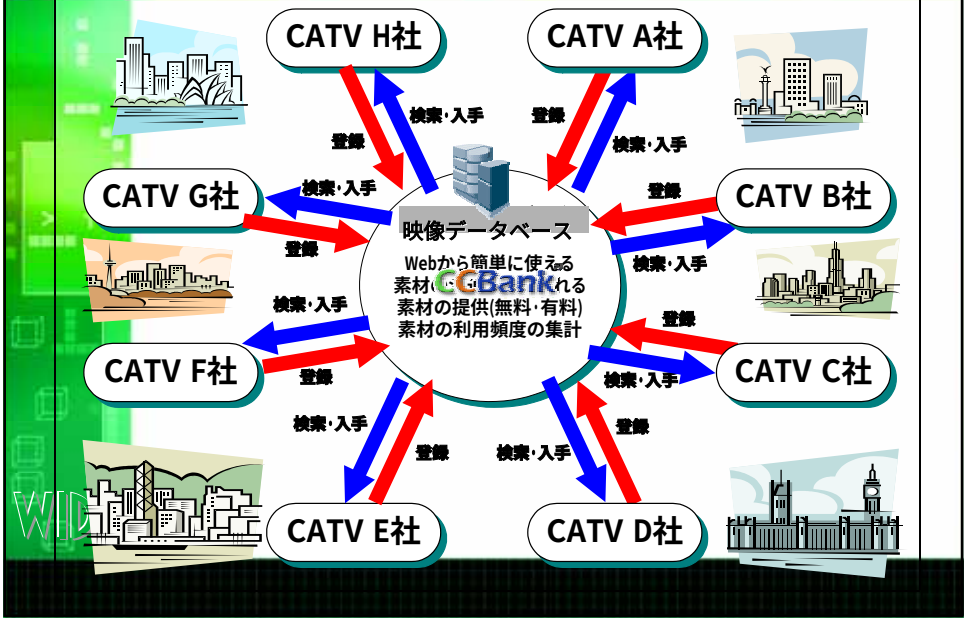
Allocation for Digital Broadcasting System



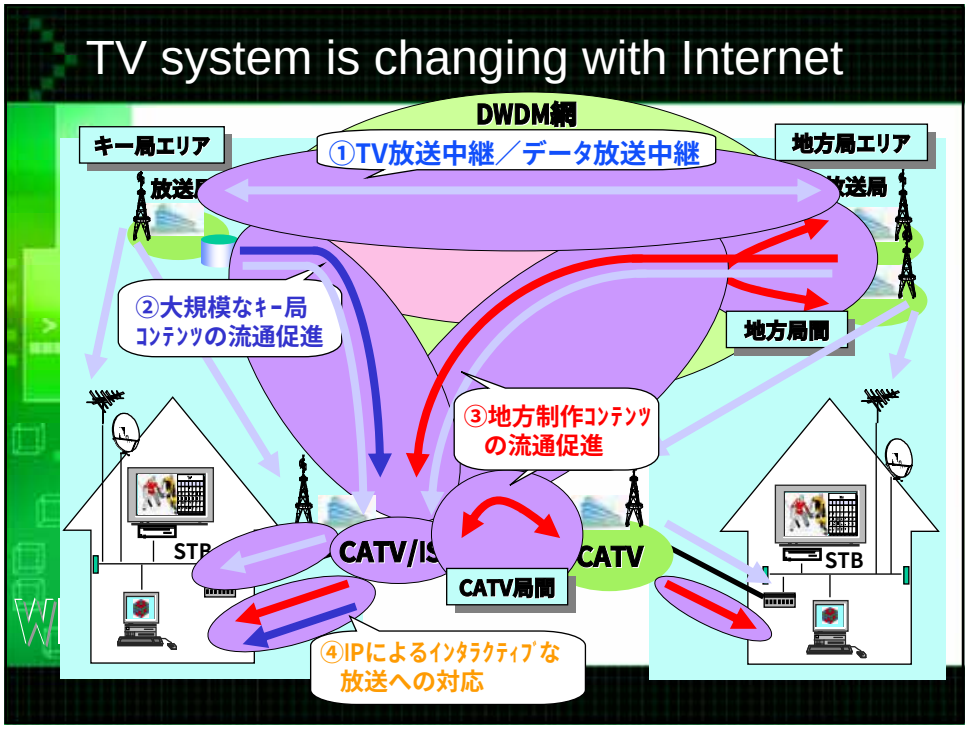
http://ascii24.com/news/i/hard/article/2003/09/30/imageview/images725390.jpg.html

