

**SOCIETY OF BROADCAST ENGINEERS • Indianapolis, Indiana
FCC Liaison Committee**

CHAIRMAN

DANE E. ERICKSEN, P.E., CSRTE
Hammett & Edison, Inc.
San Francisco, CA
707/996-5200 (voice)
707/996-5280 (fax)
dericksen@h-e.com

Committee Members

KENNETH J. BROWN
ABC, Inc.
New York, NY

GERRY DALTON, CBRE
TXU Communications
Dallas, TX

CLAY FREINWALD, CPBE
Entercom Communications
Seattle, WA

CHRISTOPHER D. IMLAY, Esq.
Booth, Freret, Imlay & Tepper
Washington, DC

GERALD M. LEBOW
TMC, Inc.
Valhalla, NY

MIKE MCCARTHY, CSRE
McCarthy Radio Engineering
Chicago, IL

LLOYD PHILLIPS
Phillips Microtechnology, Inc.
Ft. Lauderdale, FL

JOHN L. PORAY, CAE
SBE
Indianapolis, IN

RICHARD RUDMAN, CPBE
Radio Station KFVB
Los Angeles, CA

KARL VOSS
TV Station KPNX
Mesa, AZ

ELECTRONICALLY FILED

November 13, 2001

Magalie Salas Roman, Esq.
Office of the Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Dear Ms. Salas:

Attached are the timely-filed reply comments of the Society of Broadcast Engineers, Inc. to the IB Docket 01-185 rulemaking regarding an ancillary terrestrial component (“ATC”) for the Mobile Satellite Service (“MSS”).

Sincerely,

/s/ Dane E. Ericksen

Dane E. Ericksen

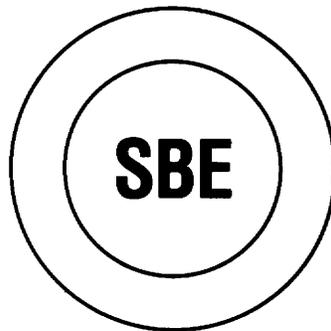
xx

Enclosure

cc: All SBE FCC Liaison Committee members
All SBE Officers and Directors

**Reply Comments of the
Society of Broadcast Engineers, Inc.**

**IB Docket 01-185
(Terrestrial MSS)**



November 13, 2001

© 2001 SBE, Inc. All rights reserved.

SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

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

In the Matter of)
)
Terrestrial MSS Operations for the) IB Docket No. 01-185
Mobile Satellite Service)
) ET Docket No. 95-18
)

To: The Commission

Reply 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 reply comments in the above-captioned notice of proposed rulemaking ("NPRM") relating to allowing a terrestrial component to be added to Mobile Satellite Service ("MSS") operations.

I. There is Still No Need to Allow a Terrestrial MSS

1. As anticipated in the initial SBE comments to this rulemaking, the cellular and Personal Communication Services ("PCS") industries have responded with a plethora of reasons why an ancillary terrestrial component ("ATC") for MSS should not be allowed. SBE notes those points included the following:

- It would be a spectrum-wasteful duplication of terrestrial services already well provided by cellular and PCS;
- Dual-band or even triple-band telephones capable of operating on MSS frequencies in remote areas and operating on cellular/PCS frequencies in urban areas would be a better solution;
- It would provide a windfall to MSS licensees who never paid any spectrum auction fees;
- It would violate Section 309(j)(1) of the Communications Act, which requires that commercial mobile radio service ("CMRS") spectrum will be awarded by auction;
- It would result in an unfair advantage to MSS in its competition with the cellular and PCS industries;

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

- It would devalue the existing cellular and PCS spectrum;
- There is a high likelihood that the supposedly “ancillary” terrestrial component would quickly morph into the primary component¹;
- There is a likelihood that, once allowed, the suspension of the terrestrial component for failure to build or maintain the space component might be difficult to invoke;
- The Commission would be attempting to impose artificial economic forces in lieu of letting the marketplace decide what role MSS should play;
- It presumes that MSS should be a mass subscriber service when in fact even current MSS licensees describe MSS as a “niche” service.

