

Optical satellite communication ground station network



Adobe stock Image #345018248

Optical communication to satellites has the potential to offer much higher speed communication with enhanced security over current radio-frequency systems. Optical lasers also have a much lower beam divergence when propagating compared to radio frequencies. This allows for longer distance transmission and prevents interference between different optical communication sources, even over large distances. The lack of interference means that optical communication is inherently more secure than RF communication. The Australian National University (ANU) is building a fee-for-service optical communications ground station that will be capable of optical communications with satellites in LEO, GEO and out to lunar distances for next-generation satellite communications.

Technology (TT2022-023)

ANU is building an optical communications ground station (OGS) at Mt Stromlo in Canberra (to be commissioned mid-23). The OGS will be equipped with multiple instruments to support different communication standards for LEO/GEO communication, lunar and deep space communication and quantum communication. The goal of the program is to develop an Australasian Optical Ground Station Network that will have high site diversity to mitigate the effects of bad weather and provide high communication availability.

Potential benefits

- > **Secure communication:** Low interference, enhanced security over existing satellite communication systems
- > **Data rates:** Higher data rates over RF communication
- > **Transmission distance:** Longer transmission distances achieved over current RF systems
- > **Low turbulence impact:** Use of adaptive optical instrumentation to mitigate signal loss due to atmospheric turbulence
- > **State of the Art:** ANU is working with global providers of lasers, electronics, software and systems to create a state of the art OGS for data collection and interpretation

Potential applications

- > Laser/Quantum communication
- > Space technology
- > Satellite data relay
- > Secure communication

Opportunity - Partnership

ANU is looking for partners with access to space assets with optical communication terminals that can be used to demonstrate optical communications from LEO, MEO, GEO or lunar orbits to fixed and portable ground stations; optical data relays with satellites; and OGS network operations including satellite handover between different ground stations, data downlink optimisation and network architecture optimisation.

Opportunity – Investment

ANU intends to develop a system of OGS in Australia to offer 24/7 service for customers on a fee for service basis. It intends to start a company to be provided rights to the initial OGS and will seek investment to roll out 4 to 5 other OGS.

IP status

ANU owns substantial knowhow and trade secrets in the set-up of optical ground stations and data acquisition and data interpretations from the optical feed.

Key research team

- > Francis Bennet, Associate Professor, ANU Research School of Astronomy & Astrophysics

Contact

Kiara Bechta-Metti
Associate Director, Commercialisation & IP
Office of Research and Innovation Services
The Australian National University
T: +61 407 234 248 | E: kiara.bechta-metti@anu.edu.au



Figure 1: The SkyMapper wide angle optical telescope at ANU Siding Spring Observatory