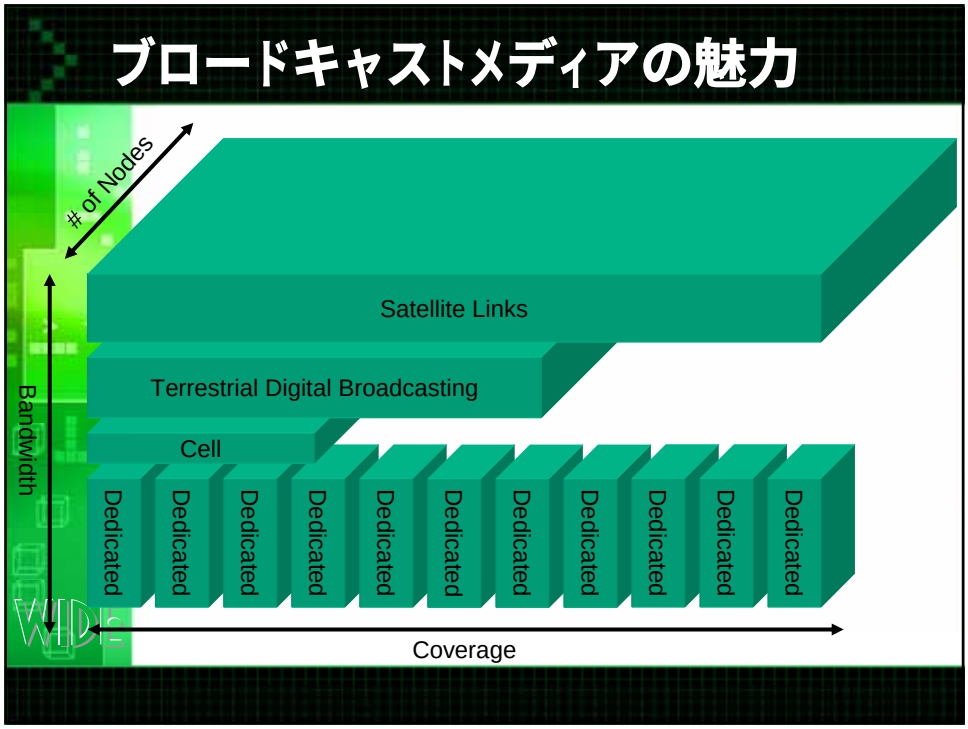
DVTS

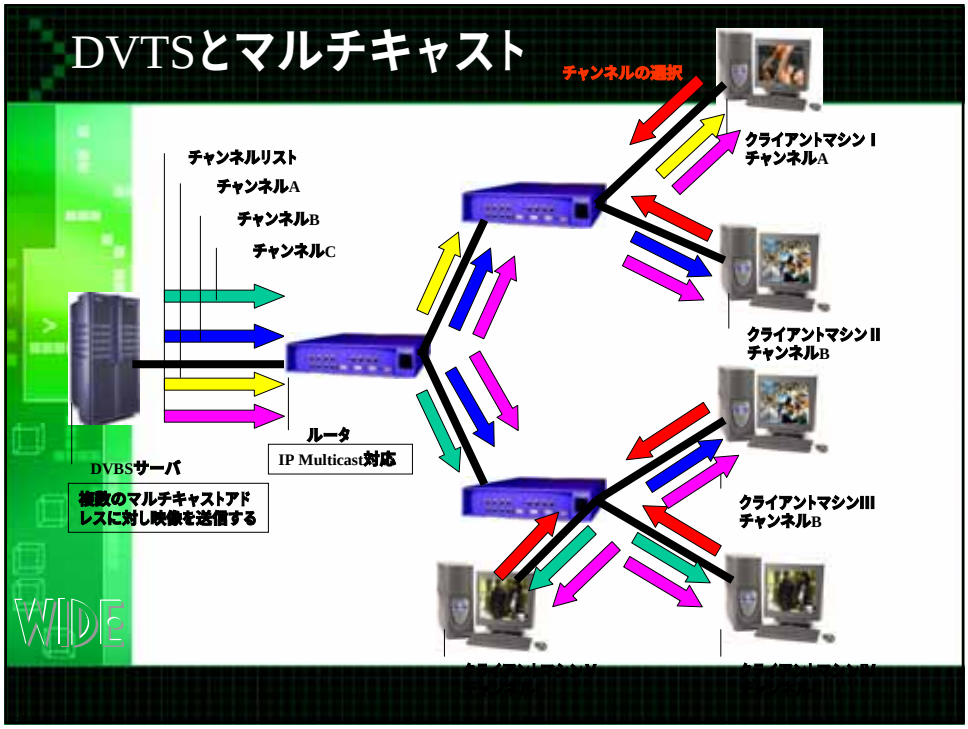
実証実験イメージ

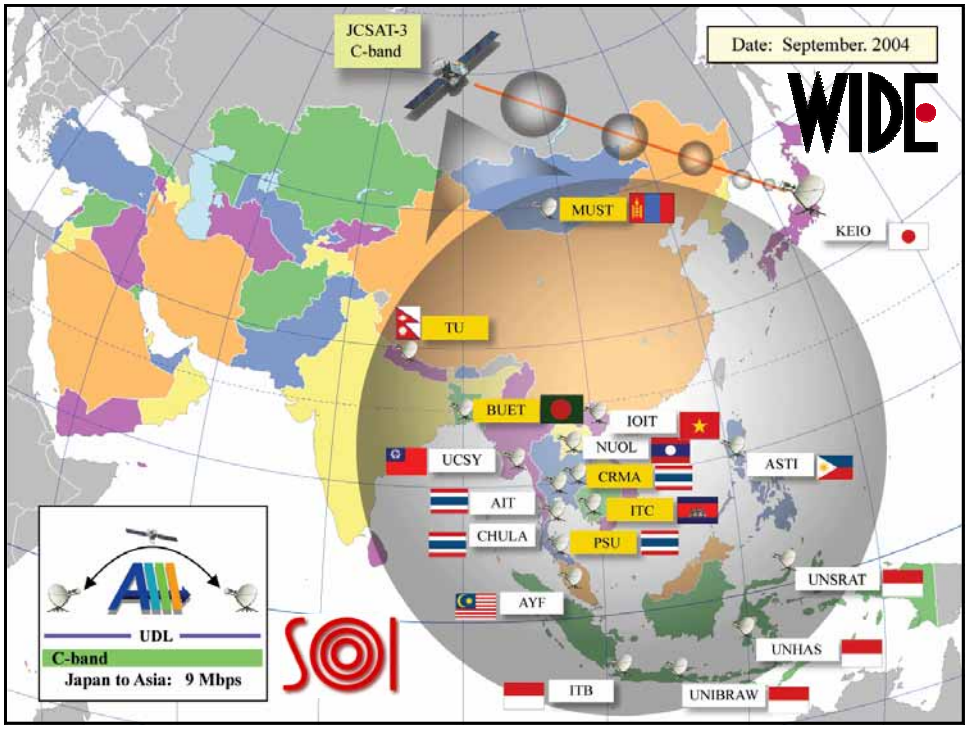


CATV: LIVE Broadcast over IP


TV system is changing with Internet
DWDM網
キー局エリア
①TV放送中継／データ放送中継
地方局エリア
放送局
②大規模なｷｰ局
ｺﾝﾃﾝﾂの流通促進
地方局間
③地方制作ｺﾝﾃﾝﾂ
の流通促進
STB
CATV/IS
CATV
CATV局間
④IPによるｲﾝﾀﾗｸﾃｨﾌﾞな
放送への対応


ブロードキャストメディアの魅力
# of Nodes
Satellite Links
Terrestrial Digital Broadcasting
Cell
Bandwidth
Dedicated
Coverage


DVTSとマルチキャスト
チャンネルの選択
チャンネルリスト
チャンネルA
チャンネルB
チャンネルC
クライアントマシンI
チャンネルA
クライアントマシンII
チャンネルB
クライアントマシンIII
チャンネルB
ルータ
IP Multicast対応
DVBSサーバ
複数のマルチキャストアドレスに対し映像を送信する
WIDE


JCSAT-3
C-band
Date: September. 2004
WIDE
MUST
KEIO
TU
BUET
IOIT
NUOL
UCSY
CRMA
ASTI
AIT
ITC
CHULA
PSU
UNSRAT
AYF
UNHAS
ITB
UNIBRAW
UDL
C-band
Japan to Asia: 9 Mbps

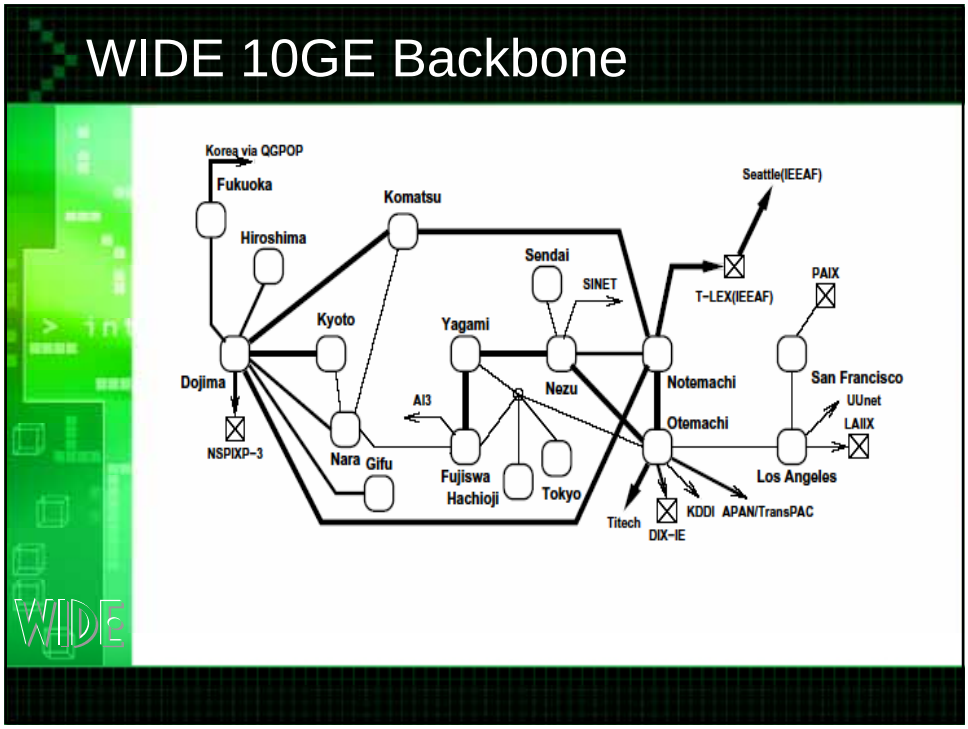
Interactive Discussion on "Interactive Distance Education"

July 2nd 2003

Participants from;

KEIO, Japan
UCSY, Myanmar
ASTI, Philippine
ITB, Indonesia
AFY, Malaysia
NUOL, Laos

