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May 26, 2009

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Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: Ex Parte Letter; *Improving Public Safety Communications in the 800 MHz Band; Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service*
WT Docket No. 02-55, ET Docket Nos. 00-258, 95-18

Dear Ms. Dortch:

TerreStar Networks Inc. ("Terrestar") hereby responds to the *ex parte* letter and attached engineering statement filed by the Association of Maximum Service Television, Inc. ("MSTV") on April 8, 2009.[1] TerreStar demonstrates below and in the attached technical reports[2] that each of the concerns raised by MSTV with respect to potential interference to BAS operations is grossly untimely and is unfounded, irrelevant or both.

BACKGROUND

MSTV's interference-related arguments lack credibility because they are so untimely. MSTV submitted its April 8 *ex parte* letter almost a year-and-a-half after TerreStar first made a technical showing that BAS/MSS sharing is feasible. MSTV's April 8 filing came twelve months after comments were due on the *Further Notice of Proposed Rulemaking* ("FNPRM")[3] in this proceeding and ten

[1] *Ex Parte* Letter filed by MSTV in WT Docket No. 02-55 and ET Docket Nos. 00-258 & 95-18, April 8, 2009 ("MSTV Ex Parte").
[2] The technical reports have been prepared by du Treil, Lundin & Rackley, Inc. ("dLR Report") and Broadcast Technology Consultants Inc. ("BTC Report").
[3] FCC 08-73 (rel. Mar. 5, 2008).

months after the close of the pleading cycle on the FNPRM. If MSTV truly had interference concerns, it is inconceivable it would have waited this long to provide an interference analysis.

Prior to April 8, the technical evidence supporting the feasibility of sharing in the 2000–2020 MHz band by MSS and BAS was uncontested. Although MSTV and NAB, in response to the FNPRM, objected to the elimination of the Top 30/Fixed Links rule, they offered no technical support for their position.[4]

The technical information filed by TerreStar in this matter, on the other hand, is substantial. TerreStar has submitted the following analyses:

- An initial dLR study, based on field tests and bench tests, showing that it is technically feasible for 2 GHz MSS systems and BAS stations to share spectrum during the completion of the BAS relocation process.[5]

- The results of a simulation predicting that at most there would be an MSS/BAS interference event every 2.29 years for MSS Band A (2000-2010 MHz) and every 1.06 years for MSS Band B (2010-2020 MHz).[6]

- A second dLR study demonstrating that because of the characteristics of fixed BAS links, the potential for interference from METs to those fixed links is even less than the already minimal potential for interference from METs to mobile and portable BAS links.[7]

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[4] *See* Comments of MSTV and NAB, WT Docket No. 02-55, ET Docket Nos. 00-258 & 95-18, at 5-9 (filed April 30, 2008).

[5] *Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions, TerreStar Networks*, Report by du Treil, Lundin & Rackley, Inc., January 30, 2008 ("dLR Initial Report"), Attachment to *Ex Parte* Letter from TerreStar Networks, Inc. in WT Docket No. 02-55 and ET Docket Nos. 00-258 & 95-18, January 30, 2008 ("TSN January 2008 Ex Parte").

[6] TSN January 2008 Ex Parte at 2.

[7] *Case Study — Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions, TerreStar Networks*, Report by du Treil, Lundin & Rackley, Inc., April 30, 2008 ("dLR Case Study Report"), Attachment to Comments of TerreStar Networks, Inc., WT Docket No. 02-55 and ET Docket Nos. 00-258 & 95-18 (April 30, 2008) ("TSN April 2008 Comments"). In addition, ICO's technical consultant made a thorough review of laboratory and field measurements and theoretical modeling and determined that "ICO's initial operations will not cause interference to BAS receivers." Comments on New ICO Satellite Services G.P., WT Docket No. 02-55 and ET Docket Nos. 00-258 & 95-18, at 9 (April 30, 2008).

RESPONSE TO MSTV *EX PARTE*

MSTV's technical arguments are so untimely that the Commission should dismiss them for that reason alone. In the event that the Commission chooses to address the substance of MSTV's position, however, then for the reasons stated below and in the attached dLR Report and BTC Report, it should reject MSTV's technical arguments.

