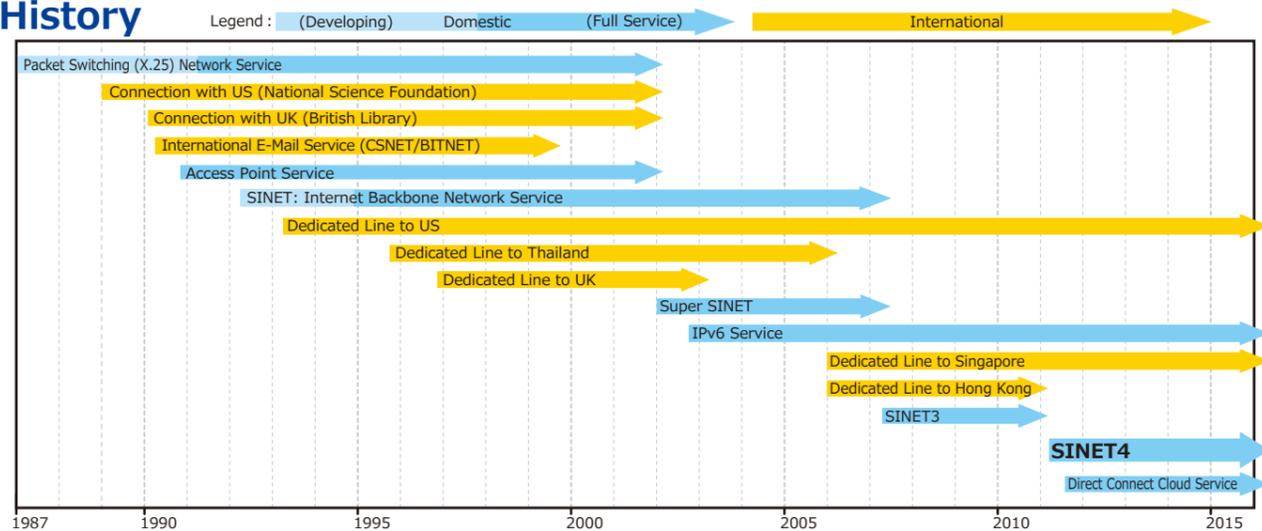


History



SINET Promotion Office

The SINET Promotion Office was established in October 2007 in order to promote the use of SINET. It provides consulting on the advanced use of the network, user support, and training and promotion regarding network services, and also carries out an educational campaign. If you experience any trouble or find something you do not understand, please contact us for assistance.

[Please direct queries to]
SINET Promotion Office
Academic Infrastructure Division
Tel: +81-3-4212-2269 Fax: +81-3-4212-2270
E-mail: support@sinet.ad.jp

Services

User consultation/response

Consulting on the use of network services

Interviews/surveys on user requests

Solicitation of comments and requests for SINET

Troubleshooting of performance-related problems

Support for network service usage problems and performance improvements

Technology promotion and educational campaign (lectures and technological exchanges)

Presentations on using SINET, educational campaign, case examples of SINET promotion, creation of documentation, and publication of information on the Web



Academic Information Infrastructure Open Forum

The Open Forum was launched in June 2009 as a framework for enhancing collaboration and information exchange among universities and research institutions in order to strengthen the Cyber Science Infrastructure (CSI), which supports the growth and development of academic research and education.

[Main activities]

- Exchanges of CSI-related information and technology
- Taking steps to further increase the speed of access lines for SINET4
- Studies to address the increasing need for cloud-based services for scientists
- Held presentations on Academic Information Infrastructure Open Forum

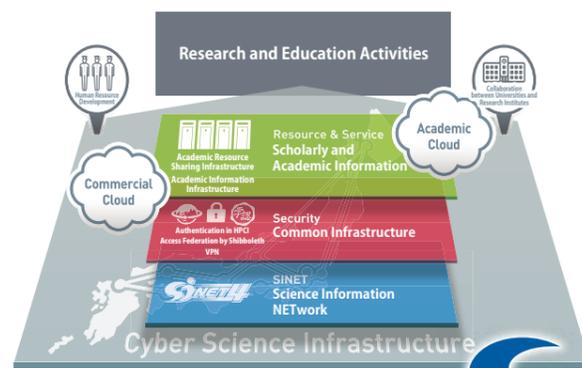
[Please direct queries to]

