Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Allocation of Spectrum for Non-Federal Space Launch Operations	)	**ET Docket No. 13-115**
	)	
	)	
Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; and	)	**RM-11341**
	)	
	)	
Federal Space Station Use of the 399.9--400.05 MHz Band	)	

To: The Commission

COMMENTS OF THE
SOCIETY OF BROADCAST ENGINEERS, INCORPORATED

The Society of Broadcast Engineers, Incorporated ("SBE")[1] hereby respectfully submits its Comments in response to a portion of the *Further Notice of Proposed Rulemaking* [2] (FNPRM) in the captioned docket proceeding. Specifically, SBE is concerned about the proposal contained in the FNPRM which would create a primary, non-Federal allocation in the band 2025-2110 MHz (referred to herein as "the 2 GHz band") for use during commercial space launches. [3] SBE is concerned: (a) that the Commission has apparently not conducted a compatibility analysis relative to incumbent licensees in the band which would support the proposed primary allocation; (b) that the Commission has given inadequate consideration before making the

[1] SBE is the national association of broadcast engineers and technical communications professionals, with more than 5,000 members worldwide.

[2] See, the *Report and Order and Further Notice of Proposed Rulemaking*, FCC 21-44, released April 22, 2021; 86 Fed. Reg. 30860 *et seq*., published June 10, 2021 (R&O and FNPRM). The Federal Register publication of this FNPRM notes a comment date of July 12, 2021. These comments are therefore timely submitted.

[3] SBE expresses no view on the portion of the FNPRM which would add non-Federal allocations in the 420-430 MHz or 5650-5925 MHz bands, and it expresses no view on the changes proposed to the table of allocations in the 2200-2290 MHz band.

proposal to the exceptionally high level of use of this band for mobile and temporary fixed electronic news gathering, video production and other disparate uses; (c) that there is a substantial actual and potential preclusion effect from the proposed allocation with respect to the ongoing reaccommodation in the 2 GHz band of United States military applications displaced from the 1.7-1.85 GHz band following the AWS-3 Auction which has not been taken into account in the FNPRM proposal; (d) there is no justification offered in the FNPRM for a primary, as opposed to a secondary allocation for space launch communications; and (e) that there are inadequate provisions proposed in the FNPRM for protection of incumbents, and for expansion of incumbent service operations at 2 GHz, when viewed in light of prior, more careful spectrum planning efforts imposed, which have led to successful sharing among disparate users in this exceptionally crowded band to date. Should the Commission decide to proceed with this allocation, there is a distinct need for geographic and frequency limitations and other conditions on new entrant, non-Federal space launch entities which are not proposed in the FNPRM. Most importantly, there would be a critical need for participation by applicants for space launch authorizations in ongoing frequency coordination processes now being conducted by SBE, with the cooperative involvement of the National Association of Broadcasters (NAB) and the Department of Defense (DoD). Any allocation, and any licensing process for space launch operations in the 2 GHz band ***must*** include an advance coordination obligation for applicants with SBE, as has been done and is being done with other services operating in this band, and a continuing obligation to participate in the coordination process in order to keep SBE coordinator s' user databases current. For its comments, SBE states as follows:

1. The fundamental premise for all of the spectrum allocation proposals in this proceeding is that, while the STA process for space launch operations is not currently

cumbersome, and while it provides *de facto* interference protection for space launch communications now, when there are still relatively few launches by private sector entities, there is no guarantee that the current STA process will be sustainable in the future, as the number of commercial launches increases (which the Commission predicts that it will) and the number of launch sites proliferate. At paragraph 18 of the R&O and FNPRM, the Commission notes that in 2012, there were seven FAA-licensed commercial launches, but in 2020, there were 39 FAA-licensed commercial launches. The Commission predicts that the number of such launches will continue to increase, especially considering the emergence of private spaceports located outside of the established Federal ranges. For exactly that reason - the assumption that commercial launches will proliferate - the Commission cannot base its compatibility analysis as between space launch operations and incumbent operations at 2 GHz on the current levels of space launch operations, or for the matter of that, current band occupancy by incumbents. It must, *ex ante*, study the compatibility of expanded, non-Federal space launch communications with expanding Federal and non-Federal incumbents; and it must have an understanding of the very high level of occupancy in this band in particular. Evidence of such study and such understanding in the four corners of the FNPRM are absent.