First, MSTV claims that the interference analyses previously filed by TerreStar addressed only interference to digital BAS operations and not to analog BAS operations. This claim is simply untrue; TerreStar has submitted tests analyzing the potential for interference to both analog and digital ENG operations.[8]

MSTV's complaint that BAS stations should not be required to go to the expense of narrowing in place during relocation also is misplaced, because TerreStar has not requested such a requirement. Rather, TerreStar has suggested to the broadcasters that a variety of practices and techniques, including narrowing in place, might be employed voluntarily on a case-by-case basis to enhance the sharing environment during BAS relocation.[9]

Next, MSTV claims that because some uncleared BAS stations employ analog "split channel" techniques, TerreStar's analysis should have analyzed potential co-channel interference. MSTV also asserts that the analysis did not take into account older analog equipment that is still being used.

As discussed in more detail in the attached dLR Report and BTC Report, these claims, too, are inaccurate. TerreStar's analysis explicitly addressed co-channel interference.[10] As for "split channel" operations, it appears that such operations are extremely limited, being used regularly only in the Los Angeles metro area and very infrequently in other areas.[11] As discussed in the BTC Report, the BAS transition in Los Angeles is well underway and likely to be completed before TerreStar commences commercial operations. Moreover, any

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[8] dLR Initial Report at 5-15 (describing analog and digital test results and discussing results of tests).

[9] Unfortunately, the broadcasters have rebuffed TerreStar's efforts, and even were unwilling to distribute to BAS licensees a survey that would have helped TerreStar to optimize its operations in order to reduce further the already minimal possibility of interference to 2 GHz BAS operations. BTC Report at 3-4.

[10] dLR Report at 3. *See also* BTC Report at 2-3 (summarizing the field and bench tests that demonstrated the feasibility of sharing between 2 GHz MSS systems and BAS stations and how there would be no co-channel interference).

[11] Statement of Hammett & Edison, Inc., Consulting Engineers, at 3 n.3, Attachment to MSTV EX Parte ("H&E Statement"); dLR Report at 3.

compatibility issues between MSS systems and split channel BAS operations in the LA metro area can be handled by a local frequency coordinator.[12] Finally, as stated in the dLR Report, the field tests on which TerreStar's technical analysis was based included an older model ENG receiver and it was found that the older receivers and newer ENG receivers have comparable interference rejection characteristics.[13]

MSTV also claims that the analysis submitted by TerreStar "failed to examine the impact on ENG relay vans …."[14] However, as discussed in the dLR Report and BTC Report, ENG relay vans are largely a relic of the past because of the development of satellite ENG.[15] Moreover, even if ENG relay vans were in use, they would be immune to interference from TerreStar handsets because ENG camera transmitters employ digital modulation.[16] In addition, ENG relay vans, if they were in use, could simply operate on a BAS channel other than A1 to avoid any possibility of interference from TerreStar.[17]

Finally, MSTV argues that TerreStar lacks the capability to prevent its customers' handsets, on a market-by-market basis, from communicating with its satellite. According to MSTV, this capability is lacking given that "the handset is communicating not with nearby base stations, but rather with satellites in low earth orbit."[18]

Even if MSTV's assertion were true, it would be irrelevant, because TerreStar is not proposing to prevent interference by blocking handset-to-satellite communications in particular regions. Rather, TerreStar has demonstrated that handset-to-satellite communications are compatible with BAS operations in all BAS markets, including those markets in which BAS stations have not been relocated.[19] In addition, as discussed in the dLR Report, MSTV and its technical consultant appear to have a fundamental misunderstanding of the TerreStar satellite network topology. TerreStar will employ a single geosynchronous earth orbiting satellite positioned more than 22,000 miles above the earth, not a low earth orbit satellite network.

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[12] BTC Report at 5.
[13] dLR Report at 4.
[14] MSTV Ex Parte at 2.
[15] BTC Report at 5.
[16] BTC Report at 5; dLR Report at 5.
[17] dLR Report at 4-5.
[18] H&E Statement at 4.
[19] MSTV may be confusing TerreStar's handset-to-satellite transmissions with its proposed ancillary terrestrial component ("ATC") operations. TerreStar has made an offer in connection with its ATC operations to forego transmissions in particular markets. *See* TSN April 2008 Comments at 6-7. In these markets, TerreStar would not deploy base stations until after BAS relocation.

In summary, the Commission should disregard MSTV's technical arguments because they are untimely. If the Commission does not disregard MSTV's technical arguments for procedural reasons, it should reject the arguments on the merits. TerreStar has shown each of the arguments to be irrelevant, without foundation, or both. TerreStar has previously demonstrated, moreover, that sharing the 2 GHz band between MSS systems and BAS stations is feasible. Accordingly, and for the reasons stated herein and in TerreStar's prior filings, the Commission should eliminate the Top 30/Fixed Links rule.

