

CESIUM

Application for Experimental Special Temporary Authority Nightingale 1 Demonstration Narrative Statement

Rev. A

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February 11, 2022

1 EXPLANATION OF WHY AN STA IS NEEDED

CesiumAstro, Inc. (“Cesium”) respectfully requests a 4-day experimental Special Temporary Authority (STA) to demonstrate basic operations and performance characteristics of Cesium’s fully-integrated phased array communication system, Nightingale 1 (NG1). Specifically, Cesium seeks an STA for the authority to perform a live demonstration of its complete hardware and software solution for high-speed RF links with a dynamically-steerable beam at the “Satellite 2022” convention. Grant of the requested authority is in the public interest as it will allow Cesium to demonstrate its functional and versatile Nightingale 1 system to prospective purchasers (See 47 C.F.R. § 5.3(g)).

2 DESCRIPTION OF THE OPERATION TO BE CONDUCTED AND ITS PURPOSE

The NG1 will be used for basic performance demonstrations to prospective purchasers throughout the duration of the convention. For demonstrations, the NG1 will be generating a randomly seeded bitstream and the signal will be transmitted over the air to a Keysight Signal Analyzer which will demodulate the waveform and display the constellation on an adjacent screen. This will also include demonstrations of the beam steering capability of the NG1, where the beam will be steered towards and away from the receive antenna at a max of ± 30 degrees from boresight to show the modulation quality change depending on the direction of the beam.

Operations will be conducted at low power to ensure the safety of operating personnel and the general public, as well as 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.

3 TIME AND DATES OF PROPOSED OPERATION

Cesium requests temporary authority for the operations stated above for four days, beginning on March 21st, 2022, through March 24th, 2022. Operations of the NG1 will be performed between 8:00 am and 9:00 pm EDT for the days within the period of the STA.

4 DESCRIPTION OF THE LOCATION

Cesium will operate the NG1 at the Walter E. Washington Convention Center in Washington, DC. Specifically, demonstration operations will be performed at the CesiumAstro booth at the Satellite 2022 convention (booth 1216, exhibit hall A-B). Coordinates for the convention center:

Latitude: 38° 54' 13" N
Longitude: 77° 01' 22" W

5 NIGHTINGALE 1 FREQUENCIES AND EMISSIONS

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

Nightingale 1

Manufacturer:	CesiumAstro, Inc.
Model:	Nightingale 1
Frequencies:	24.6 GHz, 24.7 GHz, 26.0 GHz
Emissions:	100MG1D (24.6, 24.7 GHz), 450MG1D (26.0 GHz)
Modulations:	BPSK, QPSK, 8PSK, 16APSK, 32APSK
ERP:	2.45 W (33.9 dBm)
Station Class:	FX
Experimental:	Yes

The receiving system is a Keysight Signal Analyzer.

6 OVERALL HEIGHT OF ANTENNA STRUCTURE ABOVE THE GROUND

The overall height of the NG1 antenna above ground level for demonstration operations is approximately 1 meter. Figure 1 below provides an overview of the demonstration setup.

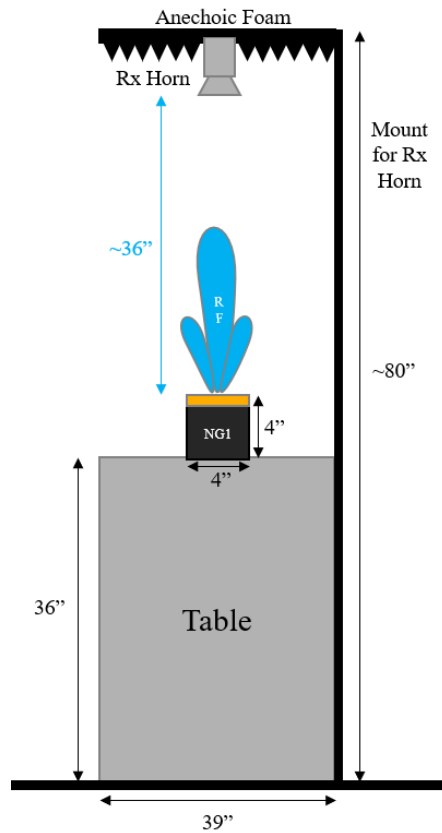


Figure 1: Overview of the Cesium NG1 demonstration setup (image not to scale)