2. Paragraphs 42 through 48 of the FNPRM address the Commission's proposal to add a co-primary non-Federal Space Operation (Earth-to-space) (space-to-space) allocation to the 2025-2110 MHz band. Although the Commission acknowledges the "heavy use of this band by [Broadcast Auxiliary Service (BAS), Cable Television Relay Service (CARS), and Local Television Transmission Service (LTTS)], and the increasing Federal use of the band, including for Federal space systems," there is not the slightest indication in the FNPRM that there has been a compatibility analysis done prior to proposing this co-primary allocation for non-Federal space

launch systems, and no indication why the allocation, even if justifiable, should be co-primary rather than secondary to incumbent applications. Instead, the sole basis stated for the proposed allocation is that the Commission "expect(s) the number of launches to continue to increase in the future" and that the allocation "will be more feasible than relying on the current STA process." SBE would suggest that this is an infirm foundation for creating a new, primary allocation in a mature, heavily-used allocation, which currently accommodates a plethora of dissimilar services. This is especially true where the prediction is that the newcomer to the mature allocation will expand (to an unquantified degree) in numbers in subsequent years. The Commission has in recent years touted spectrum overlays as a useful allocation mechanism, and it is that. However, the concept presupposes some knowledge about and an investigation of the interference susceptibility of incumbent radio services; the ubiquity of those incumbent services; the ability of those services to accommodate the expanding use without interference and without precluding or constraining incumbent services; and the anticipated growth of those incumbent services. There can be no assumptions made about the compatibility of sharing among dissimilar radio services in a given allocation. The allocation decisions must be based on a compatibility study. Yet, the proposal for a primary allocation apparently simply *assumes* compatibility; there is no evidence in the FNPRM that there have been any analyses performed prior to the adoption of the FNPRM.

3. SBE has a detailed, accurate working knowledge about the occupancy by incumbents in the 2 GHz band. It has for more than 40 years sponsored and supported a nationwide frequency coordination program which utilizes broadcast engineers located in each television market, who volunteer to serve as impartial coordinators of broadcast auxiliary spectrum. SBE coordinators maintain detailed databases of local use of BAS channels and non-broadcast user

information. The goal of SBE's voluntary frequency coordination program was in the past to maximize the efficient use and re-use of the very limited Rule Part 74, 76 and 101 frequency allocations by eligible entities in those three radio services who utilize that spectrum. Historically, the participants in this program have been Part 73 broadcast licensees, broadcast network entities, cable network entities, and video production entities and motion picture producers who are eligible to share Part 74 broadcast auxiliary (BAS) allocations. However, over time, BAS allocations became increasingly shared actively and increasingly with other users and other radio services, including DoD; NASA; Earth-Exploration Satellite Service entities, fixed point-to-point microwave licensees, broadband service providers, and other disparate services. Since effectively, the entire radio spectrum is fully allocated, additional sharing of BAS bands with non-broadcast entities has increased substantially during the last decade, and more of the same is anticipated looking forward. There have always been more users in each limited BAS band than can be accommodated at one time in many markets, and the role of the frequency coordinator to accommodate everyone, in all markets quickly became critical. SBE local chapters initiated frequency coordination as a service to broadcasters in their respective markets, and some coordination groups, though choosing to remain independent from SBE organizationally, nevertheless operate under the SBE umbrella and pursuant to its policies for reasons of consistency, efficiency and uniformity in performing the function in all markets. Cable, satellite and broadcast networks, video production companies and film and motion picture producers, as well as sports production entities now have coordinated access to spectrum originally intended to serve the needs of the local broadcaster, would not be able to operate reliably without frequency coordination. The Commission has in numerous instances noted the value of this process with

respect to BAS allocations. [4]

4. The role of the SBE local market frequency coordinator, according to longstanding SBE policy, is to act as an information disseminator and database administrator, and an entity that facilitates licensee-to-licensee contact, compatible sharing, and accommodation of *all* authorized users. Coordinators do not act as frequency assignors, or regulatory enforcement entities. The work of the coordinators is premised on the collegiality that comes from working with other broadcast and telecommunications professionals, and their work allows electronic news gathering, video and audio production, and other critical support functions for program and other content production to go forward without interference to the extent possible; and so that the difficulties inherent in inadequate spectrum allocations are minimized and do not deprive the listeners and viewers of radio and television broadcasts, cablecasts, satellite video, and sporting and entertainment events, that they expect and have a right to expect. At the same time, increasingly, inter-service sharing techniques and accommodations have been made to allow for non-broadcast operations.