Academic Infrastructure Division
Cyber Science Infrastructure Development Department
Tel: +81-3-4212-2262 Fax: +81-3-4212-2270
E-mail: openforum@nii.ac.jp



Cyber Science Infrastructure (CSI)

The National Institute of Informatics (NII) is promoting the development of the Cyber Science Infrastructure (CSI) through cooperation with universities and other organizations. CSI supports Japan's academic research and educational activities and strengthen international competitiveness. SINET plays an important role as the core component of CSI.



Inter-University Research Institute Corporation
Research Organization of Information and Systems
National Institute of Informatics

NII

Contact Info for Inquiries

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<http://www.sinet.ad.jp/>



2015.3



Science Information NETWORK 4

The Science Information Network (SINET) is an information and communication network connecting universities and research institutions throughout Japan via nationwide connection points (nodes). It is designed to promote research and education as well as the circulation of scientific information among universities, research institutions, and similar entities. SINET is also connected to research networks such as Internet2 in the U.S. and GÉANT in Europe to facilitate dissemination of research information and collaborations over networks.

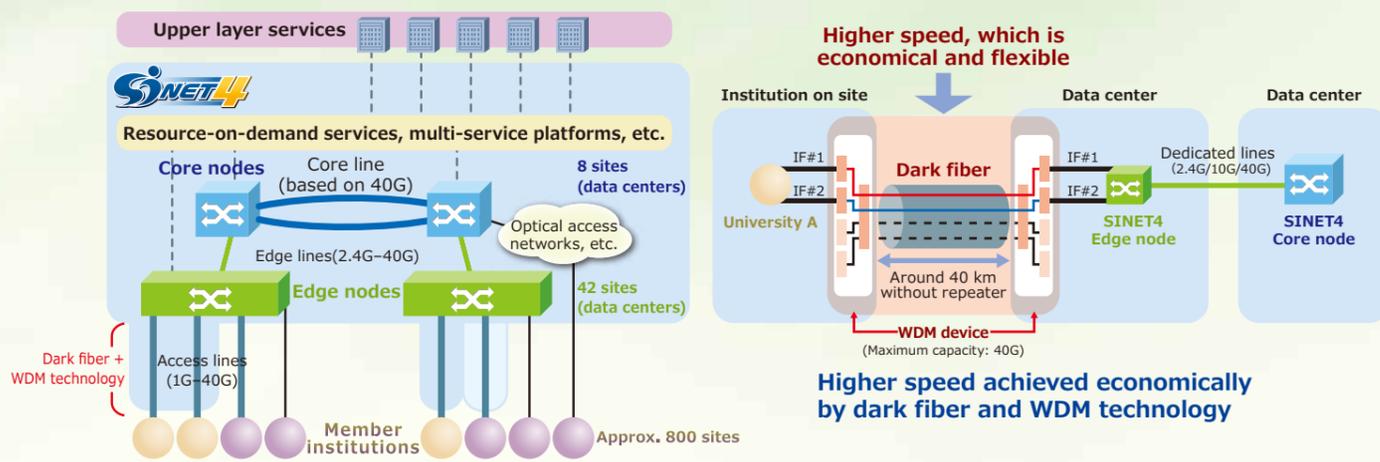
SINET4 began operations in April 2011, and it replaces the previous SINET3. SINET4 plays an important role as the core component of the Cyber Science Infrastructure(CSI).

2015

Pamphlet

SINET4 Architecture

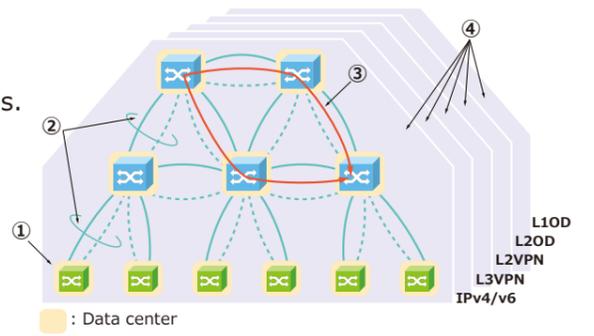
SINET4 inherits SINET3's hybrid optical and IP architecture, achieving higher network speed, greater reliability, and more stable provision of services. Adopting dark fiber and WDM technology, the access lines are faster, for more flexible and economical performance.



