KOREN, APII-Testbed and KOREN-CUDI-CLARA-APEC Cooperation

2010.4

YS LEE
National Information Society Agency (NIA)
Republic of Korea

CUDI 2010
Morelia, Mexico

Background

Chair's Report of the 40th APEC TEL WG Meeting(Cancun, Mexico, 2009.9)

3.1 Research and Education Advanced Networks, Thematic Communities, Mexico

The speaker, Salma Jalife, introduced CUDI network, the Mexican National Research and Education Networks, network topology and research projects (2009/TEL40/DSG/004). CUDI network supports different thematic research on communities areas and e-Science applications on research and education areas. Korea delegate expressed great appreciation for this report and indicated an interest in cooperating with Mexico through Korea's APII Testbed project.

APEC TEL Meeting in Cancun (2009.9)

Current APII Testbed cooperation concentrated in the Asia, Oceania, N.America region.

Exploring possibilities for Korea-Mexico-Latin America cooperation on R&E networks : bilaterally and/or within APEC's APII Testbed framework

Contents

1. NIA
2. KOREN
3. APEC's APII Testbed Project
4. KOREN-CUDI-CLARA-APEC cooperation

NIA at a Glance

NIA 한국정보화진흥원

Founded in 1987

- **To support 'informatization' of central & local govts and national information society development**

Public Agency

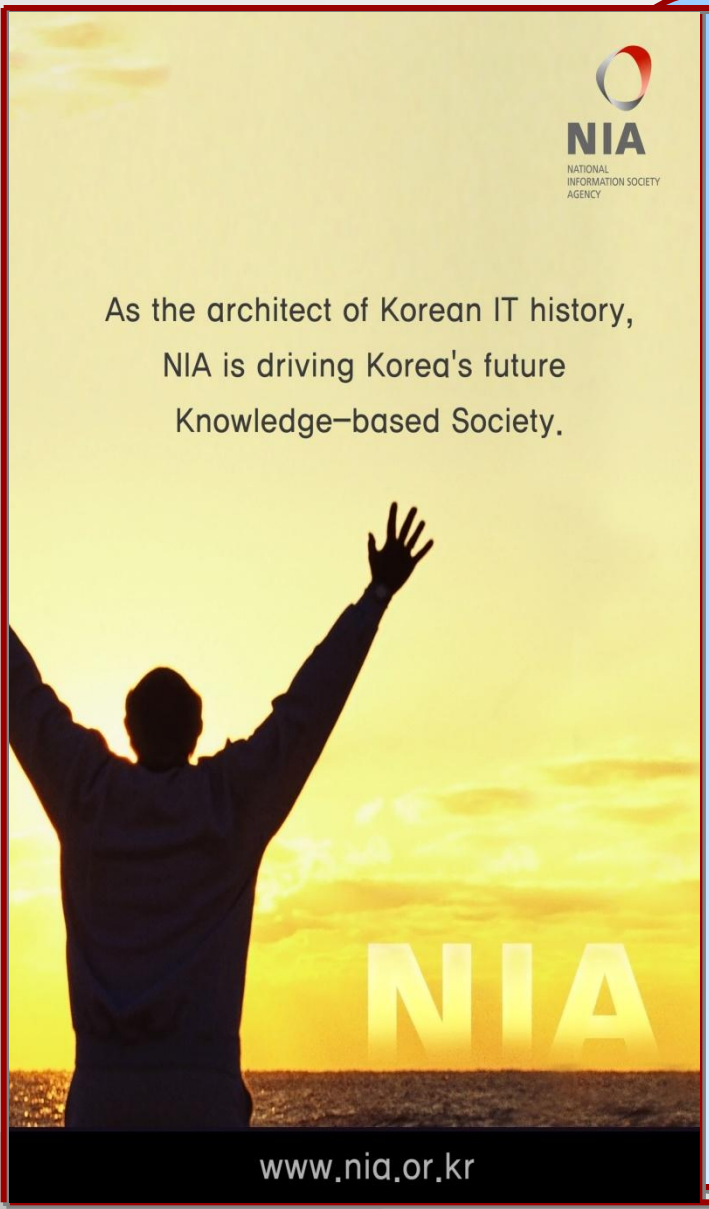
❑ **Statutory Agency**

- National Computer Network Act (1986),
- Framework Act on Information Society(1996)

❑ **Government Funded**

- USD$ 260 Million Annual Budget (2010), ~357 Employees (2010)

History



1980's:

- Established as National Computerization Agency (NCA)
- Formulated the Mid/Long term Plans for National Informatization

1990's:

- Led national broadband policy development and implementation (KII : 1995~2005)

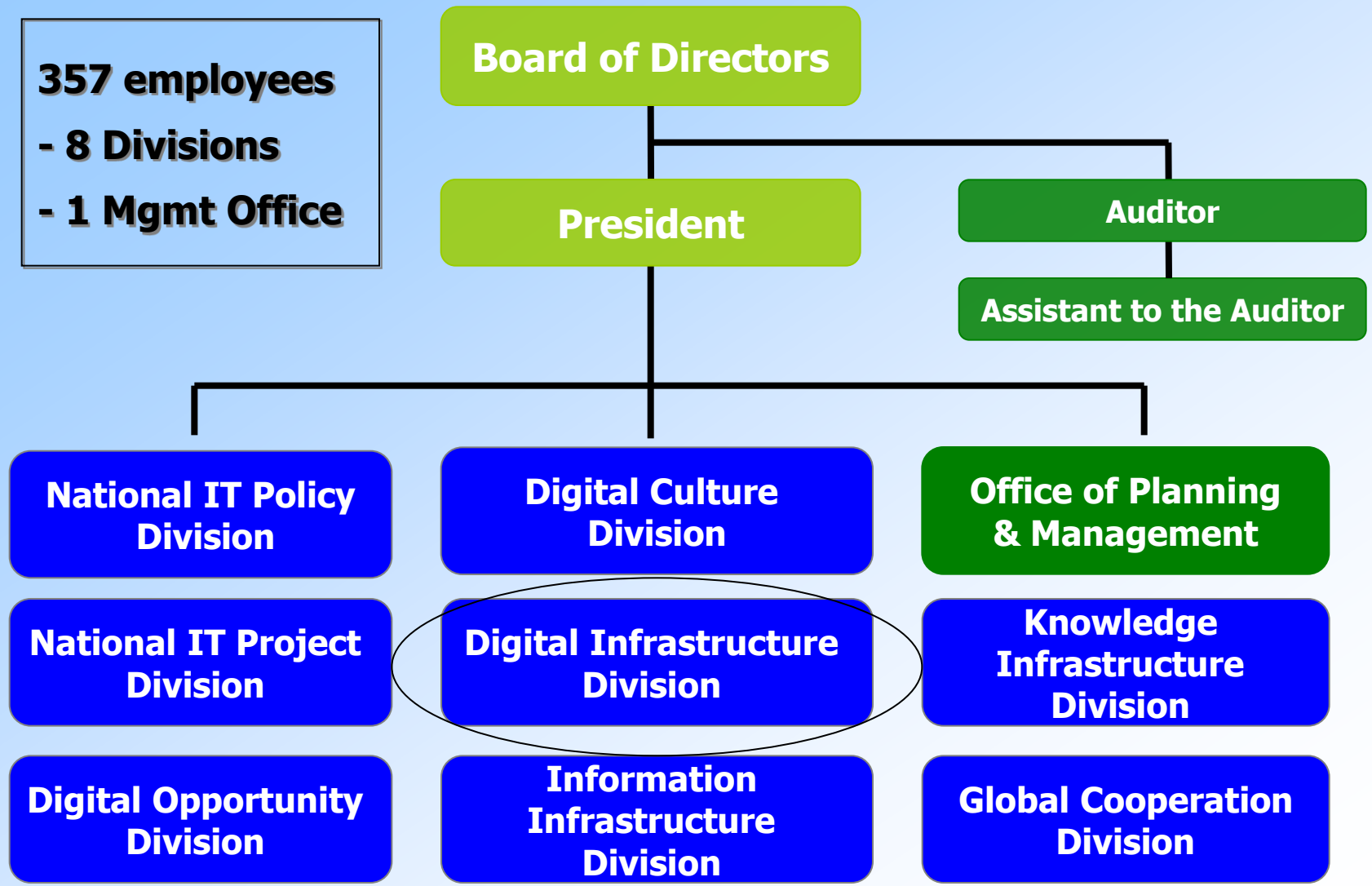
2000~present:

- Led development of national information society policies (Broadband IT Korea(2003), National Information Society Plan(2008))
- Implemented 31 e-Government Roadmap Projects
- Established ICT Cooperation Centers (Mexico, Chile, Turkey, South Africa, Bulgaria, Kuwait)
- Led national broadband policy development and implementation : BcN('04~'10), uBCN('09~'13), Future Network 2020('11~'20))
- Agency name changed to National Information Society Agency (NIA)