[4] When the Office of Engineering and Technology issues an STA or Experimental License under Part 5 of the Commission's Rules which specifies broadcast or broadcast auxiliary spectrum (including 2 GHz), they have for many years now included an SBE coordination condition on those grants. Here are two examples of the language of the condition taken from granted STAs:

> Operation is subject to prior coordination with the Society of Broadcast Engineers, Inc. (SBE); ATTN: Executive Director; 9102 North Meridian Street, Suite 305; Indianapolis, IN 46260; telephone, (866) 632-4222; FAX, (317) 846-9120; e-mail, executivedir @ sbe.org; information, www.sbe.org.

> Coordinate with the local SBE frequency coordinator prior to operation in ... 2025-2110 MHz bands.

This language is included in almost 100 percent of the issued STAs and experimental applications that specify Broadcast Auxiliary spectrum, and to our knowledge, all of those specifying operation in the 2 GHz band. OET has acknowledged the value of coordinated operation in these bands where mobile and fixed applications are mixed and where band occupancy is heavy at all times of the day and night.

5. The 2 GHz Band is used extremely heavily, at all times of the day and night, ubiquitously by BAS and CARS licensees for electronic news gathering (ENG); and by video production licensees in the LTTS for event, entertainment and sports video production in many markets.[5] Operation is mobile or temporary fixed, although there are a few fixed 2 GHz BAS facilities as well. Consultation with the Commission's ULS database, which is the means by which commercial frequency coordination entities determine compatibility in new applications, is an inadequate means of ascertaining levels of use of the band in any market in the United States. SBE coordinators perform near-real-time coordination and their databases include all local users at any given time. This permits frequency re-use at 2 GHz using such techniques as directional antennas, multiple path relays and antenna cross-polarization. The process ensures maximum spectrum efficiency in both the frequency domain and the time domain among sharing entities. In most markets, the seven, 12-megahertz bandwidth channels are informally allotted in a market-specific "home channel plan" in which multiple users are periodically asked to agree to time-shared access to each channel, permitting often five or six users per channel at any one time. The process is exceptionally efficient when everyone accessing the 2 GHz band participates cooperatively, and again, the cornerstone policy is that all authorized users are to be accommodated by the coordinator.

6. SBE, together with NAB and DoD, has since 2013 been engaged in the ongoing reaccommodation at 2025-2110 MHz of a variety of important military facilities that were displaced from the 1.7-1.8 GHz AWS-3 band, when the AWS-3 band was auctioned several years ago.[6] In Docket 13-185, the AWS-3 proceeding, the Commission adopted a DoD/ NTIA

[5] Typically, due to similarities in use, BAS, CARS and LTTS are referred to collectively as BAS, which will be the case herein.

[6] See the *Report and Order* ("R&O") in ET Docket No. 13-185, released March 31, 2014 (FCC 14-31, 29 FCC Rcd. 4610).

proposal (with which SBE concurred), pursuant to which DoD would relocate key operations from the 1755-1780 MHz band and to obtain increased Federal access to the 2025-2110 MHz band. The reasons that incumbents in the 2 GHz band accepted this proposal were several. First, the proposal was far preferable to commercial use of the 2025-2110 MHz band, because incumbent uses were deemed incompatible with commercial use. Second, the establishment of a co-primary allocation for Federal operation in the 2 GHz band was accompanied by conditions in footnotes to the Table of Allocations for the 2025-2110 MHz band which limited use of the band to military use only, and which imposed specific conditions that protected non-Federal operations, including BAS.[7] The Commission found that this allocation plan would promote efficient use of both the 1755-1780 MHz and 2025-2110 MHz bands. Importantly, the Commission added footnote US92 [8] to the Table of Frequency Allocations, [9] which established the very specific mechanism by which displaced Federal operations would be accommodated at

[7] The Commission added primary Federal fixed and mobile service allocations to the 2025-2110 MHz band; it limited Federal use of the allocation to military use; it specified coordination requirements for such operations in accordance with a Memorandum of Understanding to be negotiated between Federal and non-Federal fixed and mobile operations; and provided interference protection and priority to the specified non-Federal fixed and mobile operations in the band.

