



The U.S. National Science Foundation
Office of Polar Programs
United States Antarctic Program



Introduction and Use of Low Earth Orbit Satellites Providing Broadband Services in the USAP

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1. Purpose

Provide guidance to the United States Antarctic Program (USAP) participants regarding terms, conditions, and prohibitions governing participant introduction and use of broadband satellite low-earth-orbit (LEO) communications systems into Antarctic region operating areas managed by the National Science Foundation (NSF).

Guidance defines three categories of use cases: Personal Use, USAP Mission Use, and Science Use, to include the limits and prohibitions tailored for each category.

Terms, conditions, limitations, and prohibitions address prohibitions of personal systems when NSF-provided service is available, prohibitions and waivable exceptions for use in USAP mission applications, and usage of systems included as a component of a science field research project. RF spectrum management and cybersecurity compliance requirements apply in all cases.

2. Scope

This Instruction provides necessary procedural guidance regarding the introduction and usage of broadband LEO satellite communications systems into the USAP operating environment.

The Instruction applies to:

- 1) Activity within the USAP field setting (e.g., stations, deep field, vessels)
- 2) All USAP mission activities to include those sited at non-Antarctic locations (e.g., Christchurch, NZ; Punta Arenas, CL; Continental United States).

3. Responsibilities

- 1) NSF Office of Polar Programs, Antarctic Infrastructure and Logistics Section – Instruction administrator and adjudicator of Instruction infractions and requests for deviations.
- 2) USAP Operational Mission Partners – Instruction implementation for USAP personnel falling within the Partner organization’s administrative jurisdiction or sphere of USAP logistical support services.

4. Requirements for Governance

The advent of ubiquitous direct-to-internet LEO satellite communications services, combined with the confluence of elevated cybersecurity risks and the need for effective radio-spectrum management in USAP operating locations, created the need for guidance regarding commercially available global coverage LEO satellite broadband communications devices and services.

5. Key Definitions

Table 1: Key Definitions

TERM	DEFINITION
Authorizing Official	A senior Federal official or executive with the authority to authorize (i.e., assume responsibility for) the operation of an information system or the use of a designated set of common controls at an acceptable level of risk to agency operations (including mission, functions, image, or reputation), agency assets, individuals, other organizations, and the Nation. For NSF Office of Polar Programs (OPP) USAP information systems this official is the Section Head, AIL. [OMB Circular No. A-130, revised; 2016; p. 27]
Information Security Manager	<p>An individual with assigned responsibility for maintaining the appropriate operational security posture for an information system or program [Systems Security Officer, <i>Guide for Security-Focused Configuration Management of Information Systems</i>, NIST SP800-128, pg. B-8]</p> <p>The NSF/OPP/AIL staff member responsible for the management of the USAP Information Technology (IT) cybersecurity compliance mandated by statute law and implementation guidance by the Executive Office of the President (Office of Management and Budget [OMB])</p>
Mission Partner	<p>A US government organization or the NSF/OPP prime base operations/logistics/science support contractor that provide logistical support functions for the operations and sustainment of the USAP.</p> <p>Examples: USAP Antarctic Support Contractor; Naval Information Warfare Center, Charleston; Joint Task Force/Support Forces Antarctica (and supported DoD units).</p>
Science Research Investigator	A NSF science grant award recipient, either individual or collectively with other investigators, with approved Antarctic field work.
USAP Participant	Individuals with a participatory involvement in the USAP under the sanction and authorization of NSF, to include grantees, contract employees, visitors, and military [adaptation, <i>United States Antarctic Program Participant Guide</i> , 2022-2024 Edition; p. iv].

TERM	DEFINITION
USAP Spectrum Manager	Radio frequency assignment and interference coordination service provided by NSF/OPP USAP Mission Partner Naval Information Warfare Center (NIWC) Charleston, South Carolina.

6. Governance Framework

Governance is divided into three major use case categories for LEO direct-to-internet communications services introduced into the USAP Antarctic operating environment:

6.1. Personal Systems

A communications device that is personal property and brought to Antarctica for personal use by a USAP participant. Personal use includes sharing services with other individuals. Personal Systems of USAP participants fall under the administrative responsibility of the affiliated Mission Partner for sponsorship for the purposes of this governance framework.

6.2. Mission Partner Systems

A communications device that is introduced and used or sponsored by a USAP Mission Partner and brought to Antarctica for official USAP mission activities. Official activities include both operational and test/evaluation uses and involve direct support of USAP logistics or operations. Application of guidelines is irrespective of actual device ownership, as it is the official business intent that governs the activity.

6.3. Science Research Investigator Systems

A communications device that is a component of an NSF science grant award or NSF sponsored interagency collaboration that has approved Antarctic field work. The award may be any combination of a single investigator, a collaboration of investigators, or a component of multiple collaborative awards. Science Research Investigators fall under the administrative responsibility of the affiliated Mission Partner for sponsorship for the purposes of this governance framework, defined to be the USAP Antarctic Support Contractor unless otherwise specified.

