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STATUS UPDATE ON RESEARCH AND DEVELOPMENT OF HIGH-SPEED LASER
COMMUNICATION SYSTEM "HICALI" ONBOARD ENGINEERING TEST SATELLITE 9

Abstract

The High-Throughput Satellites (HTSs) have been emerged as the next-generation communication satellites, which provide broadband communication services to multiple users on the ground. The HTSs utilize Ka-band radio frequency (RF) so that they achieve high-speed transmissions for multiple users. However, we are concerned about the depletion of RF resources as the growing demands for broadband communication services using the HTSs.

Laser satellite communications have been researched and developed as the substitute technology to achieve high-speed satellite communications. The National Institute of Information and Communications Technology (NICT) believes that laser satellite communications will be future satellite communication technologies. NICT has also been engaged in a lot of research and development missions for laser satellite communications such as Engineering Test Satellite (ETS-), OICETS and SOTA. These missions have mainly focused on the functions of acquisition, tracking and pointing. Research for 10 Gbit/s class high-speed optical payloads has not been worked yet.

As the next laser satellite communications mission, we have started the research and development for high-speed laser communication terminal, which is called “HICALI (High-speed Communication with Advanced Laser Instrument)”. We are targeting 10 Gbit/s laser satellite communications between optical ground stations (OGSs) and “HICALI” mission system onboard Engineering Test Satellite- (ETS-). The ETS- is the next-generation high-throughput satellite to provide not only RF multi-user communication services but also high-speed optical communications as the geostationary earth orbit (GEO) satellite. The ETS- will be launched in Japanese fiscal year (FY) 2023. After the launch, 10 Gbit/s laser satellite communications between OGS and “HICALI” mission system will be demonstrated on orbit. In this paper, we will report the status update on the research and development of “HICALI” mission system. We especially describe the detail of “HICALI” mission, the manufacture of “HICALI” sub-systems and the test plans including system test and assembly integration test.