Design for High Availability

SINET4 adopts the following network design principles.

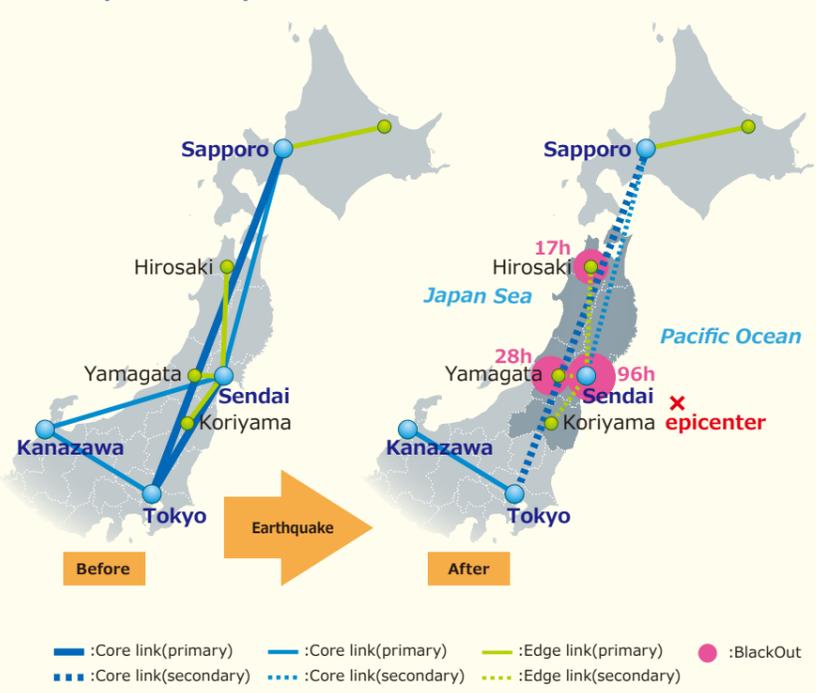
- (1) Equipment housing in data centers
- (2) Dispersed duplexed links for edge and core links
- (3) Redundant routes between core nodes
- (4) High-availability functions for each virtual service network



Example

SINET4 was not damaged by Great East Japan Earthquake

- ◆ On March 11, 2011, a commercial power black out affected SINET nodes in the Tohoku Region for an extended period (up to 96 hours), a result of the Great East Japan Earthquake. However, by refueling the emergency generators, the nodes remained functional, notwithstanding a gigantic earthquake with seismic intensity of 7 on the Japanese scale.
- ◆ Regarding the links, almost all primary links were damaged, and for two of them, both the primary and the back-up were damaged. However, we were able to secure a bypass route and the backbone was able to secure a link with any given core node, keeping both the Sendai DC and Sapporo DC from being isolated.
- ◆ IPv4/IPv6 packets were diverted by OSPF to other routes using surviving nodes and links and VPN packets were transferred without delay by MPLS protection/FRR.



SINET4 Network Services

SINET4 needs to provide the following variety of multilayer network services.

Service Menu

Service Menu	Status	Notes
Layer-3 Service	Commercial Internet access	✓ Via IXs and global ISPs
	IPv6	✓ Native/dual-stack/tunnel
	IPv4 full-route information	✓
	IPv4/IPv6 multicast	✓
	IPv4/IPv6 multicast (QoS)	✓
	L3VPN	✓
	L3VPN (QoS)	✓
Layer-2 Service	Massively Multi-Channel FTP (MMCFTP)	Beta test
	L2VPN/VPLS	✓ Fastest growing service
	L2VPN/VPLS (QoS)	✓
Layer-1 Service	L2VPN/VPLS on-demand	Planned For several projects
	L1 on-demand	✓ Over 1,000 paths were setup/released so far
Other Service	Performance measurement	✓
	Traffic measurement	✓
	Direct connect cloud	✓

