

EXH. 1 - REQUEST FOR EXPERIMENTAL AUTHORIZATION

Northrop Grumman Systems Corporation (“NGSC”) hereby requests a two-year experimental authorization as soon as possible, to conduct uplink (Earth-to-Space) testing¹ of an experimental earth station with the on-orbit SES-17 (ICFS Call Sign S3043) satellite. The proposed experimentation is for a Global Lightning government sponsored contract that supports DEUCSI, or Defense Experimentation Using Commercial Space Internet, which is a U.S. Air Force program focused on developing and testing satellite communication systems that can integrate government-owned and commercial satellite constellations. The objective of the experimental operations is to test equipment that can provide military forces with access to the combined bandwidth of both military and commercial satellite internet providers. The Global Lightning Program’s mission ties directly into the Pentagon’s vision for its new warfighting concept known as Joint All Domain Command and Control (JADC2). The JADC2 effort seeks to connect systems that are currently siloed across the battlespace under a single network, enabling warfighters to quickly send and receive critical decision-making data. Northrop Grumman was originally selected for a four-year contract by the AFRL as part of the DEUCSI Call 003 program.

Experimental testing will be from a fixed antennas located in Linthicum Heights, MD with a 1 km testing radius. Each antenna will be under NGSC’s operational control.

NGSC acknowledges that all experimental operations conducted in the requested bands will be on a non-interference basis.

Associated Government Contact Information:

US Government Agency: Air Force Research Laboratory (AFRL)

Contract Number: US Contract No. FA8650-23-C-9313

Government Program Office POC: Dr. Brian Beal, brian.beal.1@us.af.mil

Antenna Information

Manufacturer: Northrop Grumman

Model / Part Number: SPOC GL Radio (SN: SPOC_GL_008),

Northrop Grumman Ku-Ka Band Antenna

Antenna Type: Active Electronically Scanned

Array (AESA)

Waveform Information:

Frequency (Fixed or Operational Bandwidths): 27.5-29.1 GHz, 29.25-30 GHz (SES-17)

Emission Designator(s): 160MG7D

Transmitted Power Information:

Transmitter power: 200W

Effective Radiated Power: 57.86dBW

Antenna Gain: 37 dBi

The **stop buzzer contact** for this experimental authorization will be William Gammon, (858) 514-9784, William.gammon@ngc.com.

¹ as required under Government contract

Interference Analysis to Request for Experimental Authorization

Northrop Grumman Systems Corporation (“NGSC”) hereby provides this engineering analysis with its experimental application. This experiment is not likely to cause harmful interference to licensed incumbents operating in the 27.5-30.0 GHz band.

There are two known license holders in Anne Arundel County, Maryland:

1. Cellco Partnership holds two UMFUS, 47 CFR Part 30, licenses. The first license (callsign [WRBB248](#)) covers Block L1 in the 27.5-27.925 GHz band. The second license (callsign [WRBB249](#)) covers Block L2 in the 27.925-28.35 GHz band.
2. California Internet, L.P. dba GeoLinks holds block A for Local Multipoint Distribution Service (LMDS; 47 CFR Part 101; callsign [WPOH962](#)), covering the 29.1-29.25 GHz band.

Interference Mitigation:

Beamwidth:

1. Using Northrop Grumman’s SPOC GL Radio (SN: SPOC_GL_008), we are required to operate with a beamwidth below 1.6 degrees to ensure a stable GEO link and to mitigate interference to adjacent satellites.

Power Mitigation:

1. Mitigate power down from the maximum operating point of the Northrop Grumman SPOC GL Radio antenna up to 20dB.

Radome Use:

1. NGSC’s antenna will be placed in an engineered radome that has been rated for Ku and Ka band transmissions. Utilizing this radome will help absorb any stray emissions, reduce edge diffraction and suppress side lobe artifacts while helping to maintain low loss, low-reflection behavior in Ka-band emissions.
2. While we understand that a radome does not eliminate the possibility for interference to other systems, it can help with limiting possible interference.

Antenna Pointing:

1. Using the Northrop Grumman antenna in Ka-band to communicate with the SES-17 satellite and given our fixed position of 39 12 21 N 76 40 53 W inside a Ku/Ka band radome, we believe that our Azimuth and Elevation to that satellite will also mitigate interference to nearby emitters within Ka-band. Operating with an azimuth of ~185 degrees and elevation angle of ~54 degrees, and a beamwidth of less than 1.6 degrees will help to mitigate any possible EMI to those other nearby emitters.

¹ as required under Government contract

2. Please see attached document for seven-day Az/EI calculation.

Frequency Channels x8:

3. Frequencies will pseudo-randomly switch which will help with mitigating dwell-time on the carrier signal.

Mitigation statement from NGSC's SES Representative:

1. To regulate transmit emissions on the SES network, there are several controls in place at both the network and terminal level.
2. SES network employs what is called a "Terminal Type" (TT), which is mainly derived from terminal RF performance (EIRP; ESD; G/T). The TT is configured at all SES hub infrastructure as well as at the modem level. The TT configuration contains a "power delta" metric which is based on the following inputs:
 - Max EIRP of terminal
 - EIRP density limit
 - Skew angle based on shared beam location
 - Max symbol rate
3. The reference terminal for group power delta calculations is our residential terminal. The residential terminal has a 75 cm antenna with 53 dBW max EIRP. All group power deltas are relative to this terminal. A target Es/No is set per beam and the group power delta per beam by TT regulates power control to ensure FCC compliance.
4. **As a separate manual control at the terminal, the LSDR has the ability to set a minimum attenuation level which can be used to further limit the maximum EIRP for a specific user terminal.**

Daily Checks and Controls:

1. In the event of any interference, NGSC is capable of implement its interference mitigation strategy by limiting power and shutting our system down completely if directed to do so.
2. NGSC's transmission times will be limited to 3-5 days during the regular work week from 7am to 4pm.

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3. I, William Gammon, will be onsite at our Linthicum Heights, MD location every day. I am the Test Director during the testing for the entire duration and will be the Stop Buzzer to contact for immediate shutdown of our system. I have the power and authority to shut down and cease all transmissions and testing activities.

For any questions regarding this license application, or interference concerns once experimentation is in progress, contact:

William Gammon

(858) 514-9784

William.gammon@ngc.com