[8] *See* 47 C.F.R. § 2.106 footnote US92.

[9] Recognizing the exceptionally heavy BAS use of the 2 GHz band, the Commission and NTIA made it clear in Footnote US92 that BAS has priority where accommodation cannot be made for DOD applications. That footnote reads, in part, as follows: "In the band 2025-2110 MHz, Federal use of the co-primary fixed and mobile services is restricted to the military services and the following provisions apply:

> (a) Federal use shall not cause harmful interference to, nor constrain the deployment and use of the band by, the Television Broadcast Auxiliary Service, the Cable Television Relay Service, or the Local Television Transmission Service. To facilitate compatible operations, coordination is required in accordance with a Memorandum of Understanding between Federal and non-Federal fixed and mobile operations. Non-Federal licensees shall make all reasonable efforts to accommodate military mobile and fixed operations; however, the use of the band 2025-2110 MHz by the non-Federal fixed and mobile services has priority over military fixed and mobile operations.
> (b) Military stations should, to the extent practicable, employ frequency agile technologies and techniques, including the capability to tune to other frequencies and the use of a modular retrofit capability, to facilitate sharing of this band with incumbent Federal and non-Federal operations.

2 GHz without interference, and without constraint on the current and future deployment of BAS operations in the band.

7. The dynamic processes mandated for compatible sharing of 2 GHz in Footnote US92 have been effectuated cooperatively and efficiently among SBE, NAB and DoD since that time. The required Memorandum of Understanding (MOU) is in the final stages of development, having been worked on cooperatively among the three entities, which have met regularly to administer the sharing plan. The very specific process of coordination is set forth in an exhibit to that document. Dynamic coordination processes have been developed and are being effectuated based on sharing of information of operating parameters and because of the work of both DoD and SBE frequency coordinators. Migration to date of DoD ground-based tactical radio relay communications is ongoing, as are deployments of low-altitude SUAS throughout the country. SBE has retained a telecommunications consulting firm to act as SBE's Frequency Coordination Manager, primarily for the work mandated by Footnote US92. Though this ongoing process is, thus far, successful, largely as a result of the good-faith, collegial work of NAB, DoD and SBE, it is exceptionally complex, given the ubiquitous mobile operations; the heavy loading of this band; and the unpredictable nature of breaking news events and the importance to BAS of the 2 GHz band in particular.[10]

[10] The 2 GHz band is critical to ENG operations due to its relatively long-distance propagation characteristics and the difficulties in using other bands available for mobile ENG. The 2450-2483.5 MHz ("2.5 GHz") Band, which is only two channels wide, is plagued by high noise levels from Part 15 and Part 18 devices and it is not usable for terrestrial ENG in most areas of the country (though it is used for aeronautical video production in downlink configurations). The 6425-6525 MHz ("6.5 GHz") band is available for mobile operation but there are other uses being made of the band, including public safety video relay, and it is also included in the band 5.925-7.125 GHz which has recently been made available by the Commission for unlicensed, high-power Wi-Fi devices. The 6875-7125 MHz ("7 GHz") portion of that band, formerly available for mobile and fixed BAS, is now available only for licensed fixed BAS operation, since the Commission made that segment available for fixed wireless backhaul some years ago. Grandfathered mobile operations can continue, and they do, especially in large markets, but there is not enough capacity to accommodate overflow ENG from the 2 GHz band, which is overcrowded in most markets.

8. The reaccommodation process will continue actively until at least 2025, and the ongoing coordination process will provide for the continued compatible sharing between BAS and DoD operations, and expansion of those applications in the 2 GHz band thereafter. DoD applications being reaccommodated in the 2 GHz band so far include tactical radio relay operations at military facilities, and in other areas in many States. Also under consideration for 2 GHz, subject to compatibility studies and coordination protocols (as yet undeveloped) are other displaced DoD mobile and aeronautical mobile applications, the details of which are sensitive National Security matters. Coordination of these important DoD applications is difficult and complex because of the ubiquitous geographic distribution of mobile ENG and DoD applications and the mobile nature of DoD facilities. Only the SBE's near-real-time frequency coordination program permits this high a degree of spectrum efficiency and frequency reuse, and the successful accommodation (thus far) of additional DoD displaced applications in the 2 GHz band.