However, the most immediate concern to SBE, and the primary reason for SBE participating in this rulemaking, continues to be the issue raised in the initial SBE comments, namely:

- It would create an entirely new threat of adjacent-channel and brute force overload (“BFO”) interference² to 2 GHz TV broadcast auxiliary service (“BAS”) operations.

2. SBE notes the comments of Telenor Broadband Services (“Telenor”) and Inmarsat Ventures (“Inmarsat”) that there is no evidence that MSS needs to attract a consumer mass market in order to have a viable business. As stated by Inmarsat, “The questions and proposal in the NPRM reflect a fundamental misperception about the state of the MSS industry.”³ SBE notes that Stratos Mobile Networks (USA)/Marinesat Communications Network, Inc. (“Stratos/Marinesat”) state that allowing MSS licensees to provide terrestrial services on an ancillary basis would harm, rather than help, that service. Stratos/Marinesat argue that harm would result because an “ancillary” terrestrial component to MSS would require segmenting the limited MSS spectrum thus reducing the spectrum available for true MSS, while also causing harmful interference between the two modes.

¹ Indeed, such a process has already begun: the New ICO comments propose that it be allowed three months before it would have to replace a failed satellite, and even that time frame would not apply if the outage was “most unexpected,” which SBE *suspects* New ICO would always claim (New ICO comments, at Page 44). At Page 46 of its comments, New ICO lets the other shoe drop: “Moreover, buildout and testing of ATCs should definitely be permitted prior to the achievement of the [space segment] coverage conditions.” And at Page 47 of its comments, New ICO would have the Commission permit the building of a terrestrial MSS component once a mere 20% of the time coverage for the space segment operation had been achieved.

² SBE notes that both Stratos/Marinesat and Inmarsat similarly expressed concerns about BFO interference from terrestrial MSS base stations.

³ Inmarsat comments, at Page 2.

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

3. In its comments to the associated ET Docket 00-258 FNPRM, New ICO Global Communications (“New ICO”) argues on the one hand that MSS was a savior service during the September 11 terrorist attacks in New York and Washington DC, immune to the destruction of facilities that supposedly crippled cellular and PCS operations. Yet in those comments New ICO readily admits that MSS is unreliable in tall buildings and “urban canyons,,” a fact that was known before the inception of MSS. New ICO says because of this MSS will need a system of terrestrial base stations, the very same sort of terrestrial facilities that New ICO claims are at risk of terrorist attack. Sorry, New ICO cannot have it both ways.

4. SBE contends that TV Pickup stations were the real savior service, despite the destruction of many broadcast facilities and the consequent reliance on backup links. Or do New ICO and other MSS commenters suppose that all those live pictures informing viewers from local to world-wide of the true situation were relayed uptown by magic? This was a free service to the public, by highly skilled broadcasters, using microwave bandwidths originally designed for black and white telecasts. Broadcasters’ vital 2 GHz TV BAS bandwidth is now being reduced by 29 percent, while new digital TV standards mandate massively increased video data rates. Additionally, SBE has noted press reports of how Internet news sites had to cut back on pictures and streaming video in favor of simple HTML text in an attempt to reduce Internet congestion caused by the crush of people seeking information. This points out the shortcoming of a connectivity-based model versus a broadcast model for information distribution, when suddenly everyone wants the same information.

5. New ICO claimed, at Page 3 of its comments, that no party asserted that the ATC proposal would cause harmful interference to the authorized users of adjacent bands. New ICO is apparently referring to comments received in response to a predecessor FCC inquiry prior to this instant IB Docket 01-185 rulemaking, as SBE most definitely expressed concern about ATC causing interference to adjacent-band TV BAS operations in its initial (October 19) comments. At Page 36 of its comments, New ICO talks about managing its own interference (*i.e.*, intraservice interference) but fails to discuss managing interservice interference to other services (*i.e.*, TV BAS). Similarly, at Page 48 of its comments New ICO talks about the need to coordinate with adjacent channel MSS operators, but it never says anything about coordination between MSS and TV BAS.

6. At Page 18 of its comments, New ICO talks about “...power budgets similar to those governing 1,900 MHz PCS” and Figure 6 shows those link budgets at 25 to 70 dB. The same

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

figure shows the MSS link margin as 8 to 12 dB. If New ICO wants to increase its power density to match PCS, how can these numbers not result in massive self interference?

