



Research and development of low-latency broadband space backbone

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Grand Challenge and Goal :

Toward the realization of a low-latency inter-satellite optical network in low earth orbit, we will develop spatial optical transmission and switching technologies for small LEO satellites, and demonstrate a free-space optical communication system integrated with these technologies using an optical testbed that emulates long-distance inter-satellite optical links.

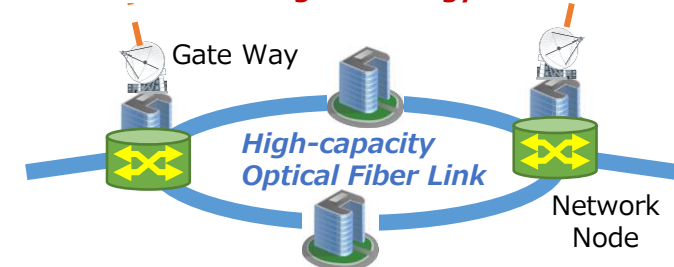
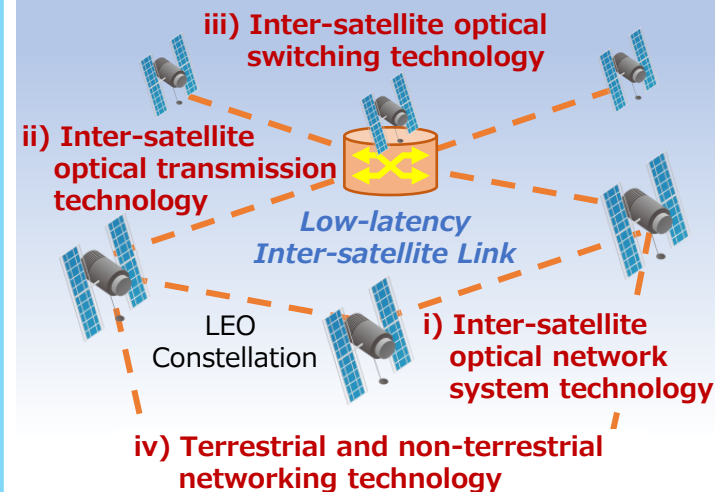
Summary :

- i) We will conduct a design analysis of a low-latency inter-satellite optical network system, and demonstrate free-space optical communications with novel optical devices and subsystems using an optical testbed.
- ii) We will develop novel spatial optical receivers and amplifiers to realize free-space optical transmissions in inter-satellite optical links.
- iii) We will develop a spatial optical switch and a hybrid (O/E/O and O/O conversions) switching system for relaying between small LEO satellites in the inter-satellite optical network.
- iv) We will develop a novel optical networking methodology for low-latency broadband backbone networks that provides seamless end-to-end connections with adaptively controlling TN and NTN domains.

Social Impact :

- A global network infrastructure constructed in low earth orbit can provide wider area broadband services and more frequent earth observation services.
- Low latency or confidentiality of inter-satellite optical networks will be utilized to create new services including remote surgery, autonomous driving, cybernetic avatar, quantum cryptography communications, and so on.

Non-terrestrial Optical Network



Terrestrial Optical Network