■ To use JGN-X for your R&D activity

JGN-X can be utilized by essentially anyone for the purpose of R&D. Please see "How to use JGN-X" on the JGN-X website before submitting an application.
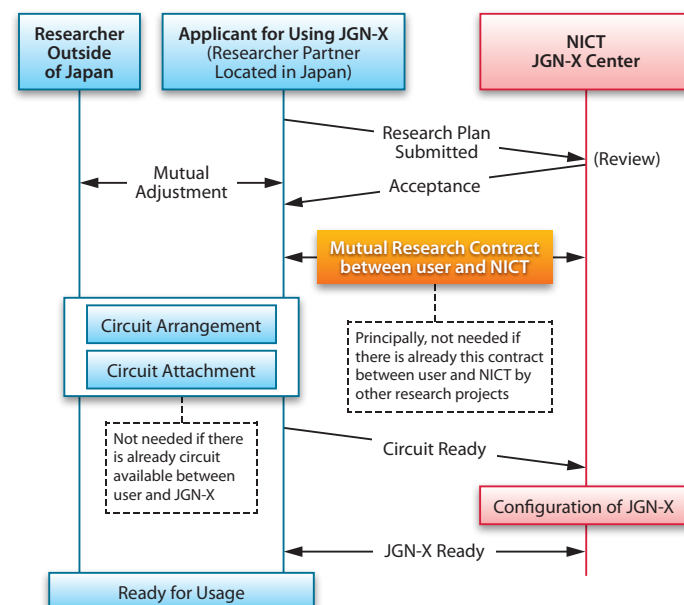
● Using JGN-X with global partner

- Utilization will need to be done by researchers in Japan.
- After submitting the research plan document to the JGN-X center, partners overseas and in Japan will need to coordinate their JGN-X usage.
- Please keep in mind that to be able to use JGN-X globally, one must be able to connect to a JGN-X access point from a global location.
- Global R&D partners will also need to uphold the "JGN-X Usage Guidelines" and "JGN-X Usage Rules," as do researchers in Japan.

For researchers outside of Japan:
This procedure is to be undertaken by researchers in Japan. Please ask your research partner in Japan or contact the JGN-X center via e-mail.

《 JGN-X Utilization Procedure 》

Researcher Outside of Japan	Applicant for Using JGN-X (Researcher Partner Located in Japan)	NICT JGN-X Center
	Research Plan Submitted →	(Review)
Mutual Adjustment	← Acceptance	
	Mutual Research Contract between user and NICT	
Circuit Arrangement		Principally, not needed if there is already this contract between user and NICT by other research projects
Circuit Attachment		
Not needed if there is already circuit available between user and JGN-X	Circuit Ready →	
		Configuration of JGN-X
	← JGN-X Ready →	
Ready for Usage		

● Local Contacts

Ministry of Internal Affairs and Communications
Technology Policy Division, Global ICT Strategy Bureau   TEL: +81-3-5253-5727

New-Generation Network comes from JGN-X/StarBED³

Network Testbed Research and Development Promotion Center

JGN-X
StarBED³

National Institute of Information and Communications Technology

Network Testbed Research and Development Promotion Center: Aims
Building a Prototype New-Generation Network!

The Network Testbed Research and Development Promotion Center of the National Institute of Information and Communications Technology (NICT) aims to build and operate a prototype new-generation network in order to establish and put to practical use its core technology. Toward this goal, the Center utilizes the new-generation network testbed JGN-X, which has cutting-edge network performance, functions, and technologies including those currently in development. In addition, the large-scale network emulator StarBED³, which is capable of simulating PC-based networking, sensor devices, home appliances, etc., using actual code in a computerized network environment is also contributed. Also the Center aims to promote R&D and validation testing on the new-generation network testbed in cooperation with industry, academia, and the government.

■ Role of the testbed toward establishing the new-generation network
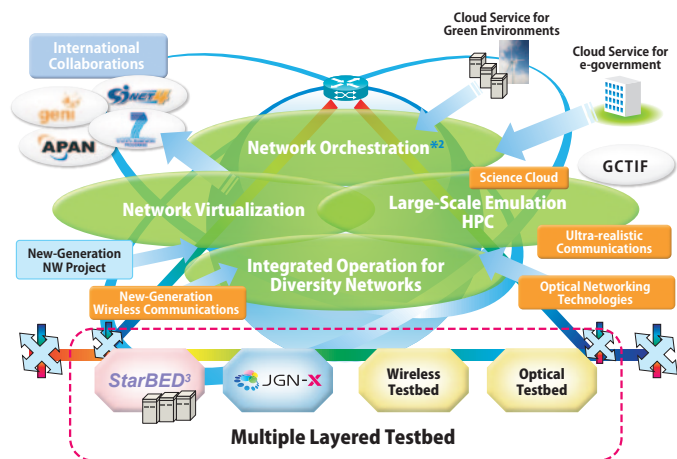
● Development of JGN/StarBED

JGN has been developed as a large-scale R&D testbed network for researching cutting-edge network technology and conducting experiments for various applications. It was operated continuously from 1999 as JGN, from 2004 as JGN2, and from 2008 as JGN2 plus. JGN improved in each phase as the most advanced contemporary functions and performance improvements were introduced. In addition, StarBED began operation in 2002 as StarBED, and in 2006, it became StarBED2. The scope of StarBED's mission has expanded from simulations of the Internet to ubiquitous networks.