7. SBE is further concerned about the reference in the New ICO comments, at Page iv, about “personal repeaters.” While New ICO somewhat defines this term at Page 17 of its comments as some sort of unlicensed, Part 15, “Bluetooth” device, SBE is concerned that New ICO might have in mind unlicensed ATC repeaters that could be placed anywhere with no engineering studies and no prior FCC approval. SBE would strenuously object to any such scheme due to the huge potential for interference to TV BAS.

II. The Current Mandatory Negotiation Period Must Be Immediately Placed On-Hold

8. SBE fully supports the October 22, 2001, *Motion for Stay of Mandatory Negotiation Period* joint petition filed by the National Association of Broadcasters (“NAB”) and the Association of Maximum Service Television, Inc. (“MSTV”) asking that the Commission immediately issue an Order staying the in-progress two-year mandatory negotiating period between broadcasters and the MSS industry.⁴ The negotiating period should not be re-started pending resolution of

- (1) this rulemaking;
- (2) the related ET Docket 00-258 Further Notice of Proposed Rulemaking (“FNPRM”);
- (3) the pending SBE petition for partial reconsideration to the ET Docket 95-18 Second Report & Order and Second Memorandum Opinion & Order, and
- (4) the completion of the pending ET Docket 01-75 rulemaking, which proposes to allow digital modulation for stations in all of the TV BAS bands, and not just the 6.5 and 18 GHz TV BAS bands, so that the mode of operation about to be required for TV BAS by the FCC will also be authorized by the FCC.

And once the mandatory negotiation period is re-started, a new two-year interval should apply to those negotiations unless all of these rulemakings result in no change to the present situation, which SBE believes will be unlikely.

⁴ SBE notes that Section 74.690(e)(1) of the FCC Rules incorrectly states that the mandatory two-year negotiation period will begin on September 6, 2010; of course this is incorrect: the two-year mandatory negotiation period commenced on September 6, 2000 (*i.e.*, pursuant to Paragraph 53 of the July 3, 2000, Second Report & Order and Second Memorandum Opinion & Order to ET Docket 95-18, thirty days after the August 6, 2000, publication of that document in the Federal Register).

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

9. The SBE Ad Hoc 2 GHz Reallocation Committee has now met eleven times⁵ to do what the Commission asked and create an un-biased and quantifiable criteria for “equivalently performing” 2 GHz band radios. That work concentrated on the continued use of FM video analog modulation, which is only practical for Phase I 14.5-MHz wide channels. Because of the uncertainty in the direction of the 2 GHz transition caused by both this instant IB Docket 01-185 NPRM and the ET Docket 00-258 FNRPM, at the October 25 meeting of this committee the proposed letter to the manufacturers of 2 GHz TV BAS radios, and a proposed test plan, have been placed “on hold.” However, to give the Commission the benefit of this work and as a further show of good faith on SBE’s part, the materials that were about to be sent to all manufacturers of 2 GHz TV BAS radios are appended to these comments.

III. The Commission Must Ensure That Broadcasters Receive Comparably Performing Radios for the Re-farmed 2 GHz TV BAS Band , or Acceptable Monetary Compensation

10. The Commission must not waiver from its ET Docket 95-18 decision that broadcasters are entitled to comparably performing equipment in a re-farmed 2 GHz TV BAS band. From all appearances it looks like the smart thing is to jump to 2,025–2,110 MHz Phase II and forgo the cumbersome and compromise-solution 2,008–2,110 MHz Phase I with its 14.5-MHz wide channels. Broadcasters will then be faced with only one-re-farming process by moving to Phase II with its 12.1-MHz wide channels, or to 8.5-MHz wide (*i.e.*, split 17-MHz wide) channels, as proposed in the SBE ET Docket 95-18 Petition for Partial Reconsideration concerning Phase II, depending on what the real capabilities of new digital ENG radios turn out to be. SBE does not feel that broadcasters should be made to suffer through the compromise solution adopted by the ET Docket 95-18 Second R&O; namely, to only clear TV BAS operations in the top-30 markets. Although a single re-farming will involve greater up-front costs that will have to be paid by MSS and whatever service(s) get assigned 2,008–2,025 MHz (and SBE believes the most likely newcomers will be third-generation wireless services, or “3G,” based on both the state-of-the-art and consumer needs), these higher costs would be mitigated by a) only occurring once and b) being spread over more than one industry.

