Comments of the
Society of Broadcast Engineers, Inc.

ET Docket 00-258
Fourth NPRM
DoD Uplinks at 2 GHz

November 3, 2003

SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
DoD Uplinks Relocated to the	)	ET Docket No. 00-258
2,025–2,110 MHz TV BAS Band	)	Fourth NPRM
So As To Make Still More Spectrum	)	
Available for Third-Generation Wireless	)	
Services at 1.7 GHz	)	

To: The Commission

Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members world wide, hereby respectfully submits its comments in the above-captioned Notice of Proposed Rulemaking (NPRM) relating to the relocation of 11 Department of Defense (DoD) tracking, telemetry and command (TT&C) Earth-to-space satellite uplink stations from 1.8 GHz to the 2,025–2,110 MHz TV Broadcast Auxiliary Services (BAS) band.

I. Proposed Relocation of DoD Uplinks to 2,025–2,110 MHz Would Be a Serious Interference Threat To TV BAS Operations

1. First, SBE does not understand why these 11 DoD uplinks cannot simply remain in their present 1,761–1,842 MHz Space Ground Link System (SGLS) band, with any displaced terrestrial DoD links now occupying 1,710–1,755 MHz being carefully relocated into the 1.8 GHz SGLS band.[1] SBE believes that this would be a far more feasible frequency sharing than

[1] This proposed move is prompted by the re-allocation of 1,710–1,755 MHz from federal government spectrum now used for terrestrial, fixed-link DoD microwave communications, to the private sector, for Third-Generation (3G) wireless services such as Internet access, to be awarded by extremely-lucrative-to-the-federal government spectrum auctions. See the October 16, 2003, FCC News release, *FCC Adopts Third Generation ("3G") Rules Making 90 MHz of Spectrum Available for Broadband and Advanced Wireless Services* and the October 17, 2003, *Wall Street Journal* article "FCC Blesses New Wireless Technology." The loss of the 1,710–1,755 MHz band to DoD means that government fixed links now using those frequencies will have to be migrated to the 1.8 GHz SGLS band; this, in turn, may require some or all of the 11 DoD TT&C uplinks addressed in this instant ET 00-258 rulemaking to move to another band, such as 2,025–2,110 MHz. SBE hopes that the action in WT Docket 02-353, awarding 45 MHz of spectrum at 1.7 GHz to 3G, does not mean that the "fix is in" to this instant ET Docket 00-258 Fourth NPRM rulemaking. SBE is accordingly still submitting its comments to this instant ET Docket 00-258 Fourth NPRM, in good faith, with the expectation that the massive interference to 2 GHz TV BAS operations that would be caused by high power and *co-channel* DoD uplinks will not be ignored or discounted because of the need to accommodate an already made decision in another FCC rulemaking.

attempting to relocate high-power DoD uplinks to 2,025–2,110 MHz. As will be shown in this filing, this would be a fundamentally incompatible sharing at this time.

2. Moving up to 11 DoD uplinks out of the 1,761–1,842 MHz SGLS band and into the 2,025–2,110 MHz TV BAS band would pose a serious interference threat to the ability of broadcasters to continue to use these frequencies for electronic news gathering ("ENG") in the vicinity of the DoD uplinks This is because the uplinks would be *co-channel* to TV BAS operations. Therefore, use of filters and more selective receivers would be of no help. DoD, NTIA, and the FCC all need to realize that broadcast ENG is an important component of Homeland Security in terms of reducing public panic during an emergency.

3. Although the NPRM is astoundingly vague on the technical characteristics of the proposed newcomer uplinks, stating only that very high transmitter power outputs (TPOs) of between 100 watts (50 dBm) and 10 kW (70 dBm) would be employed, based on its research SBE can make some educated guesses about the interference potential of such uplinks. The uplink antenna would most likely be a 10-meter diameter parabolic dish, with a gain of around 45 dBi, giving a main-beam equivalent isotropic radiated power (EIRP) of between 95 and 115 dBm. SBE estimates that the side lobes of the transmit dish would be no more than 60 dB down, meaning that the uplink would "leak" co-channel, interfering energy toward the horizon with EIRPs between 35 and 55 dBm. By comparison, a typical ENG truck uses a mast-mounted 10 watt (40 dBm) TPO transmitter feeding a 20 dBi gain transmitting antenna, for a typical EIRP of 60 dBm. And, for "low power" operation (when conditions permit), an EIRP of just 45 to 50 dBm could apply. Finally, for aircraft-relayed TV BAS operations, the originating mobile ground unit transmitter power may be as low as 1 to 2 watts into a 5 dBi gain antenna, giving EIRPs of just 35 to 38 dBm.