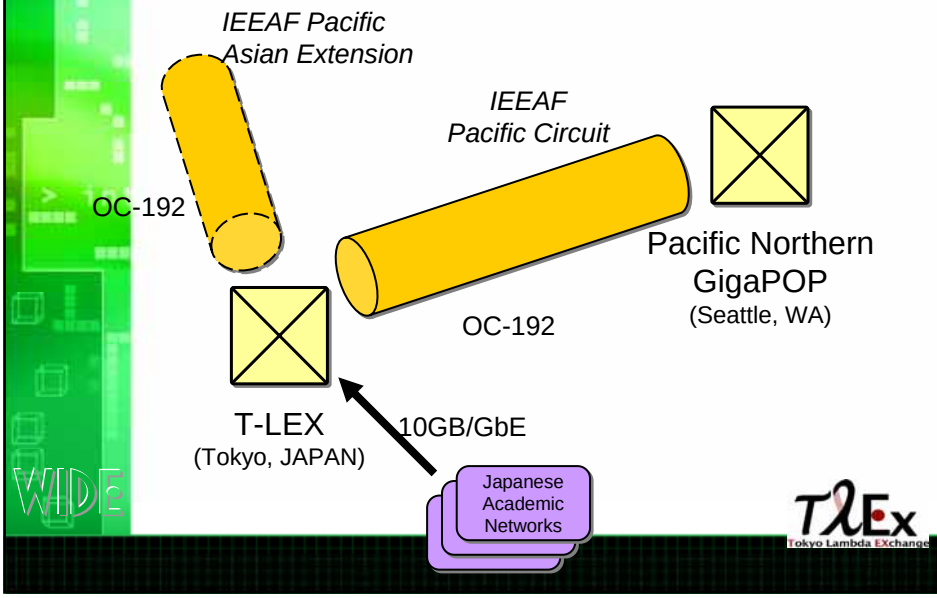
WIDE
Lambda Internet


WIDE 10GE Backbone
Korea via QGPOP
Fukuoka
Komatsu
Hiroshima
Sendai
SINET
Seattle(IEEAF)
T-LEX(IEEAF)
PAIX
Kyoto
Yagami
Dojima
Nezu
Notemachi
San Francisco
UUnet
LAIIX
AI3
Otemachi
NSPIXP-3
Nara
Gifu
Fujiswa
Hachioji
Tokyo
Los Angeles
Titech
KDDI
APAN/TransPAC
DIX-IE
WIDE

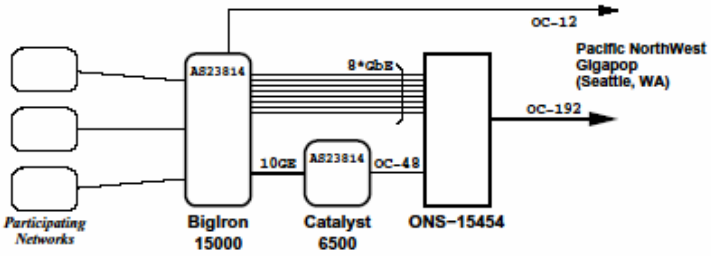
T-LEX/IEEAF Press conference

FLA-Studio

Tokyo Lambda Exchange(T-LEX)

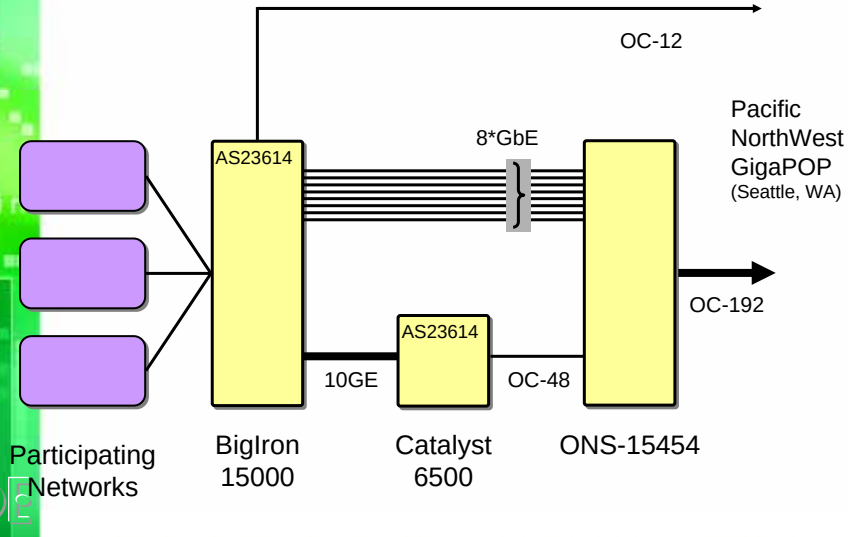


T-LEX Configuration



- BigIron-15000: 16*GbE, 3*10GE, 2*OC12-POS
  - Provides L2 switch as well as IPv4 L3
- Catalyst 6500: OC-48, 4*10GE, 6*GbE
  - Provides OC-48 as well as IPv6 L3

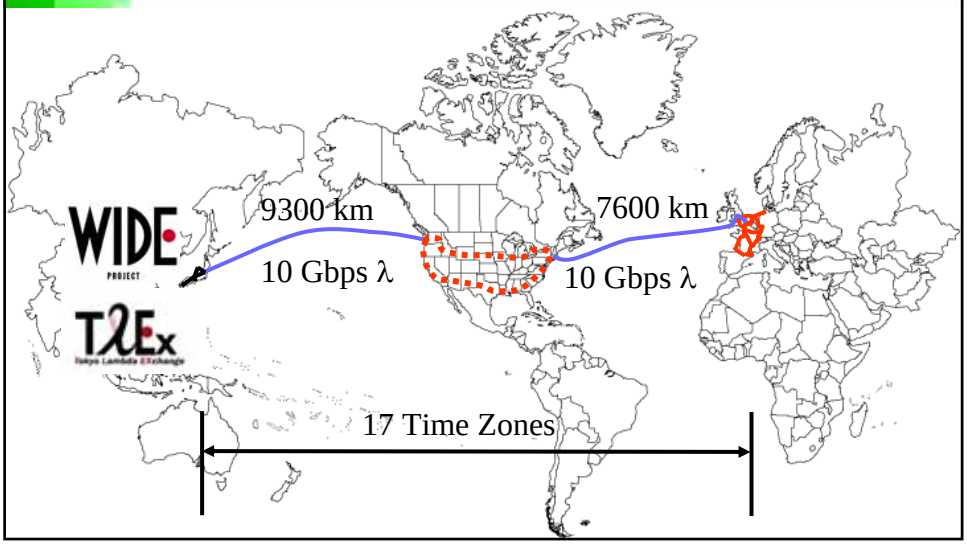
The current configuration internal to T-LEX



Current Participants of T-LEX

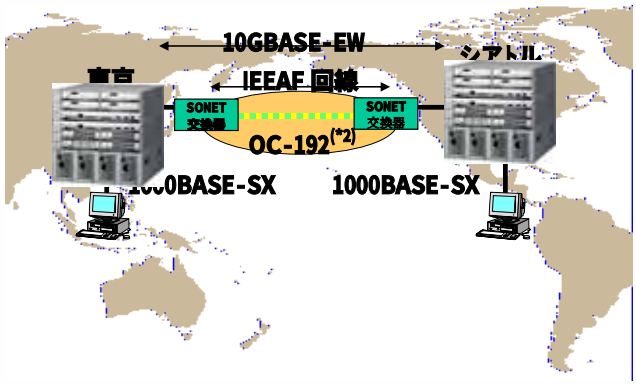
Participant	ASN	Access	IPv4	IPv6	Status
WIDE Project	2500	10GE	YES	YES	Operational
Dragon Tap	9407	FE	YES	YES	Operational
APAN-JP	7660	10GE	YES	YES	Operational
MAFFIN	18125	GbE	YES	YES	Operational
SINET	2907	GbE	YES	?	connected soon
JGN2	N.A.	10GE	N.A.	N.A.	connected soon