Sincerely,

/s/ Douglas I. Brandon
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TECHNICAL RESPONSE TO HAMMETT & EDISON, INC ANALYSIS OF dLR "PREDICTED IMPACT TO 2 GHZ BROADCAST AUXILIARY OPERATIONS FROM PROPOSED HANDSET TO SATELLITE EMISSIONS" DOCUMENT

MAY 26, 2009

This Technical Response has been prepared to address the recent *Ex Parte* communication by the Association for Maximum Service Television, Inc. (MSTV) in the Dockets "Improving Public Safety Communications in the 800 MHz Band, Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service."[1] Specifically, this Response will address the statement enclosed within the *Ex Parte* communication by Hammett & Edison, Inc., Consulting Engineers (herein "H&E Response").

The purpose of the H&E Response was to analyze and comment on the report prepared by the undersigned entitled "Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions."[2] The H&E Response raised three issues: (1) Routine broadcaster use of split channel operations, (2) Inability to limit TerreStar handsets operating in mobile satellite mode and (3) No consideration of ENG relay vans. This exhibit analyzes each of those specified issues and additionally provides a summary of the impact to analog BAS Fixed Link operations.

[1] See *Ex Parte* Letter of April 8,2009 by MSTV in WT Docket No. 02-55, ET Docket No. 00-258 and ET Docket No. 95-18.
[2] See du Treil, Lundin & Rackley, Inc., Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions, TerreStar Networks, January 30, 2008 (herein "dLR Report").

Background

Within the subject dLR report that tested the impact to BAS operations from possible narrowband TSN signals, we made the following conclusions:

- In the digital, “narrow, in-place” mode, BAS reception on Channels A1 and A2 will be immune to interference from TSN handsets for all desired signal levels and all tested TSN frequencies.
- For analog ENG operation with one audio subcarrier and employing the narrow I.F. filter mode, BAS reception on Channels A1 and A2 will be immune to interference from TSN handsets for all desired signal levels and for all tested TSN frequencies between 2007 MHz and 2008 MHz (MSS Band A).
- For analog ENG operation with one audio subcarrier and employing the narrow I.F. filter mode, TSN interference to BAS reception on Channel A2 will be limited to cases where the TSN handset operates in the beam of the BAS receive antenna at locations relatively near the BAS receive antenna and with near line-of-sight conditions if the TSN frequency is just above the bottom edge of MSS Band A (2010 MHz). As the TSN frequency is increased in MSS Band B, the amount of predicted interference to BAS Channel A2 operations will increase.
- For analog ENG operation on Channels A1 and A2 with two audio subcarriers and employing the normal I.F. filter mode, a TSN handset may cause interference in some situations no matter on which frequency it operates, usually when the BAS link is at or close to its threshold level and the TSN handset is in the beam of the BAS receive antenna.
- Based on the bench and field testing, the recovered audio quality from an analog BAS receiver in the normal I.F. bandwidth mode was observed to be more sensitive to a TSN interfering signal than recovered video quality. As an undesired TSN signal is increased, video picture impairment would usually occur only at undesired signal levels greater than those for which the onset of any audio impairment occurs.

Split-Channel Operations

Within the H&E Response, it was stated that the dLR study was based upon "*de facto* adjacent-channel" BAS analysis rather than co-channel analysis. However, there appears to be a semantic difference in defining adjacent channel operation. As discussed below, dLR did properly complete the appropriate co-channel BAS Channel A1 tests to determine the impact from a TerreStar Networks (TSN) device operating in the satellite mode.

When dLR completed its report, it was unknown which spectrum band TSN would occupy, MSS Band A (2000 to 2010 MHz) or B (2010 to 2020 MHz), and hence, the report had to include the analysis for both spectrum case scenarios, which may affect either BAS Channels A1 (1990 to 2008 MHz) or A2 (2008 to 2025 MHz). TSN subsequently reported it would occupy MSS Band A for mobile handset transmission to satellite or base stations that are co-channel with BAS Channel A1. Contrary to statements in the H&E Response, the dLR study documents testing of TSN handset emissions located within, or co-channel, to BAS Channel A1.