4. TV stations in the larger markets have established multiple ENG receive only (ENG-RO) sites that are situated on mountain tops, atop tall buildings, or near the top of broadcast towers. This is done to increase the likelihood that no matter where a news event occurs, an ENG truck transmitting from that venue will have line-of-sight to at least one ENG-RO site, and thus be able to establish a path. The ENG-RO sites use either an omnidirectional receiving antenna, or a remotely-controlled, steerable receiving antenna, which can be aimed at the ENG truck's location. Since a substantial portion of ENG operation is still analog, a desired-to-undesired (D/U) signal ratio of 60 dB or better is needed to ensure no interference from a co-channel DoD uplink.

5. A co-channel DoD uplink leaking energy at 35 to 55 dBm EIRP toward the horizon could therefore have almost the same EIRP as that radiated by an ENG truck. If the ENG truck is attempting to transmit from a location such that when the ENG-RO receive antenna is aimed at the truck's transmit location it is also aimed in the general direction of the DoD uplink, the ENG-RO receiver would not see a D/U signal ratio of 60 dB or better, but rather could see D/U signal ratios of as poor as 15 to 5 dB (or worse, depending on relative distances from the transmitters), even when the uplink is aimed at "high" elevation angles. Massive interference would result. Of course, ENG-RO sites using an omnidirectional receiving antenna (generally, an array of several antennas to give a more or less omnidirectional pattern) would be even more at risk. And, if the DoD uplink dish is operating at the 3° elevation angle mentioned in Paragraph 32 of the NPRM, the D/U ratios could be much, much worse.[2]

6. Another approach would be to calculate how far away a DoD uplink with line-of-sight to an ENG-RO antenna would need to be so as to give a receive carrier level (RCL) that is 10 dB below the -87 dBm noise threshold of a typical 2 GHz ENG analog receiver. For a co-channel DoD uplink leaking at a mid-range EIRP of 45 dBm at the horizontal and an ENG-RO receiving antenna with 20 dBi of gain, the answer is 1,496 kilometers (930 miles). But, as can be seen from the attached Figures 1A through 1E, the proposed DoD uplink sites are not remotely that far removed from the TV markets in which they propose to operate.

7. The NPRM hypothesizes that some of the DoD uplinks may have terrain obstruction to TV BAS ENG-RO sites; however, this is not as likely as one might expect, because the whole point of ENG-RO sites is to place them on high-elevation locations so that, no matter where an ENG truck might need to transmit from in the station's market, one or more of the ENG-RO sites will have line-of-sight. Thus, unless the DoD uplink is in a valley, the chances are good that the uplink will have line-of-sight to one or more ENG-ROs operating in the area. Further, it is unlikely that any of the DoD uplinks are in a deep valley (erroneous NPRM coordinates notwithstanding), because the uplinks need to see low earth orbit satellites which can have relatively low elevation look angles. For example, SBE notes that, at Paragraph 32, the NPRM states

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[2] Indeed, Paragraph 32 of the NRPM explains that current DoD uplinks at 1.8 GHz can radiate up to 40 dBW (70 dBm) at the horizontal, and at 70 dBm plus three times the elevation angle from zero to 5 degrees. Thus, for an elevation angle of just 2°, a 1.8 GHz DoD uplink can radiate up to 76 dBm. The NPRM states "We anticipate that NTIA will update its *Manual* to require that TT&C uplink earth stations operating in the band 2,025–2,110 MHz will likewise conform to these limits." Accordingly, the NPRM is proposing co-channel uplinks that would be allowed to radiate at the horizontal 10 to 16 dB *more* EIRP than a typical ENG truck!

> "Thus, the 11 DoD earth stations currently operating in the band 1,761–1,842 MHz do not transmit until their antenna (main beam) is pointing at least at 3° above the horizon."