9. There is a past predicate for the carefully planned paradigm that the Commission and NTIA adopted for the compatible sharing of the 2 GHz band by the United States military with incumbent BAS and other operations. In a *Seventh Report and Order* in Docket 00-258,[11] in order to free up spectrum at 1.7 GHz for Advanced Wireless Services (then 3G systems), the Commission decided to allow Federal access to 2 GHz as relocation spectrum for displaced military uses. Specifically, DoD was allowed to use 2025-2110 MHz, on a co-equal, primary basis with non-Federal incumbents for Earth stations at 11 specific sites to support military space operations (primarily tracking, telemetry, and command or "TT&C"). However, there were substantial limitations imposed, including a coordination requirement, in the area of each of the eleven uplink sites, in order to prevent interference or constraint of incumbent BAS operations.

[11] *Seventh Report and Order*, FCC 04-246, released October 21, 2004.

The Commission stated in that Report and Order in 2004 that it was "maintaining in the 2 GHz band [its] longstanding policy that first-licensed facilities have the right of protection from later-licensed facilities operating in the same band." [12] Thus, the Commission required that a new DoD TT&C uplink Earth station seeking to operate at 2 GHz must coordinate with all BAS stations that may be affected by the new earth station's operation. To ensure that the "right of protection of first-licensed facilities" was maintained, the Commission found it necessary to require that not too long a period of time elapsed between the authorization and the commencement of operations of a DoD TT&C uplink earth station at 2 GHz. So, DoD was required to coordinate facilities at the 11 sites only when construction and/or implementation were anticipated, and prior to authorization. DoD was required to coordinate the TT&C uplink Earth station with all potentially affected incumbent BAS, CARS, and LTTS licensees of stations within the coordination contour of the Earth station, consistent with Appendix 7 of the ITU Radio Regulations, and to engage the local market SBE BAS frequency coordinator(s), where available, in support of achieving such coordination.[13] DoD, at the time it submits its application for the authorization of a 2 GHz earth station to the Commission through NTIA's FAS, was required to provide, with its application, a list of the entities with which coordination was undertaken. Anticipating that situations where no reasonable coordination can be negotiated would be "rare", the Commission noted that the issue could be raised to it, and to NTIA to jointly arbitrate a resolution. However, the Commission warned that it would not concur with authorizing operation of any 2 GHz DoD TT&C uplink earth station in the absence of successful coordination between DoD and the affected BAS incumbents. Limitations to protect incumbent

[12] *Citing, e.g., Amendment of Parts 2 and 90 of the Commission's Rules to Provide for Narrowband Private Land Mobile Radio Channels in the 150.0-150.8 MHz, 162-174 MHz, and 406.1-420 MHz Bands that are Allocated for Federal Government Use*, ET Docket No. 04-243, *Notice of Proposed Rulemaking*, FCC 04-165 (rel. July 6, 2004) ¶ 40. *See also* 47 C.F.R. §§ 2.104(d)(3)(iii), 2.105(c)(2)(iii).

[13] SBE maintains a list of local frequency coordinators, by county, on its website at www.sbe.org .

operations were included in an amended U.S. Footnote 346, which read in relevant part as follows:

> US346 Except as provided for below and by footnote US222, Federal use of the band 2025-2110 MHz by the space operation service (Earth-to-space), Earth exploration-satellite service (Earth-to-space), and space research service (Earth-to-space) shall not constrain the deployment of the Television Broadcast Auxiliary Service, the Cable Television Relay Service, or the Local Television Transmission Service. To facilitate compatible operations between non-Federal terrestrial receiving stations at fixed sites and Federal earth station transmitters, coordination is required. To facilitate compatible operations between non-Federal terrestrial transmitting stations and Federal spacecraft receivers, the terrestrial transmitters in the band 2025-2110 MHz shall not be high-density systems (see Recommendations ITU-R SA.1154 and ITU-R F.1247). Military satellite control stations at the following sites shall operate on a co-equal, primary basis with non-Federal operations:
>
> *****
>
> [list of eleven sites omitted]

10. Upon the enactment of that requirement in 2004, SBE and DoD met and negotiated in a series of meetings a Memorandum of Understanding which included technical sharing parameters. This arrangement was beneficial and it largely obviated the need for individual negotiations with individual broadcasters in the eleven markets in which the DoD uplinks were to be located. The arrangement is still utilized today in case of any changes in the operations of the uplink facilities.