Therefore, appropriate co-channel BAS Channel A1 tests were in-fact completed and reported where the TSN emission is adjacent to the BAS emission but within the same BAS Channel. This occurs when the BAS operation is the conventional non-split channel mode.

The H&E Response alleges that *Category I* ENG markets "…routinely use split-channel, or frequency offset, operations." However, as implied by the footnote contained on Page 3 within the H&E Response, the use of split-channels by BAS operations is not extensive. The footnote categorizes both the markets that employ any split-channel use and overall BAS band market congestion. The footnote defines the only *Category I* market, with "extremely heavy use, mostly split channel," as Los Angeles. The following category, *Category II – Metro*, specifies "…some split channel use, not a lot…" Hence, outside of the Los Angeles market, the use split-channel is infrequent to nonexistent according to the footnote cited in the H&E Response.

The H&E Response also states that older model ENG receivers will "most likely" have poorer interference rejections, compared to the ENG receivers tested within the dLR Report. However, it was observed that an older generation ENG receiver - initially used during the Salt Lake City tests and manufactured by MRC - had similar interference rejection characteristics [of TSN emissions] compared to the current generation of ENG receivers.[3] Furthermore, in discussions with the in-house engineers during the NuComm Bench Testing concerning this issue, it was determined that older ENG receivers with selectable I.F. filters would have similar interference rejection characteristics as the tested receivers.

Inability to Limit TSN Handsets

H&E believes that TSN will not have the ability to limit TSN handsets because "…the handset is communicating not with nearby base stations, but rather with satellites in low earth orbit." H&E fundamentally misunderstood the TSN satellite topology. TSN will not employ satellite(s) in a low earth orbit (LEO) topology but rather a single geosynchronous earth orbiting satellite positioned over 22,000 miles above earth. H&E correctly notes that TSN will not restrict the operation of a MSS handset once it has been released to a user. However, dLR understands there will be few mobile handsets transmitting to the TSN satellite in advance of the latest February, 2010 request for extension of the BAS relocation deadline.

No Consideration of ENG Relay Vans

H&E is also concerned with the possibility of interference to ENG relays located at an ENG van, either receiving a signal from a nearby ENG camera or a short-link operation. Due to the frequency agility and short service range of these types of devices, operation on another BAS Channel besides A1 is all that is necessary to avoid

[3] Due to an unrelated technical problem occurring to that specific BAS receiver observed during the Salt Lake City testing, the receiver was replaced and therefore the results were not reported. The ENG receiver, an MRC Model CR4019R10BF, was manufactured approximately 10 years ago and had selectable I.F. filters, permitting the narrow filter to be employed to reduce the impact from adjacent emissions.

TSN interference. Furthermore, as the ENG cameras with a mounted transmitter employ digital modulation, they will be immune to interference from TSN handsets for all desired signal levels and all tested TSN frequencies.

Analog BAS Fixed Link Operations

Within the 2 GHz Broadcast Auxiliary frequency band, broadcasters may utilize fixed link analog microwave paths for Intercity Relays (ICR's) and/or Studio-to-Transmitter Links (STL) applications. In general, analog fixed microwave links should have greater interference immunity from TSN devices, then comparable analog electronic news gathering (ENG) operations operating in the same frequency band. This is because fixed microwave paths are typically designed for long-term reliability by incorporating substantial signal fade margins and receive antennas mounted at high elevations. Both of these path attributes will increase the interference immunity from a TSN device when the fixed link is in analog mode.

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BTC

BROADCAST TECHNOLOGY CONSULTANTS INC.

BTC Consultations Report
TerreStar 2 GHz BAS Transition

Submitted
May 26, 2008

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BTC Consultations Report: TerreStar 2 GHz BAS Transition

BTC Scope of Services for TerreStar Networks

Broadcast Technology Consultants (BTC) was commissioned in June 2007 to support TerreStar as a resource with knowledge and experience in past, present and planned use of facilities in the Broadcast Auxiliary Service (BAS) as current licensees migrate to the new channel plan above 2025 MHz. BTC recommended and collaborated with consulting engineering firm du Treil, Lundin & Rackley (dLR) on determining the feasibility of co-channel operation of mobile satellite service/ ancillary terrestrial component (MSS/ATC) handsets and BAS/ENG receivers in the 1990 to 2008 MHz band (BAS channel A1). BTC assisted dLR in the design and conduct of bench and field tests aimed at modeling the RF emission characteristics of integrated MSS/ATC handsets on BAS radio propagation, both analog and digital. During field testing, actual co-channel interference measurements were taken to document the affect of a TerreStar integrated mobile handset transmitting to TerreStar-1 (TS-1, a GSO satellite) or an ATC base station (BTS), on a relatively higher powered ENG transmission to BAS central receive sites.