6.1 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 the demonstration setup, the NG1 will be pointed vertically towards the receiver horn positioned above the NG1. Demonstrations will include operating the active phased array to steer the beam a maximum of ± 30 degrees from boresight (vertical). The reference antenna beam patterns for the NG1 are below.

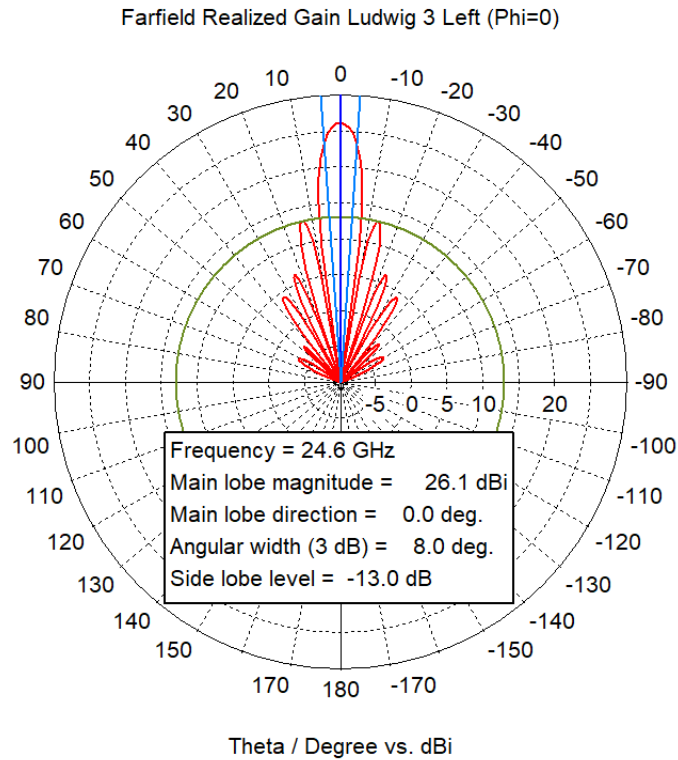


Figure 2: NG1 reference antenna pattern at 24.6 GHz

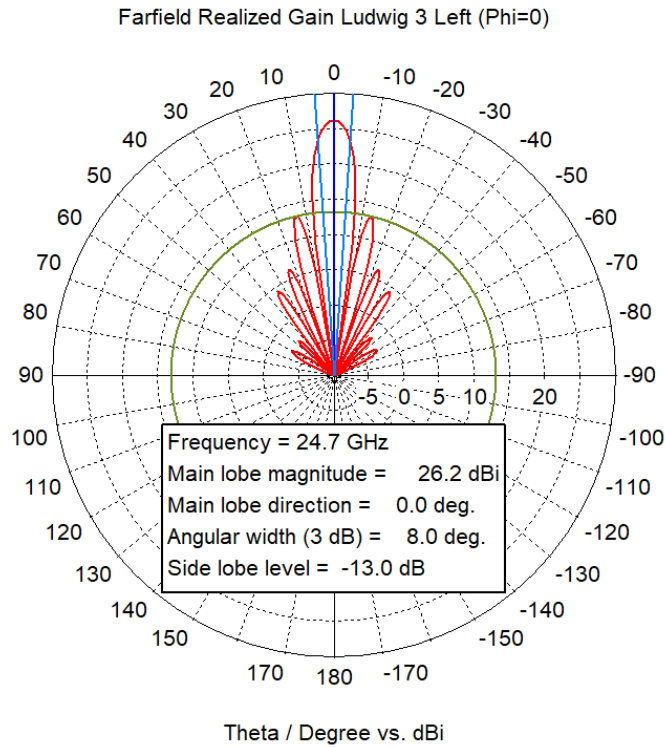


Figure 3: NG1 reference antenna pattern at 24.7 GHz