Through these operations, NICT has promoted the latest R&D in information and communications technology, and has also contributed to human resource development, regional R&D activities, technology industrialization, and international relations. NICT has accumulated extensive knowledge and experience through these activities.

《 Activities toward New-Generation Network 》

*1: Project of establishing architecture of new-generation network and design the network accordingly.
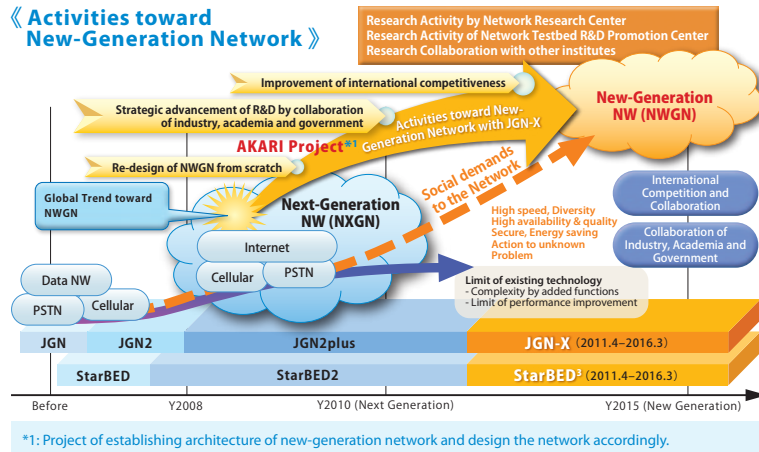
● Building a prototype of the new-generation network based on JGN-X/StarBED³

Multiple Layered Testbed

*2: Operation and administration of various layer.

In April 2011, NICT introduced the Network Testbed Research and Development Promotion Center to improve and support R&D using testbeds and began operation of JGN-X and StarBED³, which have newly upgraded functions and performance. In its JGN-X operations, the Center focuses on establishment and expansion of new-generation network technology and on accelerating the R&D in areas such as wireless/optical integration, network virtualization, and advanced operation of various virtualization layers. For these purposes, JGN-X has cutting-edge network performance, functions, and technologies including those currently in development, over a network encompassing the entire Japanese Archipelago. The Center also promotes collaboration among the many users of JGN-X in order to foster the establishment and expansion of new-generation network technology.

Through the combination of JGN-X and StarBED³, the Center provides an integrated testbed environment for both emulation and experiments on large-scale networks and also promotes the related R&D and validation testing in cooperation with industry, academia, and the government. Ultimately, by using feedback received on this testbed and combining it with wireless and other testbeds, a prototype of the new-generation network will be realized in JGN-X.

■ Services for accelerating the establishment of the new-generation network

● Partnership Services

"Partnership Services" is the general term for the services our center provides to researchers in the new-generation network field. Through these services, the Center aims to expand the R&D activities of both the researchers and NICT, and to create a relationship of mutual trust. Researchers can choose from two types of services, depending on their R&D activities:

1. Active usage service: Users can conduct ongoing R&D on the new-generation network unconstrained by traditional service limitations.
2. Passive usage service: Users can perform validation experiments on our platforms.