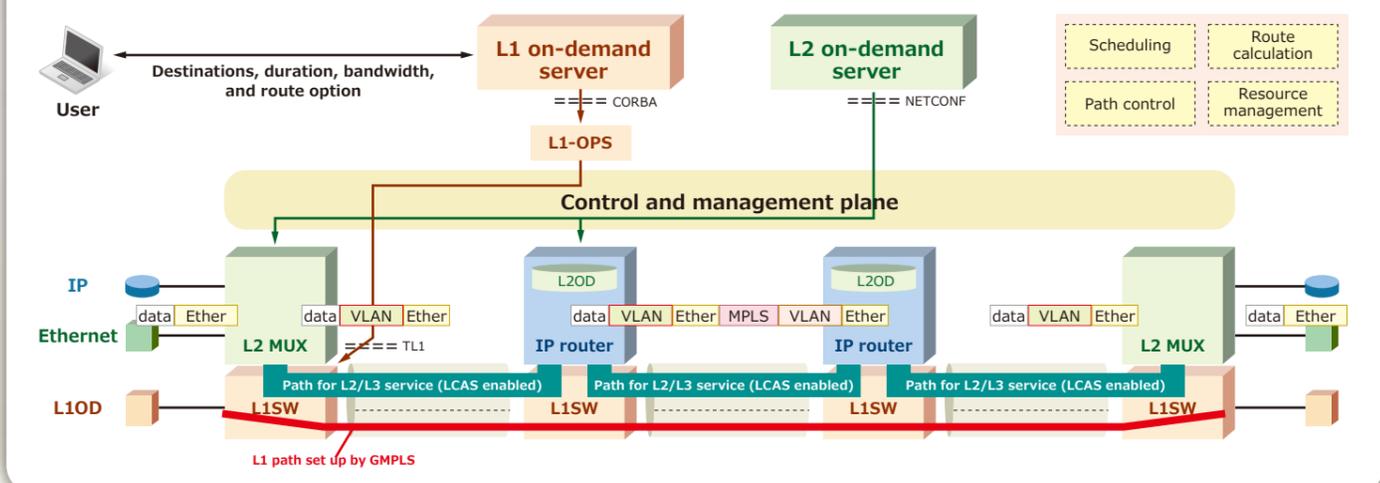
*Other services are also being considered.

Classification by network layer and QoS

QoS-guaranteed	High Priority	Best Effort	
			On-demand
			BW-specified L1VPN
			Lambda L1VPN
	L3VPN(QoS)		On-demand
	Multicast (QoS)		VPLS(QoS)
	Application-based QoS		L2VPN(QoS)
			On-demand
			VPLS
			L2VPN
			IP (L3)
			Ethernet (L2)
			Lambda/Dedicated (L1)

Design for Layer 1/2 On-demand Services

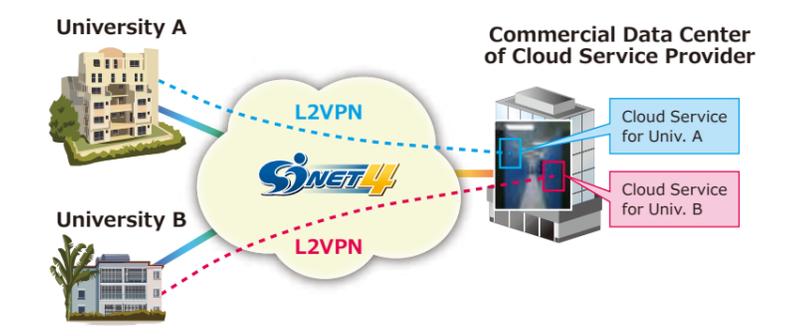
SINET provides L1/L2 on-demand services. When a user specifies an origin, a destination, duration, bandwidth, and route options on the Web, a path is automatically set up and becomes available for the user at the specified time.



Facilitation of Private Cloud

Universities can now establish a private network cloud environment on the SINET economically.

