SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2) Advanced Technologies for Space Communications and Navigation (3)

Author: Dr. Morio Toyoshima

National Institute of Information and Communications Technology (NICT), Japan, morio@nict.go.jp

Mr. Hideki Takenaka

National Institute of Information and Communications Technology (NICT), Japan, take@nict.go.jp Mr. Yoshisada Koyama National Institute of Information and Communications Technology (NICT), Japan, koyama.yoshisada@nict.go.jp Dr. Yoshihisa Takayama National Institute of Information and Communications Technology (NICT), Japan, takayama@nict.go.jp Mr. Hiroo Kunimori NICT, Japan, kuni@nict.go.jp Dr. Toshihiro Kubo-oka National Institute of Information and Communications Technology (NICT), Japan, toshi.kubooka@nict.go.jp Dr. Maki Akioka National Institute of Information and Communications Technology (NICT), Japan, akioka@nict.go.jp

APPLICABILITY OF FREE SPACE LASER COMMUNICATIONS FOR MICRO-SATELLITES IN DIRECT AND INTER-SATELLITE LINK SCENARIOS

Abstract

Recently, the development of micro-satellites are actively promoted; however, the small satellite community still uses 9.6-kbps communication links by employing ham radio communications because of resource constraints in the nano-class satellites. The compact terminal can be used in nano-class satellites that have a mass of the order of a few tens of kilograms. In addition, there is a significant advantage with regard to the frequency-licensing problems faced by satellites, and the optical frequency carrier will be very useful to the small satellite community. In this paper, the applicability of space laser communications for micro-satellites is described. The link analyses are conducted for three communication links such as low earth orbit (LEO)-to-LEO, LEO-to-geostationary earth orbit (GEO) and GEO-to-LEO scenarios. In the optical links through the atmosphere, the atmospheric fluctuation is considered in the link budget analyses. The onboard resources are also considered and the achievable data rate is presented for each scenario.