8. A 3-degree elevation angle is hardly a "high" elevation angle. Indeed, if DoD uplinks operate with elevation angles as low as 3 degrees this means that they had better not be in a valley, as their look angle to low earth orbit military satellites would be too likely to be blocked. The Naval Satellite Control Network (NSCN) uplink at Laguna Peak is a good example of locating an uplink antenna so that it has freedom to operate at low elevation angles. Unfortunately, this also means that the uplink dish has a high interference potential to co-channel 2 GHz TV BAS terrestrial operations. For example, and as shown by the attached Figure 3B, all of the Denver ENG-RO antennas have line of sight to the DoD uplink at Buckley AFB. And, as shown by Figure 4C, a shadowgraph map for the actual Schriever AFB uplink location (more on this later), although the ENG-RO sites at the two Colorado Springs TV studios appear to be terrain obstructed to the Schriever AFB uplink, the two mountain top ENG-RO sites, at Cheyenne Mountain and at Almagre Mountain, have line-of-sight to the Schriever AFB uplink. As shown by Figure 7C, although the Cape Canaveral uplink has line-of-sight to just one of the three Orlando-Daytona Beach-Melbourne area ENG-ROs, the "Pink" Bithlo tower receive site, the estimated obstruction loss to the "Yellow" Orlando South Chase Tower receive site is only 30 dB, which would probably not be sufficient to ensure no interference to analog ENG operations. Figure 7D shows the terrain profile to the Daytona Beach Hilton "Blue" ENG-RO, which has a predicted obstruction loss at 2 GHz of 66 dB; this just might be enough to avoid interference, if the other conditions proposed by SBE at Section V are adopted. In contrast, and as shown by Figures 5C and 5D, the Kirtland AFB uplink does appear to have good shielding to Albuquerque and even to the ENG-ROs at Sandia Crest. SBE notes that this apparent terrain blockage for the Kirtland AFB uplink makes it different from the other DoD uplinks, and hopes that this is not due to not having the true and correct geographic coordinates for the Kirtland AFB uplink (see Paragraphs 17–19 to these comments, and the second e-mail documented in the attached Figure 13). If the Kirtland AFB uplink shadowing really is as good as shown in Figure 5C, then this uplink would be a reasonable candidate for conversion to 2 GHz operations even though it is located in a top-50 TV market (again subject to the operational conditions given at the end of these SBE comments, at Section V).

9. It does not help that the current version of FCC Form 601 only allows a TV Pickup station to specify a single set of receive coordinates, and then limits the receiving antenna height that can be entered to just 6.1 meters (20 feet) AGL. Most ENG-RO antennas use much greater heights. SBE pointed out this shortcoming in its July 9, 2001, comments to the ET Docket 01-75

rulemaking, but the November 13, 2002, Report & Order (R&O) declined to take action because the issue was supposedly outside the scope of the rulemaking. Because the ET 01-75 rulemaking was intended to be a general updating and harmonization of the Part 74 BAS Rules, SBE disagreed that addressing shortcomings of the supposedly "one form fits all" Form 601 and the Commission's Universal Licensing System (ULS) was outside the scope of that rulemaking, and included this issue in its April 4, 2003, *Petition for Partial Reconsideration*. On October 20, 2003, the FCC issued a Memorandum Opinion & Order (MO&O) which addressed this SBE concern, but, unfortunately, continued to find that modifying Form 601 was outside the scope of the ET 01-75 rulemaking, and suggested that SBE could either maintain its own database of ENG-RO sites and heights, or submit a Petition for Rulemaking to amend Form 601 and the ULS to track this information. SBE expects that it will do the latter, as the ULS database seems the appropriate venue for important details involving TV Pickup stations. Because of the inability of FCC Form 601 and the ULS to allow broadcasters to document ENG-RO sites, there is no easy way for DoD, NTIA or the FCC to know the locations and heights of ENG-RO sites. Form 601 and the ULS need to be modified to allow broadcasters to enter this critical information, and to allow database searches for ENG-RO sites!