WIDE-IEEAF Lambda Internet

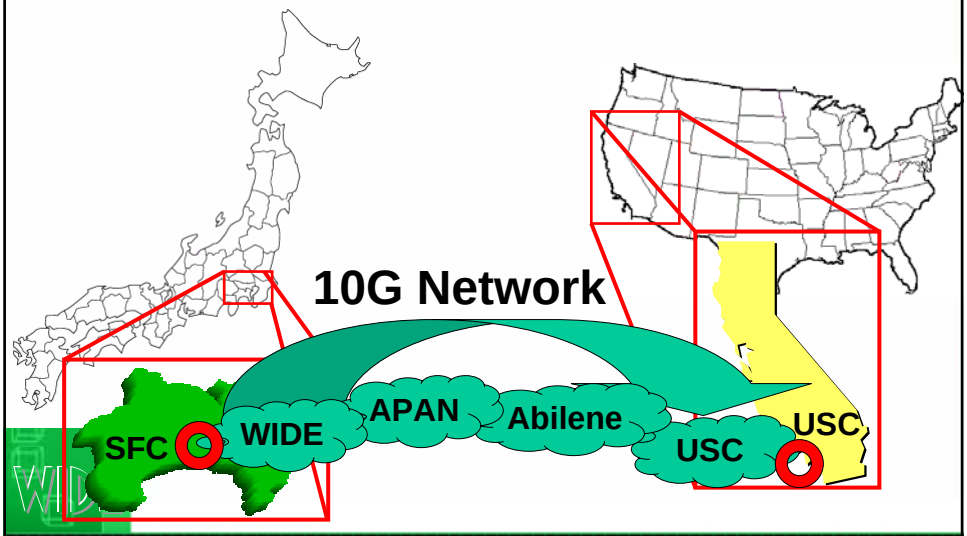


IEEAF Wan-Phy test: Seattle-Tokyo

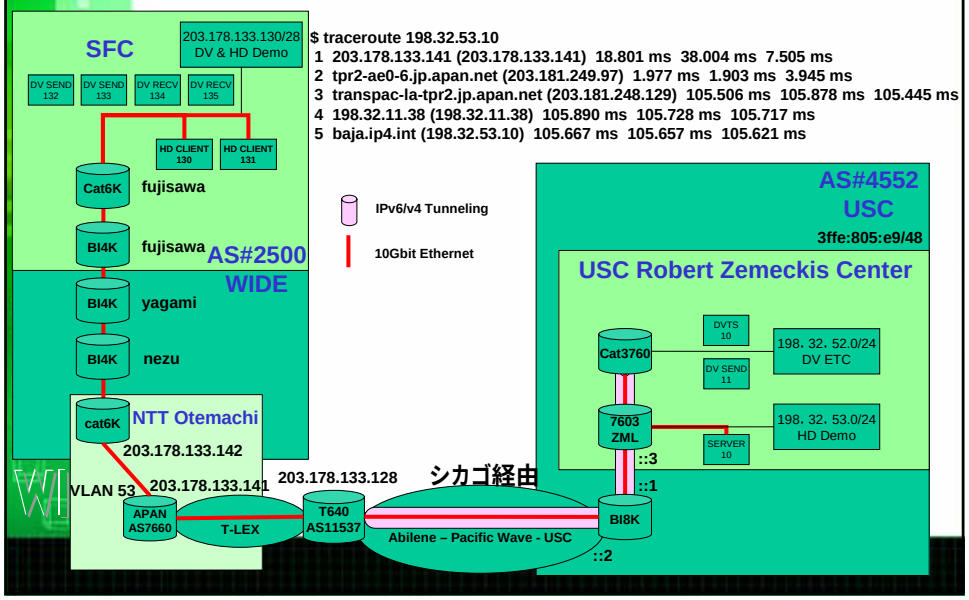
- The first 10GbE WAN-PHY btwn US-JP
- On IEEAF OC-192 Tokyo-Seattle
- Hitachi's WAN-PHY equipment