Organization

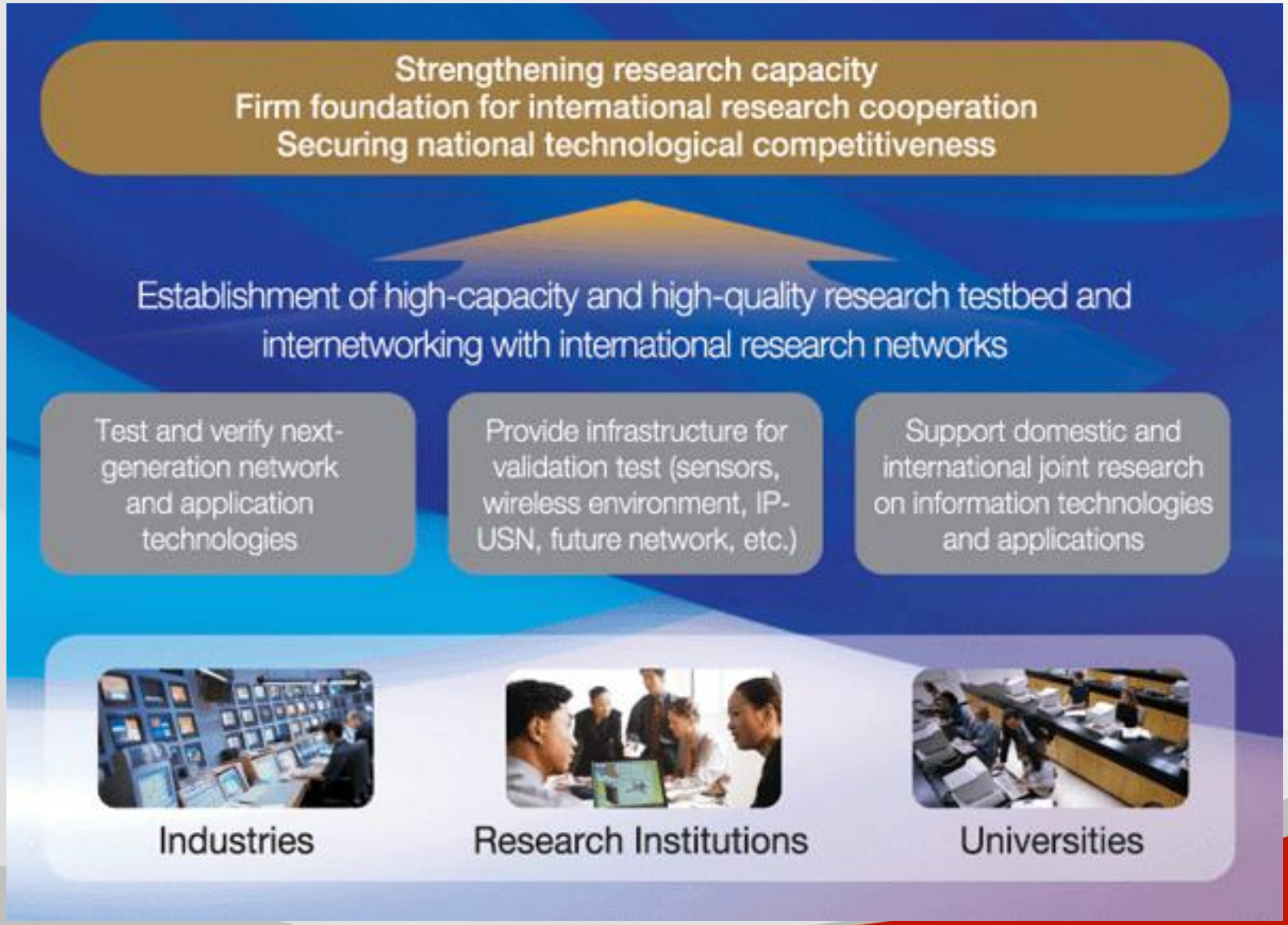
NIA 한국정보화진흥원

357 employees
- 8 Divisions
- 1 Mgmt Office



R&E Network work at NIA : KOREN

KOREN : KOrea advanced REsearch Network



KOREN : General Info(1)

NIA 한국정보화진흥원

o Korea's national ICT testbed network
  - supporting 'disruptive' experiments as well as applications research & experimentation

o Budget : appr $ 5 million per year
  - source : government's ICT Fund
  - funded by KCC (Korea Communications Commission)

o Connectivity
  - domestic : connects major cities with 20G and 10G backbone
  - overseas : APII(10G, Japan), TEIN(2.5G, Asia, Europe, Oceania)

o KOREN users : 102 institutions
  - full KOREN members : 59 (mostly universities, R&D institutes, hospitals, etc)
  - associate KOREN members : 2
  - other users : 41 (mostly corporations)

KOREN : General Info(2)

NIA 한국정보화진흥원

o number of research projects using KOREN : 126 (2009)
  - network research : 56
  - applications research : 70

o NIA funded research projects utilizing KOREN : 11 (2009, $350K)

o thematic working groups within KOREN User Forum : 9
  - weather/climate, medical, physical science, mobile, USN, P2P, multimedia collaboration, measurement/engineering, e-culture

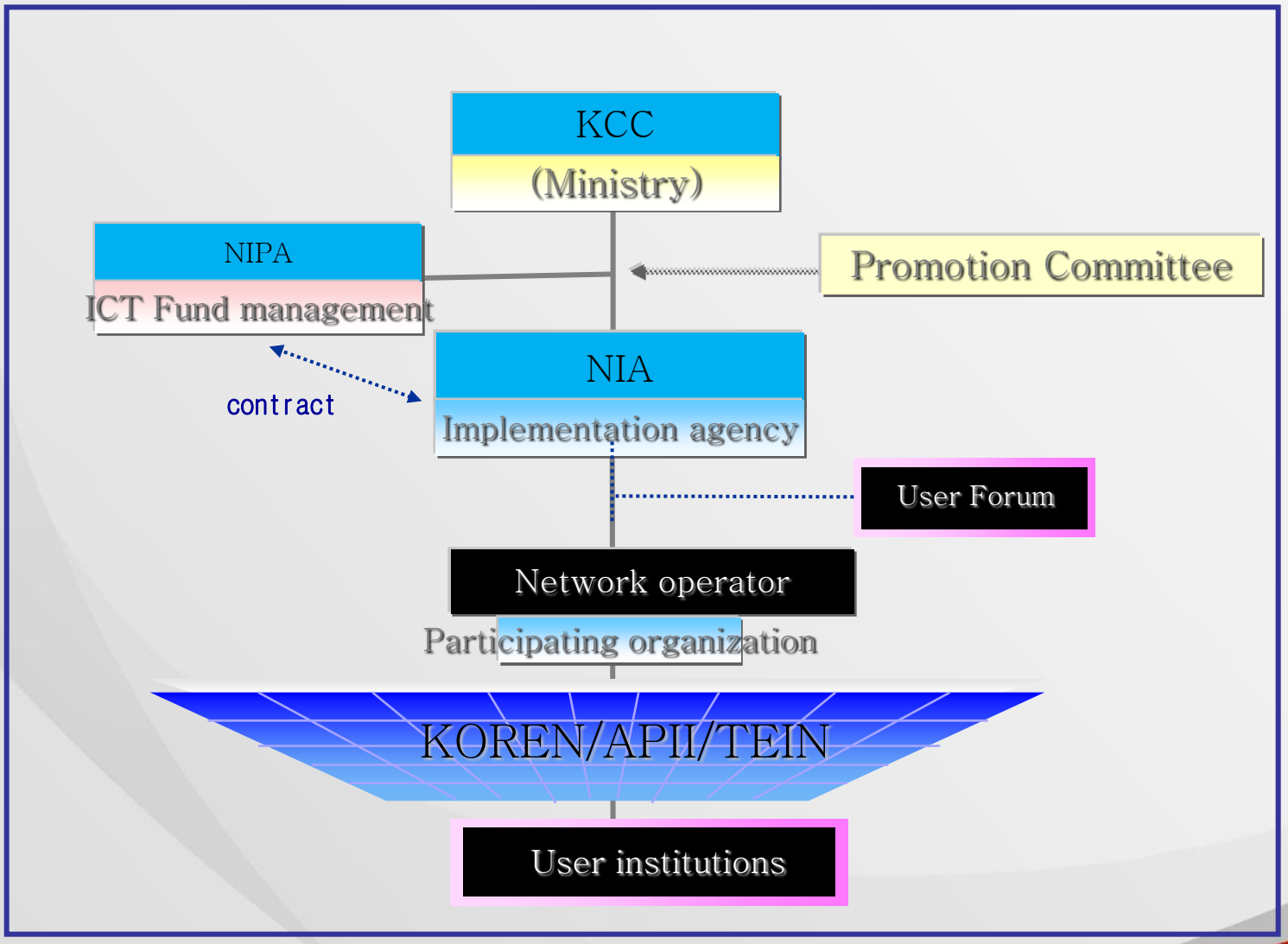
o patents/papers deriving from research over KOREN : 241 (2009)
  - patents : 29, papers : 212

o annual events : 2 KOREN Workshops (main workshop held in Spring)