10. Thus, the Commission is proposing a fundamentally incompatible sharing that is unlikely to succeed, at least as long as broadcasters are using analog ENG links. Once broadcasters have converted to digital ENG, the D/U protection ratio can probably be relaxed by three orders of magnitude (*i.e.*, from 60 dB to 30 dB), and, for *some* of the 11 DoD sites, that are not in the "back yard" of major TV markets with extensive ENG operations, such sharing *may* become feasible. But it will be many years before all ENG operations have transitioned to digital modulation. Since it appears that it would also be several years before this frequency shift for DoD uplinks could be implemented, SBE concedes there may yet be a possible home for DoD uplinks at 2 GHz, but only with the upmost of care.[3]

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[3] From a February 2001 presentation by Major Michael J. Ward, USAF, "Future Achitecture for U.S. Government Satellite Operations," a time line of 2020 to 2025 is given in the SATOPS Transition Plan for completing the move from 1.7 GHz to 2.0 GHz. Included in that presentation was the statement:

> The transition plan established the recommendations as "goals" but did not perform detailed analysis of costs or operational impacts.

SBE has to wonder whether the term "operational impacts" was referring to impacts to DoD operations or impacts to TV BAS operations, or both. Since, nowhere in the presentation was that fact that 2,025–2,110 MHz is already heavily used by TV BAS, SBE has to conclude that the concern about "operational impacts" was solely to DoD, and not about "operational impacts" to broadcasters.

11. Of course, any fixed, point-to-point 2 GHz TV BAS links would have to be protected, although SBE does not anticipate that would be particularly difficult, since, unlike TV Pickup operations that use omnidirectional or directional but steerable receiving antennas, fixed link stations use highly directive receiving antennas; and, of course, their path and orientations are known, so conventional frequency coordination calculations can be applied. Nevertheless, it should be incumbent on DoD to check all fixed link 2 GHz TV BAS stations within, say, 400 kilometers of the uplink site.[4]

12. SBE believes that any future sharing of 2,025–2,110 MHz DoD uplinks and all digital ENG would require that the DoD uplink dishes be upgraded so as to have side lobes that are at least 95 dB down instead of 60 dB down, and that the minimum dish elevation angle be restricted to a more reasonable range; say, no elevation angles below 10°. Adding a "pie tin" shroud around the periphery of the uplink antenna, lined with RF absorbing material, should be practical. This is the technique used by the manufacturers of parabolic dish antennas used for terrestrial point-to-point links, to obtain better off-axis suppression (*i.e.*, better side lobe suppression), and such techniques typically offer side lobe suppression improvements of 30 to 35 dB.[5] In effect, SBE is asking the FCC to require that DoD makes its uplinks "stealthy" if it wants to share 2 GHz with broadcasters, and then only if all 2 GHz TV BAS operations in the vicinity have converted to digital modulation, and finally only for TV markets 51 and higher (*i.e.*, SBE would generally oppose any co-channel DoD uplinks in TV markets 1 through 50, even if made "stealthy").

II. Frequency Coordinating with DoD is Unrealistic

13. The NPRM suggests that broadcasters and co-channel DoD uplinks might be able to co-exist because, probably, the DoD uplinks would not be transmitting continuously, and would not interfere with all 2 GHz TV BAS channels at the same time. This is little consolation to SBE. It is akin to giving your opponent a machine gun, while you have none, but telling you not to worry because only a few bullets, rather than an entire belt, will be available. And even this is not guaranteed.

14. Of major concern is that the interference would be all one way: the DoD uplinks would be a serious interference threat to TV BAS operations, but no TV BAS operations would be an interference threat to DoD uplink operations. This is because to interfere with, or "jam" an

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[4] SBE notes that 400 kilometers is the below-15 GHz "keyhole" coordination distance given in Section 3.4.4 of TSB-10F ("Interference Criteria for Microwave Systems"), which is cited as a "safe harbor" methodology for frequency coordination studies in Section 101.105(c)(1) of the FCC Rules.