⁵ The initial meeting and the founding of the SBE Ad Hoc 2 GHz Reallocation Committee occurred on April 24, 2001, at the NAB Broadcast Engineering Conference in Las Vegas, Nevada. Subsequent meetings have occurred on May 3, 23 and 30; June 28; July 12 and 26; August 22; September 19; and October 9 and 25, 2001.

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

11. As broadcasters faced the mechanics of how to implement a partial reallocation, it has become painfully clear that a partial reallocation will not work because of the adjacent-market problem. The adjacent market problem will occur wherever 2 GHz TV BAS operations in a below-top 30 TV market are impacted by the re-farmed electronic news gathering (“ENG”) use that occurs in a nearby top-30 market. This rulemaking and the related ET Docket 00-258 rulemaking provide the Commission with the perfect opportunity to correct its compromise ET Docket 95-18 decision with a single-re-farming, a one-time move of 2 GHz TV BAS to a narrowed, 85 MHz-wide TV BAS band, and the implementation of digital modulation. This will certainly be preferable to trying to force a flawed 2 GHz TV BAS relocation plan to work.

12. In SBE’s view, New ICO has fought the Commission, and broadcasters, at every step of the ET Docket 95-18 rulemaking in so-far unsuccessful attempts to evade its “emerging technologies” obligation to pay all reasonable and prudent relocation costs of the incumbents in the band(s) it wants to use. SBE has learned by experience that it, and the broadcasting industry, need to be vigilant lest New ICO and other MSS parties invent new ways to try to avoid the fair and equitable requirement that they make the current 1,990–2,025 MHz users “whole.” As noted in the Phillips Microtechnology web site, www.tvtower.com, while MSS representatives have almost weekly *ex parte* meetings at the FCC, SBE, as a volunteer group, must be content to file electronic comments as provided for by the Administrative Procedures Act (“APA”).

13. In the New ICO comments to the ET Docket 00-258 FNPRM, New ICO repeatedly refers to the cost of clearing broadcasters from 1,990–2,025 MHz as “exorbitant.” It estimates those costs at \$200 million under the present “phased in” approach adopted by the ET Docket 95-18 Second R&O, and at \$580 million if a one-time only conversion is adopted.⁶ Yet at Page 40 of the New ICO comments to IB Docket 01-185, New ICO states that the total investment cost for MSS will be 8.6 billion dollars (\$3.7 billion for a “global network,” \$1.4 billion to “vendors,” and \$3.5 billion to “get the service launched.”). SBE fails to see how \$0.58 billion can be considered as “exorbitant” when compared to \$8.6 billion. SBE does, however, agree with New ICO on one point: the increased costs for a one-time transition of TV BAS from 1,990–2,110 MHz to 2,025–2,110 MHz should be equitably apportioned between MSS and 3G, although in both cases broadcasters should be entitled to these funds (or equivalently performing radio systems, if they prefer) up front. SBE believes

⁶ New ICO comments to the ET Docket 00-258 FNPRM, at Page 34.

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

that broadcasters should not be placed at risk if one or more MSS entities again financially stumble (*i.e.*, again enter into bankruptcy proceedings).

IV. Summary

14. There is no need to allow an “ancillary” terrestrial component for MSS. Dual or triple-band radios are the appropriate solution for persons needing a telephone that will work both in remote areas and urban areas, or by using the growing capacities of the existing switched networks. Even if the plethora of fairness, legal, and economic arguments against terrestrial MSS were to disappear and the Commission were to permit ATCs, the Commission is obligated to address both adjacent-channel and BFO interference threats to 2 GHz TV BAS operations due to any high-powered (compared to mobile telephone) terrestrial MSS base stations. A far better path is keep MSS as a satellite-based niche service, and assign and auction 2,008–2,025 MHz to 3G or use this 17 MHz as relocation spectrum for other displaced entities. If assigned to 3G this will immediately put that spectrum to good use while also bringing additional revenues to the federal treasury, and allow a single conversion of 2 GHz TV BAS to the Phase II spectrum of 2,025–2,110 MHz with digital modulation. Steps will still need to be taken to ensure that 3G’s use of 2,008–2,025 MHz does not cause interference to BAS, and an equitable sharing of the one-time cost for relocating 2 GHz TV BAS operations should certainly be adopted between MSS and 3G.

