

# JGN2

## Advanced Network Testbed for R&D in Japan

Nov 13, 2006

National Institute of Information and Communications Technology  
(NICT)

Takayuki Nakao  
nakao@nict.go.jp

# National Project “JGN2”

## JGN2 Summary

- JGN2 is **high-speed open testbed network** for **R&D activities** and **field trials** for many kinds of applications.
- JGN2 is **National Project** which is based on **National IT policy** “e- Japan strategy” and “u-Japan strategy”.
- JGN2 is owned and operated by **NICT** (National Institute of Information and Communications Technology), which is the only public organization in the field of ICT.
- JGN2 has been promoting in collaboration with the **industry**, the **academia**, the **government** and **regional organizations**.

## Goal of JGN2

**JGN2 will get the future ICT society in perspective**

# Outline of JGN2

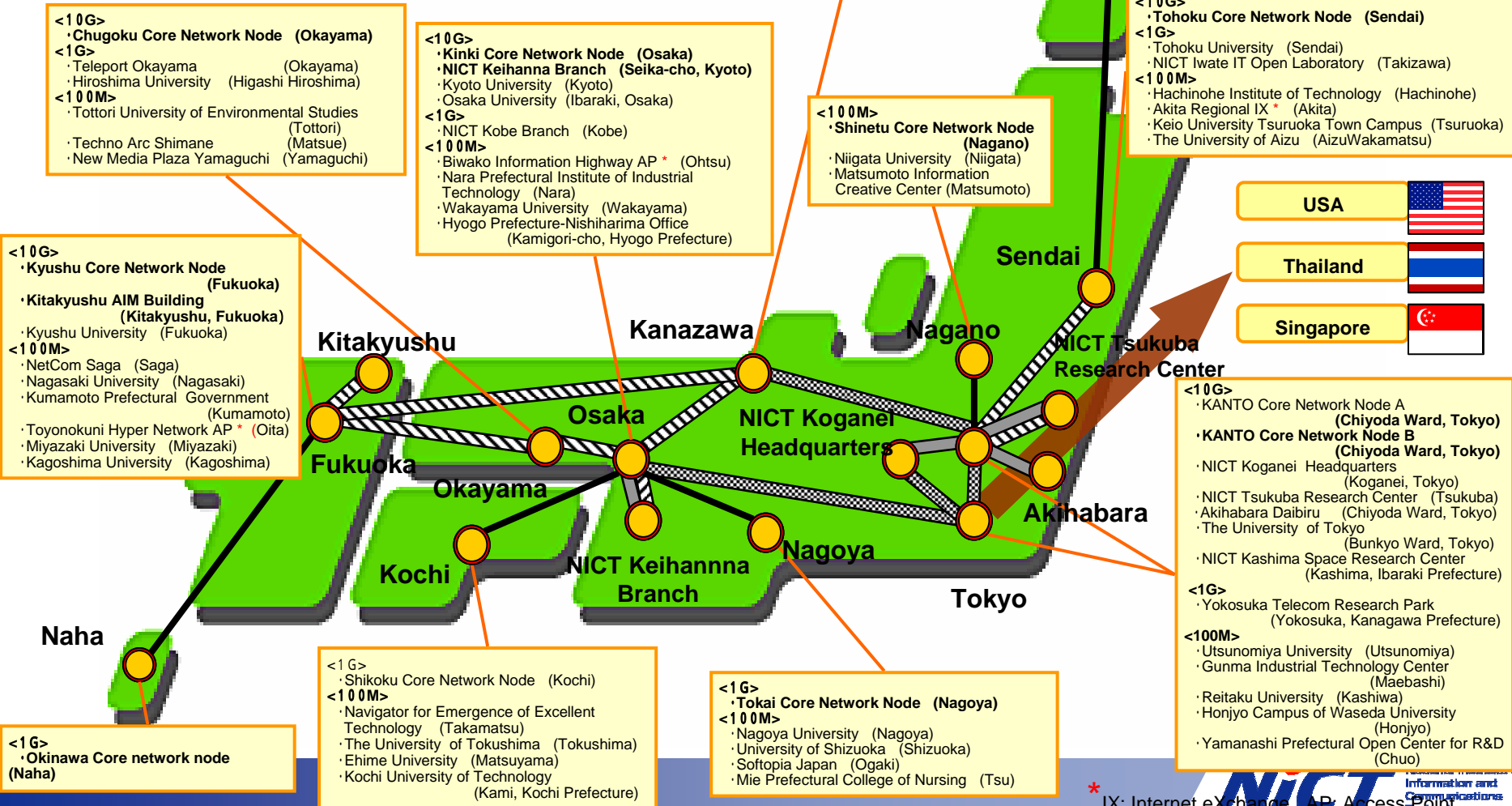
- **Open testbed** network for research and development;
- Network based on **Eathernet (L2) and IP(L3)**;
- Super-high-speed backbone network up to **20Gbps**  
(10Gbps x 2);
- **Nationwide** access point (s) in each prefecture  
(Total: 64);
- **International circuits** for USA, Singapore and Thailand;
- Implementation of **Optical Cross Connect (OXC)**;
- **Optical testbed** facilities with dark fiber;