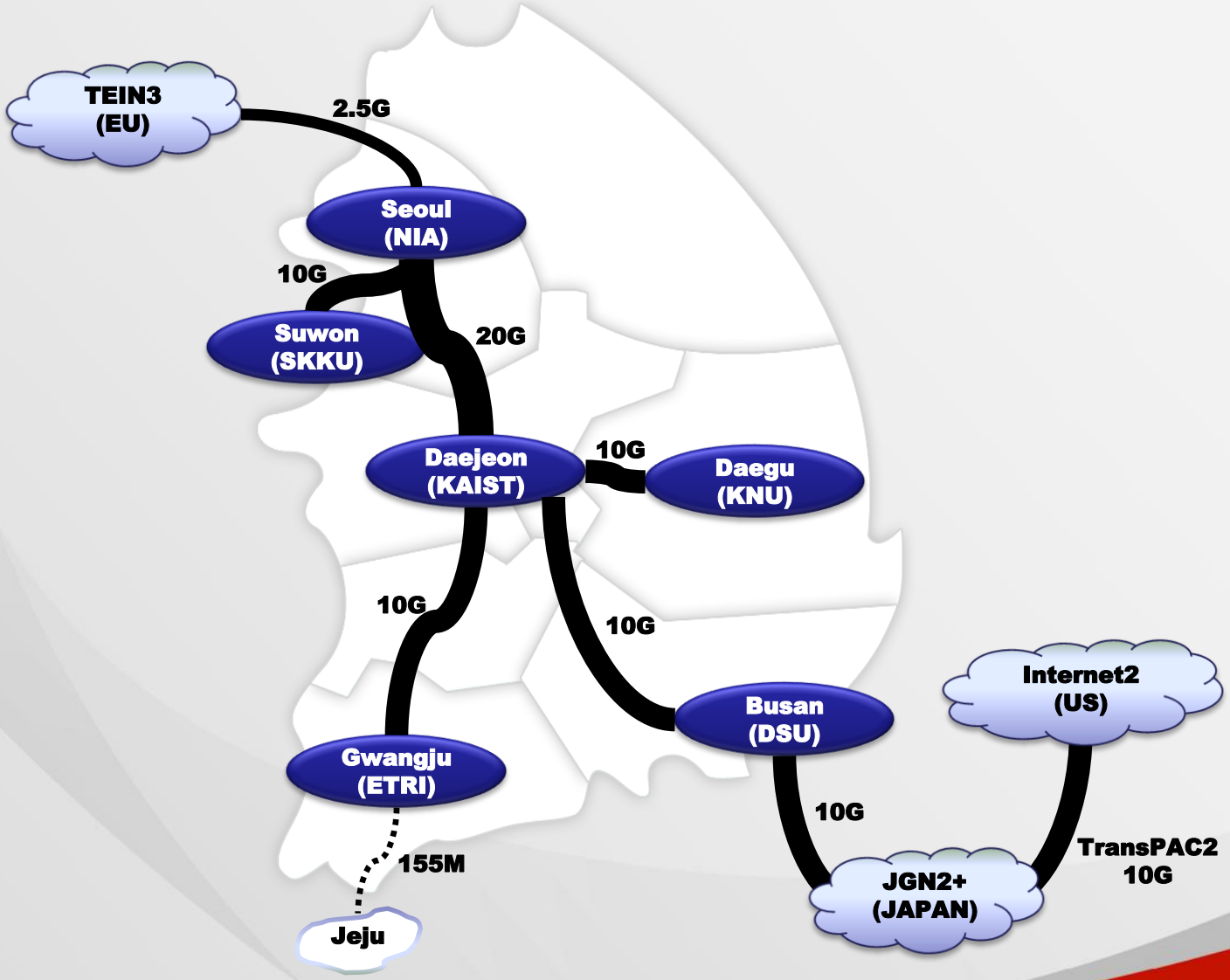
o value to the research community : appr $15m in 2009
  - incl. cost savings as result of not having to use commercial networks

o KOREN user/client satisfaction : 86.9% (2009)

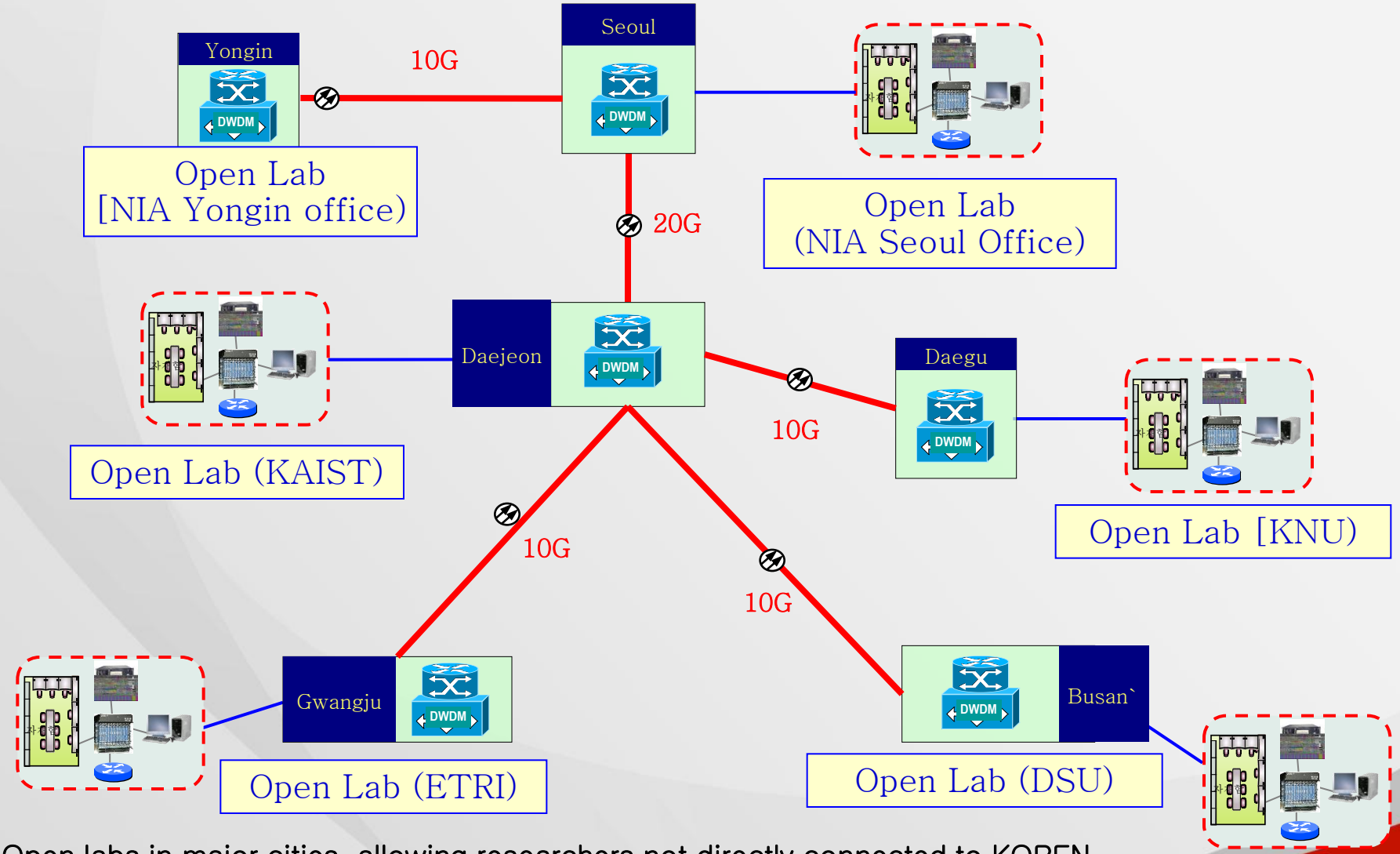
KOREN Management Structure



KOREN Domestic Connections

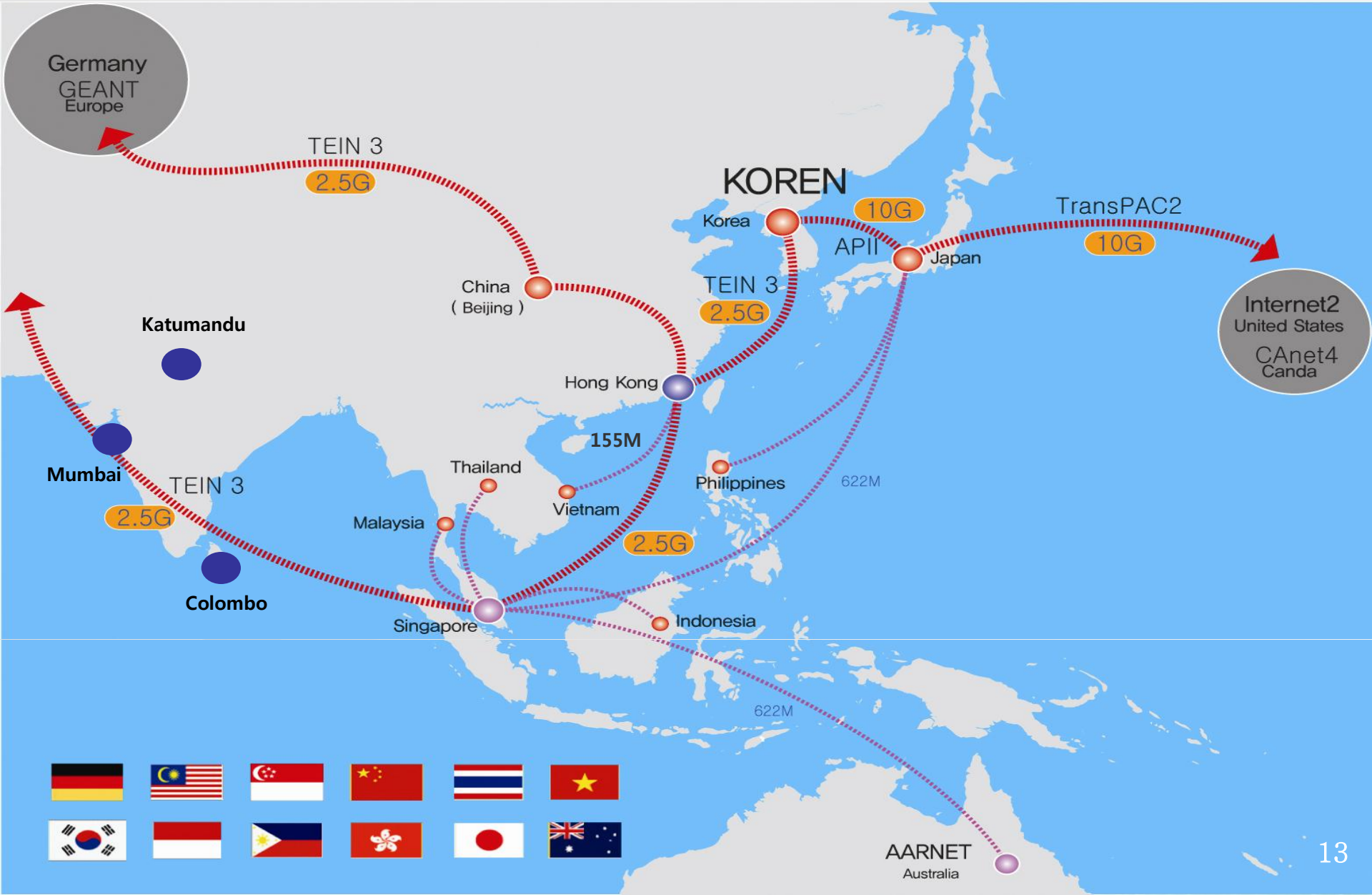


Open Lab facilities on KOREN



Open labs in major cities, allowing researchers not directly connected to KOREN (such as SMEs) to come to the open labs and conduct experiments over KOREN