SBE Reply Comments: IB Docket 01-185 (Terrestrial MSS)

List of Exhibits

15. The following exhibits have been prepared as a part of these IB Docket 01-185 reply comments:

1. On-hold SBE Ad Hoc 2 GHz Reallocation Committee letter to all manufacturers of 2 GHz TV BAS radios
2. On-hold draft SBE Ad Hoc 2 GHz Reallocation Committee “equivalency” test procedure for 14.5-MHz wide analog radios.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

/s/ Troy Pennington, CSRE
SBE President

/s/ Dane E. Ericksen, P.E., CSRTE
Chairman, SBE FCC Liaison Committee

/s/ Christopher D. Imlay, Esq.
Its Counsel

November 13, 2001

Booth, Freret, Imlay & Tepper
5101 Wisconsin Avenue, NW, Suite 307
Washington, D.C. 20016
202/686-9600

Gentlemen,

The SBE is undertaking a project in which your help and participation would be invaluable.

As you know, the FCC has mandated the reallocation of certain frequencies in the 2 GHz Broadcast Auxiliary Services (BAS) ENG band to other services. Part of that process includes providing 'comparable facilities' to those licensees who will be displaced. Since no benchmark exists which defines the performance of the equipment that must be replaced, we propose to have an independent lab perform tests on 'state-of-the-art' equipment designed for the 17 MHz bandwidth channels now in operation. We will also be testing modified or replacement equipment designed to operate in the future reduced channel bandwidths of 14.5 and 12 MHz. The performance of both types of equipment will be compared to determine if comparable performance can be obtained at the narrower bandwidths. It is anticipated that this testing will be performed late this year or early next.

In order to provide an industry-wide evaluation, we will be requesting that you make available three 2GHz transmitters from your top-of-the-line equipment that were shippable as standard gear in August, 2000, along with one receiver that would customarily be used with those transmitters. (For reference, the three transmitters will be required in order to ascertain upper and lower channel interference ratios.) For example, a central receiver would be expected to mate with standard 2 GHz transmitters in ENG vans or helicopters, using the current 17 MHz channel spacing band plan. Portables that might use the same band plan would also qualify.

We will also be requesting equipment designed or modified for operation in the reduced channel bandwidths of 14.5 and 12 MHz. Equipment so provided should be capable of meeting the 'comparable facilities' benchmark for these tests. At the time of submission, specifications for these new designs would be requested to accompany the units to be tested. It would be helpful if the same complement of three transmitters and one receiver could be provided for this narrower bandwidth equipment.

We are notifying you upfront of our future request to borrow equipment so that we may more accurately refine our test plan. It would be quite helpful if you could supply information on what equipment model numbers that you feel meet the pre August, 2000, criteria as well as your ability to lend these radios for testing. Similarly, a projection of your ability to provide equipment designed or modified for the narrower bandwidths would also be quite useful.

When the test plan is finalized, you will be supplied a document containing the complete range of tests we intend to perform in both phases of the evaluation. At that time you may choose whether to participate in our rather extensive testing program. We intend to subject all versions of radios to the same battery of tests in order to be as objective as possible. Any suggestions you may wish to make before the test program begins certainly would be helpful.

Your early response to this request is appreciated.