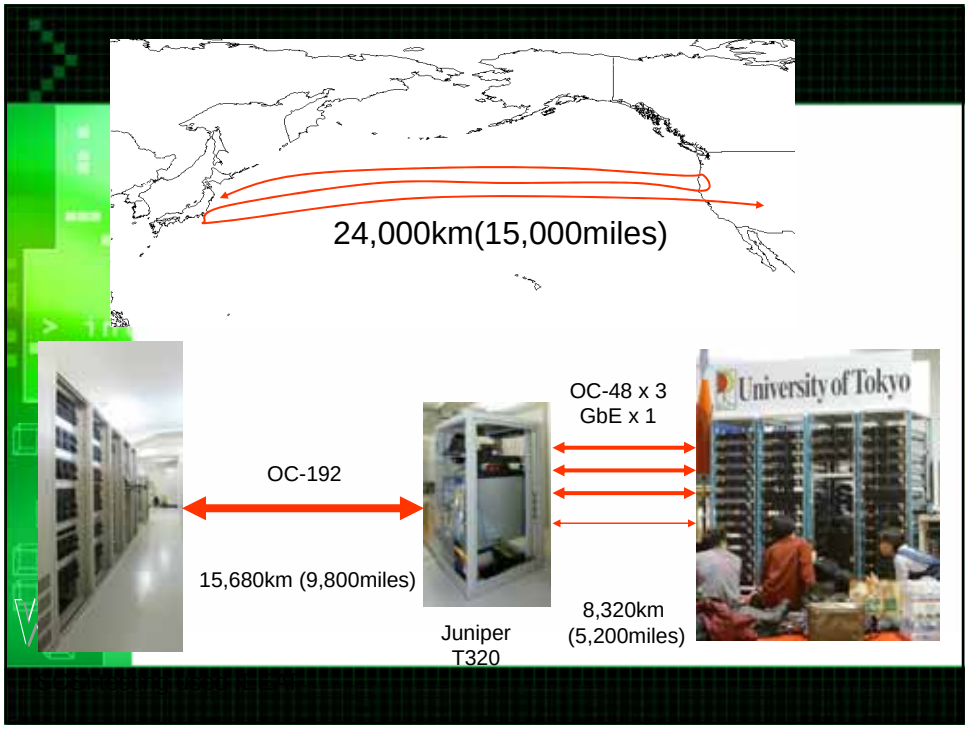


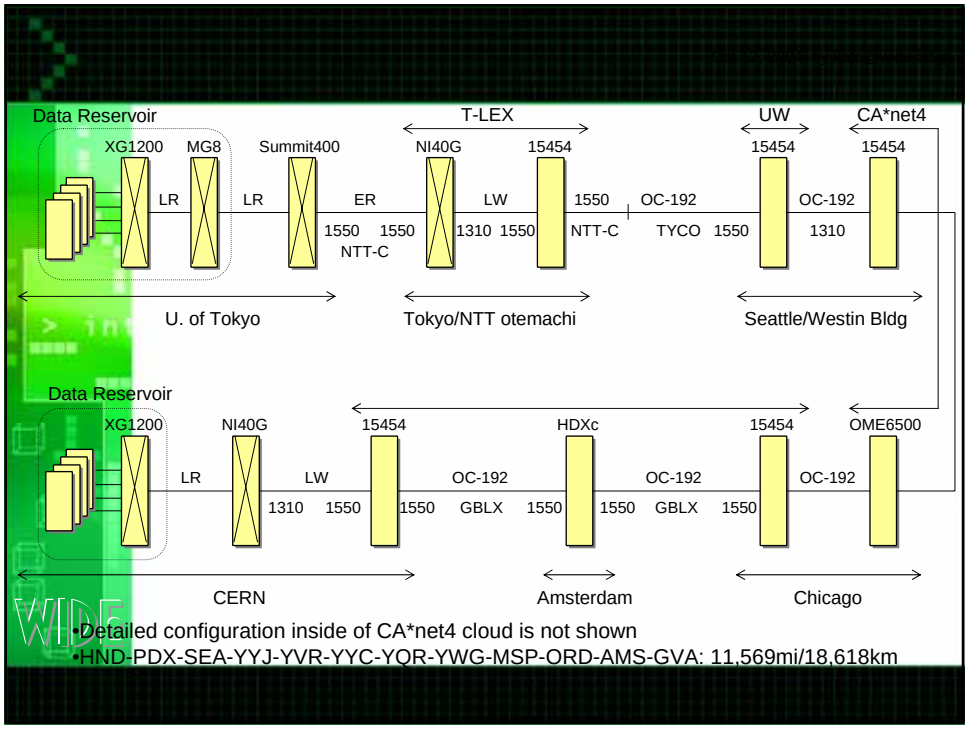
日米間ネットワーク



ネットワークトポロジ図



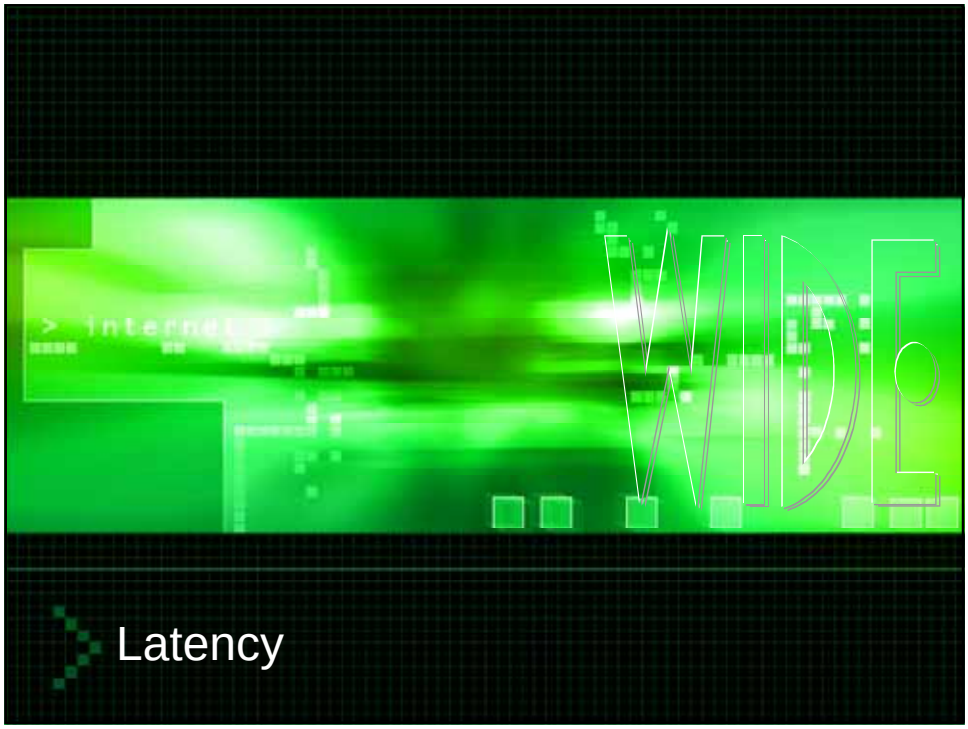


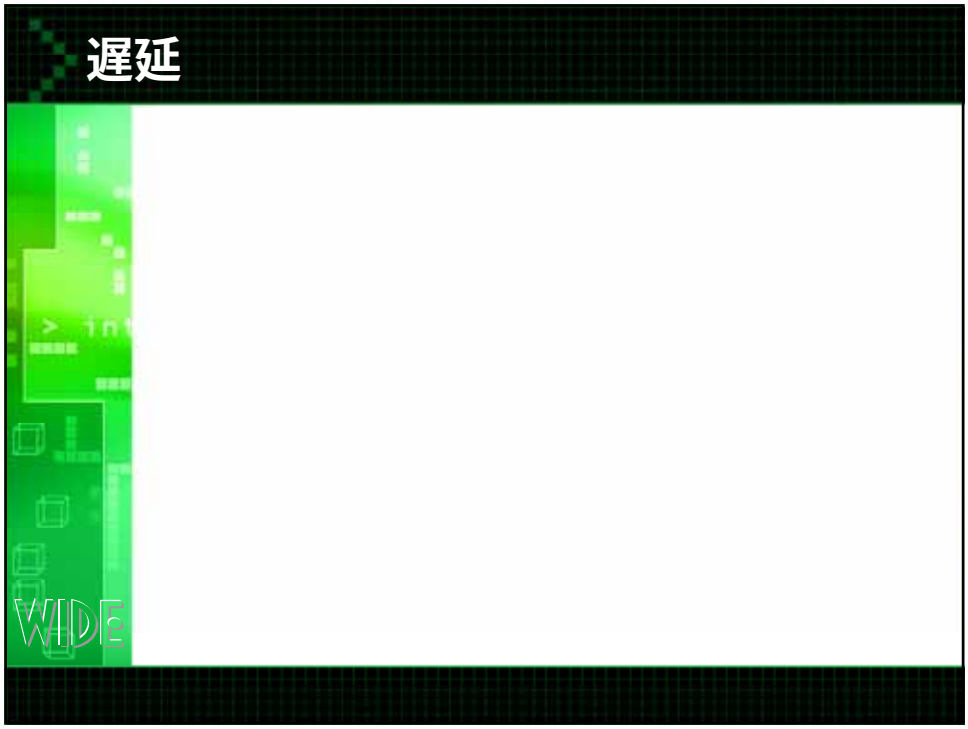


- Detailed configuration inside of CA*net4 cloud is not shown
- HND-PDX-SEA-YYJ-YVR-YYC-YQR-YWG-MSP-ORD-AMS-GVA: 11,569mi/18,618km

Geneva--Tokyo Application

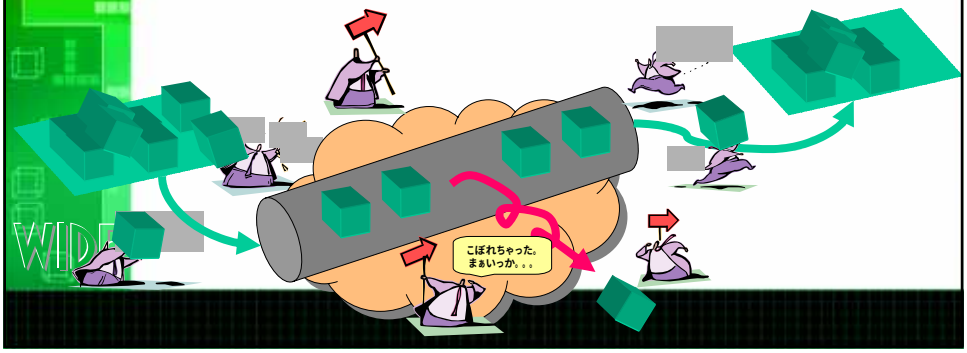
- Data Reservoir project chaired by Prof. Kei Hiraki
- http://data-reservoir.adm.s.u-tokyo.ac.jp/
- Marked 7.57Gbps *single* TCP stream, memory-to-memory
  - Celsio 10GE NIC, TCP off-loaded
  - 1500Byte MTU
- 9Gbps filled by 9 Xeon Servers in each side
  - disk-to-disk


WIDE
Latency

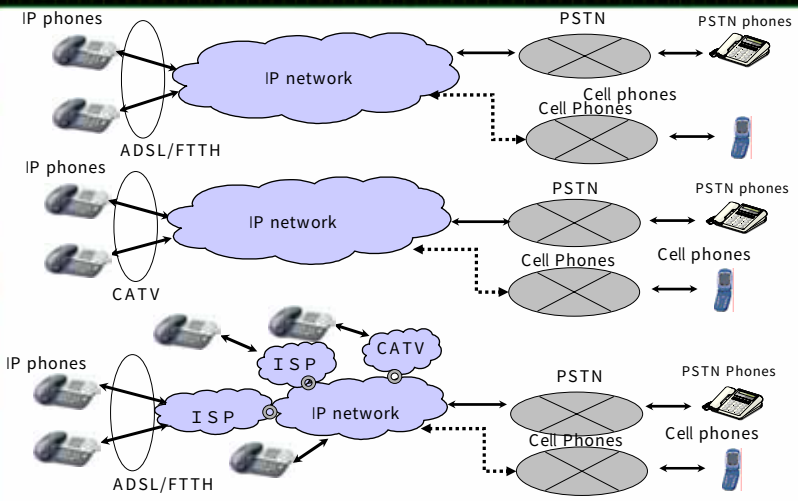

遅延
WIDE

IPの役割

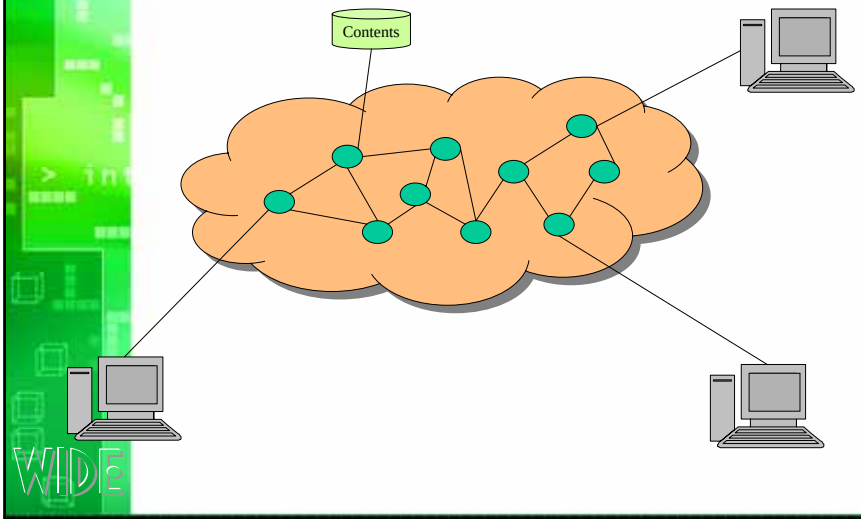
- パケット通信:
  - 混むかもしれない
  - 遅くなるかもしれない
  - でも、結局必ずとどく
  - そして安い！



