

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of

Application of Tyvak Nano-Satellite	)	
Systems Inc. for a 60-Day Special	)	Call Sign: N/A
Temporary Authorization To Provide	)	
Tracking, Telemetry & Command To	)	File No.: SES-STA-_____
Its In-Orbit Satellites	)	

**REQUEST FOR SPECIAL TEMPORARY AUTHORITY**

Tyvak Nano-Satellite Systems Inc. (“Tyvak”), pursuant to Section 25.120 of the Commission’s rules, 47 C.F.R. § 25.120, respectfully seeks a 60-day special temporary authorization (“STA”) to operate four (4) identical earth stations (the “400 MHz Yagi”) at a rooftop facility in San Diego, California to communicate with Tyvak’s low-Earth orbit (“LEO”) non-geostationary satellite orbit (“NGSO”) cubesats (the “CICERO” spacecraft). Tyvak seeks to perform tracking, telemetry and command (“TT&C”) to provide housekeeping and subsystem control for the CICERO cubesats in the 401-401.3 MHz band (Earth-to-space/space-to-Earth).

Tyvak seeks to commence TT&C operations on April 11, 2018, or as soon as practicable thereafter, to ensure continuing and reliable ground support for the CICERO spacecraft. The CICERO cubesats were the subject of a recently granted 30-day STA to provide TT&C from a partner facility in Deadhorse, Alaska<sup>1</sup> following the mechanical failure of Tyvak’s ground station in Norway, which has left Tyvak unable to adequately communicate with the CICERO spacecraft. Although the *Deadhorse STA* provided immediate emergency support for the CICERO mission, Tyvak seek the instant 60-day STA to perform TT&C from its own U.S. earth station facility in San Diego and plans file an application for regulatory authority for these operations.

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<sup>1</sup> See RBC Signals LLC, File No. SES-STA-20180330-00293 (“*Deadhorse STA*”).

## I. BACKGROUND

Tyvak is an Irvine, California-based company that provides nanosatellite products and services supporting state-of-the-art commercial and scientific Earth exploration satellite service (“EESS”) missions. Tyvak currently holds multiple experimental licenses from the Commission, including for the first demonstration satellite of the CICERO mission.<sup>2</sup> The subject CICERO satellites, which operate pursuant to authority granted by the Norwegian Communications Authority (“Nkom”),<sup>3</sup> are technically identical versions of the 6U cubesat previously described to the Commission in the *CICERO Experimental License*.<sup>4</sup>

The operations proposed herein are fundamentally similar to those previously approved by the Commission in the *CICERO Experimental License* and Tyvak will operate consistent with its existing experimental authorization. In the instant request, Tyvak seeks short-term authority to conduct TT&C operations for the Norwegian-licensed CICERO spacecraft (four cubesats) in the 401-401.3 MHz band (Earth-to-space/space-to-Earth).

Grant of this STA request is important for the ongoing reliability of the CICERO mission following the failure of Tyvak’s Norway ground station and, at a minimum, will support the

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<sup>2</sup> See Tyvak Nano-Satellite Systems Inc., File No. 0399-EX-PL-2016, Call Sign WI2XKJ (“*CICERO Experimental License*”).

<sup>3</sup> See Technical Appendix, III. Pursuant to the regulatory procedures adopted by Nkom, the attached submission of Advance Publication Information to the International Telecommunications Union (“ITU”) constitutes the Nkom authorization action for the CICERO spacecraft.

<sup>4</sup> The CICERO satellites will operate under the Tyvak-0082 ITU NGSO system filings. Tyvak acknowledges that authority for TT&C operations does not constitute market access to the United States for the Tyvak satellites and therefore is not providing the full technical information required by Sections 25.114 and 25.137 of the Commission’s rules, 47 C.F.R. §§ 25.114 and 25.137. See, e.g., SES Americom, Inc., File No. SES-MFS-20160624-00607, Call Sign E050287 (granting authority for an earth station to provide TT&C services to the foreign-licensed ASTRA 3A operating at 86.85° W.L.); Hawaii Pacific Teleport, L.P., File No. SES-MFS-20131030-00913, Call Sign E030115 (granting authority for an earth station to provide TT&C services to ASTRA 3A operating at 176.85° W.L.).

proposed regular earth station operations from the San Diego site. Given its proximity to Tyvak's headquarters and other geographic factors, the San Diego site provides more effective ground station support than the temporary Deadhorse operations and is well-situated to support the CICERO spacecraft. The proposed operations will be conducted on an unprotected and non-interference basis and only as-needed to communicate with the CICERO spacecraft as it passes over the San Diego earth station (several times per day with an average access time of five to seven minutes).

