A New Development in Academic Information Infrastructure

To collaborate with and promote academic research and educational activities at universities and other academic and research institutions, SINETS offers enhanced cloud and security features and academic content, on an ultra-high-speed network.

History

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, use cases of SINET promotion, creation of documentation, and publication of information on the Web

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

Contact Info for Inquiries
SINET Promotion Office, Academic Infrastructure Division
E-mail support@sinet.ad.jp
TEL +81-3-4212-2269  FAX +81-3-4212-2270
SINET5 commenced full-scale operation as of April 2016. SINET is now being used by over 3 million researchers and students etc., at over 800 universities and research institutions throughout Japan. At the time of commencing initial operation, SINET5 is equipped with one 100Gbps and one 10Gbps line to the United States, two direct 10Gbps lines to Europe, and a single 10Gbps line to Asia. Through collaboration with overseas partners, SINET5 offers more sophisticated data transfer environment for joint international research, and enables use of experimental facilities in other countries, provision of domestic experimental facilities, and high-capability linkage between facilities both overseas and in Japan.

SINET5 achieves the realization of a nationwide 100Gbps network. By securing optical fiber lines to form the shortest possible connections between nodes and using the latest cutting-edge transmission devices, SINET5 provides an ultra-high-speed, low-latency, scalable network. At the same time, by ensuring redundancy at the optical fiber level, it also ensures a high level of availability. Furthermore, by connecting nodes in a full mesh-type network, SINET5 also minimizes delays between arbitrary points on the ground.
SINET5 Architecture

The MPLS-TP of transmission devices is connected to routers with two or more 100Gbps links and carries out load balancing. Sections between each MPLS-TP are connected via ROADMs (Reconfigurable Optical Add/Drop Multiplexers) by both wavelength and logical paths, with dual logical paths (primary and secondary) being used to ensure high availability.

3) Even in the event that both of the logical paths (i.e. primary and secondary) between two nodes are interrupted, routers autonomously form an alternative route within a few seconds, limiting the impact on user transmissions as much as possible.

2) Where two nodes are connected by two logical paths (primary and secondary) and the active path is severed, transmission rapidly switches over to the alternative route via the secondary logical path, and communication continues with no packet loss. Dual logical paths are arranged in an alternative redundancy configuration, ensuring that the two paths do not affect one another.

1) Each node is connected to another by at least two optical fiber routed and continues transmission autonomously forms alternative routes to prevent communication from being severed. Even in the event of optical fibers being severed, transmission rapidly switches over to the alternative route via the secondary optical fiber path, and communication continues with no packet loss.

High Availability of SINET5

In order to protect them from earthquakes and other disasters, major optical fibers are installed inside underground tunnels called cable tunnels (or "tunnels" in Japanese).

Virtual University LAN Services

SINET enables free expansion of university LANs to connect to multiple campuses and clouds.

- User side: Specifies range of VLAN-IDs. VLAN-IDs for connection to Internet/L2 & L3 VPN are specified separately. Use procedures for addition of new VLAN-IDs are unnecessary, enabling flexible operation by participating institutions.
- SINET side: Automatically recognizes VLAN-IDs at SINET nodes and automatically connects between multiple points.

Layer 2 (L2) On-demand Services

Users can connect to L2VPN/VPLS on-demand, based on the connection points and start and end times (from short-term to long-term) they specify. Below is an image of how this service works when in use.

Layer 3 (L3) Services

In order to expand and enhance network service functionality and build secure, advanced research environments for universities and research institutions, SINET5 offers an expanded range of user-oriented services, including virtual university LAN and L2 on-demand services.

Framework for Secure Use of Cloud Services

In order to enable secure use of upper-layer services (e.g. e-mail and storage), SINET5 adopts a framework whereby the lines that connect cloud service providers to SINET are prepared by the cloud service providers themselves.

SINET5 Network Services

In order to expand and enhance network service functionality and build secure, advanced research environments for universities and research institutions, SINET5 offers an expanded range of user-oriented services, including virtual university LAN and L2 on-demand services.
SINET Use Cases

SINET has been utilized as academic information infrastructure essential for scientific research and education in a broad array of areas in Japan. For details of SINET use cases, please visit the SINET website. https://www.sinet.ad.jp/en/

High Energy Physics and Nuclear Fusion Science

- SINET Speeds Up Japan-Europe Collaboration in International Research on Nuclear Fusion
  - Institutions: National Institute for Fusion Science, Japan Atomic Energy Agency
- The "Bake Experiment": A Major Contribution to Confirmation of the Theory of Kobayashi and Maskawa, Nobel Laureates in Physics
  - Institutions: High Energy Accelerator Research Organization (KEK), The University of Tokyo, Nagoya University, Osaka University, etc.
- Neutrino Research
  - Institutions: Kamioka Observatory (ICRR, The University of Tokyo), J-PARC, domestic and overseas researchers
- Nuclear Fusion Research for a Clean Future Energy
  - Institutions: National Institute for Fusion Science (NIFS), University of Tsukuba, Kyushu University

Space Science and Astronomy

- The ALMA Project and SINET
  - Institutions: National Astronomical Observatory of Japan
- Optically Connected VLBI Observation Using SINET L1 On-demand Service
  - Institutions: Nagoya University, National Institute for Earth Science (GSI), University of Tokyo, etc.
- Studying the Sun with the Solar Observation Satellite Hinode
  - Institutions: Institute of Space and Astronomical Science (ISAS), JAXA, and solar physics researchers worldwide
- Geodetic Research
  - Institutions: Geospatial Information Authority of Japan and observatories worldwide
- Hayabusa2 (Asteroid explorer)
  - Institutions: Institute of Space and Astronomical Science (ISAS), JAXA

Environmental Science, Meteorology, Earth Science

- A Computer Network Enabling an Increasing Volume of Data
  - Institutions: National Institute of Genetics
- International Sharing of Extra-Large Volumes of Data from VLBI Observations
  - Institutions: Geospatial Information Authority of Japan and observatories worldwide

Remote Learning and Communications

- International Remote Lectures Using SINET
  - Institutions: University of the Ryukyus, Keio University, the Academic Arm of the United Nations, University of Hawaiʻi, University of the South Pacific, Asian Institute of Technology, National University of Samoa

Telemedicine

- Promoting International Telemedicine Using Academic Networks
  - Institutions: Kyushu University, universities in Asia

HPC1 (High Performance Computing Infrastructure)

- High energy research
  - Institutions: 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.
- Nuclear fusion science research
  - Institutions: National Institute for Fusion Science, Japan Atomic Energy Agency
- Astronomy research
  - Institutions: Institute of Space and Astronomical Science (ISAS), The University of Tokyo, Tohoku University, Tokyo Institute of Technology, The University of Tokyo, Nagoya University, Osaka University, etc.
- Geodetic research
  - Institutions: Geospatial Information Authority of Japan and observatories worldwide
- Hayabusa2 (Asteroid explorer)
  - Institutions: Institute of Space and Astronomical Science (ISAS), JAXA

Promoting International Telemedicine Using Academic Networks

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