



**Application for Experimental Special Temporary Authority
Nightingale 1 Demonstration
Narrative Statement**

Rev. A

CesiumAstro, Inc.
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REVISIONS AND HISTORY

REV.	DESCRIPTION	SUB. DATE
Rev. A	Initial Filing	08/12/2021

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 short-duration live demonstration of its complete hardware and software solution for high-speed RF links with a dynamically-steerable beam at the “Satellite 2021” convention. Grant of the requested authority is in the public interest as it will allow Cesium to promote 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 (Field Fox) 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 chance 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 two frequencies in Ka-band using BPSK and QPSK modulations. 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 September 7th, 2021, through September 10th, 2021. Operations of the NG1 will only 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 Gaylord National Resort & Convention Center in National Harbor, MD. Specifically, demonstration operations will be performed at the CesiumAstro booth at the Satellite 2021 convention (booth 829, exhibit hall A-E). Approximate coordinates for the transmitter within the convention center:

Latitude: 38° 46' 51" N
Longitude: 77° 01' 01" 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
Emissions:	1M10G1D
Modulations:	BPSK, QPSK
ERP:	2.45 W (33.9 dBm)
Station Class:	FX
Experimental:	Yes

The receiving system is a Keysight Signal Analyzer (Field Fox).

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.

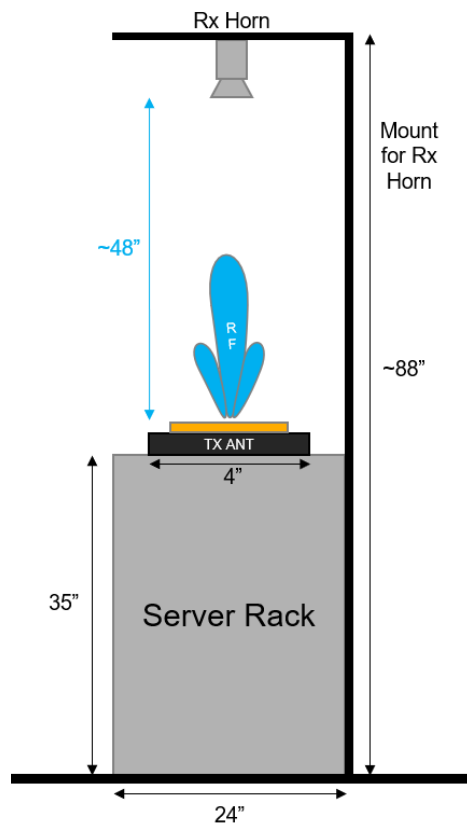


Figure 1: Overview of the Cesium NG1 demonstration setup (image not to scale)

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.