11. The Docket 00-258 and the Docket 13-185 arrangements for sharing at 2 GHz provide examples of how compatible, successful sharing of a mature allocation can occur with few disruptions of incumbent or incoming operations. The use of memoranda of understanding and a clear instruction to new entrants to participate in an ongoing, stable frequency coordination process, and an unequivocal statement from the Commission prioritizing the uses of the band are critical components of the success of the sharing initiative.

12. An example of a far less successful sharing plan, where the coordination process has *not* been effective, is with respect to Earth Exploration Satellite Service licensing in the 2 GHz band. SBE, beginning in November of 2020, began correspondence with the Commission's International Bureau, noting that this is a matter of significant and increasing concern to television broadcasters, broadcast engineers, and television and motion picture producers nationwide. SBE explained that Earth Exploration Satellite Service (EESS) uplink facilities are regularly and increasingly being licensed by the International Bureau in, among other bands[14], the band 2025-2110 MHz, and these authorizations are being granted now and have been granted repeatedly and increasingly without any ongoing frequency coordination obligation conditioning EESS operation, with facilities that predictably will, and do, cause preclusive, harmful interference to incumbent mobile, temporary fixed and fixed licensees in the BAS, CARS and LTTS Services in various markets. SBE acknowledged that internationally, the band is allocated to the fixed, mobile, space operation (SOS), EESS, and space research (SRS) services on a co-primary basis in all three ITU regions, and that the SOS, EESS, and SRS allocations are limited to uplink and space-to-space transmissions. Domestically, however, the band 2025-2110 MHz is allocated to the fixed and mobile services on a primary basis for non-Federal Government use. The 2 GHz band is available to the BAS[15] and LTTS services for fixed and

[14] Other bands in which EESS licensing has taken place without any ongoing frequency coordination obligations being imposed on applicants or licensees include part of the 450-451 MHz Remote Pickup band for audio remote broadcast relay, and the 6875-7125 MHz ("7 GHz") Band, which is used for fixed and mobile Broadcast Auxiliary and program production purposes by BAS, CARS and LTTS licensees.

[15] Prior to 2000, the 2 GHz BAS band extended from 1990-2110 MHz. On June 27, 2000, the Commission reduced the band by reallocating the 1990-2025 MHz segment to the mobile-satellite service, ultimately leaving the band 2025-2110 MHz to serve the needs of the BAS community. In that action, the Commission also made Federal Government satellite operations co-primary in the band 2025-2110 MHz, but with the caveat that these operations not constrain the deployment of BAS. *See Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by Mobile-Satellite Services*, ET Docket No. 95-18, *Second Report and Order and Second Memorandum Opinion and Order*, 15 FCC Rcd 12315 (2000). The reduction in the 2 GHz band resulted in the narrowband conversion of the seven BAS channels in the band from 17 megahertz to 12 megahertz. The channels in the band are referred to as A1 through A7.

mobile use and to CARS for mobile use only, and it is also allocated domestically by footnote to the EESS and SRS for Federal and non-Federal Government use, generally on a secondary basis to BAS uses, and limited to uplink and space-to-space transmissions. While Federal Government SRS and EESS allocations are direct entries in the Table of Allocations, non-federal SRS and EESS authorization is found *only* in Footnote US347, which states:

> In the band 2025-2110 MHz, non-Government Earth-to-space and space-to-space transmissions may be authorized in the space research and Earth exploration satellite services *subject to such conditions as may be applied on a case-by-case basis. Such transmissions shall not cause harmful interference to Government and non-Government stations operating in accordance with the Table of Frequency Allocations*. (Emphasis added)