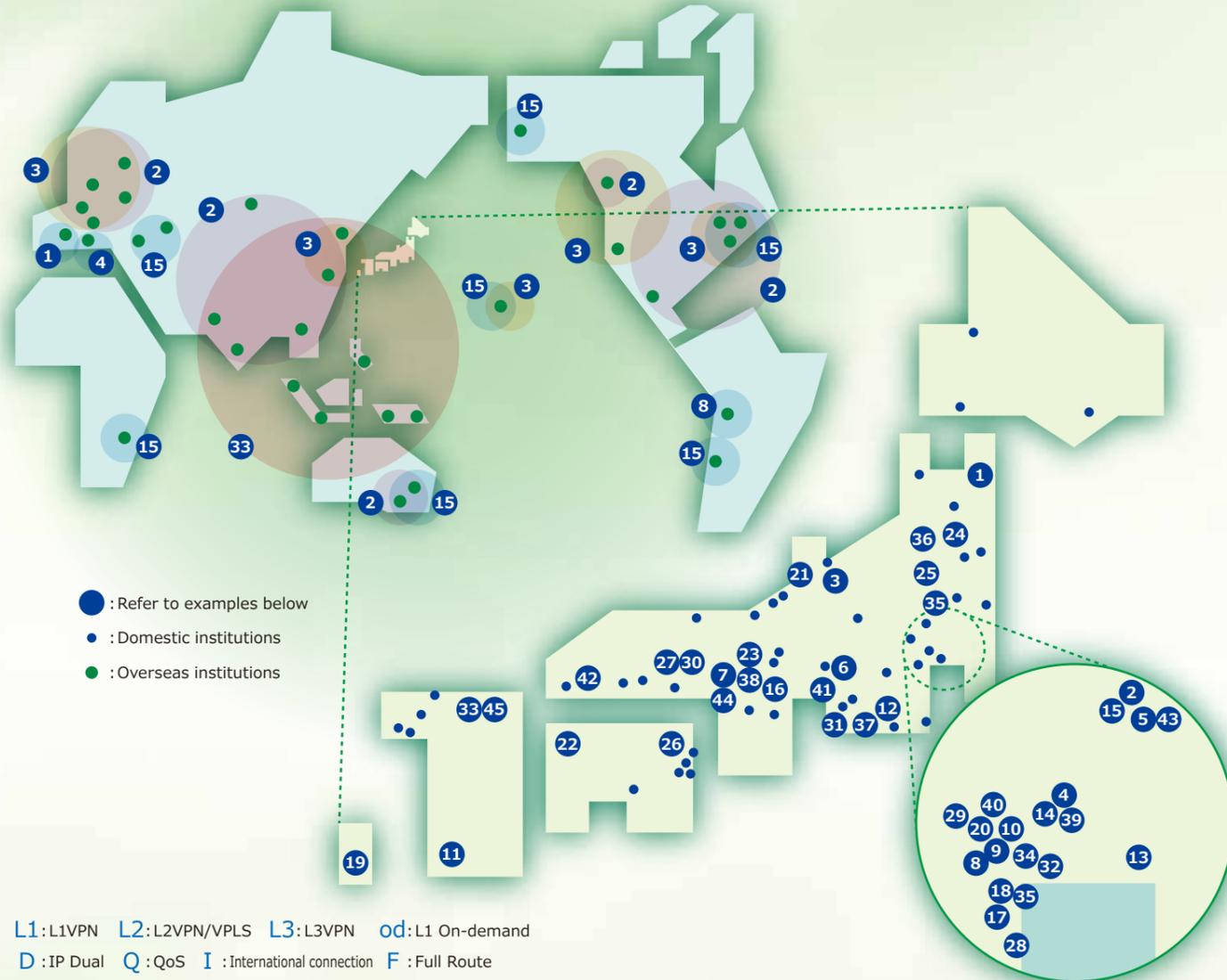
- NII provides a framework that permits the support of university research and education activities through the direct connection of cloud service providers to SINET4.
- As a general rule, each university shall connect its campus LAN to the facilities of service providers using L2VPN.