Global Connections : APII-TB, TEIN



TEIN : initiative of ASEM

NIA 한국정보화진흥원

o TEIN : Trans Eurasia Information Network
- research network linking Asia and Europe
- initiative originally proposed by Korea (at ASEM LM in 2000 in Korea)
  * ASEM : Asia Europe Meeting
- EU designated DANTE is the current project management organization
- Korea(NIA)'s current network contribution is the linkage between Korea-HongKong-Singapore (2.5G)
- TEIN will be evolving to TEIN4 and Korea(NIA) will take over the project management duties of TEIN4

R&E Projects funded by NIA in 2009(1)

NIA 한국정보화진흥원

o OpenFlow based Testbed Implementation Project
  - Kyungnam University (Korea), Korea Telecom (Korea), Kyushu University (Japan)

o Core Technology Development for Global IP-USN
  - Kyung Hee University (Korea), Institute for Infocomm Research (Singapore), FOKUS (Germany)

o Research on NetFPGA based future network technology and applications
  - Seoul National University, Kookmin University (Korea)

o DCN Implementation & Interoperation for Broadband based Applications
  - Jeju University (Korea), NICT (Japan)

o Research on Global IP-USN Network Management
  - Ajou University (Korea), Global IP-USN Testbed group (Philippines, Malaysia, Indonesia, Thailand, Australia, etc)

R&E Projects funded by NIA in 2009(2)

NIA 한국정보화진흥원

o High-Speed Compressed High-Definition Medical Video Transmission System for Tele-medicine
  - Seoul National University Bundang Hospital (Korea), Kyushu University (Japan)

o Korea-China-Europe IPTV Application Services Testing Environment Research
  - Hankuk University of Foreign Studies, KAIST (Korea), Jia Tong University (China), Telecom & Management SudParis (France), FOKUS (Germany)

o Mobile IPTV Service Mobility between WLAN and Wibro
  - ChungBuk National University, KAIST (Korea), Jia Tong University (China)

o Research on Networked Performance of Performing Arts between Korea and Spain
  - KAIST (Korea), RedIRIS (Spain)

R&E Projects funded by NIA in 2009(3)

NIA 한국정보화진흥원

o High Energy Physics Data Transmission
  - Kyungpook National University (Korea), CERN (Europe), Academia Sinica Grid Computing Center (Chinese Taipei), Fermi National Accelerator Laboratory (USA)

o The Prediction of Weather/Climate Change and Natural Disasters
  - Pukyung National University (Korea), European Center for Medium-Range Weather Forecasts (Europe), Indian Institute of Tropical Meteorology (India), VietNam, Laos

Overseas partners include partners from Japan, Singapore, Germany, Philippines, Malaysia, Indonesia, Thailand, Australia, China, France, Spain, Switzerland, USA, India, Vietnam, Laos, Chinese Taipei,

In the future : participation by partners from Latin America (hopefully)

R&E Projects funded by NIA in 2010

NIA 한국정보화진흥원

o network research
  - network engineering & measurement related to future network
  - wireless technology such as sensors, wimax
  - implementation of overlay network utilizing router virtualization, and MP-BGP/VRF (Multi Protocol-Border Gateway Protocol & Virtual Routing and Forwarding)

o applications research
  - high quality video transmission technology for areas such as tele-medicine, tele-education
  - green IT, environment, climate, and other application areas

RFP will be issued shortly.

Possible to apply with Korean partners

KOREN Workshop

http://www.kuf.kr/workshop/

Main themes

(1) Future Network Testbed
(2) Network Engineering
(3) R&E Activities in Asia
(4) 100G Test between KR&JP
(5) Applications

Workshop Agenda near completion.
Many presentations from overseas research networks :
Australia, Japan, Malaysia, TEIN, China, Thailand, India

Possible participation by Mexico/Latin America? (onsite or remote)

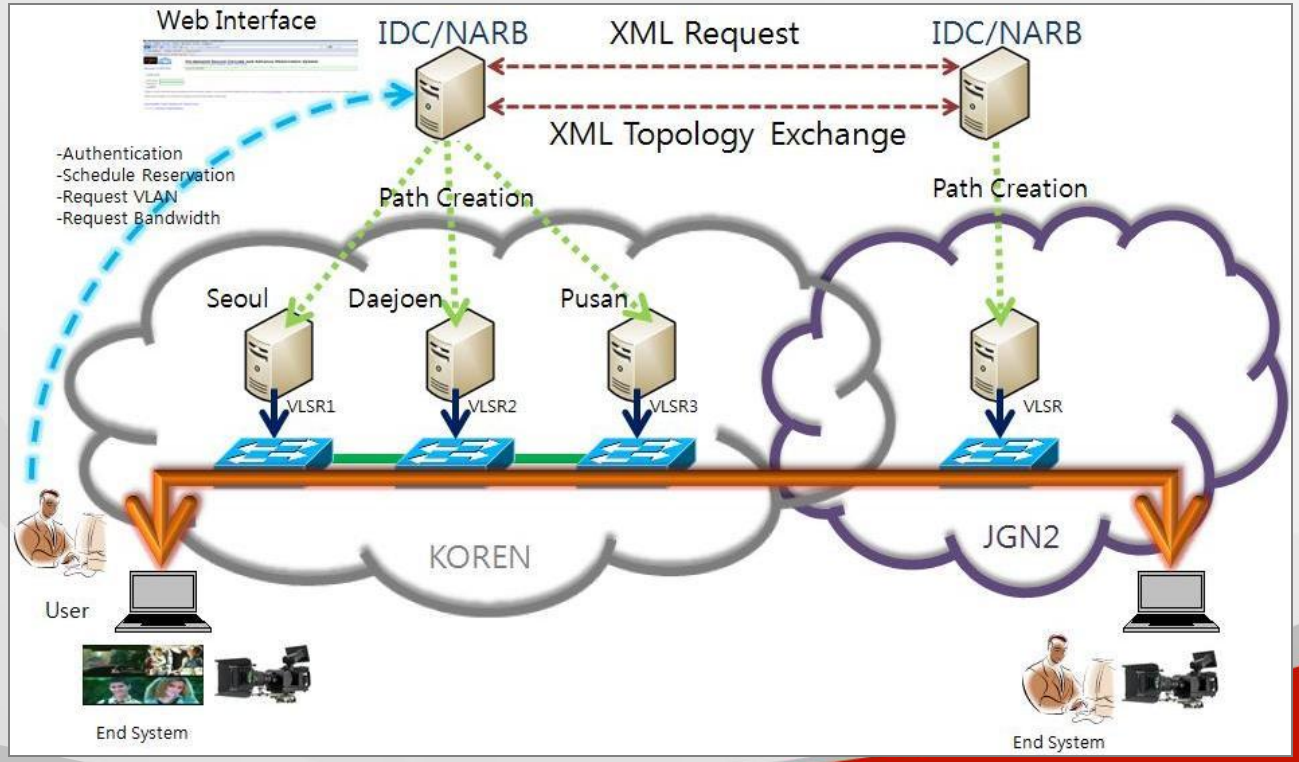
Examples of R&E Activities over KOREN

Dynamic Circuit Network(1)

NIA 한국정보화진흥원

- Apply DCN to KOREN

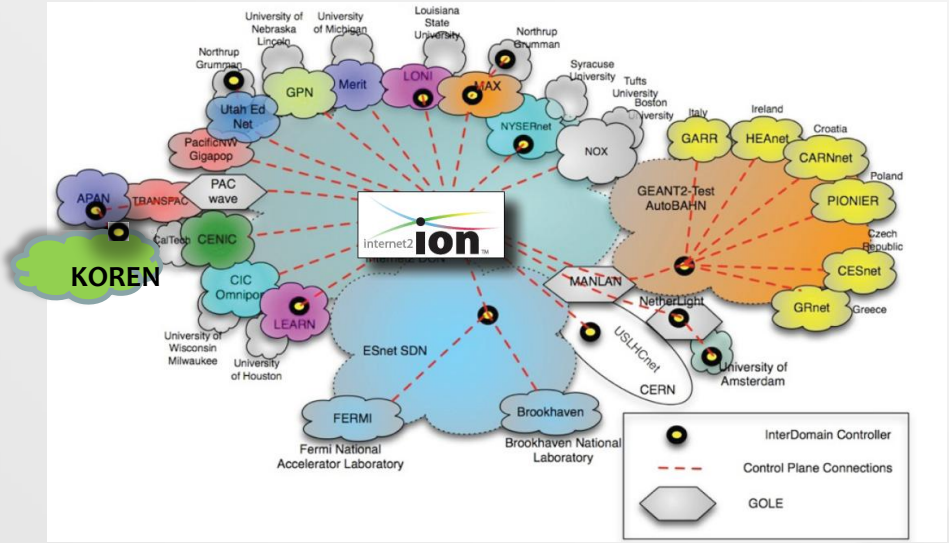
  - Advanced IP network & DCN Service
  - Effective support for researcher who need Large scale data transfer
  - Develop Control plane for deployment and control of network resources and support End-to-End reserved resource service