Andy Bater

Distribution List Name:

2 Ghz Equipment Manufacturers

Members:

Bill Dumm (E-mail)	bdumm@nucomm.com
CARL GUSTEFERO (E-mail)	carlgmrc@jps.net
Christopher Ahern (E-mail)	cahern@ikegami.com
Dan McIntyre (E-mail)	DMcIntyre@MRCBroadcast.com
Everett Shilts (E-mail)	eshilts@aol.com
Hans Emmenegger (E-mail)	hans@bms-inc.com
John Payne (E-mail)	jpayne@nucomm.com
John Wood (E-mail)	JWood@MRCBroadcast.com
Peter Larson (E-mail)	plarson@bst.wescam.com
Sam Nasiri (E-mail)	samn@gmsinc.com
Tony Finizio (E-mail)	TFinizio@MRCBroadcast.com
Wayne Rogers (E-mail)	wayner@gmsinc.com

SBE Ad Hoc 2 GHz Reallocation Committee
Laboratory Test Procedure for Analog 2 GHz
Transmitter/Receiver Performance Characterization

(VERSION 5 DRAFT, November 13, 2001)

DRAFT V5

SBE Ad Hoc 2 GHz Reallocation Committee

Laboratory Test Procedure for Analog 2 GHz Transmitter / Receiver Performance Characterization

TABLE OF CONTENTS

1. Introduction
2. Overall Test Criteria
 - 2.1 Solicitation of radios for testing
 - 2.2 17 MHz & 14.5 MHz channel spacing and offsets
 - 2.3 Tests of ALL radios will be identical
 - 2.4 All tests will include two channels of audio
 - 2.5 Video and audio tests
 - 2.6 1st & 2nd IF filter selection & notation
 - 2.7 Emission mask requirements
 - 2.8 Manufacturer's specifications required for each system
3. Transmitter/Receiver Test Parameters
 - 3.1 Measurements to be made on each radio (the test sequence)
 - 3.2 Adherence to emission mask requirements
 - 3.3 Fade margin (no interference)
 - 3.4 Co-channel performance
 - 3.5 Adjacent channel tests
 - 3.6 Split-channel tests
4. Contractor Services
 - 4.1 Contractor capabilities
 - 4.2 Performance test procedures
 - 4.3 Comparison test procedures
 - 4.4 Setup and calibration
 - 4.5 Conduct tests
 - 4.6 Data analysis
 - 4.7 Report preparation
5. Interpretation of test results
 - 5.1 Comparison of measured parameters
 - 5.2 Present data in both tabular and graphical formats
 - 5.3 Contractor not to draw conclusions from data

Section 1: **Introduction**

The goal of these tests is to provide data that will enable BAS licensees to ascertain the ability of reduced bandwidth electronic news gathering (ENG) equipment to replicate the service of existing equipment. The tests will enable BAS licensees to determine whether currently available analog ENG equipment designed for and operating in 14.5 MHz-wide channels can replicate the service provided by existing analog ENG equipment designed for and operating in 17/18 MHz wide channels. This is the ascertainment of so called “comparable performance” as defined by the FCC in 47 CFR 101.75(b). For purposes of this test plan differences in throughput and reliability will be measured.

The goal of these tests is to determine the current level of performance of 17 MHz wide 2 GHz radios versus performance of proposed 14.5 MHz radios. This data will be used by BAS licensees to determine if comparable performance has been achieved. An appropriate number of samples of radio systems of each bandwidth will be tested for audio and video performance at various receive signal strength levels. Interfering signals will also be introduced at varying levels to assess each radio systems rejection capabilities at different desired receive signal levels.

Each submitted radio system will be required to must meet the parameters of the test’s “Overall Test Criteria.” This section defines the basic parameters of the test program and minimum requirements for each tested radio system. This will ensure that fundamental capabilities are similar between all tested systems.

The actual detailed test parameters are shown in Section 3. The services required from the laboratory contractor are delineated in Section 4 and are followed by requirements for interpretation of collated data and a preparation of a final report illustrating the performance differences among all systems tested.

Section 2: **Overall Test Criteria**

2.1 We intend to solicit several current production 17/18 MHz ENG systems (3 or 4) for test to establish the a baseline reference of current technology ENG for narrow band systems performance. Microwave system manufacturers will be asked to submit samples of current state of art radio systems modified or purposely built for use in the narrower 14.5 MHz bandwidth. Samples not submitted by a date certain will not be considered for test. Each of the 17/18 MHz radios as well as narrow band radios must meet the emission mask parameters of 47 CFR 74.637 for the bandwidth in which they propose to operate.

