

Low-power Optical Modem for Long-distance communication

Project title

### Fundamental and feasibility studies on long-distance communication system with free-space laser link technologies

Institution : Sony Corporation

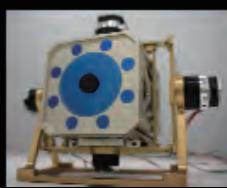
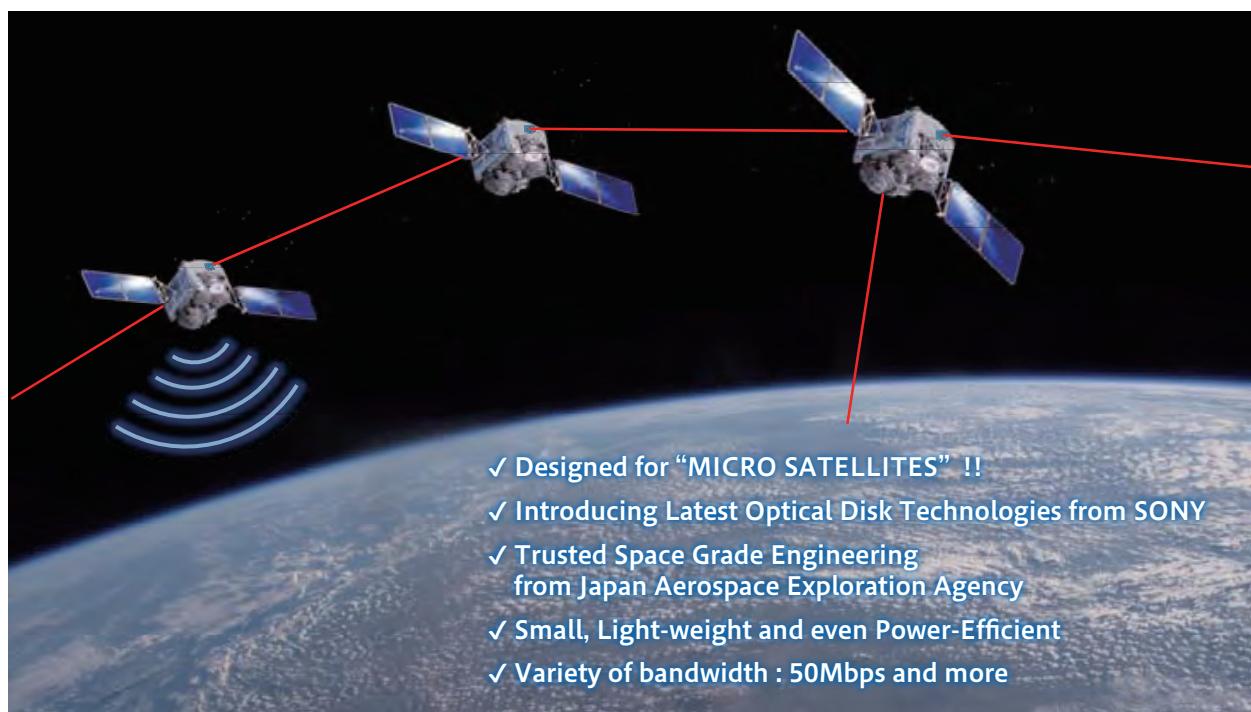
#### Research outline

##### Objective Contents Research outline

In recent years, low Earth orbits have been increasingly utilized due to technological innovations primarily in advances in ultra-small satellite, also known as micro and nano satellite technology and reus-able rocket technology. However, low Earth orbit is not always connected to the Internet.

The purpose of this study is to develop a fundamental technology for optical communication device that can be operated in ultra-small to small satellites, with the objective of allowing for constant connectivity between low Earth orbit and the Internet communication network. Therefore, it is important to produce compact, light-weight, and highly-power efficient optical communication devices for satellites. In this study, we will develop a fundamental technology by applying the following our own technologies with well experienced.: compact, light-weight, and highly-efficient optical systems and optical discs with control systems.

We believe this technology will contribute continuous connectivity to the terrestrial Internet communication network with inter-satellite optical communication that employs ultra-small satellites, and keep connecting to the internet during operations accompanying satellite missions. To this end, we plan to connect a ~4,500 km communication distance at a control angle range of  $\pm$  -500 mrad and accuracy of ~10 ( $\mu$ rad). To achieve this goal, we will incorporate laser and optical technology using optical discs, integrated optics technology, and control technology to meet the weight of the optical communication system below about 1.5kg. Rest of works include managing radiation, heat, vibrations, and shock as required in a space environment; we will try to convert optical disc technology as a “ground” technology into one that can be utilized in outer space at an early stage.



optical inter-satellite system (mockup)



transmitting optics (working prototype)

#### Target Specification

weight (kg)	~1.5
band width (Mbps)	50~
inter-satellite distance (km)	~4500
laser out (W)	1.5
power consumption (W)	15
tracking accuracy (urad)	~10