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BTC Qualifications

Steven A. Smith, President of BTC and exclusive consultant to TerreStar, has four decades' of electrical and broadcast engineering experience including a SBE CSBE certification. He has served as Chief Engineer of major broadcast network affiliates and as VP Engineering/Technology for a large group broadcaster. He has experience in television station operations and construction with extensive knowledge of station facilities and day to day newsroom operations including utilization of 2 GHz BAS equipment and systems for electronic news gathering (ENG).

Mr. Smith has served on numerous industry committees and working groups for over 30 years. In the 1970's as ENG evolved, Mr. Smith participated in the NAB working group formed at the request of the FCC to review then current BAS Rules and propose changes aimed at providing local broadcasters flexibility over use of BAS allocations. Mr. Smith managed the conversion of the first major group broadcaster from film to electronic newsgathering in 1976 and developed, implemented and proved many of the 2 GHz BAS facility concepts in use today. He has successfully managed resolution of many 2 GHz BAS challenges including identification and resolution of interference conflicts between 1.9 GHz PCS systems and BAS when PCS systems began operation. Mr. Smith's Biography is at the end of this report.

Reference Documents:

(1) du Treil, Lundin & Rackley, Inc Report "Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions, TerreStar Networks, dated January 30, 2008.
(2) du Treil, Lundin & Rackley, Inc Power Point Presentation "Temporary Spectrum Sharing in the 2GHz Broadcast Auxiliary Band for the FCC OET, February 14, 2008.
(3) Statement of Hammett & Edison, Inc, Consulting Engineers, "Analysis of dLR "Predicted Impact to 2 GHz Broadcast Auxiliary Operations from Proposed Handset to Satellite Emissions, Submitted as attachment to MSTV letter to FCC dated April 8, 2009

BTC Consultations Report: TerreStar 2 GHz BAS Transition

Executive Summary:
BAS and MSS/ATC operations can *temporarily* co-exist in the 2000 to 2020 MHz band pending completion of the on-going BAS migration. The temporary nature of the co-existence, the declining base of BAS licensees operating in the 1990 – 2025 MHz band, the phased emergence during 2010 of low power MSS/ATC handsets and the sound engineering foundation produced by the dLR report all point to circumstances ripe for adoption of band sharing protocols that avoid interference. Temporary band sharing between MSS and BAS is eminently feasible with minimal impact on ENG operations.

Simple market-specific coordination protocols are available to either eliminate the need for co-channel operation or allow co-channel operation without interference. Optimized solutions for shared co-channel operations between MSS and analog or digital BAS need to be negotiated for DMA's that have not transitioned when TerreStar begins handset deployment in October, 2009.

BTC urges the Commission to rely on the sound engineering findings published in the dLR report and a short-term pragmatic spectrum policy as described herein to compel BAS incumbents assigned to channel A1 to cooperate in exploring the optimal use of one or more coordination protocols suggested in this report.

Key Findings of BTC's Engagement
In the course of collaborating with dLR on its engineering analysis and assessment of the interference characteristics of co-channel BAS and MSS/ATC operation, BTC has reached independent conclusions about the feasibility of shared use of the band. Given the delay in relocation to the revised BAS channel plan, the Commission is faced with establishing conditions under which BAS and MSS/ATC operations can *temporarily* co-exist in the 2000 to 2020 MHz band pending completion of the on-going BAS migration. The temporary nature of the co-existence, the declining base of BAS licensees operating in the 1990 – 2025 MHz band, the phased emergence during 2010 of low power MSS/ATC handsets and the dLR engineering analysis all combine to create circumstances ripe for pragmatic interference avoidance solutions based on an irrefutably sound engineering foundation produced by dLR. Following are summary facts and conclusions BTC has drawn in the course of its consulting activity.