2.2 Each radio system will adhere to the appropriate bandwidth under test. The following are the current 2 GHz BAS channel spacings (and offsets) as indicated below, followed by the proposed 14.5 MHz channel spacings:

Current Part 74 2GHz BAS channels:

<u>Channel #</u>	<u>Begin</u>	<u>Center</u>	<u>End</u>
Channel 1	1990.0	1999.0	2008.0
Channel 2	2008.0	2016.5	2025.0
Channel 3	2025.0	2033.5	2042.0
Channel 4	2042.0	2050.5	2059.0
Channel 5	2059.0	2067.5	2076.0
Channel 6	2076.0	2084.5	2093.0
Channel 7	2093.0	2101.5	2110.0

Offsets are 4.25 MHz above (+) and below (-) each center channel

FCC Phase 1 (14.5 MHz) Transition Plan Channel Spacings:

<u>Channel #</u>	<u>Begin</u>	<u>Center</u>	<u>End</u>
Channel 1	2008.0	2015.25	2023.0
Channel 2	2023.0	2030.25	2037.5
Channel 3	2037.5	2044.75	2052.0
Channel 4	2052.0	2059.25	2066.5
Channel 5	2066.5	2073.75	2081.0
Channel 6	2081.0	2088.25	2095.5
Channel 7	2095.5	2102.75	2110.0

Offsets are 3.5 MHz above (+) and below (-) each center channel

2.3 Each tested radio system will be submitted to the same test procedures regardless of the specific parameters of the radio system. The data collected from each system will similarly be identical. Only the mechanical configuration of each radio system may vary from system to system.

2.4 All tests will include two channels of audio. The traditional mechanism (used in all of the current 17 MHz radio systems) for transport of these audio channels is analog subcarriers. This test will permit vendors to submit narrow band radio

systems that do not conform to this standard may be submitted as long as they pass two channels of audio. The submitted narrow band radio systems are only required to meet emission mask parameters, and have a latency (compared to video) of no more than ± 63.5 microseconds, and maintain stereo phasing performance. Variances in frequency response, noise performance and distortion of any such system will be tested in the overall program.

However, 17 MHz reference radios must use analog audio subcarriers as this is the current practice in the industry. The frequency of these subcarriers must be at 4.83 MHz and 6.2 MHz. Injection levels must be -26 dBc and PEAK audio deviation must be at ± 75 kHz using FCC 75 microsecond pre-emphasis. All steady state audio tests (except for audio SNR) are to be done at peak program level. Program level will be 10 dB below peak.

2.5 Video test signals used for these procedures fall into two categories: interfering signals and desired signals. Interfering test signals will always be SMPTE color bars with burn in ID text. The sync reference for each test signal will not be referenced to any other signal (interfering nor desired). The desired signal for subjective tests will include a 20% flat field. Desired signal test patterns for objective tests will be chosen as needed by the test in progress. Vertical interval test signals may be used for automated tests. If deemed advantageous by the Contractor, typical camera captured video sequences can be provided by the SBE for subjective viewing tests.

Audio test signals also fall into the “interfering” and “desired” categories. Interfering audio signals will always be peak modulated 1 kHz test tone. This is extremely common in the field and easy to hear in the desired signal. For subjective listening tests, the desired test sequence will include silence as a test signal. Test signals for objective audio tests will be chosen as needed by the test in progress. If deemed advantageous by the Contractor, audio test material may be excerpted from the EBU Sound Quality Assessment CD (tracks 17, 35, 51 and 54).

2.6 All objective tests must be performed at each IF filter bandwidth provided by the manufacturer. If a fixed 1st (or 2nd) IF filter exists, its bandwidth must be noted in the test results. Subjective tests will be done at the IF filter bandwidth that provides the best performance for each radio in each test.

2.7 All radio systems must meet the emission mask parameters of 47 CFR 74.637 for the bandwidth in which they choose to operate.

2.8 Standard receiver and transmitter specifications must be submitted with each radio system. These specifications must include (at a minimum) receiver threshold, receiver noise figure, video performance specifications, audio performance specifications and a list of standards to which the system adheres.

