

A Japanese National Project for Superconductors Network Devices

Mutsuo Hidaka

Superconductivity Research Laboratory (SRL), International Superconductivity Technology Center (ISTEC)

A five-year project for Nb based single flux quantum (SFQ) circuits supported by Ministry of Economy Trade and Industry (METI) in Japan was started at September 2002. This project is called as Superconductors Network Device Project. From April 2003, the project was supported by the New Energy and Industrial Technology Development Organization (NEDO) instead of METI. In the project, integration level of Nb based SFQ circuits will improve to several tens thousand Josephson junctions, whereas starting integration level of them was a few thousand junctions. Problems to be solved in this project are electric power crisis due to rapid increase of power consumption by network devices, especially by servers, and congestion due to rapid increase of communication traffic. SFQ servers and routers have potentials to solve them. Actual targets are a 20 GHz dual processor module for the servers and a 1.0 Tbps switch module for the routers. Twelve researchers gathered to SRL Tsukuba from NEC, Hitachi, Fujitsu and Nagoya University. Moreover, Nagoya University, Yokohama National University, Hokkaido University and Communication Research Laboratory corroborate with the SRL to achieve the targets. The SFQ servers and routers will open the window to markets for superconducting digital applications. SFQ circuit research using high- T_c superconductor (HTS) was merged to the Nb project from April 2003. Targets of the HTS research are a wide-band AD converter for mobile-phone base stations and a sampling oscilloscope for wide-band waveform measurements. Process, design and assembly technologies for implementing these devices are developing at SRL Tokyo.