Salt Lake City Field Test
BTC collaborated with dLR in the preparation of a Field Test Plan used in cooperation with KSL TV in Salt Lake City. The dLR report documents field test procedures used to establish interference thresholds at BAS receive sites when simulated WCDMA or GMR3 carriers are emitted on a co-channel basis into analog and digital ENG feeds transmitted to the BAS receiver. For digital ENG transmission, there was no detectable interference from a simulated TerreStar handset signal. For analog ENG transmission, detection of the simulated TerreStar handset signal was only possible when the analog BAS signal was simultaneously near threshold and the emitter was aligned in the bore sight of the BAS ENG receiving antenna. The probability of bore sight alignment of these signals is very unlikely to occur when the BAS ENG signal is at threshold. Some limited

impact on an analog audio subcarrier was observed; however the interference level is substantially mitigated by selection of a narrow 10 or 12 MHz IF bandpass on the BAS receiver.

Nucomm Bench Test

BTC collaborated with dLR in the preparation of two Lab Test Plans designed to measure ENG receiver sensitivity to simulated MSS/ATC signals and thereby establish an interference threshold for analog and digital BAS receivers. The first test occurred in a bench test environment at Nucomm prior to field testing to identify zones of likely interference to KSL-TV receive sites; the second test occurred after field testing to validate the interference margins observed in the lab tests with the in-field results which used live TVPU emitters, signal measurement and video recording gear at the KSL central receive sites. The dLR Report documents lab test procedures and results**.** The bench tests results postulated, and the Salt Lake field tests confirmed, that the low transmit power of a MSS/ATC mobile device (1 watt EIRP to the satellite, .25 watt average to a terrestrial BTS) relative to the signal strength of a BAS emitter, even if operating at threshold, resulted in minimal marginal signal degradation to the BAS analog receiver and no degradation to a BAS digital receiver.

BAS Coordination and Survey

BTC is aware that TerreStar has on numerous occasions since late 2006 attempted to engage Sprint and broadcasters in cooperative business to business dialog around engineering practices and temporary shared use protocols aimed at accelerating access to BAS channels 1 and 2 (A1, A2) on a coordinated basis to avoid interference. TerreStar proffered a willingness to remain secondary and forgo operation of ATC facilities in a market until the BAS migration is complete. It has expressed willingness to throttle uplink channel capacity to TS-1 and operate temporarily near the upper edge of its authorized return link spectrum. TerreStar has been the only party in this proceeding to proactively and in good faith seek negotiation of best engineering practices for shared use of the 1990 to 2025 MHz band as the Commission has urged the parties to do. The Commission has long provided for local frequency coordination in the 1990-2110 MHz band for fixed and mobile applications to minimize the potential for licensees to cause or receive harmful interference.

The location of BAS central receive sites used by channel A1 and A2 assignees and basic information about the receive site antenna and receivers in an uncleared DMA is vital for any evaluation of shared use. Many DMA's have local SBE coordinators to provide this information to broadcasters but some have informal coordination protocols among station staff. TerreStar attempted to secure this data from Sprint in 2007 but was denied. BTC prepared a single page BAS Survey designed to identify users of channels A1 and A along with associated receive site and RF data that would be used to optimize market specific interference avoidance practices in DMA's that have not migrated. Survey results would identify alternative channel utilization protocols that could release channel A1 at such time in late 2009 that TerreStar deploys MSS handsets in uncleared DMA's. The results would establish a basis for discussion of pragmatic engineering practices and

customized coordination protocols tailored to specific circumstances in each DMA that would enable temporary shared use of the band. TerreStar has unsuccessfully solicited MSTV assistance in distribution of the survey to broadcasters in DMA's unlikely to transition by TerreStar's scheduled launch of commercial operations in October, 2009.

BAS Band Coordination Protocols

BTC has concluded during the course of its due diligence that the co-channel RF characteristics of MSS/ATC mobile terminals and BAS receivers make it eminently feasible for MSS and BAS to co-exist without interference using simple coordination procedures that are non-intrusive or minimally intrusive on ENG operations. The RF channel agility and excellent operational characteristics of digital BAS equipment and most legacy analog RF gear facilitates the feasibility of co-existence. BTC has developed some simple coordination protocols and rules of engagement to enable co-existence of both services. In many DMA's, co-channel operation will not be required. For example, where sufficient BAS capacity exists, voluntary migration of ENG feeds to BAS channels A3 through A7 is a simple solution. In larger markets, assignment of channels A1 and A2 to the first digital movers in a DMA who would then migrate to 12 MHz narrow in place operation represents a co-channel operating protocol that allows cooperative band sharing without harmful interference. Adherence to the following general protocols will avoid unacceptable interference in any DMA using analog radios on channel A1 during the gap period following deployment of MSS handsets before BAS relocation is completed.