Dynamic Circuit Network(2)

NIA 한국정보화진흥원

- Participate in Global DCN service
  - DCN expand from Internet2 to other global R&E networks.
  - KOREN deploy pilot DCN service and interconnect to Japan , US.
  - Need to customizing our own resources



Openflow Testbed(1)

NIA 한국정보화진흥원

- **Goal**
  - Deploying OpenFlow test-bed network on KOREN for advancement of KOREN service
- **results of this year's work**
  - Deployed an OpenFlow Test-bed on KOREN
    - OpenFlow switches are installed at 7 KOREN nodes (Seoul, Suwon, Deajeon, Kwangju, Deagu, Busan, Jeju).
    - OpenFlow controller and servers are installed at KOREN Deajeon node.
  - Developed an OpenFlow Path Control System
    - Network users or managers can monitor the status of OpenFlow network and setup paths for traffic flows explicitly.
  - OpenFlow test-bed can support >700Mbps and <10ms performance.
- **Utilization of research results**
  - for new applications which require advanced KOREN services
  - as a backbone network of future Internet test-bed

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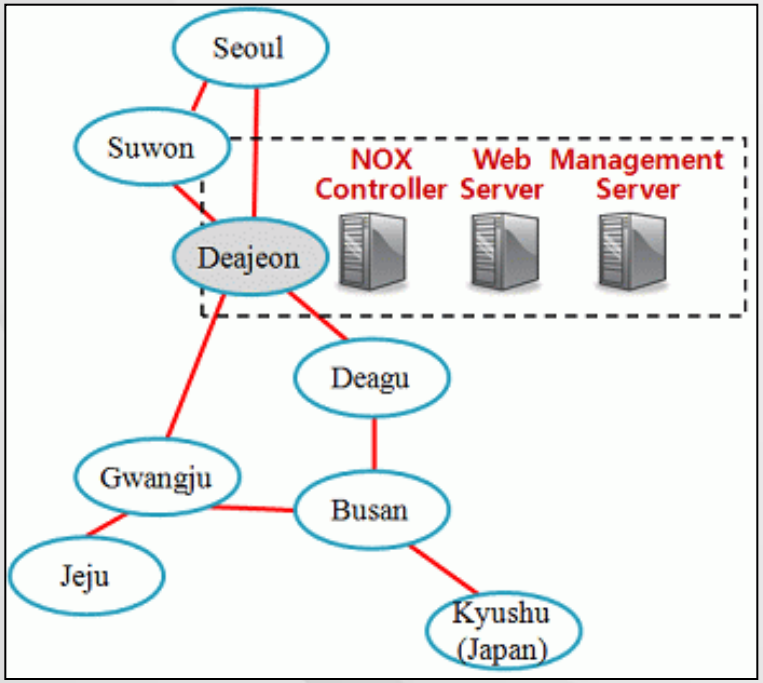
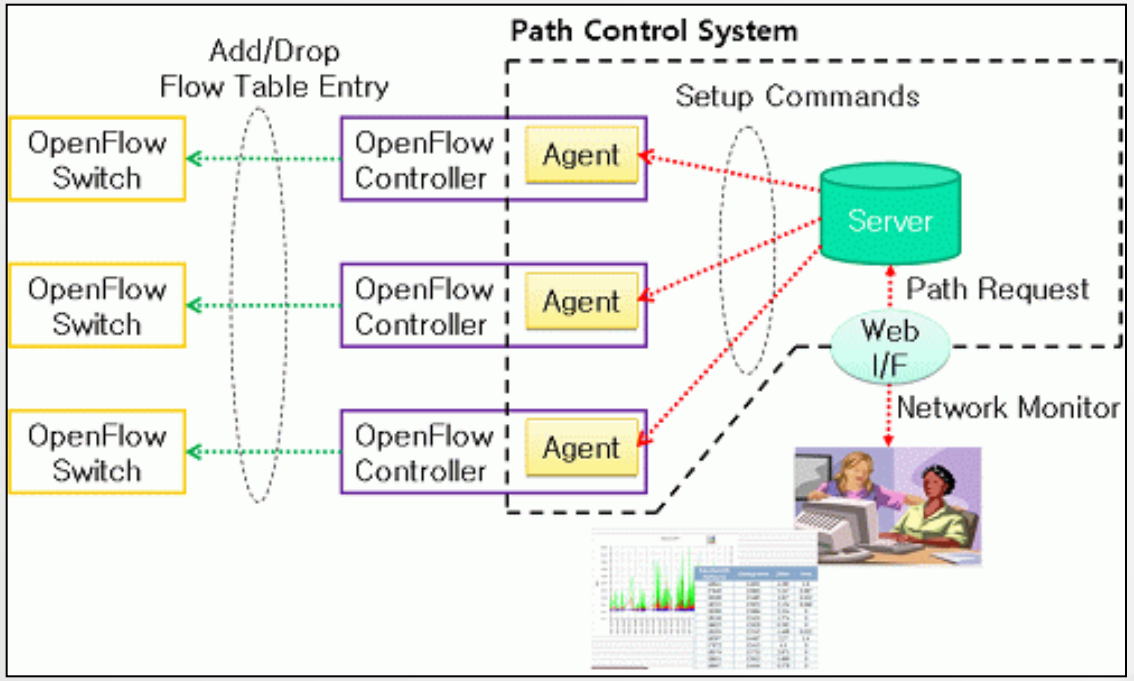
Openflow Testbed(2)

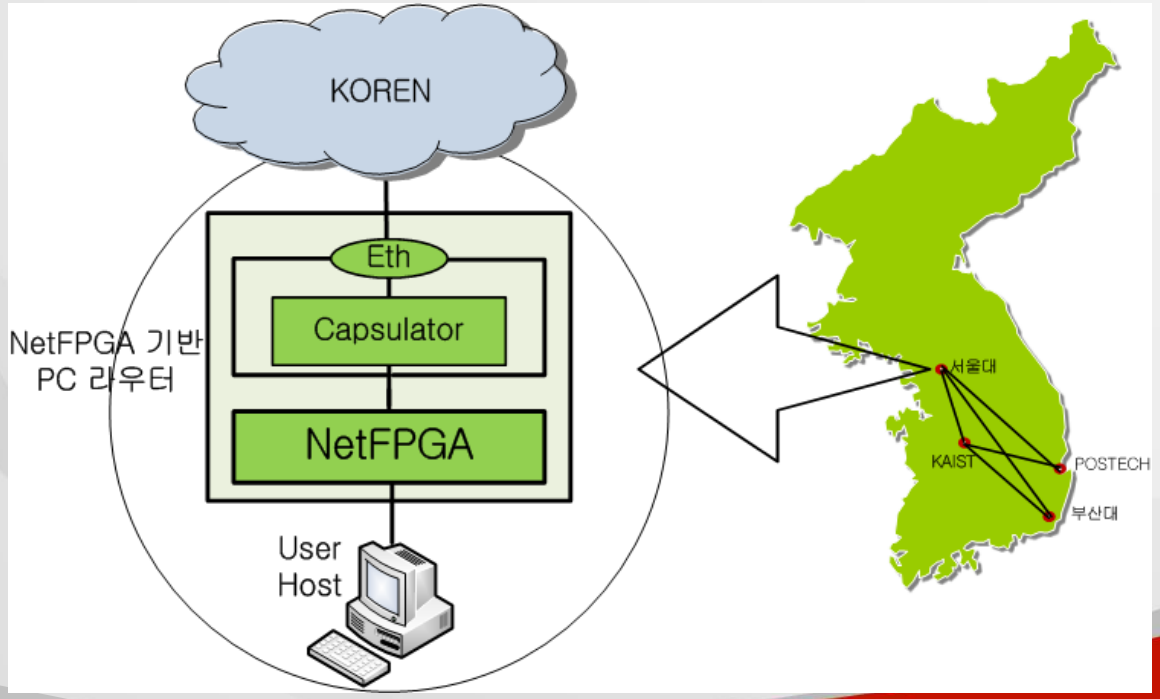




NIA 한국정보화진흥원

A Study on Technology and Application of Future Network using NetFPGA

- We have implemented a testbed using NetFPGA over KOREN where we can experiment new technology and application for future network.
- NetFPGA-based PC Router provided about 172Mbps in the performance experiment.
- We have developed a remote router control system.

