This subtopic seeks innovative technologies for long-range RF telecommunications supporting the needs of space missions. Proposals are sought in the following areas:

- Ultra-small, low-cost, low-power, modular deep-space transceivers, transponders, and components, incorporating MMICs and Bi-CMOS circuits;
- MMIC modulators with drivers to provide large linear phase modulation (above 2.5 rad), high-data rate (10-200 Mbps), BPSK/QPSK modulation at X-band (8.4 GHz), and Ka-band (32 GHz and 38 GHz);
- High-efficiency (>70 %) Solid-State Power Amplifiers (SSPAs), of both medium output power (10-50 W) and high-output power (150 W - 1 KW), using power combining techniques and/or wide-bandgap semiconductor devices at X-band (8.4 GHz) and Ka-band (32 GHz and 38 GHz);
- Traveling Wave Tube Amplifiers (TWTAs), SSPAs, modulators, and MMICs for 26 GHz Ka-band (lunar comm);
- TWTAs operating at millimeter wave frequencies and at data rates of 10 Gbps or higher;
- Ultra low-noise amplifiers (MMICs or hybrid) for RF front-ends (MEMS-based RF switches and photonic control devices needed for use in reconfigurable antennas, phase shifters, amplifiers, oscillators, and in-flight reconfigurable filters. Frequencies of interest include S-, X-, Ka-, and V-band (60 GHz). Of particular interest is Ka-band from 25.5-27 GHz and 31.5-34 GHz.

Research should be conducted to demonstrate technical feasibility during Phase 1 and show a path toward a Phase 2 hardware demonstration that will, when appropriate, deliver a demonstration unit for testing at the completion of the Phase 2 contract.