● Environments for Partnership Services

Users of the partnership services are able to use a combination of the environments built on JGN-X:
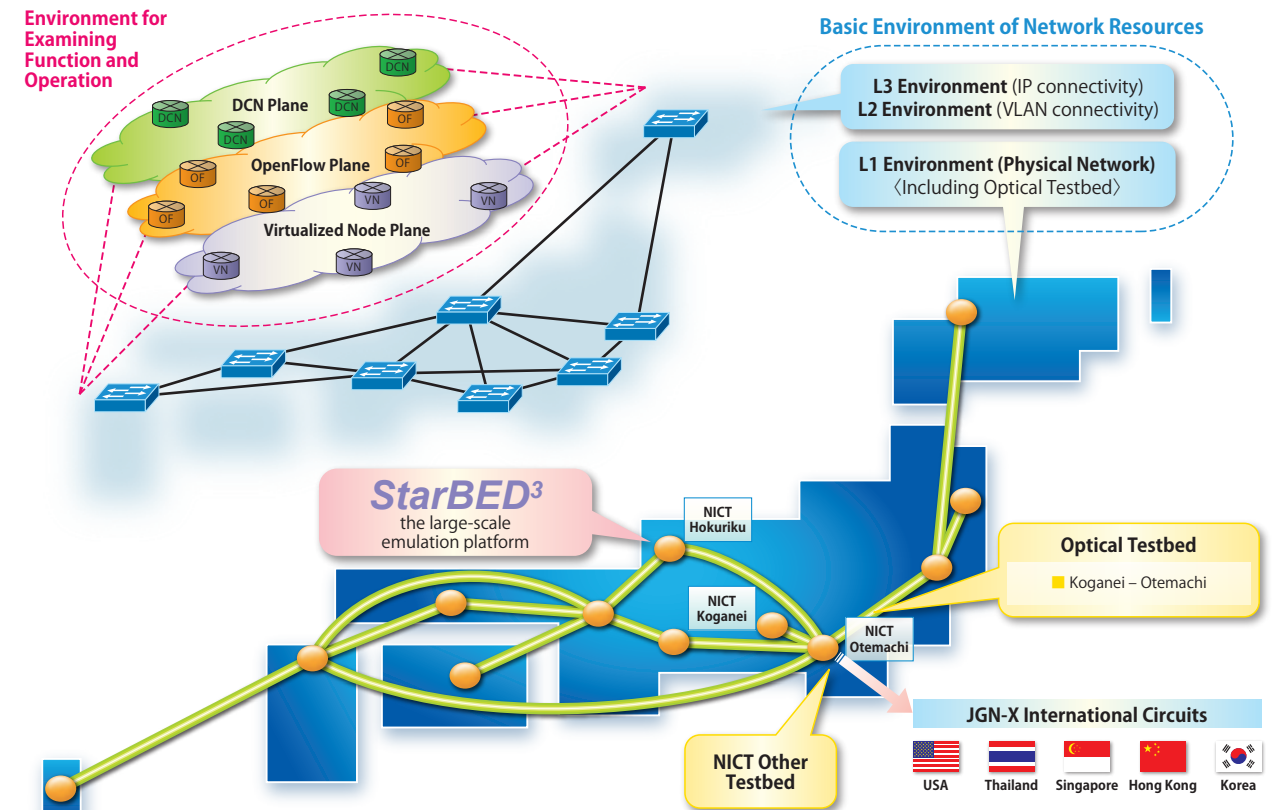
1. Environment for examining function and operation
2. Basic environment of network resources

Basic Environment of Network Resources

Environment for Examining Function and Operation
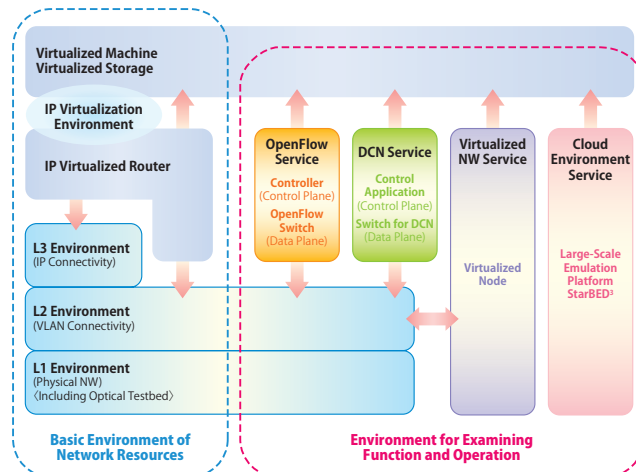
■ New-generation network JGN-X enables various validation experiments

As the largest testbed network in Japan, the JGN-X network has the following network capabilities to allow various field tests.
The JGN-X network equipment includes layer2 switches and layer3 routers, and it has 25 access points nationwide. The backbone networks connecting the main access points consist of networks from 10 to 100 Gbps. Other access points are connected by bandwidths such as 1 Gbps.

● L1 Environment: Physical network, including optical testbed
● L2 Environment: Network based on VLAN connectivity provided by layer2 switches
● L3 Environment: Network based on IP connectivity with IPv4/IPv6 dual stack capability

Environment for Examining Function and Operation

DCN Plane
OpenFlow Plane
Virtualized Node Plane

Basic Environment of Network Resources

L3 Environment (IP connectivity)
L2 Environment (VLAN connectivity)

L1 Environment (Physical Network)
〈Including Optical Testbed〉

StarBED³
the large-scale emulation platform

NICT Hokuriku
NICT Koganei
NICT Otemachi
NICT Other Testbed

Optical Testbed
■ Koganei – Otemachi

JGN-X International Circuits

USA　Thailand　Singapore　Hong Kong　Korea

■ JGN-X international circuits connecting with global R&D networks

JGN-X promotes collaborations between Japanese researchers and researchers outside of Japan, as shown in the following figure.

Bandwidth International

US-JP line	: Tokyo – Los Angeles, 10Gbps
KR-JP line (APII)	: Tokyo – Seoul, 10Gbps
HK-JP line	: Tokyo – Hong Kong, 10Gbps
HK-SG line	: Hong Kong – Singapore, 2.4Gbps
SG-TH line	: Singapore – Thailand, 1Gbps