

7. SNET Collaborative Research

SNET is the collaboration network for the Japanese fusion researches based on SINET5 layer-2 and layer-3 virtual private network (L2/L3-VPN) services. SINET5 is the national-wide academic network operated by National Institute of Informatics (NII). SNET directly connects the universities, research institutes for which NIFS has started the SNET operation for the collaboration category of “Remote participation for LHD experiment” since March 2002. The other categories of “Remote use of supercomputer system” and “Bilateral collaboration” have been added since 2005 fiscal year (FY). Figure 1 shows the present 18 participating sites of SNET.

The network connections in “Remote participation for LHD experiment” are used specifically for LHD experiments, whereas “Bilateral collaboration” network covers multiple experimental devices in universities; QUEST in Kyushu University and GAMMA10 in the University of Tsukuba. It is planned that another new experimental device, TST-2 in the University of Tokyo, will be added to the SNET Bilateral collaboration in 2017 FY.

SINET5, the fifth generation of the Japanese academic network backbone SINET, has been upgraded from SINET4 since April 2016, in which the tree-branch structure of the previous SINET generations has been completely reformed to be full mesh one with the upgraded 100 Gbps JA-US and the new 20 Gbps JA-EU overseas links. The SNET research also makes an investigation for the practical use of such the high performance long distance networks for the remote collaborations and participations. The technological pursuit for high-speed data transfer is ongoing also for contributing to the ITER Remote Experimentation Centre with the JA-EU Broader Approach framework. Details are reported in “Research highlights” below.

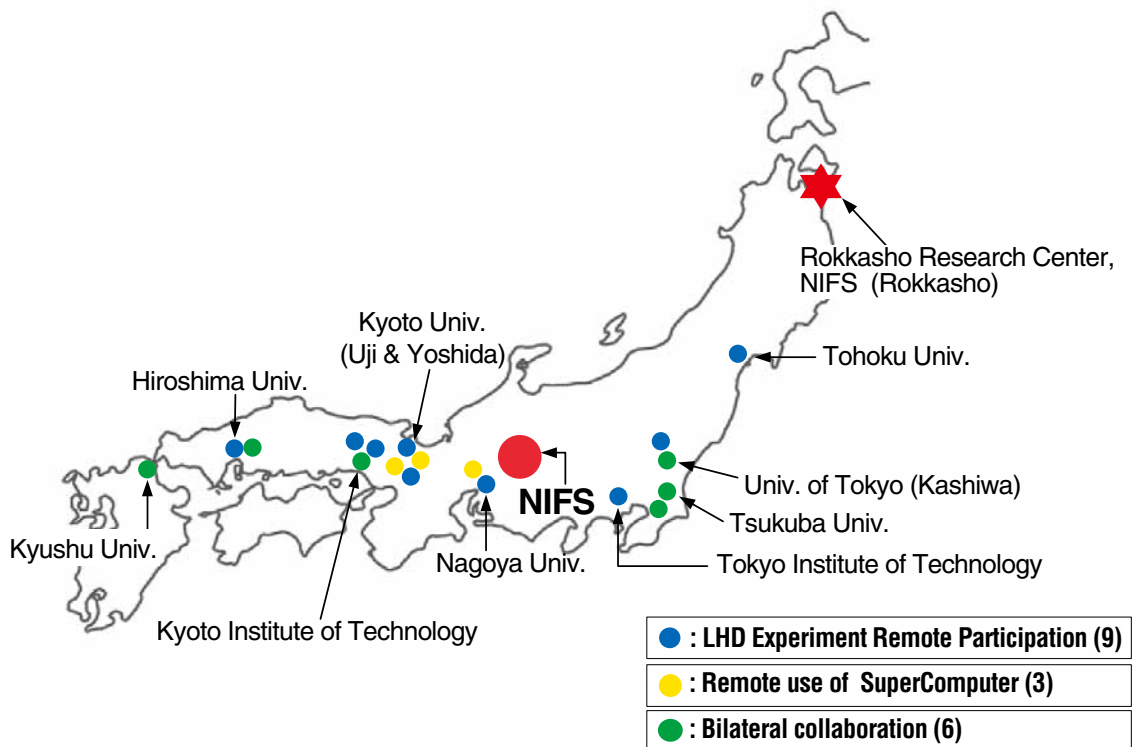


Fig. 1 SNET connection map

Large Volumes of data successfully transferred via SNET/ SINET at unprecedented speeds

Large volumes of data from ITER were successfully transferred to Japan at unprecedented speeds. Major advances in the technical groundwork have been made for remote experiments from Japan, 10,000 km away from ITER.

Repeated transfer of 1 tera-byte (TB) data within 30 minutes, which are the conditions assumed in the initial experiments of ITER, from ITER in France to ITER Remote Experimentation Centre (REC) in Rokkasho, Japan, was demonstrated in August 30 to September 5, 2016. Amount of transferred data of 50 TB per day, demonstrated here, was the world largest level inter-continental high speed data transfer from one site to another site. The results were also presented at the IAEA Fusion Energy Conference held at Kyoto in 17–22 October 2016.

In collaboration with the National Institutes for Quantum and Radiological Science and Technology (QST), the National Institute of Informatics (NII), NIFS and the ITER International Fusion Energy Organization (ITER), a layer-2 virtual private network (L2VPN) had been temporarily set up via the international backbones of SINET5, GÉANT and the French RENATER between one server in ITER and another in REC. Using this connection, the stable high-speed transfer (approximately 7.9 Gbps) of 1 TB of data have been repeatedly demonstrated within 30 minutes (See Figure 2). This achievement is the result of a synergetic effect from collaboration in state-of-the-art information science and technologies and in remote cooperation for nuclear fusion research.

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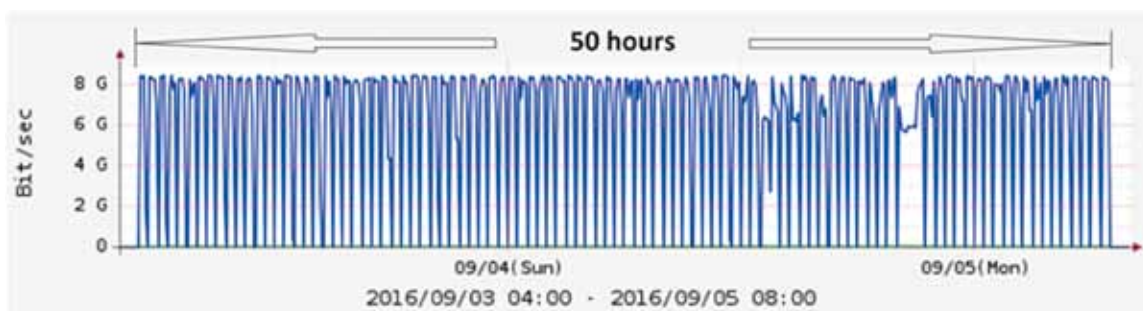


Fig. 2 Result of the transfer of 105 TB sent repeatedly every 30 min at a high speed (approximately 7.9 Gbps) from ITER (France) to REC (Japan) for 50 hours. 50 TB/day is the new world record of inter-continental high-speed data transfer.