# JGN2 Network Topology

May, 2006

## [Legends]

- 20Gbps
- 10Gbps
- 1Gbps/100Mbps
- Optical testbed
- Access points
- Core network nodes (Available as access points)



**<10G>**

- Hokuriku Core network node (Kanazawa)
- Ishikawa Create Lab (Nomi-shi, Ishikawa Prefecture)

**<100M>**

- Toyama Institute of Information Systems (Toyama)
- Fukui Information Super Highway AP\* (Fukui)

**<1G>**

- Hokkaido Core Network Node (Sapporo)
- Network Organization for Research and Technology in Hokkaido (Sapporo)

**<10G>**

- Chugoku Core Network Node (Okayama)

**<1G>**

- Teleport Okayama (Okayama)
- Hiroshima University (Higashi Hiroshima)

**<100M>**

- Tottori University of Environmental Studies (Tottori)
- Techno Arc Shimane (Matsue)
- New Media Plaza Yamaguchi (Yamaguchi)

**<10G>**

- Kinki Core Network Node (Osaka)
- NICT Keihanna Branch (Seika-cho, Kyoto)
- Kyoto University (Kyoto)
- Osaka University (Ibaraki, Osaka)

**<1G>**

- NICT Kobe Branch (Kobe)

**<100M>**

- Biwako Information Highway AP\* (Ohtsu)
- Nara Prefectural Institute of Industrial Technology (Nara)
- Wakayama University (Wakayama)
- Hyogo Prefecture-Nishiharima Office (Kamigori-cho, Hyogo Prefecture)

**<100M>**

- Shinetsu Core Network Node (Nagano)
- Niigata University (Niigata)
- Matsumoto Information Creative Center (Matsumoto)

**<10G>**

- Tohoku Core Network Node (Sendai)

**<1G>**

- Tohoku University (Sendai)
- NICT Iwate IT Open Laboratory (Takizawa)

**<100M>**

- Hachinohe Institute of Technology (Hachinohe)
- Akita Regional IX\* (Akita)
- Keio University Tsuruoka Town Campus (Tsuruoka)
- The University of Aizu (AizuWakamatsu)

**<10G>**

- Kyushu Core Network Node (Fukuoka)

**<100M>**

- Kitakyushu AIM Building (Kitakyushu, Fukuoka)
- Kyushu University (Fukuoka)
- NetCom Saga (Saga)
- Nagasaki University (Nagasaki)
- Kumamoto Prefectural Government (Kumamoto)
- Toyonokuni Hyper Network AP\* (Oita)
- Miyazaki University (Miyazaki)
- Kagoshima University (Kagoshima)