Application examples using SINET

SINET has been utilized as scientific information infrastructure essential for scientific research and education in a broad array of areas in Japan. For details of case studies using SINET, please visit the SINET website.

<http://www.sinet.ad.jp/case-examples/>



L1: L1VPN L2: L2VPN/VPLS L3: L3VPN od: L1 On-demand
D: IP Dual Q: QoS I: International connection F: Full Route

High Energy Physics and Nuclear Fusion Science

1	I	SINET Speeds Up Japan-Europe Collaboration in International Research on Nuclear Fusion	Institutions: National Institute for Fusion Science, Japan Atomic Energy Agency
2	L3 I	The "Belle Experiment": A Major Contribution to Confirmation of the Theory of Kobayashi and Maskawa, Nobel Laureates in Physics	Institutions: High Energy Accelerator Research Organization (KEK), Tohoku University, Tokyo Institute of Technology, The University of Tokyo, Nagoya University, Osaka University, Etc.
3	L2 L3	Neutrino Research	Institutions: Kamioka Observatory (ICRR, The University of Tokyo), J-PARC, domestic and overseas researchers
4	I	Distributed analysis of enormous amounts of data produced by the LHC accelerator	Institutions: The University of Tokyo, High Energy Accelerator Research Organization (KEK), University of Tsukuba, Waseda University, Tokyo Institute of Technology, Tokyo Metropolitan University, Nagoya University, Kyoto University, Kyoto University of Education, Shinshu University, Okayama University, Hiroshima Institute of University, Nagasaki Institute of Applied Science, CERN, Etc.
5	L3	Lattice QCD Simulation in Research on Hadron Physics and the Standard Model of Elementary Particles	Institutions: University of Tsukuba, High Energy Accelerator Research Organization (KEK), Kyoto University, Osaka University, Hiroshima University, Kanazawa University
6	L2 L3	Nuclear Fusion Research for a Clean Future Energy	Institutions: National Institute for Fusion Science (NIFS), University of Tsukuba, Kyushu University
7	L3	LEPS experiments to study the properties of hadrons using a laser-electron-photon beamline	Institutions: Osaka University, Japan Synchrotron Radiation Research Institute

Space Science and Astronomy

8	L3	The ALMA Project and SINET	Institutions: National Astronomical Observatory of Japan
9	od	Optically Connected VLBI Observation Using SINET L1 On-demand Service	Institutions: National Astronomical Observatory of Japan (NAOJ), Hokkaido University, Yamaguchi University, National Institute for Fusion Science (NIFS), High Energy Accelerator Research Organization (KEK)
10	L1	Studying the Sun with the Solar Observation Satellite Hinode	Institutions: Institute of Space and Astronautical Science (ISAS), NAOJ, and solar physics researchers worldwide
11	L2	The VERA Project: Mapping our galaxy in 3D-kinematics	Institutions: Kagoshima University, National Astronomical Observatory of Japan

Environmental Science, Meteorology, Earth Science

12	D I	A Computer Network Enabling an Increasing Volume of Data	Institutions: National Institute of Genetics
13	D	Receipt, Processing, Archiving, and Dissemination of Satellite Data	Institutions: Chiba University
14	L2	Building and Operation of the Japan Data Exchange Network (JDXnet) for Earthquake Observation Data	Institutions: The University of Tokyo, Hokkaido University, Hiroasaki University, Tohoku University, Kyoto University, Nagoya University, Hiroshima University, Kyushu University, Nagasaki University, Japan Agency for Marine-Earth Science and Technology
15	I	International Sharing of Extra-Large Volumes of Data from VLBI Observations	Institutions: Geospatial Information Authority of Japan and observatories worldwide