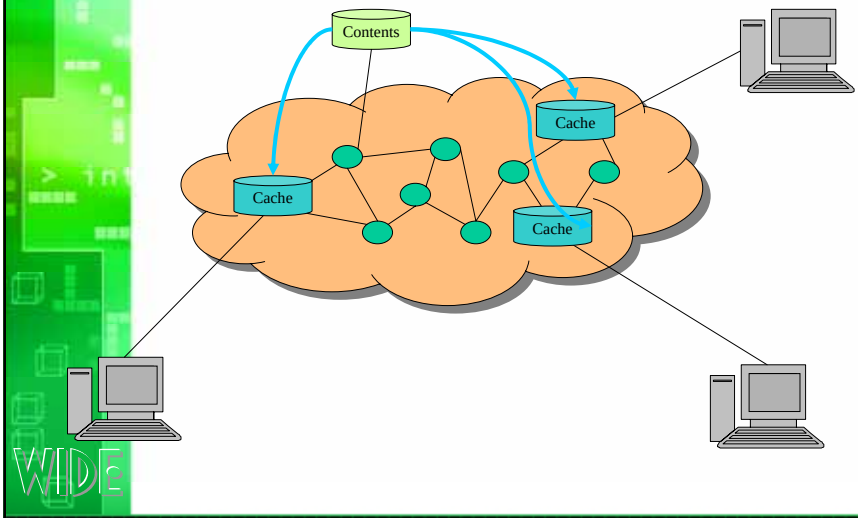
VoIP Evolution



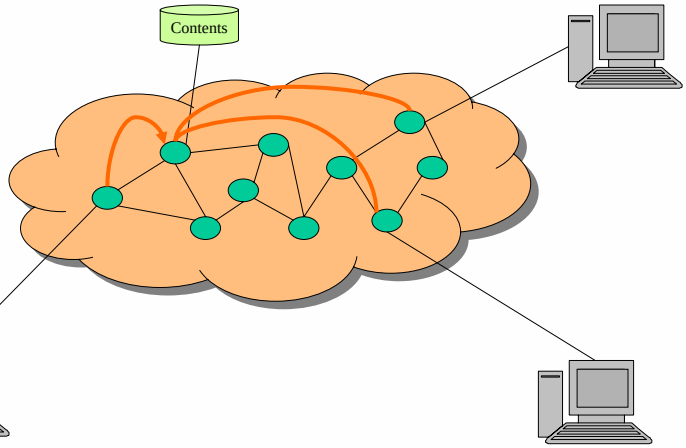
Contents location



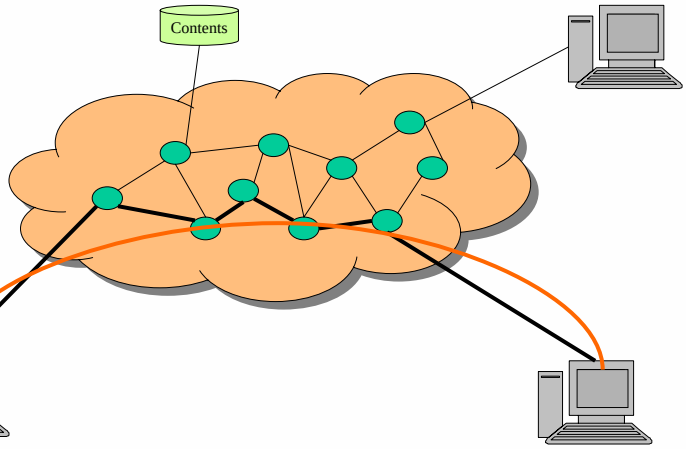
Cache: ‘Push data toward users’



Direct path, direct peering



Lambda network: MPLS and beyond

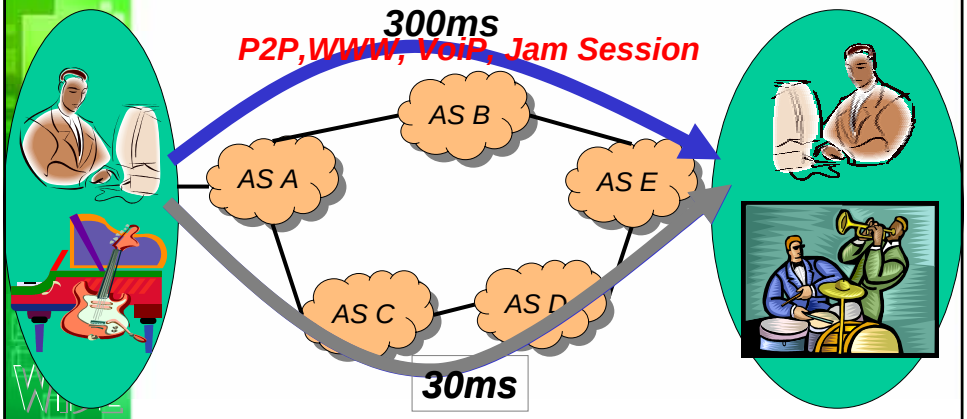


VoIP: 050 regional code criteria

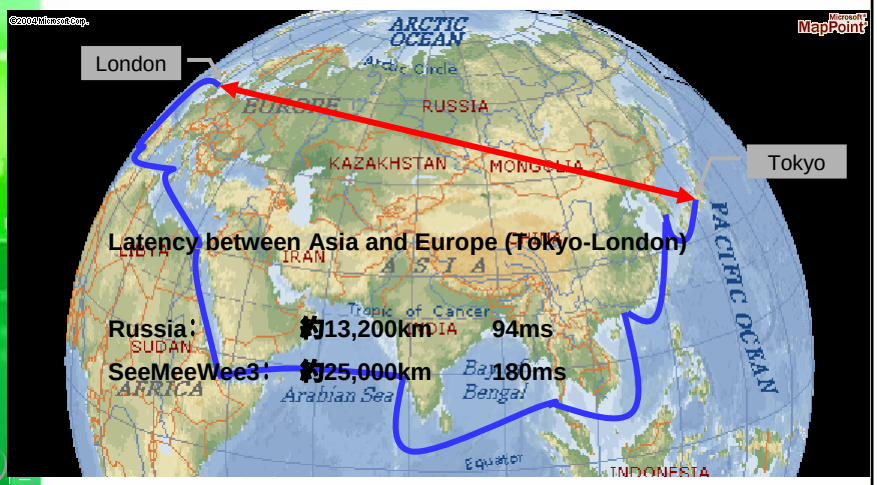
	Class A	Class B	Class C
Trans. Quality	>80	>70	>50
Audio Quality	>86	>73	>50
End-to-End latency	**<100ms**	**<150ms**	**<400ms**

EGP Today..