13. Further, the band 2025-2110 MHz is allocated to the SOS on a primary basis, for Federal Government use, limited to uplink and space-to-space transmissions. It is clear from Footnote US347 that non-government EESS must protect all BAS operation and DOD operation at 2025-2110 MHz.[16] EESS uplink applications specifying 2025-2110 MHz are being filed regularly and are being processed and granted by the International Bureau, apparently without reference to the interference potential to co-channel BAS operations (including ENG), and without reference to terrain shielding, duty cycle of the uplink, or the expected total number of EESS low Earth orbit satellites in the constellation. These 2 GHz fixed uplink applications are coordinated with commercial frequency coordination entities such as Comsearch or Micronet, but no *commercial* coordinator conducts near-real-time frequency coordination, and no coordination is done on a continuing basis for these facilities. The commercial coordinators can examine multiple, fixed receive locations shown in the ULS database, but they cannot examine EESS uplink interference to mobile or temporary fixed ENG or program production receive

[16] The same is true for Federal EESS uplinks. Pursuant to Footnote US346, Federal EESS (Earth to Space) and SRS (Earth to space) "shall not constrain the deployment of the Television Broadcast Auxiliary Service, the Cable Television Relay Service, or the Local Television Transmission Service."

locations in the 2 GHz band at unpredictable, ubiquitous locations. For this reason, the commercial coordinators cannot possibly conclude from a ULS or other database search that EESS uplink operation at a given teleport will not conflict with BAS, LTTS, CARS or DOD operations in the 2 GHz band. All of those operations are or include temporary fixed, mobile and itinerant operation which is both ubiquitous and unpredictable. There are few BAS fixed links in the ULS database in this band. There are some registered receive (passive) sites, but there are many mobiles, and temporary receive sites that do not appear (for coordination purposes) in the ULS database at all. SBE also coordinates operations in this band in real time with NASA, which is another sharing partner at 2 GHz. All of these uses require real-time coordination, which is not being done now by commercial coordinators (though it is offered as a service by SBE coordinators).[17] Absent such real-time coordination, SBE suggested, there is a fundamental incompatibility between non-government EESS or other satellite uplinks in the 2 GHz band, and ongoing BAS, CARS, LTTS and DoD uses of the band due to the ubiquitous, unpredictable and expanding operation of all of those services, each of which has priority over any proposed EESS operation premised on Footnotes US346 and US347, or otherwise. [18] SBE urged that the International Bureau reexamine the process of EESS licensing and to make necessary changes to comply with the provisions of these Footnotes. SBE has found that EESS licensees are typically completely unaware of their secondary status at 2 GHz, and how heavily the band 2025-2110 MHz is used by broadcasters for ENG, especially in the larger metro areas. Urbanized and suburban areas are not good locations for these facilities because the antenna, tracking an EESS

[17] Typically, commercial coordinators include some non-specific statement with an EESS application that states that the coordinator's consultation with its database of fixed, point-to-point facilities or the receive sites that appear there or in the ULS reveal no conflicts, or else there is a generalized statement that "the Earth Station proposed is in a remote area" of whatever State in which it will be located. These are woefully insufficient in terms of interference avoidance or mitigation.

[18] Even when coordination is submitted for these spacecraft, it is often done when the spacecraft is ready for launch, or even post-launch, and the operating parameters are at that point fixed and no longer subject to modification.

LEO Cubesat, will sweep along a wide range of azimuths and elevation angles as it tracks the satellite. Because the main beam EIRPs are typically in the 82 to 89 dBm range, the TT&C uplink operation radiates interfering signals co-channel to ENG in many directions. As a longer-term issue, SBE recommended that the Commission re-examine the Section 25.203 rule provisions, which do not appear sufficient to protect ENG receive only sites at 2 GHz. SBE suggested instead that the interference criteria should be no greater than a 0.5 dB degradation of the noise threshold of a receiver at an ENG receive site. To date, despite discussions with the International Bureau and a follow-up letter explaining the need for ongoing coordination of EESS license applicants with SBE, no change has been initiated for EESS licensing.

14. Given the foregoing extensive history of both successful and unsuccessful spectrum management in the 2 GHz band, where dissimilar radio services are sharing this heavily used frequency band, SBE has the following recommendations. First, the Commission should not treat commercial space launch entities differently than it has the Department of Defense or other sharing partners at 2 GHz. The same coordination requirements applied to DoD relocated operations at 2025-2110 MHz should be required of other services in the Band. There must be an affirmative, unambiguous statement in a Footnote to the Table of Allocations making it clear that space launch communications may *not* constrain BAS, CARS, LTTS or DoD coordinated operations in the 2 GHz band. There should be a coordination requirement in effect prior to licensing and during the license term of the space launch operator, involving both SBE's Frequency Coordination Manager and the SBE local market coordinator. This obligation should be unrelated to, but in addition to any commercial coordination requirement that the Commission wishes to impose on applicants for commercial space launch communications in the 2 GHz band, or with respect to any band other than 2025-2110 MHz. The point is that the *commercial*