Remote Learning and Communications

16	L2	Interactive Remote Lecture System Linking Three Universities of Education in Kyoto, Osaka and Nara	Institutions: Kyoto University of Education, Nara University of Education, Osaka Kyoiku University
17	D	HD Remote Lecture to Promote Screening of Congenital Heart Disease	Institutions: Kanagawa Children's Medical Center
18	D	Use of HD Interactive Remote Lectures and IPv6 for Training in the Healthcare Information Field	Institutions: Yokohama National University, Yokohama City University
19	I	International Remote Lectures Using SINET	Institutions: University of the Ryukyus, Keio University, the Academic Arm of the United Nations, University of Hawaii, University of the South Pacific, Asian Institute of Technology, National University of Samoa
20	D	Remote Lecture System Linking 18 UGAS Universities across Japan	Institutions: Tokyo University of Agriculture and Technology, Iwate University, Hiroasaki University, Gifu University, Tottori University, Ehime University, Kagoshima University, Saga University, Utsunomiya University, Yamagata University, Obihiro University of Agriculture and Veterinary Medicine, Etc.
21	D	Interactive Remote Learning System Linking the National Universities of Three Hokuriku Prefectures	Institutions: Kanazawa University, University of Toyama, University of Fukui, Japan Advanced Institute of Science and Technology
22	L2	Interactive Remote Learning in Special Support Education	Institutions: Ehime University, Tottori University
23	od	Studying the t-Room room-sharing communication system	Institutions: Doshisha University

Regional Revitalization and Career Training

24	D	Leading an upgrade of the intra-university infrastructure and regional computerization through the Morioka Data Center	Institutions: Iwate University
25	D	Action for Earthquake Disaster Revival and Regional Revitalization by Using Advanced IT	Institutions: The University of Aizu
26	D	Developing the Human Resources to Build a Better Shikoku Based on the Collective Results of the "Knowledge of Shikoku" Project	Institutions: Kagawa University, The University of Tokushima, Naruto University of Education, Ehime University, Kochi University, Shikoku University, Tokushima Bunri University, Kochi University of Technology

Remote Use of Computing Resources, Experimental Facilities, Etc.

27	D	SINET Used to Connect X-Ray Free Electron Laser Facility, SACLA, with K Computer	Institutions: RIKEN, Japan Synchrotron Radiation Research Institute (JASRI)
28	L2 D	Connecting the Earth Simulator supercomputer to SINET	Institutions: Japan Agency for Marine-Earth Science and Technology
29	L2 D	Using SINET to provide computing resources and to facilitate smooth campus relocation	Institutions: The Institute of Statistical Mathematics
30	D	Measurement of X-ray Diffraction Intensity using remote operation	Institutions: Japan Synchrotron Radiation Research Institute
31	Q	Remote Control System with Haptic Feedback	Institutions: Toyohashi University of Technology, Hakodate National College of Technology
32	L3	The Renkei Project: A study of resource coordination techniques for the formation of research communities	Institutions: Tokyo Institute of Technology

Telemedicine

33	D od	Promoting International Telemedicine Using Academic Networks	Institutions: Kyushu University, universities in Asia
34	od	Promoting fetal medicine in Japan and Asian region utilizing SINET	Institutions: National Center for Child Health and Development

Development of Advanced Campus Network

35	L2	An IT-BCP Mission-Critical System for Quick Restoration of University Operations	Institutions: Utsunomiya University, Yokohama National University
36	L2 D	Construction of Highly Distributed Campus Network Environment Using Yamagata DC	Institutions: Yamagata University
37	L2	Construction of a Remote Backup System Based on SINET L2VPN	Institutions: Shizuoka University
38	L2	Kyo2 Cloud Center Operation	Institutions: Kyoto University of Education
39	L2	Campus Network 'UTnet' Utilizing SINET for External Connection	Institutions: The University of Tokyo
40	L2	Cloud Mail Using SINET L2VPN Service	Institutions: Tokyo University of Agriculture and Technology
41	L2	Campus Network 'MEINET' Using L2VPN Service	Institutions: Meijo University
42	D	Construction and operation of a web authentication system for a campus network (HINET2007)	Institutions: Hiroshima University
43	L2	L2VPN connection between Tsukuba and Tokyo Campus	Institutions: University of Tsukuba

Network Research

44	od	Use of SINET L1 On-demand Service to Evaluate iSCSI-APT Performance	Institutions: Osaka University, Hokkaido University, Kyushu University
45	F	Global Load Balancing Experiments Using the SINET Full Route Provision Service	Institutions: Kyushu University, Kyushu Sangyo University