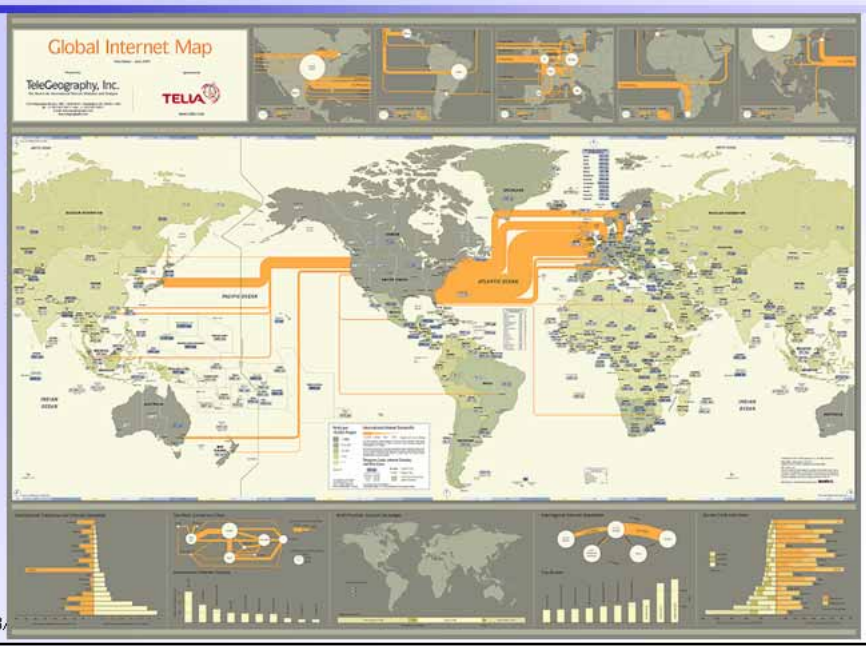
A → B → E = 3 < A →C →D→E=4

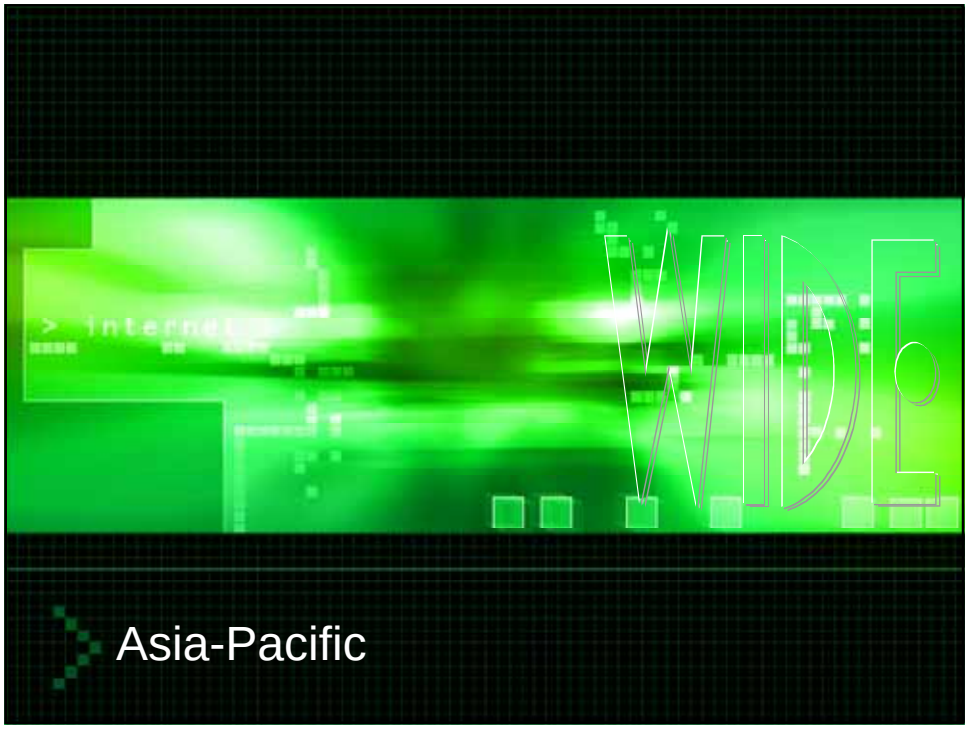


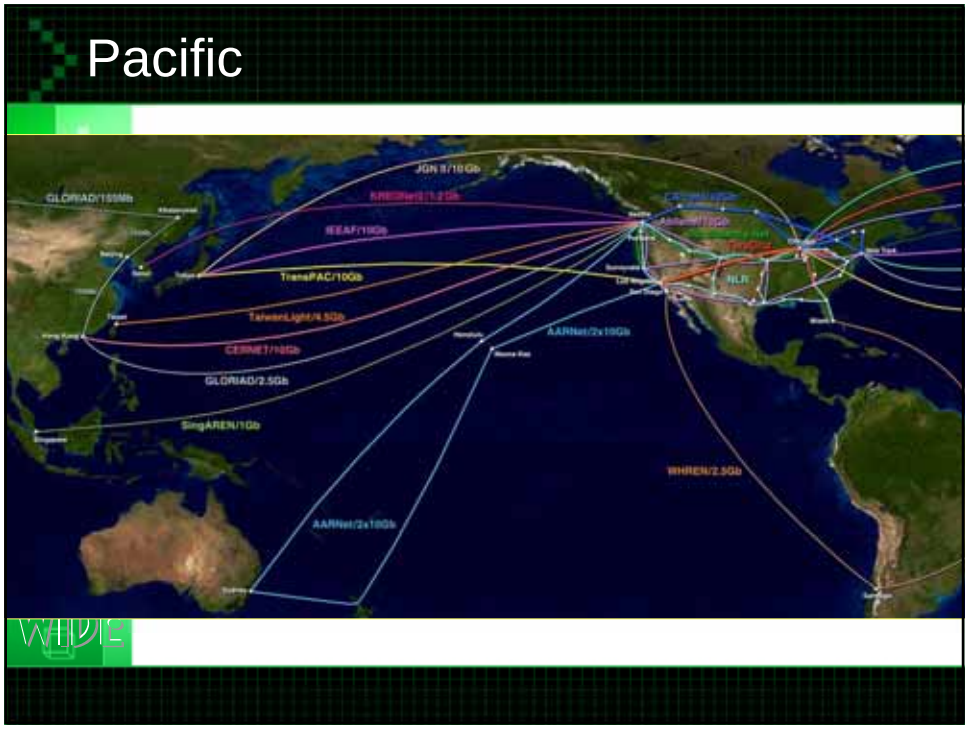
Asia and Europe: Latency?