Tyvak provides the attached Technical Appendix, including a draft FCC Form 312 Schedule B, for information relating to the proposed earth station operations and the CICERO spacecraft. In addition, Tyvak will conduct these earth station operations in accordance with the Commission's rules and interagency requirements governing fixed earth station operations in the subject band. The proposed TT&C operations are fundamentally similar to Tyvak's existing operations at its Irvine, California headquarters in the 399.9-400.05 MHz band,<sup>5</sup> which have caused no interference to other users of the band. Grant of the requested STA – which is necessitated by operational limitations preventing the effective TT&C communications with the CICERO cubesats – will serve the public interest, convenience and necessity.

## **II. DISCUSSION**

Tyvak seeks to operate four 400 MHz Yagis<sup>6</sup> in the 401-401.3 MHz band (Earth-to-space/space-to-Earth) to provide near-term TT&C support for the CICERO cubesats. The CICERO spacecraft, launched in mid-2017, have a mission life of over two years and an orbit period of approximately 1.6 hours. The spacecraft will operate in a sun-synchronous orbit with an at an orbital

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<sup>5</sup> *Supra* n. 2; Tyvak Nano-Satellite Systems Inc., File No. 0398-EX-PL-2016, Call Sign WI2XKK.

<sup>6</sup> The 400 MHz Yagis are M2 Antenna Systems Model 400CP30A.

altitude of approximately 550 km and an inclination of 97.8°. Tyvak incorporates by reference the CICERO satellite technical specifications previously provided in the *CICERO Experimental License*<sup>7</sup> and provides the Nkom Authorization<sup>8</sup> for additional information relating to the spacecraft.

The goal of the CICERO mission is to perform GPS Radio Occultation (“RO”) measurements using Tyvak’s EESS atmospheric sensors, validating the RO mission and quality of data collected. Grant of this STA request is critical for the ongoing CICERO mission and supporting TT&C services during the pendency of Tyvak’s forthcoming earth station application.

#### **A. TT&C Frequency Use**

The United States Table of Frequency Allocations (“Table of Allocations”), Section 2.106 of the Commission’s rules, 47 C.F.R. § 2.106, provides that the 401-402 MHz band is shared on a co-primary basis between meteorological aids and space operations services. Tyvak seeks to perform TT&C uplink and downlink operations in the 401-401.3 MHz band pursuant to the co-primary space operations allocation in this band.<sup>9</sup>

Tyvak understands that there are certain U.S. government meteorological aids and earth exploration operations conducted in the 401-402 MHz band.<sup>10</sup> Tyvak will operate on an unprotected, non-interference basis and, if it learns that its operations are causing harmful interference to other

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<sup>7</sup> The Commission has previously reviewed the Orbital Debris Assessment Report for the CICERO spacecraft in context of Tyvak’s experimental license application. To the extent the Commission seeks addition information, Tyvak will provide such information at earliest possible time.

<sup>8</sup> Attached to the Nkom Authorization is the ITU SpacePub submission reflecting the CICERO information available on the ITU website.

<sup>9</sup> See 47 C.F.R. § 2.1 (defining “space operations” as “a radiocommunication service concerned exclusively with the operation of spacecraft, in particular space tracking, space telemetry, and space telecommand.”).

<sup>10</sup> See [https://www.ntia.doc.gov/files/ntia/publications/compendium/0401.00-0402.00\\_01MAR14.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/0401.00-0402.00_01MAR14.pdf).

operations, it will suspend or modify its operations to resolve such interference. Based on our research and consultations to date, Tyvak has not identified any terrestrial or earth station operations and believes the proposed TT&C operations in this band will not present a potential for interference to other spectrum users of this band.

### **B. STA Request & Public Interest Considerations**

Tyvak respectfully requests this 60-day STA pursuant to Section 25.120 of the Commission's rules, 47 C.F.R. § 25.120. Section 25.120(a) provides that STA requests should be filed at least three working days prior to the date of commencement of the proposed operations. Here, Tyvak seeks a commencement date of April 11, 2018. Additionally, the Commission may grant a 60-day STA if the STA request has not been placed on public notice and the applicant plans to file a request for regular authority for the operations. Tyvak plans to file an application for longer-term authority to permit continuing TT&C operations for the CICERO cubesats from the San Diego facility.

Grant of this STA request is in the public interest because it will facilitate the safe operation of the CICERO satellites in the near-term from a Tyvak-licensed facility and ensure uninterrupted TT&C support following the expiration of the *Deadhorse STA* and prior to Commission action on Tyvak's forthcoming earth station license application. Grant of this STA request will also promote U.S. leadership in the development next-generation satellite technologies by enabling a U.S. ground station to support the evaluation of the benefits and commercial viability of Tyvak's EESS and atmospheric monitoring services.

### **III. CONCLUSION**

In view of the foregoing, including the importance of reliable TT&C operations, the public interest would be served by a grant of a 60-day STA to allow Tyvak to perform TT&C functions for four CICERO cubesats in the 401-401.3 MHz band from San Diego, California, commencing on April 11, 2018 or as soon as practicable thereafter.