General Protocol Recommendations For Use During The Gap

Vacant Channel Option: Most TV stations locally coordinate for use of two of the seven BAS channels available in the 1990 to 2110 MHz band. If there are three or fewer stations using BAS in a DMA, then adequate BAS channel capacity exists to accommodate local needs and release use of channel A1 to TerreStar. Dozens of DMA's across the country have three or fewer stations using ENG.

Transitional Market: In DMA's where BAS equipment replacement is substantially underway, MSS/ATC handsets will not interfere with a BAS receiver if the station assigned channel A1 has installed digital equipment that is tuned to operate in either narrow bandwidth analog mode, or digital narrow in place. In either case, co-channel operation is possible without interference while waiting for the DMA cutover.

Non-transitional Market: In DMA's where BAS equipment replacement is substantially incomplete and the station assigned channel A1 has not received or installed BAS digital receivers, the scenario described above for a Transitional Market could be implemented by prioritizing delivery of a digital receiver to the station coordinated to use A1 or by swapping radios with another station that has received one.

Market Re-coordination: In DMA's where more than three stations conduct ENG operations in the 1990 to 2110 MHz band, the local coordination group could re-

coordinate BAS operations to use channels A2 through A7 until one station in the DMA installs digital receivers and can operate narrowed in place or in analog mode with a narrow IF bandpass selected.

Receive Site Specific Channel Plan: BAS receive site locations and channel assignments vary for each station in a DMA. If channel A1 is assigned to a station that uses a receive site located on a distant broadcast tower or mountain top, the distance will prevent emissions from the MSS/ATC handset from being detected by the receive site under any conditions.

Split Channel Operations in top 10 markets: Split Channel operation divides the seven BAS Channels in half creating fourteen BAS channels. The upper half of channel A1, designated A1+, can be impacted by a TerreStar handset emission if the device is near a BAS receive site and strong enough to interrupt the digital bit stream or analog video and or audio. BTC contacted equipment vendors and TV stations and confirmed that Los Angles is the only market that uses split channel operation for the entire market. A few stations in other markets may on an occasion use split channel operation but not the entire market.

Since Los Angeles is the only market using split channels, the impact of the MSS/ATC handset on split channel in LA can be completely mitigated by the local frequency coordinator. Using a simple precautionary guideline that upper channel A1+ be used for long shots to various mountain top ENG receive sites (such as Mt. Wilson) will ensure that the other 13 channels can be used with absolutely no impact by TerreStar handsets because the low power handset could not be received at distant mountain top receive sites. As a practical matter, the BAS transition in Los Angeles is well underway and likely to be completed, based on Sprint's current schedule, before TerreStar begins commercial operation.

Special Protocols not needed for ENG Relay Vans and Wireless BAS Cameras
ENG Relay Vans were fairly common during the early years of ENG. They relayed live video feeds from a helicopter to an ENG Live Van or between two ENG Live Vans using analog technologies. With the advent of satellite ENG for covering news events on locations beyond the range of a single truck, the need for and use of ENG Relay Vans declined and they are for the most part a relic of days past. BTC confirmed this fact with a leading manufacturer of ENG vans who stated they had not had a request for an ENG Relay Van for decades. If an ENG Van is used to relay a portable ENG camera with BAS microwave back to a receive site, the equipment is most certainly digital COFDM, the same as the BAS digital equipment, which will not be impacted by a TerreStar handset because relay applications are short range and do not operate at threshold conditions.

Market Specific Protocols
The general protocols noted above can be optimized to market-specific conditions.

Since November 2007 when a dLR summary report was distributed to the broadcast community, TerreStar has continually invited open discussion of coordination protocols to accommodate temporary shared use of the 1990 to 2025 MHz band during the gap period. Several coordinated shared operation scenarios, based on sound engineering logic and minimal intrusion to broadcast news operations, are possible depending on market specific circumstances. Completion of the BAS Survey noted above by BAS licensees in DMAs scheduled to transition after October, 2009 would capture market-specific data enabling advanced planning for optimal coordination aimed at interference avoidance.

The Commission has urged MSS and BAS licensees to negotiate in good faith, use best engineering practices and consider all options in evaluating the feasibility of freeing spectrum for the MSS uplink. I can attest from working with TerreStar for the past two years that it has made all reasonable efforts to do exactly that. Since publication of the dLR report, TerreStar has engaged broadcasters to jointly develop field test plans and procedures to replicate the dLR results. It has offered to make local broadcaster presentations describing interference avoidance options and develop a quarterly coordinated spectrum sharing plan and report. It has further offered manual backstop mechanisms such as a toll-free hotline, a web portal as a source of answers to specific BAS licensee questions, liaison between with BAS Acceleration Teams and TerreStar Operations staff in addition to escalation channels to senior TerreStar management.