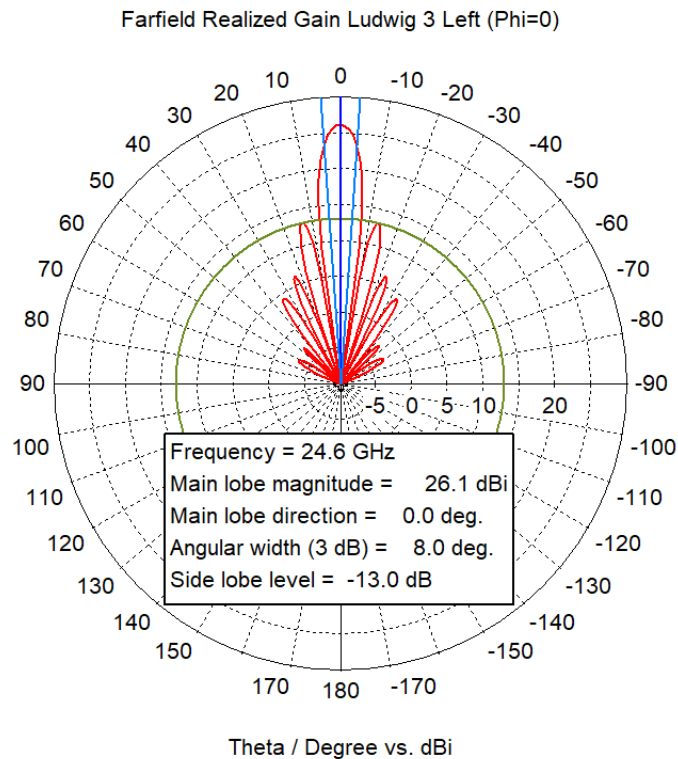


Figure 2: NG1 reference antenna pattern at 24.6 GHz

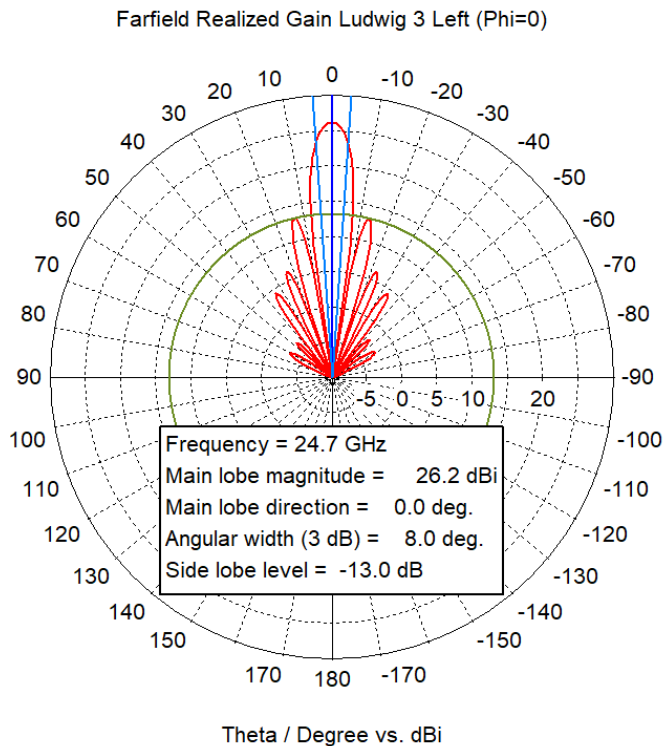


Figure 3: NG1 reference antenna pattern at 24.7 GHz

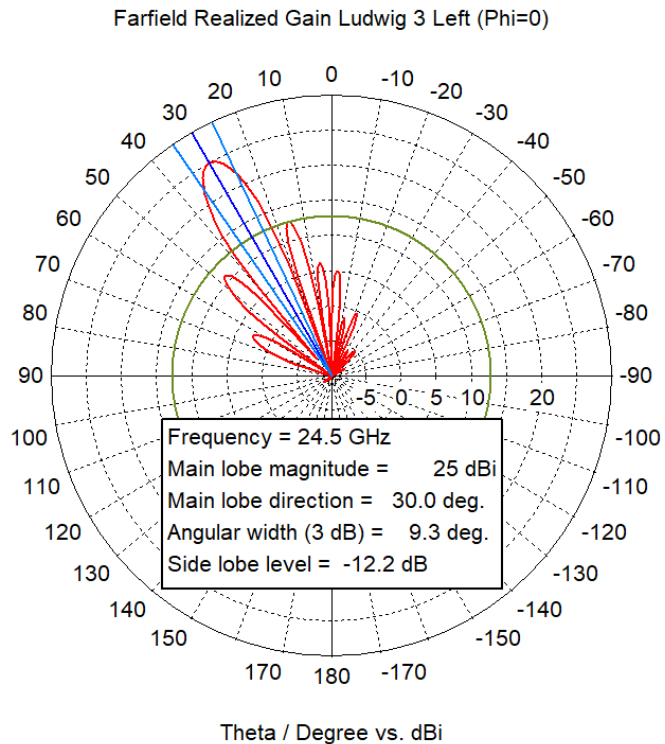


Figure 4: NG1 reference antenna pattern that characterizes the beam pattern when steered ± 30 degrees. Pattern depicted here is similar to those for the requested frequencies

7 LICENSEE SEARCH

Cesium conducted licensee searches through the IBFS and ULS databases prior to an initial filing. A ULS database search returned no results for licensees within a 30-kilometer radius from the specified coordinates above in the frequency range of 24.5 GHz – 24.8 GHz. An IBFS database search for active licenses in the frequency range of 24.5 GHz – 24.8 GHz returned one licensee with an authorization that overlap with our STA request:

- Audacy Corporation (SAT-LOA-20161115-00117), 24.45 – 24.75 GHz

Given that this authorization is for a MEO constellation with a ground gateway station located in California, Cesium is confident that there is no possibility for the NG1 to cause harmful interference with this licensee from our operations under this STA.

In the event that interference is a potential for systems and licensees outside of this search performed, Cesium is open to coordination and mitigation strategies to prevent harmful interference for the operations proposed in this STA.

8 NAME, ADDRESS, PHONE NUMBER OF THE APPLICANT

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

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