7. Guidelines

7.1. Personal Systems

1. Personal systems are categorically prohibited from interconnecting with USAP network and IT infrastructure, to include USAP workstations.
2. Personal systems are not permitted at Antarctic stations and USAP vessels where NSF provides personal broadband communications access to the internet. This supports management of the RF spectrum environment.

3. At Antarctic operating locations where NSF does not provide personal communications to the internet, personal systems may be permitted under the following provisions:
 - a) Necessary RF spectrum compatibility coordination occurs and receives a favorable assessment prior to the shipment of the equipment to Antarctica,
 - b) The transaction of USAP mission activities and transmission of USAP mission data are strictly prohibited
 - c) The requesting personnel understand and attest that usage is restricted exclusively to personal use, where failure to comply is subject to sanctions of the USAP Code of Conduct
4. Mission Partners are responsible for sponsorship/management of personnel under their stewardship who request consideration under section 7.1.3. Responsibilities include:
 - a) Serving as coordinator of the request, to include initial receipt
 - b) Conducting required RF spectrum coordination
 - c) Executing a cybersecurity attestation with the requesting personnel asserting the understanding of the limitations and prohibitions of usage
 - d) Preparing a justification accompanied by the spectrum review results and cybersecurity attestation, and
 - e) Reporting the results to NSF/OPP/AIL for NSF review and approval/disapproval.

7.2. Mission Partner

1. Mission Partner applications are USAP mission business functions.
2. Transaction of USAP mission business functions are categorically prohibited and will only be considered for test/evaluation purposes on a case-by-case basis.
3. Appeals for a waiver from the prohibition are to be submitted to the NSF/OPP/AIL Chief Program Manager for evaluation and adjudication, to include a cybersecurity review by the NSF/OPP/AIL Information Security Manager and NSF/OPP/AIL Authorizing Official approval.
4. Appeals must conform to the following criteria:
 - a) Total length must not exceed one page. Submissions beyond one page will be rejected and
 - b) The following criteria must be succinctly answered in summary form:
 - i. Mission Need and Purpose

- ii. Benefit to NSF
 - iii. Government information and USAP mission processes involved
 - iv. Network logical data flows
5. If approved, the Mission Partner is required to submit a test/evaluation report to NSF/OPP/AIL within 60 calendar days following the conclusion of the approved period of performance.

7.3. Science Research Investigator

1. Research Investigators must have an NSF/OPP/AIL approved USAP Event Number.
2. Requirements planning must be conducted within the NSF/OPP POLARICE planning system and receive an approved Research Support Plan (RSP).
3. The POLARICE review must include a spectrum management coordination and receive a favorable review by the USAP Spectrum Manager.
4. The POLARICE review must include any plans for test/check-out within the local area of USAP stations or other areas of concentration of USAP science and operational RF device operations.
5. Interconnection with the USAP network and IT systems is categorically prohibited.
6. Stipulations regarding any constraints on operational locations, cybersecurity operational modes or times are documented in the RSP.

8. Background

8.1. Management of Radio Spectrum

The conducting of scientific research and the operations necessary to support US operations in Antarctica are critically dependent upon the radio spectrum. Use of the radio spectrum supports essential life safety, navigation, scientific research, and operational communications.

NSF/OPP administers an active radio spectrum management program to ensure the harmonious coexistence of approved activities. NSF maintains a USAP Spectrum Manager to facilitate coordination of the introduction of devices that emit RF energy (active use) or are dependent upon the reception of RF energy (passive use).

8.2. Cybersecurity and Connectivity

NSF expends significant effort and resources to establish and maintain an effective cyber-defense to protect the USAP network and all that it supports, expending over a million dollars annually and extensive labor hours. This essential effort maintains the

necessary vigilance and defense to preclude an information security breach that could place lives at risk, destroy valuable data or property, or cause disruption to program operations. NSF conducts its cyber operations and services to ensure that these negative risks are not realized.

9. Review

This Instruction is valid until rescinded. It will be reviewed at an interval of not more than five years.

10. Glossary

- **AIL:** Antarctic Infrastructure and Logistics, a section of the US National Science Foundation Office of Polar Programs
- **DoD:** Department of Defense
- **IT:** Information Technology
- **LEO:** Low Earth Orbit
- **NIST:** National Institute of Standards and Technology
- **NIWC:** Naval Information Warfare Center
- **NSF:** National Science Foundation
- **OMB:** Office of Management and Budget
- **OPP:** Office of Polar Programs
- **POLARICE:** Participant On-Line Antarctic Resource Information Coordination Environment
- **RF:** Radio Frequency
- **RSP:** Research Support Plan
- **USAP:** United States Antarctic Program

Signature Approval

Approved by:

Stephanie Short

Date

Section Head, Antarctic Infrastructure and Logistics, Office of Polar Programs