**USA**

**Thailand**

**Singapore**

**<10G>**

- KANTO Core Network Node A (Chiyoda Ward, Tokyo)
- KANTO Core Network Node B (Chiyoda Ward, Tokyo)
- NICT Koganei Headquarters (Koganei, Tokyo)
- NICT Tsukuba Research Center (Tsukuba)
- Akihabara Daibiru (Chiyoda Ward, Tokyo)
- The University of Tokyo (Bunkyo Ward, Tokyo)
- NICT Kashima Space Research Center (Kashima, Ibaraki Prefecture)

**<1G>**

- Yokosuka Telecom Research Park (Yokosuka, Kanagawa Prefecture)

**<100M>**

- Utsunomiya University (Utsunomiya)
- Gunma Industrial Technology Center (Maebashi)
- Reitaku University (Kashiwa)
- Honjyo Campus of Waseda University (Honjyo)
- Yamanashi Prefectural Open Center for R&D (Chuo)

**<1G>**

- Shikoku Core Network Node (Kochi)

**<100M>**

- Navigator for Emergence of Excellent Technology (Takamatsu)
- The University of Tokushima (Tokushima)
- Ehime University (Matsuyama)
- Kochi University of Technology (Kami, Kochi Prefecture)

**<1G>**

- Tokai Core Network Node (Nagoya)

**<100M>**

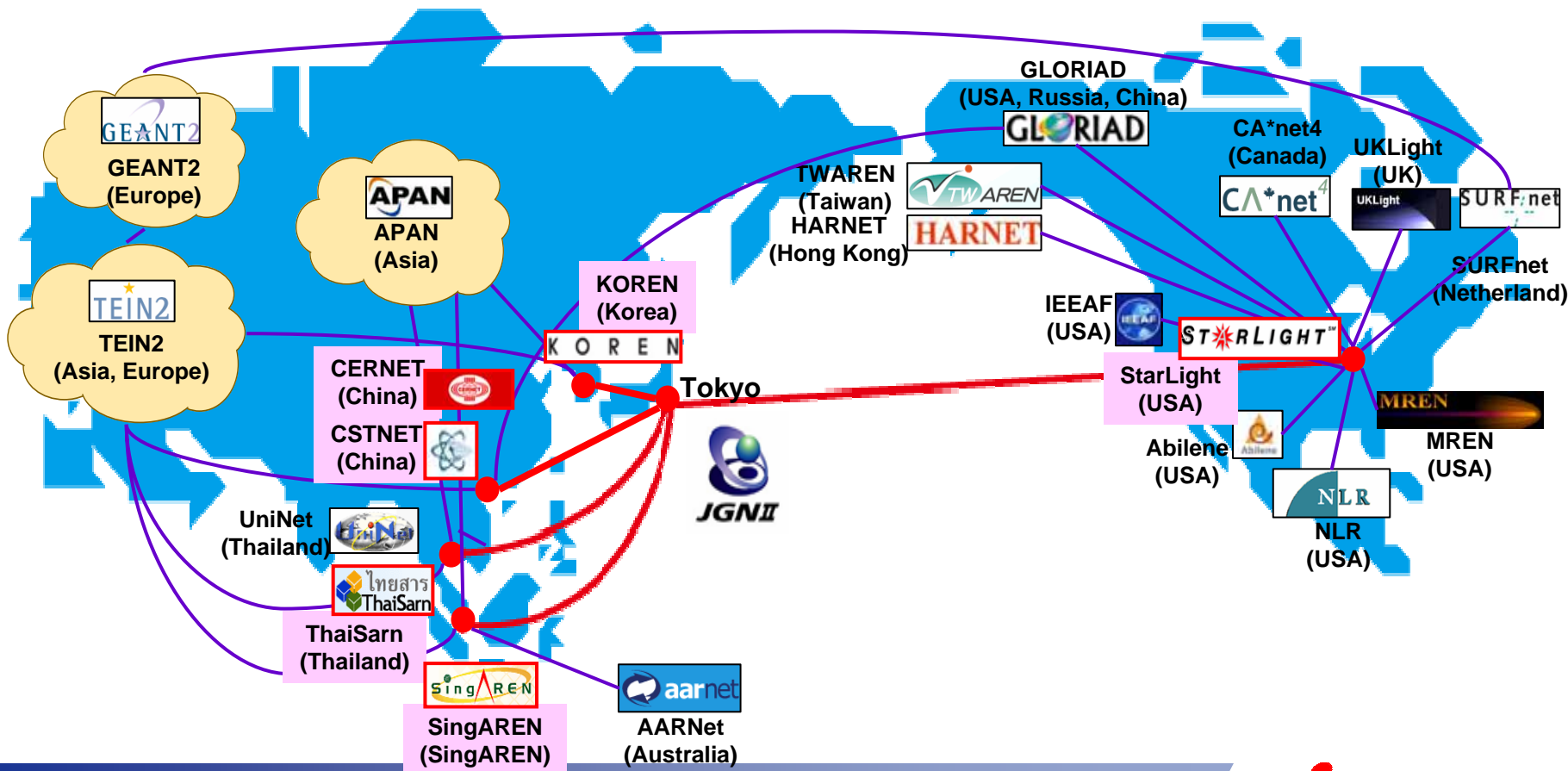
- Nagoya University (Nagoya)
- University of Shizuoka (Shizuoka)
- Softopia Japan (Ogaki)
- Mie Prefectural College of Nursing (Tsu)