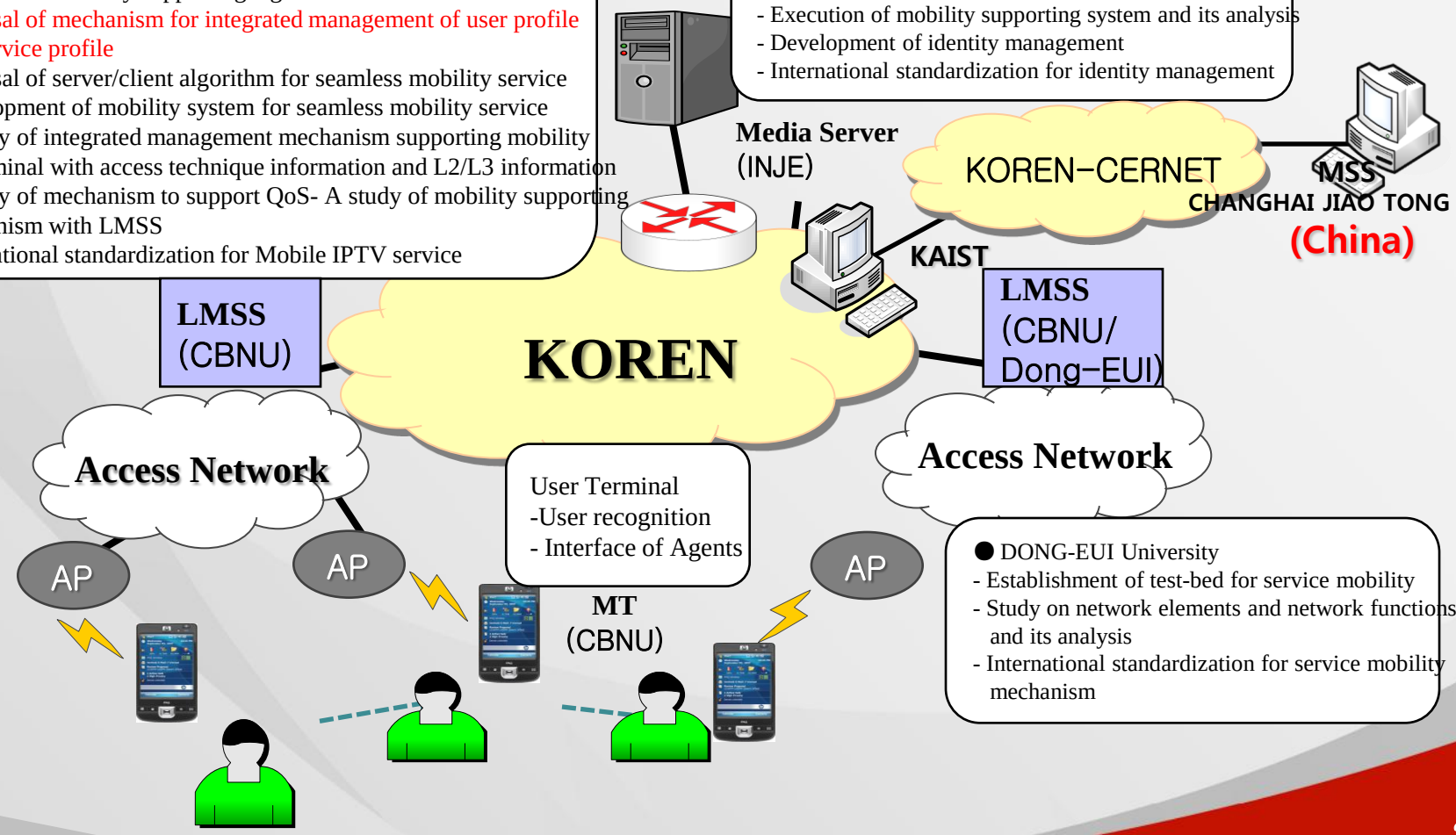


Mobility

A study on research of service mobility for Mobile IPTV between WLAN and WiBro in KOREN environments

Core Mobility Agent
- Proposal of mobility supporting algorithm
- Proposal of mechanism for integrated management of user profile and service profile
- Proposal of server/client algorithm for seamless mobility service
- Development of mobility system for seamless mobility service
- A study of integrated management mechanism supporting mobility to terminal with access technique information and L2/L3 information
- A study of mechanism to support QoS- A study of mobility supporting mechanism with LMSS
- International standardization for Mobile IPTV service

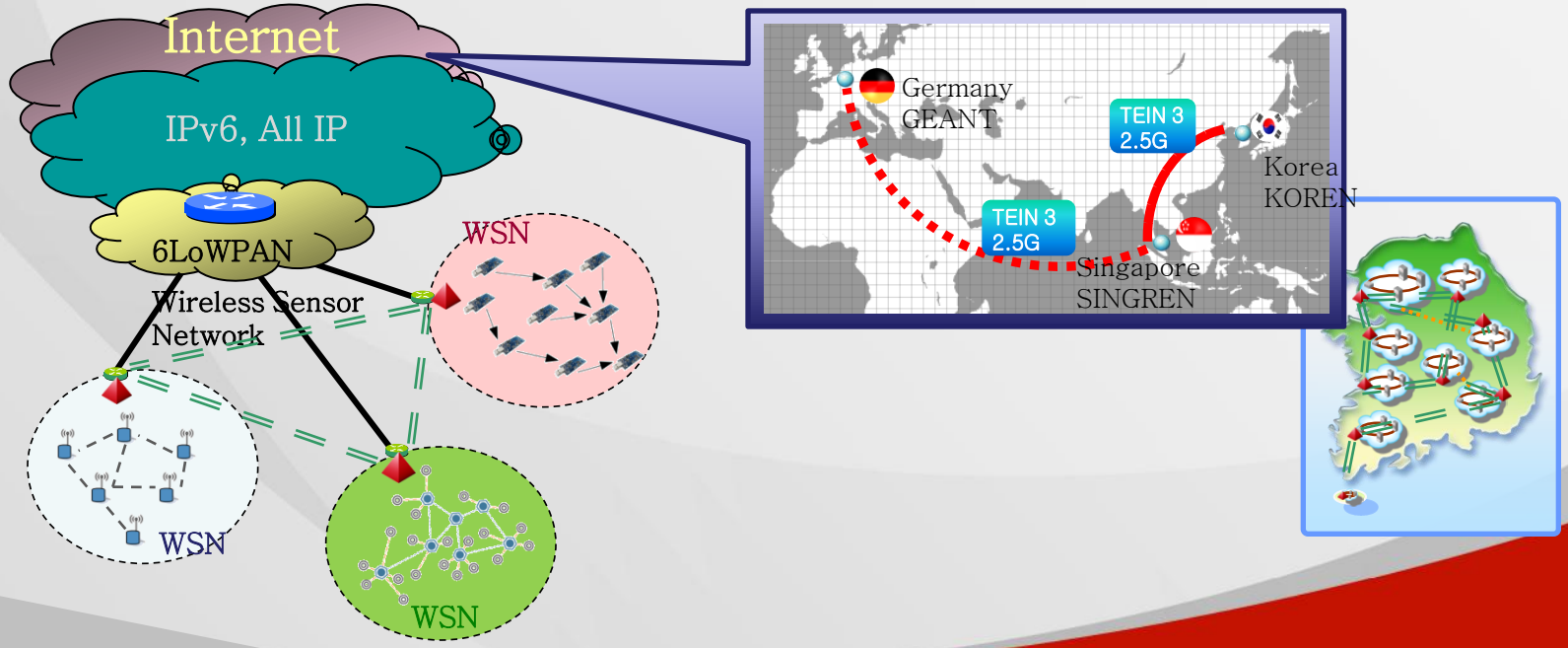
● INJE University
- Configuration of streaming server for Mobile IPTV service
- Execution of mobility supporting system and its analysis
- Development of identity management
- International standardization for identity management



● DONG-EUI University
- Establishment of test-bed for service mobility
- Study on network elements and network functions and its analysis
- International standardization for service mobility mechanism

Development of Key Technologies for Global IP-USN on KOREN

- Global IP-USN Key Technologies & Location Detection Application
  - Kyung Hee Univ. Sungkyunkwan Univ. Iware,Inc. Singapore Institute of Infocomm Research
  - Global IP-USN Management System: Dynamic Topology composition, Dynamic interval scheduling, Congestion control algorithm, Reliable data transmission, WSN Management & Monitoring System
  - Interpan-Mobility: Research & Development 6LoWPAN Sensor Gateway for support mobility Based on PMIPv6
  - Location Detection Application : Method for detect exact location, IP-USN Interworking, PMIPv6 Load balancing



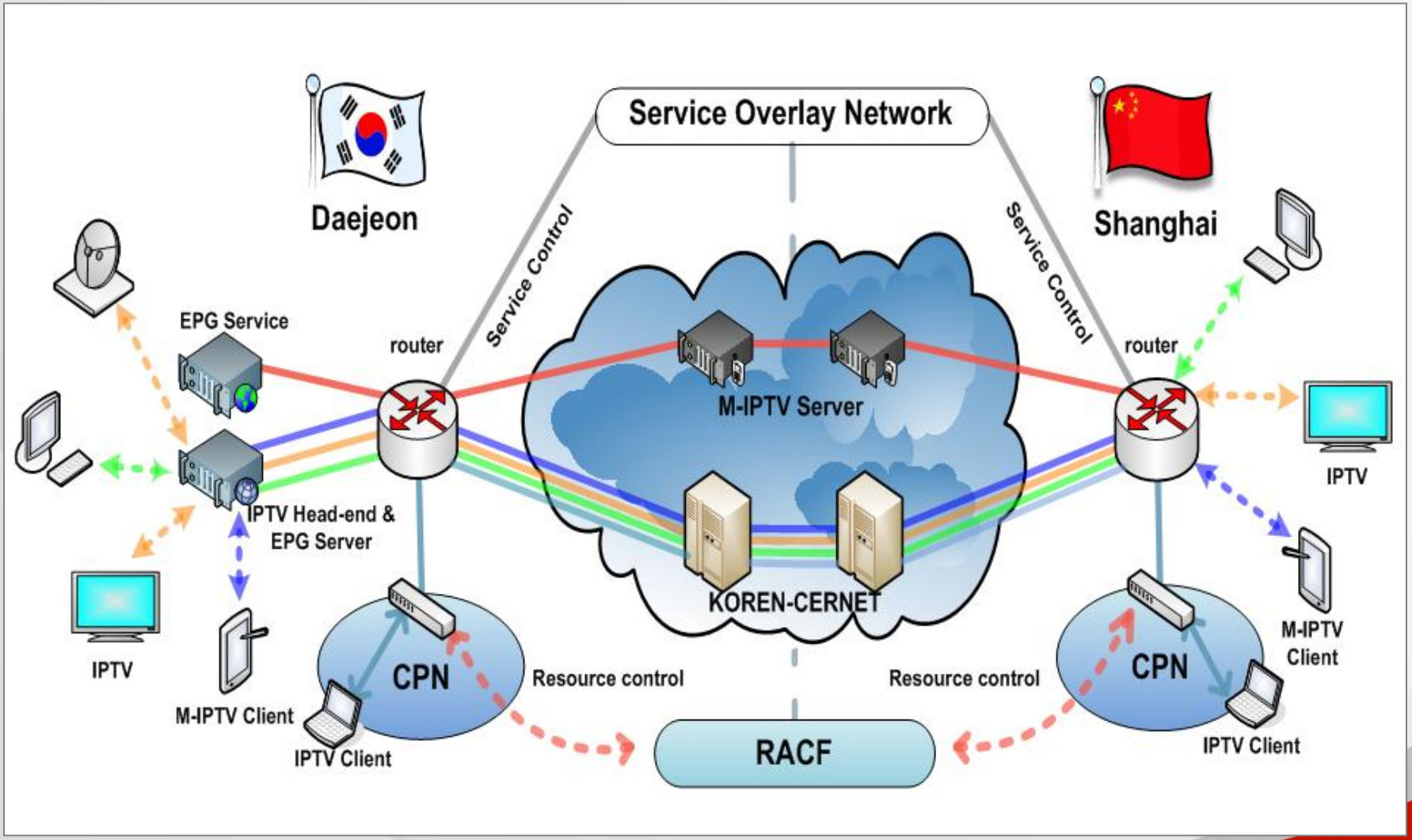
IPTV(1)