[5] See Page 47 of Andrew Corporation Catalog No. 38.

uplink, the "jammer" must have a power comparable to the target uplink at the target receiver.[6] As has been shown, a typical ENG TV Pickup station has an EIRP of 60 dBm, or 35 to 55 dB less power than a DoD uplink and, further, TV BAS transmissions are typically not aimed upward; accordingly, terrestrial ENG operations are not remotely a threat to the receivers in DoD satellites. Thus, unlike the present situation for broadcasters, where the ENG operations between TV stations pose roughly equal interference threat levels (thus giving broadcasters a strong incentive to cooperate with each other), there would be no such incentive for DoD. DoD, by its very nature of a) being a large bureaucracy and b) being the military, is the unlikeliest of candidates for real time, or even near real time, frequency coordination with "mere" commercial, private-sector users of those same frequencies. Such real-time or near real-time frequency coordination is the lifeblood of ENG in the larger TV markets. Without this high level of cooperation between broadcasters, with "home channel" plans, time-sharing of channels, and the careful balancing of ENG truck transmitting powers to allow the simultaneous split-channel operations in the most congested TV markets, modern-day ENG coverage would not be possible.

15. DoD and NTIA need to realize that time-sharing of only seven 2 GHz TV BAS channels means that sometimes all users don't get access to the spectrum exactly when they want it; any attempt to automatically guarantee such "coordination" would mean that the DoD operation would transmit on demand regardless of disruption to ENG, and would fail the test of "co-equal" status. ENG would be relegated to *de facto* secondary status.

16. At Paragraph 27, the NPRM states:

> However, NTIA has emphasized to us that DoD is willing to assume the full burden of coordinating these 11 TT&C earth stations to avoid causing interference to incumbent BAS operations.

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[6] See Government Accounting Office (GAO) Report No. GAO-02-781, August, 2002, "Critical Infrastructure Protection," primarily addressing protection of commercial satellites, although this report also addressed military satellites. The pertinent text is as follows:

> Techniques to protect satellite links include the use of encryption, high-power radio frequency (RF) uplinks, spread spectrum communications, and a digital interface unique to each satellite.
>
> A second security technique for links is the use of high-power RF uplinks: that is, a large antenna used to send a high-power signal from the ground station to the satellite. To intentionally interfere with a satellite's links, an attacker would need a large antenna with a powerful radio transmitter (as well as considerable technical knowledge).

Thus, one of the safe harbors for a DoD uplink is the use of high power. SBE does not doubt that the default mode for DoD uplinks will be to the use of the higher, rather than lower, uplink transmitter powers.

Yet, as shown by the attached Figure 13, a series of emails sent by SBE to DoD personnel in an attempt to obtain more technical details regarding the proposed uplinks, all that SBE was able to obtain was an admission that the geographic coordinates for the Laguna Peak uplink were indeed in error, and that the uplink was not located in a 3.7-meter (12-foot) AMSL creek bed but rather atop a 444.1-meter (1,457-foot) AMSL mountain peak. As of the filing of these comments, no responses to the SBE "up the chain of command" email, or the Kirtland AFB email, have been received. For purposes of this proceeding, therefore, preliminary coordination has failed. DoD is now demonstrating lack of compliance with the coordination process which NTIA promised DoD would assume.

17. Because SBE cannot learn what the exact uplink frequencies might be, or their occupied bandwidth, SBE (and apparently also the FCC) do not know if DoD uplinks would spread their potential interference more or less equally across all seven 2 GHz TV BAS channels, or whether a particular uplink would tend to concentrate its transmissions in a single channel. If a particular DoD uplink was to confine its transmissions to a single re-farmed 12-MHz wide TV BAS channel, this would, of course, throw the "home channel" plan into disarray, perhaps with the "culprit" DoD uplink not even realizing what havoc it had caused.[7] Indeed, NTIA may not even appreciate how frequency coordination for 2 GHz TV BAS operations differs from frequency coordination for a new fixed link, which is a one-time task. For TV ENG, frequency coordination is a never-ending, ongoing task. If DoD uplinks want to share frequencies with 2 GHz TV BAS operations (and then only subject to certain restrictions, as summarized in Section V), DoD would have to commit to becoming part of the real-time and near real-time frequency coordination process that broadcasters routinely employ in the larger TV markets.

