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# SYSTEM TEST RESULTS OF HIGH-SPEED LASER COMMUNICATION SYSTEM HICALI ONBOARD ENGINEERING TEST SATELLITE 9

**Abstract**

Demands for High-Throughput Satellites (HTSs), which are advanced communication satellites, have currently been growing. The HTSs are expected to provide broadband connections for multiple users on the ground. The HTSs can achieve large-volume data transmission for multiple users utilizing Ka-band Radio Frequency (RF). However, it is anticipated that the depletion of RF resources may be a critical concern as the number of HTSs is expected to significantly increase in the future.

Laser satellite communications have gathered much attention as the key technologies to achieve higher data-rate satellite communications. The National Institute of Information and Communications Technology (NICT) has demonstrated various laser satellite communication missions to realize practical implementation. NICT is currently aiming at 10 Gbit/s optical feeder link utilizing Geostationary Earth Orbit (GEO) satellite as the next laser satellite communication mission.

Under the scenario, we have been engaged in research and development for 10 Gbit/s high-speed laser communication system, which is referred to as High-speed Communication with Advanced Laser Instrument (HICALI). The HICALI mission system will be implemented on the next-generation high-throughput GEO satellite, which is referred to as the Engineering Test Satellite-9 (ETS-9). The ETS-9 is capable of providing not only RF multi-user links but also high-speed laser communication links, and it is scheduled to be launched in Japanese fiscal year 2025. After the launch, we plan to demonstrate

10 Gbit/s bidirectional laser satellite communications between Optical Ground Stations (OGSs) and the HICALI mission system onboard the ETS-9.

In preparation for the satellite launch, we have completed design, manufacturing and testing of several components that are integrated into the HICALI mission system. In order to integrate these components into the satellite, we have conducted system test for the HICALI mission system. In this paper, we will report the system test results of the HICALI mission system. These test results verify fundamental functions, performances, and sequences of the HICALI mission system. In addition, we outline some future plans for the continued development of the HICALI mission system.