NIA 한국정보화진흥원

A Study on Development of Test Environment for IPTV Application Service between Korea, China and Europe Using KOREN

- Objectives of this study
  - Development and test of IPTV application test environment for web based IPTV service using KOREN
  - Development of international testbed for IPTV service between Korea-China, Korea-Europe using KOREN/CERNET/TEIN3
  - International standardization of IPTV technology conducted from this study
  - Preparation of infrastructure for IPTV service among Korea-China-Europe using KOREN/CERNET/TEIN3 for future co-work
- Accomplishments of this study
  - Attending WIN 2009 workshop held between Korea and China
  - Developed and tested test environment for HD IPTV service between Korea-China
  - Hosted France-Korea International IPTV Joint Workshop
  - Developed international test environment and tested ICMP for IPTV service between Korea and France
  - Contributed 7 documents for international IPTV standardization
  - Wrote 2 international paper and 2 domestic paper for future IPTV service
  - Scheduled to apply 1 patent on personalized IPTV service

IPTV(2)


Service Overlay Network
Daejeon
Shanghai
Service Control
Service Control
EPG Service
router
router
M-IPTV Server
IPTV Head-end &
EPG Server
IPTV
IPTV
KOREN-CERNET
M-IPTV
Client
CPN
Resource control
Resource control
CPN
M-IPTV Client
IPTV Client
IPTV Client
RACF

Weather/Climate

NIA 한국정보화진흥원

Project Name	The study on prediction of weather/climate disaster using KOREN/TEIN			
Main Research Institute	PKNU Institute of Enviromental and Marine Sciences and Technology Super Computer Center	**Principal Investigator**	Jai-Ho Oh	
		Co-Investigator	P.N.Sen / R.Kripalani	
Project Period	2008.7.20~2008.12.31 (5.3 months)	**Research Fund**	Government Fund	30,000,000 won
			Research Institute Fund	10,000,000 won
			Total	40,000,000 won
Research Objectives	• Production and application of weather/climate disaster prediction information using GME based on KOREN/TEIN3			

Scope and Contents of Research	
Contents	Scope
Construction of system for High-resolution NWP model GME based on KOREN/TEIN3	Installing of GME model based on KOREN/TEIN3
ECMWF data access using TEIN/KOREN and Traffic test	Collection of ECMWF data and Traffic test
Production and Analysis of Medium-range Forecast and weather/climate disaster data using GME	Production and Analysis of Medium-range Forecast output using GME range from local to Global region

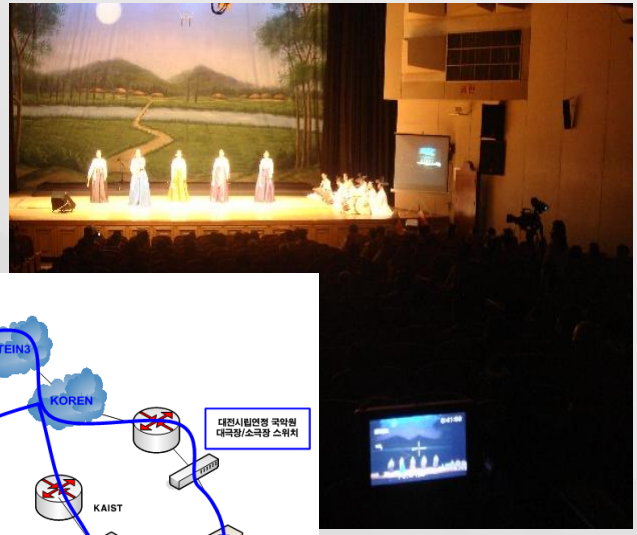
e-culture

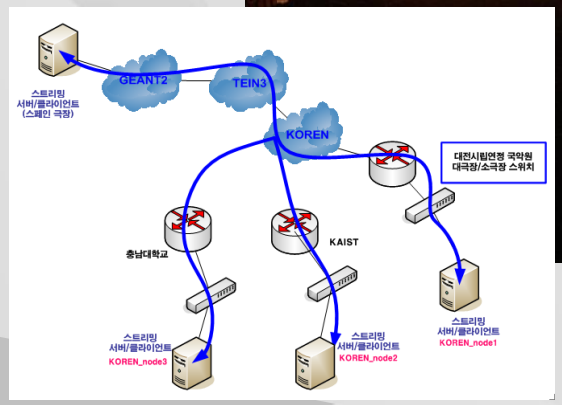
NIA 한국정보화진흥원

- Cultural performance utilizing network between Korea- Spain using TEIN
  - Overcoming limitations of physical space to create new type of cultural performance (performers from 2 locations jointly perform)
  - Performance conducted between 2009.7~12

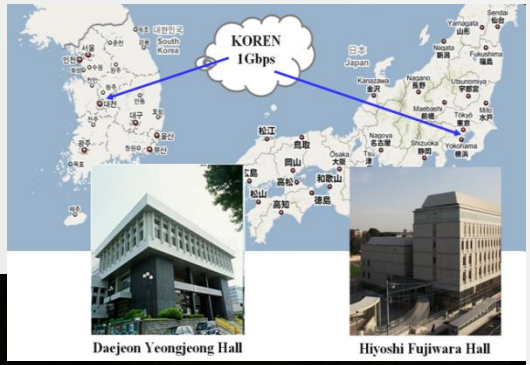
Realtime transmission of Korean traditional performance to Spain

(Daejeon Traditional Music Organization)