**<1G>**

- Okinawa Core network node (Naha)

# JGN2/NICT International Network Structure

US-JP line	: Tokyo-Chicago, 10Gbps x 1
TH-JP line	: Tokyo-Bangkok, 45Mbps x 1
SG-JP line	: Tokyo-Singapore, 155Mbps x 1
KR-JP line	: Fukuoka-Hyeonhae, 2.4Gbps x 1
HK-JP line	: Tokyo-Hong Kong, 2.4Gbps x 1



## Results of JGN2 R&D Project

### Total Number of R&D Domestic Projects through JGN2: **130**

- Network	
· Network Basic Technology	17
· Optical Technology	20
· IPv6 Technology	16
· Security Technology	13
- Middleware	
· Quantum Cryptography Technology	2
· Grid Research	7
· Human Interface	7
- Application	
· Educational Field	17
· Medical Field	9
· Regional Field	13
· Contents Field	14
· Environmental and Scientific Field	5

(Project Category: counted plural times)

## International Project

Number of International Project: **18**

The projects via JGN2 were performed with the research organizations in USA, Thailand, Singapore and also Europe and the areas in East Asia via the other networks with interconnection.

## JGN2 Human Resource Development

(Category)	(Number)
Research Organization	<b>466</b>
Participated Researcher	<b>1396</b>
Participated Researcher from 7 Research Centers	<b>94</b>
Thesis	<b>61</b>
Presentation	<b>89</b>
Patent Application	<b>2</b>

## 1. Research activities in NICT Research Centers

- Grid network technology
- Nationwide IPv6 Multicast experiment
- GMPLS network operation and management technology
- Sensor network experiment etc

## 2. Research activities on Optical Testbed on JGN2

- 1000 Wavelengths WDM experiment for 126Km Transmission
- 100Tera Optical Router Technology
- 160Gbps Optical Packet Switching System Prototype
- Quantum Cryptography Telecommunications Technology etc.