III. Incorrect Uplink Coordinates

18. Shockingly, SBE has discovered that most of the geographic coordinates given in the NPRM for the DoD uplinks are in error (at least 6 of the 11 sites appear to have erroneous coordinates). As shown by Figure 2A, the NSCN Laguna Peak uplink is, as the name implies, at Laguna Peak and not 1.72 kilometers (1.07 miles) northwest of Laguna Peak and in a creek bed. As shown by Figure 6A, the Camp Parks Communications Annex coordinates appear to be

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[7] Under a "home channel" plan, one or two TV stations in a market are treated as having first use of that channel. Other TV stations in the market, or itinerants visiting the market, can use that channel if they coordinate with the home channel station(s) first. For example, perhaps in a given market Channel A3 is assigned to a particular TV station, but that station uses its home channel primarily during weekdays, with lighter or no use on weekends or holidays. In that event, a visiting Broadcast Network Entity could probably arrange to use Channel A3 to cover a weekend golf tournament.

incorrect by about 1.15 kilometers (0.72 miles). As shown by Figure 10A, the NSCN Prospect Harbor uplink coordinates appear to be incorrect by about 1.24 kilometers (0.77 miles). As shown by Figure 11, the Hawaii Tracking Station, Kaena Point, uplink coordinates appear incorrect by 0.78 kilometers (0.48 miles). As shown by Figure 3A, the Buckley AFB coordinates appear correct.[8] As shown by Figure 8A, the New Boston AFS coordinates also appear correct, as do the Cape Canaveral (Figure 7A), Vandenberg AFB base (Figure 9A), and Andersen AFB, Guam (Figure 12) coordinates. However, as shown by Figures 1C and 4A, the Schriever AFB base coordinates are massively incorrect, by 40.5 kilometers (25.2 miles),[9] and as shown by Figures 1D and 5A the Kirtland AFB uplink coordinates appear incorrect by about 2.57 kilometers (1.60 miles) [SBE doubts that the uplink is really in a creek bed between two quarries in the Cibola National Forest, several miles east of Albuquerque and well outside the Kirtland "military reservation boundary" line shown on the 1990 edition of the Tijera, NM, USGS quadrangle map]. SBE is still attempting to ascertain from DoD the true geographic coordinates of the Kirtland AFB uplink, but unfortunately no response to an e-mail sent to the DoD person with responsibility for the Kirtland AFB uplink (based on an October 21 telephone call, confirming that he was the correct person to contact) has been received; a copy of the never responded to October 21 SBE e-mail is included in Figure 13. Because of this lack of response, SBE has resorted to other methods to determine the most likely actual location of the Kirtland AFB uplink.

19. Because terrain shielding, or the lack of terrain shielding, is such a significant factor in allowing interested parties to make informed comments to this rulemaking, it is imperative that only accurate geographic coordinates for each uplink site be used. And, it would be helpful if, in the future, the *datum* for any reported geographic coordinates is specified.[10]

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[8] This is not to say that SBE is vouching as to the accuracy of the reported geographic coordinates, only that the claimed coordinates plot to the general location of the specified base and do not otherwise appear unreasonable.

[9] Accordingly, the 35-mile distance to Colorado Springs, CO, given in Paragraph 29, Table 2, is incorrect: the actual distance is just 5 miles.

[10] The ambiguity whether the provided coordinates are North American Datum 1927 (NAD27) coordinates or North American Datum 1983 (NAD83) geographic coordinates cannot begin to explain the location errors. For the contiguous United States, the shift between the two datums does not exceed 1.3 seconds in latitude nor 4.4 seconds in longitude, and this represents at most a few hundred feet shift. See Figures 1 and 2 from "NAD83: What Is It and Why You Should Care," by Dane E. Ericksen, P.E., from the *Proceedings* to the 1994 SBE National Convention, Los Angeles.

20. The following is a summary of the apparent actual geographic coordinates of the DoD uplinks, based on SBE's research:

Uplink Name/Location	NPRM Coordinates (datum not specified)	Actual Coordinates (NAD27)
NSCN Prospect Harbor, ME	44° 24' 55" N 68° 00' 50" W	44° 24' 15" N 68° 00' 47" W
New Boston AFS, NH	42° 56' 52" N 71° 37' 37"W	no change
Cape Canaveral, FL	28° 29' 10" N 80°34' 34" W	no change
Buckley AFB, CO	39° 42' 55" N 104° 46' 29" W	no change
Schriever AFB, CO	38° 48' 21" N 104° 03' 43" W	38° 48' 21" N 104° 31' 43" W
Kirtland AFB, NM	35° 03' 00" N 106° 24' 00" W	35° 01' 56" N 106° 25' 05" W
Camp Parks, CA	37° 44' 00" N 121° 52' 00" W	37° 43' 59" N 121° 52' 47" W
Vandenberg AFB, CA	34° 49' 24" N 120° 31' 54" W	no change
NSCN Laguna Peak, CA	34° 06' 55" N 119° 04' 50" W	34° 06' 30" N 119° 03' 50" W
Hawaii Tracking Station, HI	21° 33' 48" N 158° 14' 54" W	21° 34' 04" N 158° 14' 33" W
Guam Tracking Stations, GU Andersen AFB	13° 36' 48" N 144° 51' 12" E	no change.