coordination requirement is insufficient to ensure compatible operation in the 2 GHz BAS band. Only the participation of the applicant for a commercial space launch communications facility in the SBE's near-real-time coordination process, both before licensing and periodically during the license term to keep the SBE local market coordinators' databases complete and accurate, will be sufficient to protect incumbents from interference and to avoid constraint of those incumbents' operations.

15. SBE is obligated by the terms of Footnote US92 to "make all reasonable efforts to accommodate military mobile and fixed operations" in the 2 GHz band as part of the AWS-3 reaccommodation process. To date, this has been done diligently, and SBE will continue to accommodate DoD facilities at 2 GHz. The authorization of commercial space launch communications facilities in the 2 GHz band would have a currently unknown preclusion effect on the DoD reaccommodation process, and it may also constrain the development of BAS facilities in the band. There must therefore be geographic limitations on the deployment of space launch communications such that planned DoD deployments of, for example, tactical radio relay facilities at military bases, other military facilities, and the deployment areas of SUAS operations are not predictably, adversely affected. The preclusion effect on DoD facilities at 2 GHz can be avoided in many cases by the SBE coordination process prior to initial licensing of space launch communications facilities. However, space launch operations should be expressly conditioned on non-interference and non-constraint of all incumbents at 2 GHz at the time of licensing, consistent with the Commission's longstanding policy that first-licensed facilities have the right of protection from later-licensed facilities operating in the same band. It is unclear why the Commission is of the view that a primary allocation is called for in the 2 GHz band, and SBE

would strongly suggest that there is no such justification. A secondary allocation is far more appropriate.

16. In addition to geographic limitations, there should also be frequency limitations for space launch operations. As NAB has recommended, SBE would endorse a limitation on such operations to the two, 500 kHz "data return link" channels at 2025 - 2025.5 MHz and 2109.5 - 2110 MHz, assuming that many space launch systems require less than 500 kHz of occupied bandwidth. The Commission's proposal in the FNPRM to permit space launch communications without either geographic or frequency limitations is poor spectrum management indeed.

17. Finally, in terms of technical operating parameters, each space launch communications applicant should, in addition to making showings (a) that it has previously coordinated its proposed operations with the SBE Frequency Coordination Manager; (b) that it has ascertained that its proposal will not constrain, preclude, nor interfere with incumbents in the band, including BAS, CARS and LTTS licensees and DoD relocated operations; and (c) that it be obligated to demonstrate in a technical showing that its proposed operation will not create more than 0.5 dB increase in the noise threshold of a receiver at a fixed or temporary fixed ENG receive site.

18. SBE would encourage the use of technical compatibility studies in the future, prior to any proposed spectrum overlay allocation. In this case in particular, it is lamentable that such was not done. SBE would have been pleased to provide its experience with this band in particular when such an allocation is under consideration. SBE would also ask the Commission to not underestimate the potential preclusion effect on both the development of BAS or DoD operations in the 2025-2110 MHz band from the proposed allocation here. This is indeed, by a large margin, the most important broadcast auxiliary band there is, and it is critical in the

production of televised news, entertainment and sporting events. It is now being used extremely heavily, but efficiently in most markets in the United States. It can only accept additional uses if the same processes that have been successful in the past are followed cooperatively and in good faith, and the licensing processes that have proven unsuccessful, such as the current licensing process for EESS, not be duplicated or repeated. Therefore, SBE recommends that, should the Commission proceed with the allocation proposed, the procedures for licensing non-Federal space launch communications should follow the successful model established by the Commission and NTIA for accommodation of DoD operations displaced from the 1.7- 1.8 GHz band as described herein; impose an SBE coordination requirement; and the allocation should be secondary to incumbents as discussed above.

Therefore, the foregoing considered, the Society of Broadcast Engineers, Incorporated respectfully requests that the Commission proceed in the instant Docket proceeding as recommended herein, and not otherwise.

Respectfully submitted,

THE SOCIETY OF BROADCAST ENGINEERS, INCORPORATED

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