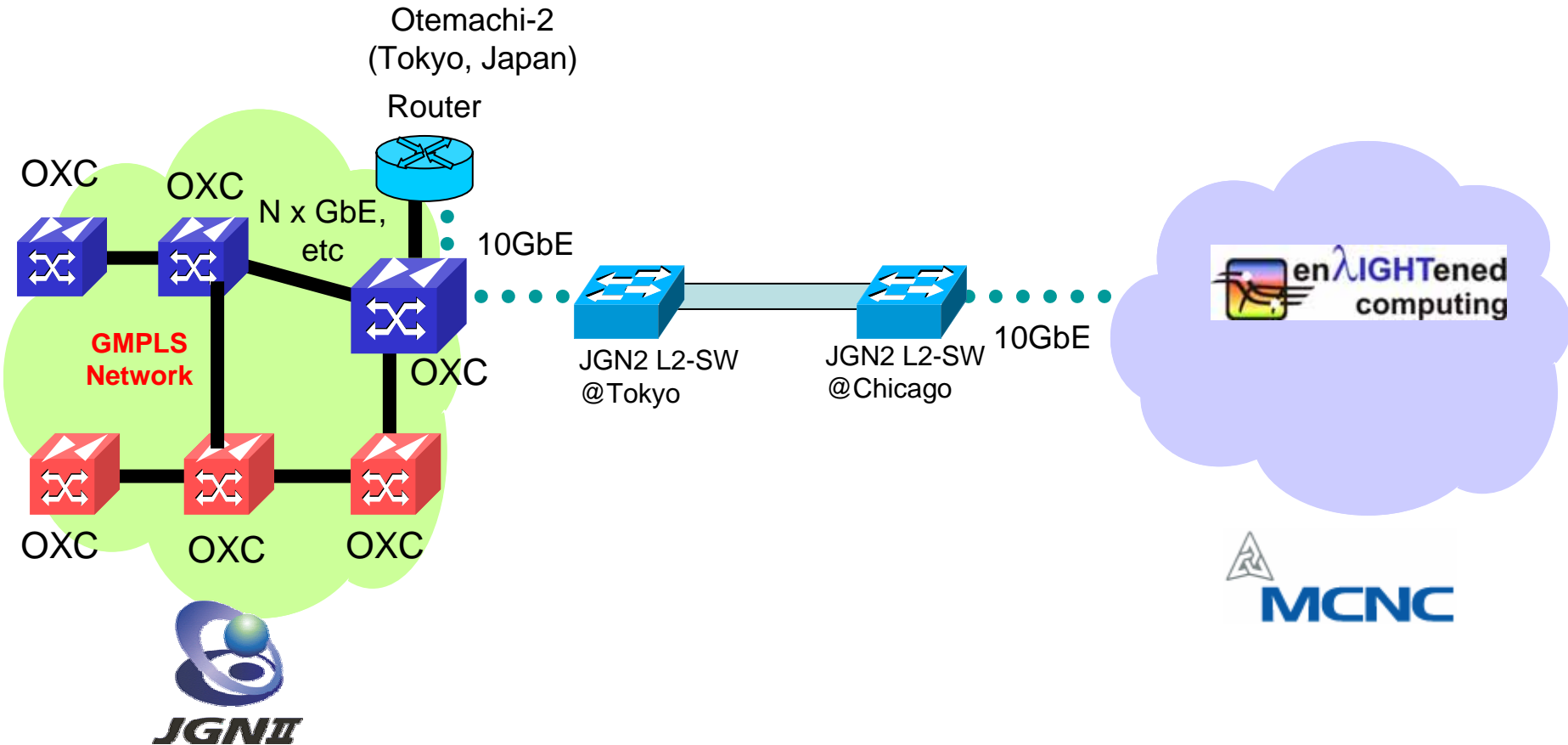
## 3. International Research activities on JGN2

- 4K Digital Cinema (4096 x 2160 pixel resolution)
- Data Reservoir :LSR demonstrative experiment on IPv4 and IPv6
- Globe-scale radio astronomy (e-VLBI)
- 3D-HD Experiment of Telemedicine etc.

# GMPLS (Tsukuba Research Center)

## Enlightened/G-Lambda Collaboration Demo with MCNC

Collaboration of GRID:  
GLIF@Tokyo, Japan 2006/09/11-12  
SC06@Tampa, USA 2006/11/11-17





**Thank you for your attention!**

**Enjoy demos utilizing JGN2!**

## **Contact Information**

**National Institute of Information and  
Communications Technology  
(NICT)**

**4-2-1, Nukui-Kitamachi, Koganei,**

**Tokyo 184-8795 Japan**

**TEL: +81-42-327-6005**

**E-Mail: [jgn2center@jgn2.jp](mailto:jgn2center@jgn2.jp)**

**URL: <http://www.jgn.nict.go.jp/>**