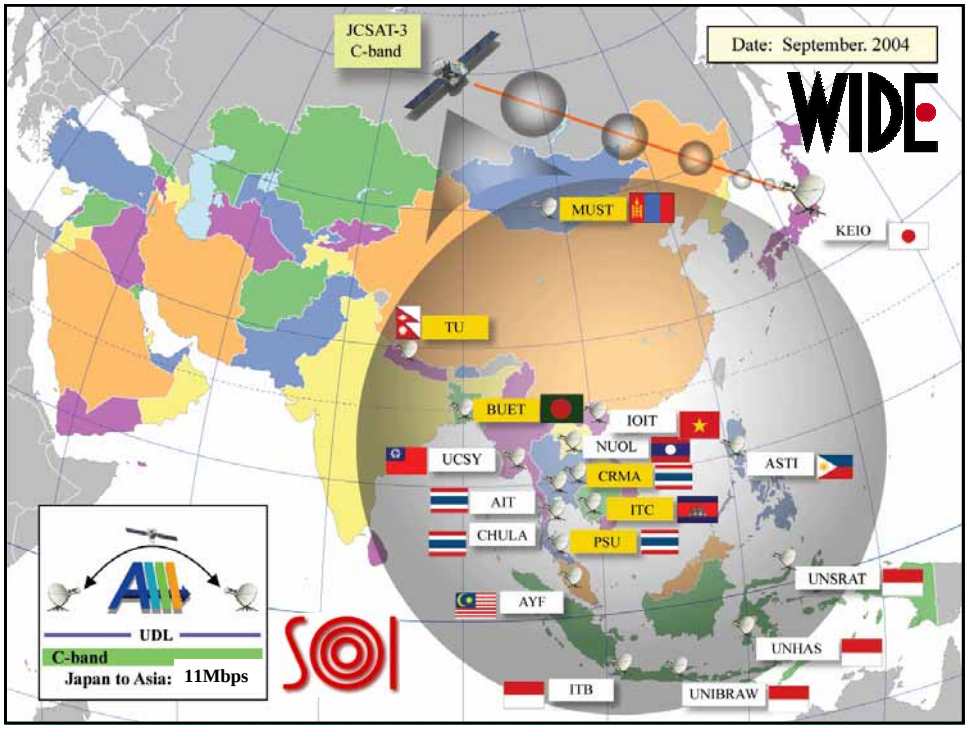


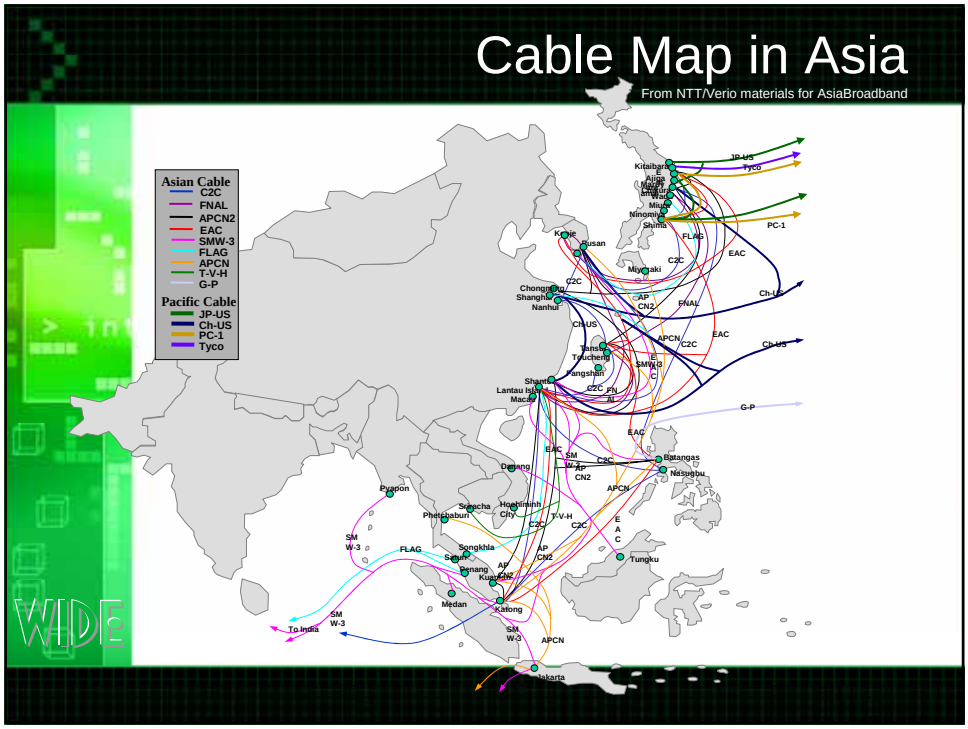
2001 Internet Traffic

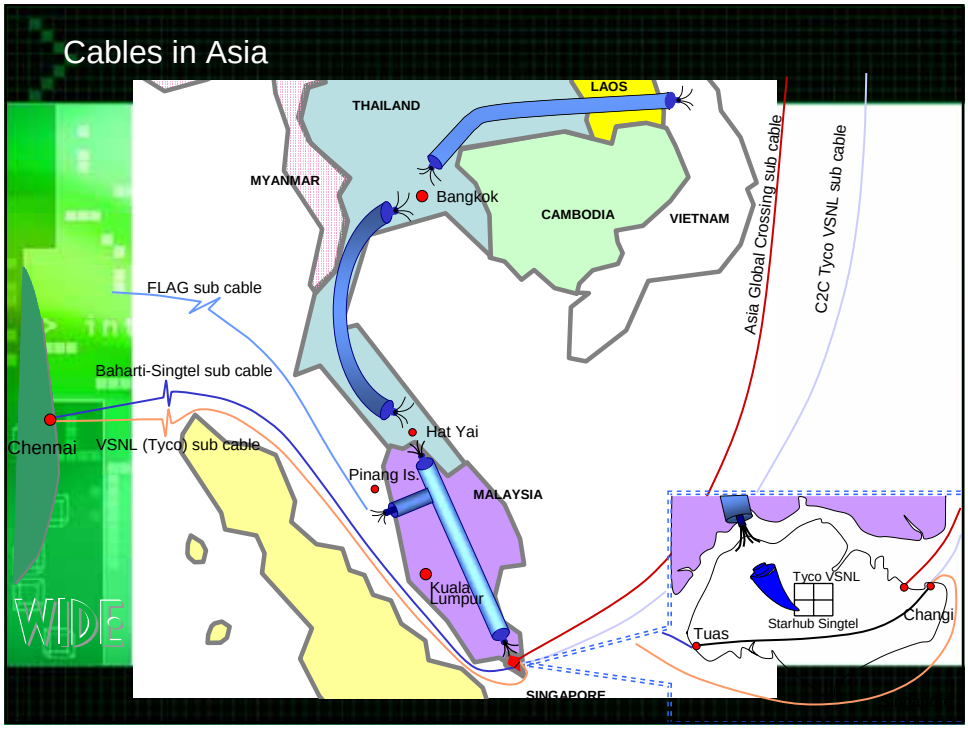



WIDE
Asia-Pacific


Pacific
GLORIAD/155Mb
JGN II/10Gb
IEEAF/10Gb
TransPAC/10Gb
TaiwanLight/4.5Gb
CERNET/10Gb
GLORIAD/2.5Gb
SingAREN/1Gb
AARNet/2x10Gb
NLR
WHREN/2.5Gb
AARNet/2x10Gb
WIDE


JCSAT-3
C-band
Date: September. 2004
WIDE
MUST
KEIO
TU
BUET
IOIT
NUOL
UCSY
ASTI
CRMA
AIT
ITC
CHULA
PSU
UNSRAT
AYF
UNHAS
ITB
UNIBRAW
UDL
C-band
Japan to Asia: 11Mbps
SOI


Cable Map in Asia
From NTT/Verio materials for AsiaBroadband
Asian Cable
C2C
FNAL
APCN2
EAC
SMW-3
FLAG
APCN
T-V-H
G-P
Pacific Cable
JP-US
Ch-US
PC-1
Tyco
WIDE



SOI ASIA Project

SOI Asia Sharing Knowledge Across Borders
- Tsunami: Lessons Learned and Universities' Role –

School On the Internet

Date & Time

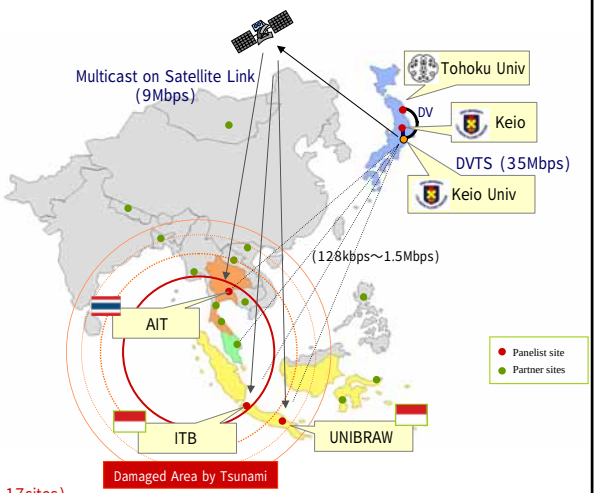
Feb 24, 2005 16:30-20:30(JST)

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

Panelist Sites

- Keio University, Japan
- Tohoku University, Japan
- Asian Institute of Technology (AIT), Thailand
  (by Dr. Anat in Chulalongkorn University)
- Institut Teknologi Bandung (ITB), Indonesia
- Brawijaya University, Indonesia



Other SOI ASIA Partner Sites (Total: 11countries 17sites)

Chulalongkorn University (Thailand)
Prince of Songkla University (Thailand)
Chulachomklao Royal Military Academy (Thailand)
National University of Laos (Laos)
University of Computer Studies, Yangon (Myanmar)
Sam Ratulangi University (Indonesia)
Hasanuddin University (Indonesia)
Institute Of Information Technology (Vietnam)
Advanced Science and Technology Institute (Philippines)
Institute of Technology of Cambodia (Cambodia)
Bangladesh University of Engineering and Technology (Bangladesh)
Mongolian University of Science and Technology (Mogolia)
Tribhuvan University (Nepal)

Role of Asia-Pacific
Work hard in where new issues exists