BTC Conclusion and Recommendations

a. BTC believes split channel operation and ENG relay trucks are not a factor in co-channel operation of MSS and BAS. Even if they were, there are simple proven remedies to eliminate co-channel operation.

b. As the commission has previously suggested, various coordination protocols and engineering practices exist to make temporary band sharing between MSS and BAS eminently feasible with minimal impact to ENG operations. BTC proposes herein several simple non-intrusive protocols for use in specific markets that have not narrowed in place or completed the transition to the new BAS band plan.

c. Broadcaster cooperation completing a BAS Survey designed to obtain market-specific BAS channel utilization and receive site information will enable the implementation by BAS and MSS licensees of simple coordination protocols to eliminate the need for co-channel operation or allow co-channel operation without interference. Optimized solutions for shared co-channel operations between MSS and analog or digital BAS must be negotiated for DMA’s that have not transitioned when TerreStar begins handset deployment in October, 2009.

d. The dLR report remains the only credible engineering analysis on the record describing the interference characteristics of mobile MSS handsets on BAS receivers, despite the late filed attempt by Hammett & Edison to obfuscate issues. The dLR report is founded

on scientific bench and field tests using generally accepted spectrum engineering practices and calculations to support the reported conclusions.

e. BTC urges the Commission to rely on sound engineering and spectrum stewardship as recommended herein to compel BAS licensees to cooperate in exploring the optimal use of one or more coordination protocols suggested in this report.

Steven A. Smith Biography

Mr. Smith's career in the broadcast industry includes tenures as Chief Engineer of KCTV (CBS) Kansas City, WCCO-TV (CBS), Minneapolis, and KSDK-TV (NBC), St. Louis. He served as the Director of TV Engineering for Meredith Corporation, which owned multiple affiliates of major broadcast networks. Between 1995 and 2006, Mr. Smith served as the Vice President Engineering/Technology for Liberty Corporation, which owned 15 major network affiliated television stations when it merged with Raycom Media in 2006. In these capacities, Mr. Smith gained extensive experience in television station electrical/broadcast engineering systems, design, automation, construction, digital transition, and regulation.

In February 2006, Mr. Smith restarted Broadcast Technology Consultants (BTC), a consulting company Mr. Smith operated in the 1980's. BTC provides broadcast management/engineering consultations on television station operations, capital investment planning, budgeting and implementation including expansion and new studio and transmitter facilities. Other BTC services include emergency planning and facility recovery projects from losses due to hurricanes and other casualties; representation on industry committees; and consultation on television product development and marketing for new entrants. BTC has provided technology services to the broadcasting industry including project consultant on new studio facilities (for example, WCCO-TV Minneapolis; WDIV-TV Detroit; KCRA-TV Sacramento; KOIN-TV Portland; WAVY-TV Norfolk, WJLA-TV Washington; and WJXT-TV Jacksonville) and project management for construction of new television stations (for example, WOFL-TV Orlando, WJZY Charlotte; WLBJ-TV Davenport; and KSAS-TV Wichita).

Since 2006, Mr. Smith represented MobiTV on ATSC committees for Mobile DTV and is the Broadcast Management/Engineering Consultant to TerreStar on 2 GHz BAS Spectrum relocation. He has served as the co-chair of the South Carolina Broadcasters Association Engineering Committee and their Winter Engineering Conference. Professional memberships include the IEEE, SMPTE and SBE (CSBE). ATSC groups with which Mr. Smith has been involved include AS, IS, PC, T3, TSG, as well as the Ad Hoc Group that developed the Distributed Transmission System Standard and Recommended Practice. Mr. Smith is active in the SMPTE S22 Committee Ad Hoc Group on Lip Sync Issues.

Mr. Smith has been granted one patent "System & Method for Determining Optimal Broadcast Area of an Antenna" (Optimal Beam Tilt). He is a graduate of the University

of Missouri with a BSEE and George Washington University with a Masters in Engineering Administration (MEA). His Masters Thesis was entitled "An Assessment of the Technological Impact of Integrated Automation Systems on the Broadcasting Industry".