Normalized Boresight Gain in dB vs Theta in deg. 26GHz

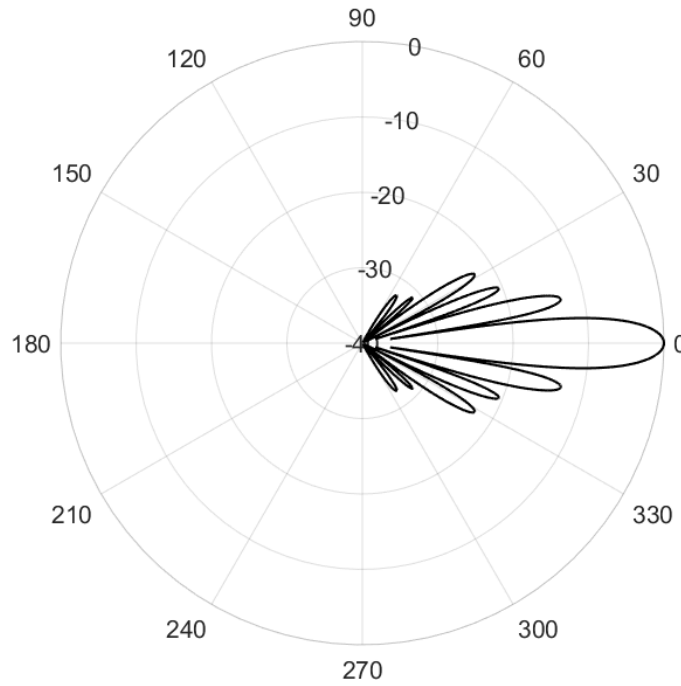


Figure 4: NG1 reference antenna pattern at 26.0 GHz

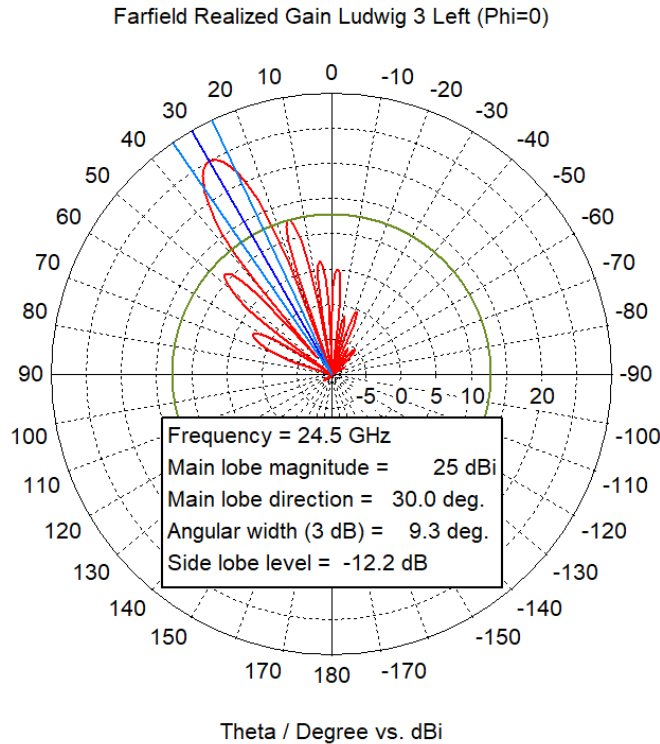


Figure 5: NG1 reference antenna pattern that characterizes the beam pattern when steered ± 30 degrees. Pattern depicted here is similar to those for the requested frequencies

7 NAME, ADDRESS, PHONE NUMBER OF THE APPLICANT

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

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