IV. Summary

21. High power DoD uplinks in the same band as terrestrial 2 GHz TV BAS operations, and in areas (TV markets) where ENG is actively used, are not a compatible sharing at this time. Such sharing *may* become feasible at a future date, for DoD uplinks located outside the larger TV markets and after broadcasters have converted their ENG operations to all digital modulation and if DoD installs uplink antennas with reduced side lobe leakage. Because the interference threat would be one way, from DoD uplinks to TV BAS, and because of the inherent bureaucracy of the military and the understandable reluctance to share technical and operational details for possible mission-critical uplinks, it is not realistic to expect DoD to ever be capable of the real-time or near real-time frequency coordination that is the life blood of modern ENG operations in the largest and most heavily congested TV markets. Accordingly, the goal must be frequency re-use, not frequency sharing.

22. SBE accordingly requests that any future sharing of 2,025–2,110 MHz by DoD uplinks be conditioned on:

1) In general, only DoD uplinks located outside TV markets 1–50 should be eligible (only if a DoD uplink has unusually favorable terrain shielding should it be considered as a candidate for conversion to 2 GHz even though located in a top-50 TV market)

2) All 2 GHz TV BAS links and TV Pickup stations in the TV market where the uplink is located must be using digital modulation

3) The DoD uplink antenna must have side lobes that are at least 95 dB down

4) The DoD uplink must only transmit for elevation angles of 10° or higher

5) As proposed in the NPRM, each uplink operation must have been deemed by SBE to have been successfully frequency coordinated

6) A "hot line" telephone number must be provided to SBE, and staffed, at all times when the uplink is transmitting, so, in the event of interference, said interference can be promptly made known to the DoD uplink in question and corrective action taken. SBE believes that this requirement should also apply to any secondary DoD operations, as proposed in Footnote 46 and Paragraph 38 of the NPRM.

If these operational restrictions were to be applied, then SBE would not object to the amendment of footnote US346 (with, of course, corrected and accurate geographic coordinates) to allow DoD

meeting these restrictions to operate TT&C uplinks in the 2,025–2,110 MHz TV BAS band on a co-equal, primary, basis. This is because adoption of these conditions and restrictions would achieve frequency *re-use* rather than frequency *sharing*. For frequency re-use the simultaneous and interference-free operation of more than one station on the same frequency is achieved, thus greatly reducing, and possibly entirely eliminating, the need for real-time or near real-time frequency coordination.

List of Figures

23. The following figures or exhibits have been prepared as a part of these SBE comments to the ET Docket 00-258 Fourth NPRM:

1. Maps showing locations of DoD uplink stations
2. Naval Satellite Control Network, Laguna Peak, Los Angeles, CA, uplink figures
3. Buckley AFB, Denver, CO, uplink figures
4. Colorado Tracking Station, Schriever AFB, Colorado Springs, CO, uplink figures
5. Kirtland AFB, Albuquerque, NM, uplink figures
6. Camp Parks Communications Annex, Pleasanton, CA, figures
7. Eastern Vehicle Check-out Facility & GPS Ground Antenna & Monitoring Station, Cape Canaveral, FL, uplink figures
8. New Hampshire Tracking Station, New Boston AFS, Manchester, NH, figures
9. Vandenberg Tracking Station, Vandenberg AFB, Lompoc, CA, map
10. Prospect Harbor Tracking Station, Prescott Harbor, ME, map
11. Kaena Point, HI, tracking station map
12. Guam tracking station map
13. SBE emails unsuccessfully attempting to obtain technical details for DoD uplinks.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

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November 3, 2003

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