



**Application for Experimental Special Temporary Authority
Over-the-Air Ground Station and Nightingale 1 Testing
Narrative Statement**

Rev. A

CesiumAstro, Inc.
13215 Bee Cave Parkway Suite A-300
Austin, Texas 78738

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EXPLANATION OF WHY AN STA IS NEEDED

CesiumAstro, Inc. (“Cesium”) respectfully requests a 6-month FCC experimental Special Temporary Authority (STA) to test and validate operation and performance characteristics of Cesium’s fully-integrated phased array communication system, Nightingale 1 (NG1), and experimental ground stations. Specifically, Cesium seeks an STA for the authority to perform over-the-air RF testing between a transmitting NG1 and receiving experimental ground stations, as well as coexistence/isolation testing with two NG1s. Grant of the requested authority will allow Cesium to continue development of its RF systems which are of interest to the US DoD, NASA, and commercial businesses. This testing supports development of these RF systems for operation in future programs and use cases.

DESCRIPTION OF THE OPERATION TO BE CONDUCTED AND ITS PURPOSE

Transmissions will be directed towards the ground and all operations will be monitored by Cesium personnel to ensure the safety of operating personnel and the general public, as well as to mitigate the potential for harmful interference. Demonstration operations will only be performed under the control and supervision of Cesium personnel. Cesium personnel will ensure that keepout zones around the transmitter are enforced during operation of the NG1 as defined in the radiation hazard analysis. The demonstrations will utilize Ka-band frequencies. Cesium acknowledges that operations under this STA will be performed on a non-interference basis.

GROUND STATION POINTING PERFORMANCE

Testing between a transmitting NG1 and receiving ground stations will be performed to test and validate the pointing performance of the ground dish by seeing if it can find and point to the signal sent from the NG1. The NG1 will be located on the roof top of the Cesium TX office and pointed downward towards the nearby receiving ground station. The frequency range requested for this test covers the operational range of the ground station system and is necessary for testing and validating the performance characteristics of the system. Transmissions for this test will be at reduced power.

NG1 Tx to Rx COEXISTENCE/ISOLATION

Testing with two NG1s will be performed to test the Tx-to-Rx coexistence/isolation when the Tx NG1 is transmitting at max power. This test is to be performed over-the-air as opposed to in a range, as our range is too small to test the coexistence at full power. Both the transmitting and receiving NG1s will be placed on the roof top of the Cesium TX facility next to one another and pointed downward towards the ground in the direction of the nearby receiving ground station location. The frequency range requested for this test covers the operational range of the NG1 system and is necessary for testing and validating the performance characteristics of the system. The entire spectrum will not be used all at once, as emissions are limited by the requested bandwidth.

TIME AND DATES OF PROPOSED OPERATION

Cesium requests temporary authority for the operations stated above for 6 months, beginning on August 29th, 2022, through March 1st, 2023. If the STA is unable to or can be granted before the start date above, Cesium requests a 6-month period beginning as soon as the STA is able to be granted.

DESCRIPTION OF THE LOCATION

Operations under this STA will be performed at the Cesium TX facility and adjacent land where Cesium ground stations are located. Address and coordinates for these locations are listed below:

Cesium TX Facility

Address: 13215 Bee Cave Parkway, Building B
Austin, Texas 78738
Latitude: 30° 18' 49" N
Longitude: 097° 56' 47" W

Ground Station Location

Address: 13301 Galleria Parkway, Austin,
TX 78738
Latitude: 30° 18' 54" N
Longitude: 097° 56' 48" W

NIGHTINGALE 1 FREQUENCIES AND EMISSIONS

The NG1 will operate using the following requested frequency bands and emissions:

Nightingale 1

<i>Manufacturer:</i>	CesiumAstro, Inc.		
<i>Model:</i>	Nightingale 1		
<i>Frequencies:</i>	24.5 – 29.5 GHz	27 – 29 GHz	27 – 29 GHz
<i>ERP:</i>	609.54 W (27.85 dBW)	609.54 W (27.85 dBW)	609.54 mW (27.85 dBm)
<i>Gain:</i>	27 dBi		
<i>Emission Designator:</i>	162MG1W		
<i>Polarization:</i>	LHCP		
<i>Modulations:</i>	BPSK, QPSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK, 256APSK		
<i>Station Class:</i>	FX		
<i>Experimental:</i>	Yes		

OVERALL HEIGHT OF ANTENNA STRUCTURE ABOVE THE GROUND

The height of the building the transmitting NG1 antenna will be located on is approximately 12 meters. The NG1 antenna will not extend beyond 6 meters above the building. Figure 1 below provides an overview of the demonstration setup.