Korea-Japan Network Performance **tBand Wa-i"**

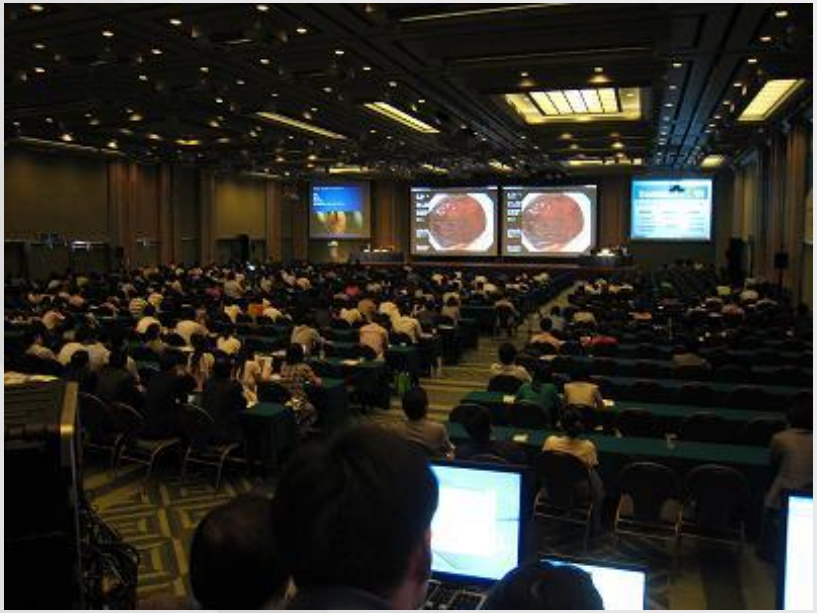


tele-medicine

NIA 한국정보화진흥원

o international tele-surgery demonstrations

o research on high quality HD content transmission technology



< demonstration event at Hilton Hotel in Seoul (‘09.8) >

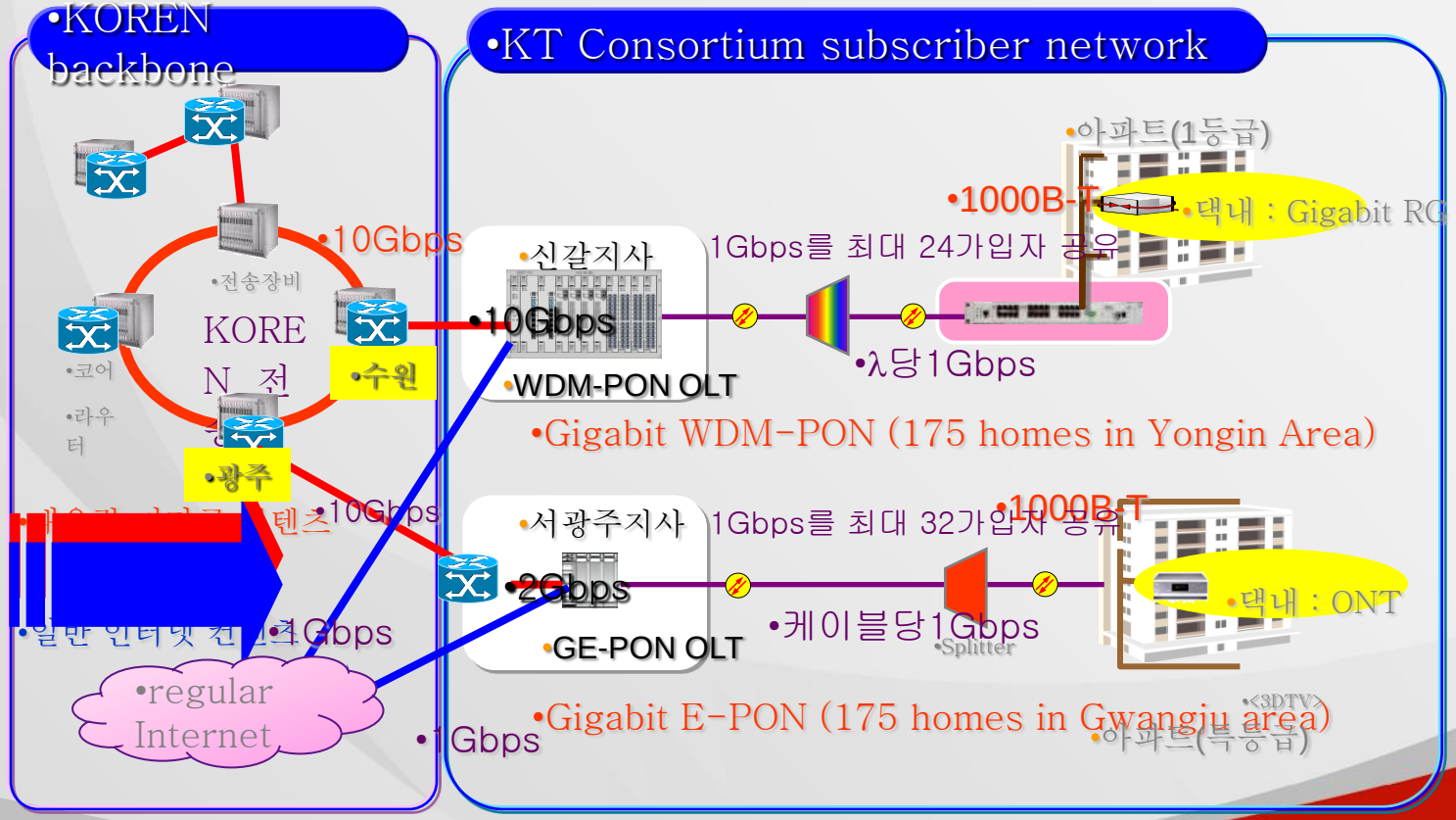
< Demonstration during APEC TEL (’08.3)>

- HD quality video of surgery performed in area A transmitted to area B (with lecture)
- Great potential for doctor training in developing countries

KOREN as backbone for IT pilot prjs

KOREN is not only used for academic community, but also as backbone for field trial pilot projects of government's broadband policy implementation

- e.g. Giga Internet Pilot Project which aims to bring gigabit Internet connection to households by 2013

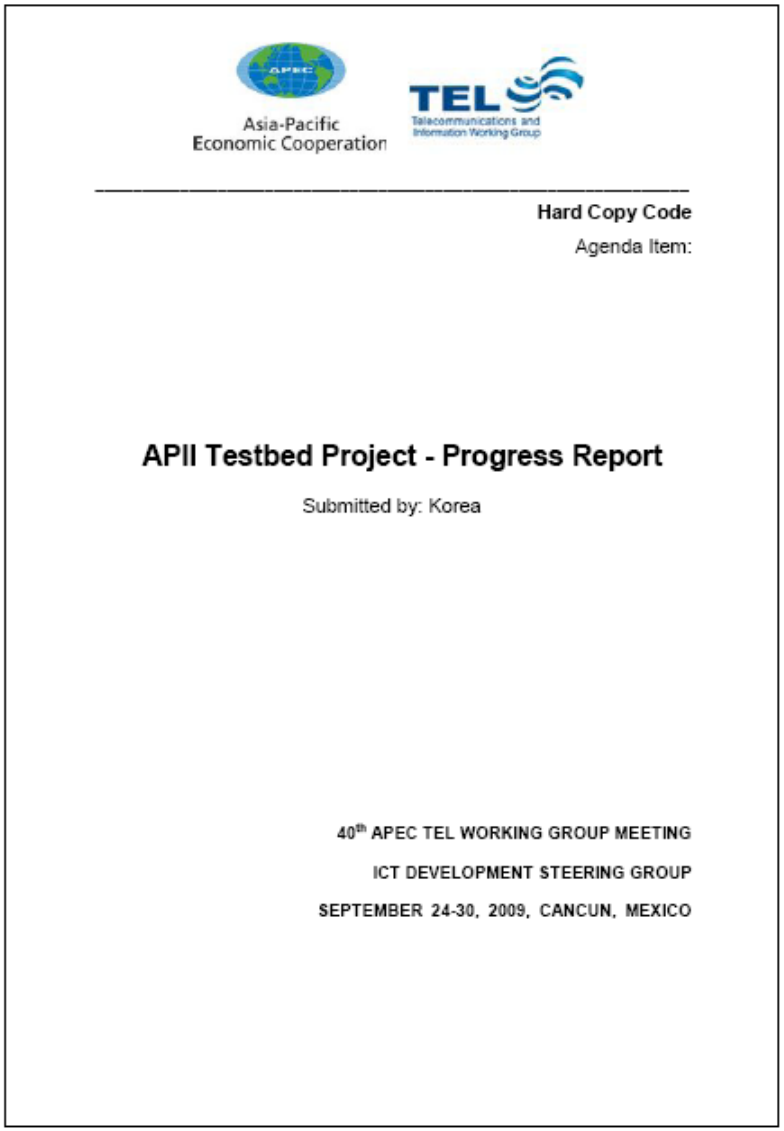


APII Testbed Project

- 1994
- At the APEC Leaders' Meeting, the concept of APII(Asia Pacific Information Infrastructure) was conceived.

- 1995
- At the 1st APEC Ministerial Meeting (TELMIN) held in Seoul, Korea, APEC ministers agreed to advance the information infrastructure and establish the Asia Pacific Information Infrastructure (APII) in the Asia Pacific region.
- At the 12th APEC TEL Working Group held in China, Korea and Japan jointly proposed (with Korea as the project leader) the APII Test-bed project, to facilitate the development of APII from research & testing perspective. The Project was approved.

APII Testbed Project


Asia-Pacific
Economic Cooperation

TEL
Telecommunications and Information Working Group

Hard Copy Code

Agenda Item:

APII Testbed Project - Progress Report

Submitted by: Korea

40th APEC TEL WORKING GROUP MEETING

ICT DEVELOPMENT STEERING GROUP

SEPTEMBER 24-30, 2009, CANCUN, MEXICO

- Progress reports on APII Testbed have been submitted at each APEC TEL meeting ever since.
- APII Testbed connections between Korea-Japan, Korea-US, Korea-Singapore, Korea-China were set up
- Currently Korea-Japan connection remain with the APII Testbed name
- APII Testbed Project is more than just physical linkage but a framework for R&E cooperation among APEC member economies

APII Testbed Project

APII Testbed on the APEC Ministers' Agenda

Ministers' directive on APII-TB in 2008 : 1st explicit directive at TELMIN

The Seventh APEC Ministerial Meeting on
The Telecommunications and Information Industry
(TELMIN7)
(23-25 April 2008, Bangkok, Thailand)

BANGKOK DECLARATION
"Digital Prosperity: Turning Challenges into Achievement"

23. We encouraged further work to ensure that all APEC economies benefit from innovative technologies and services, recognizing the potential transformative nature of advanced and emergingtechnologies. We also encourage continued sharing of information and demonstration of new and advanced technologies, including cooperative projects such as grid computing and ***testbeds*** that could benefit all economies.

APII-TB Workshop(1)

o created to facilitate more in-depth discussion of APII Testbed

o held every year since 2004.

o 2009 APII Testbed Workshop,
- organized by NIA
- held in Kaohsiung, Chinese Taipei on March 2nd, 2009,
- in co-location with the APAN meeting
  * APAN : meeting of research network organizations in the Asia Pacific region
- theme of the workshop : 'Emerging Technologies for Sustainable Future Network Testbeds'.

o 2010 APII Testbed Workshop
- organized by NICT of Japan
- will be held in Hanoi VietNam in August of 2010
- also in co-location with the APAN meeting.

APII-TB Workshop(2)

< 2009 APII Workshop Participants >

< Main Speakers of the '09 Workshop including APEC TEL DSG Convenor>

Would like to encourage Latin American APEC members' participation
– Mexico, Peru, Chile –

Opportunity to meet with research networking community in the Asia Pacific region

KOREN-CUDI-CLARA-APEC Cooperation

* some possible areas for cooperation

o information exchange
  - information exchange on R&E activities, relevant experts(who's who), RFP on R&E projects, etc
  - video conference between KOREN-CUDI
    . at first, once a year, then gradually increase on a need basis

o participation at one anothers' activities and joint activities
  - participation at one anothers' annual conferences (e.g. this CUDI conference, KOREN Workshop, CLARA event, etc)
  - participation at one anothers' R&E projects through joint project with relevant partners (possible areas : tele-medicine?)

o cooperation at APEC (at policy level and research level)
  - continued support for APII Testbed Project at APEC
  - co-sponsoring of APII Testbed Project
  - mutual participation at and/or hosting of APII Testbed Workshop

o mutual participation at common relevant fora : APAN?

Thank You

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www.koren.kr