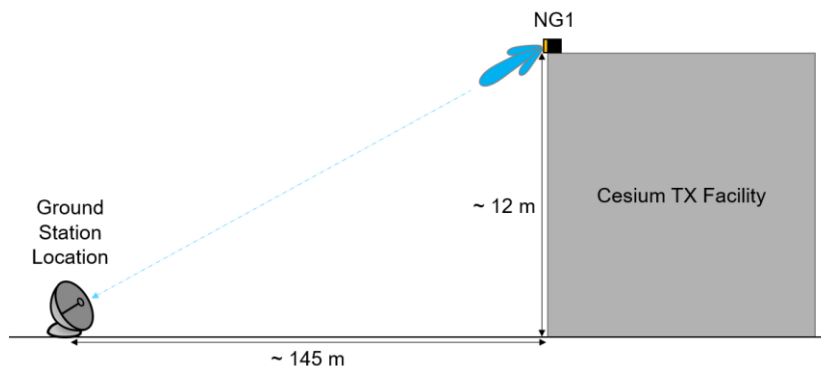


Figure 1: Overview of the test setup (image not to scale).

DIRECTIONAL ANTENNA

The Cesium NG1 is a directional antenna, and the width of the beam at the half power point is 8 degrees boresight. For testing, the NG1s will be pointed towards the ground (below the horizon) where the ground stations are located. The reference antenna patterns for the NG1 are below.

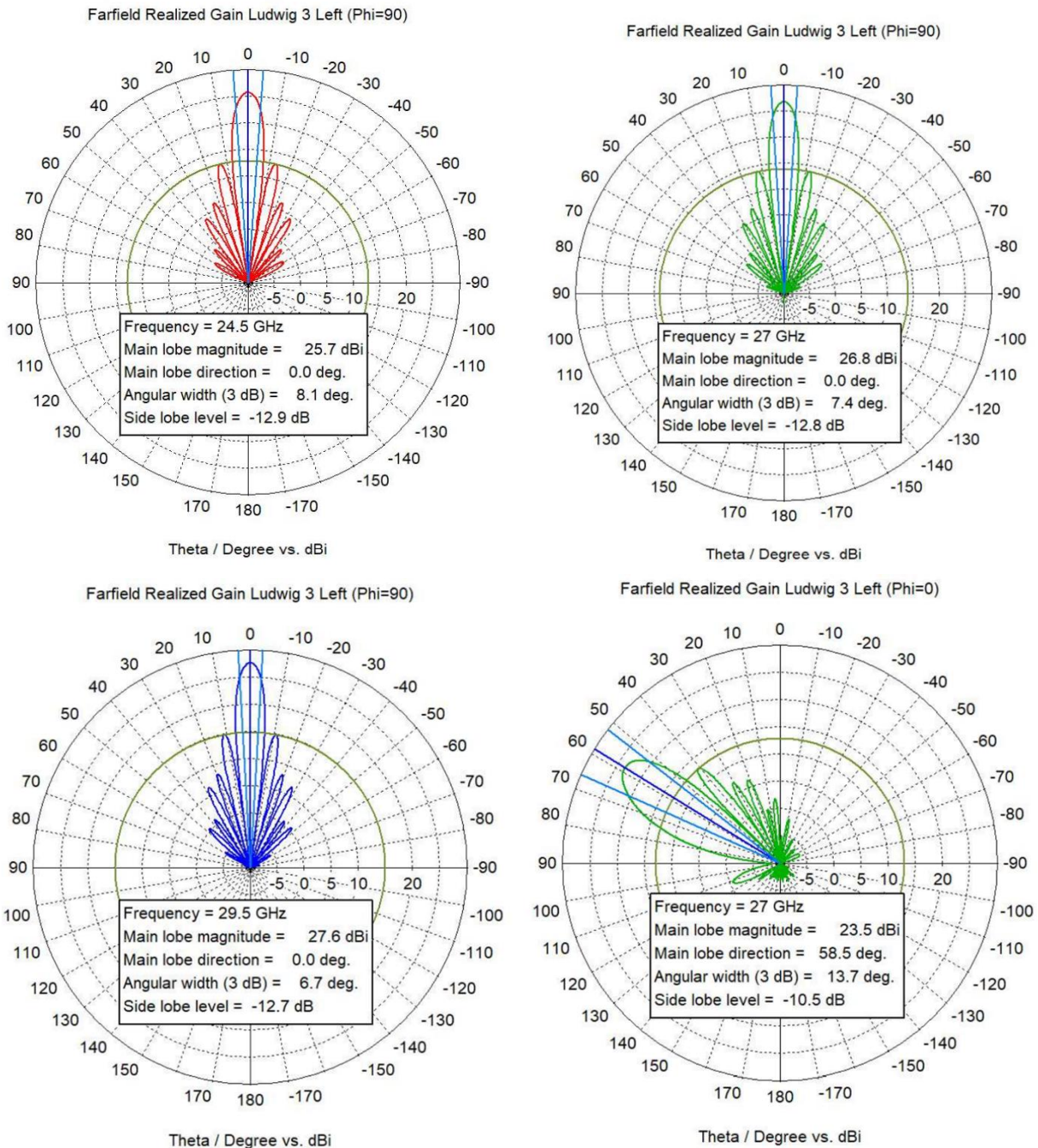


Figure 2: NG1 antenna patterns at various frequencies. The bottom-right pattern characterizes the beam shape when steered 60 degrees.

NAME, ADDRESS, PHONE NUMBER OF THE APPLICANT

Applicant and secondary “Stop Buzzer” name, address, phone number, and E-mail:

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