Section 3: Transmitter/Receiver Test Parameters

3.1 Objective and subjective video and audio tests performed for each configuration of each system under test will be as follows:

Video Tests:

- Signal to Noise Ratio
- Frequency Response (to 5 MHz)
- CCIR rating (tests to be conducted in accordance with CCIR Recommendation 500)
- Subjective description of impairments
- Receiver IF Spectrum Display (recorded for each test)
- Receiver Threshold (recorded once for each receiver)
- Receiver Noise Figure (recorded once for each receiver)

Audio Tests:

- Signal to Noise Ratio (from +4 dBm program level, with 10 dB headroom to ± 75 kHz deviation, *i.e.* 14 dBm audio level = ± 75 kHz deviation; Rx level: -40 dBm)
- Frequency Response (from 50 Hz to 15 kHz)
- THD+N (@ +4 dBm & +14 dBm)
- Crosstalk - Ch 1 into Ch 2 & Ch 2 into Ch 1 (@ +4 dBm & +14 dBm)

Subjective description of video impairments

- CCIR rating of audio (tests to be conducted in accordance with CCIR Recommendation 500)

3.2 Each transmitter will be tested to ensure compliance with 47 CFR 74.637. The Contractor will develop a test procedure for this parameter. Transmitters that do not meet the Part 74 emission mask parameters will be excluded from testing.

3.3 Fade margin tests will be conducted on each submitted system from -60 dBm receive level down to un-usable picture levels. The tests in Section 3.1 will be conducted on each system under test.

3.4 Co-Channel performance tests will be conducted on each submitted system. Desired receive levels will be -40 dBm, -60 dBm and -80 dBm. The Contractor will determine undesired RF levels. These levels will range from levels that create no perceptible interference to levels that cause unusable pictures and/or sound. The tests in Section 3.1 will be conducted on each system under test.

3.5 Adjacent channel tests will be conducted with desired signal levels at 3 levels: strong (-40 dBm), medium (-60 dBm) and weak (-80 dBm). In each case the desired and undesired signal levels will begin at the reference level (either -40, -60 or -80 dBm) and decrease in power until the system produces unusable pictures and/or sound. Tests will be conducted for first upper adjacent undesired, first lower adjacent undesired, simultaneous undesired first upper and lower adjacent. Similarly, second adjacent upper, lower undesired channels and concurrent second adjacent upper and lower undesired channels will be tested.

3.6 So-called “split channel” operation will also be tested. These tests involve using offsets (4.25 MHz for 17 MHz bandwidth, 3.5 MHz for 14.5 MHz bandwidth) from the center of the BAS channel. No other parameters of the transmitter are altered. Both the positive and negative offsets of a single BAS channel should be used for this test. Both the upper and lower offsets must alternately be measured to ensure symmetry of receiver performance. The final adjacent channel test involves three adjacent split channels. The upper split of the next lower channel (or the lower split of the next higher channel) is added to the single channel split. The center split channel will be measured as above using the upper and lower adjacent split channels as undesired signals.

Section 4: **Contractor Services**

4.1 The Contractor will provide the engineering services necessary to design and perform laboratory tests that will enable BAS licensees to ascertain the ability of reduced bandwidth ENG equipment to replicate the service of existing equipment. The tests performed by the Contractor will enable BAS licensees to determine whether analog ENG equipment using 14.5 MHz-wide channels can replicate the service of existing analog ENG equipment using 17/18 MHz wide channels. Comparative analysis about the replication of service will be based on differences in throughput, reliability and operating costs (as defined by the FCC, 47 CFR 101.75(b)).

4.2 The Contractor shall develop test procedures to establish performance level of all tested analog ENG systems per above Receiver/Transmitter Test Parameters.

4.3 The Contractor shall develop comparative procedures for comparing existing equipment performance levels with proposed equipment performance levels.

4.4 The Contractor will be responsible for setup and calibration of all necessary test equipment and facilities.

4.5 The Contractor is responsible for the performance of the actual tests described in the test procedures referenced above.

4.6 The Contractor is responsible for data reduction and analysis of the measurement data.

4.7 The Contractor is responsible for the preparation of a report for submission to the SBE (in an electronic format).

Section 5: **Interpretation of test results**

5.1 Each measured parameter will be presented with the same parameter from the other radios under test and the “reference” data collected from the 17 MHz radios. The 14.5 MHz data has no value in and of itself. It only gains meaning by comparison to the 17 MHz reference data.

5.2 After reduction, data will be presented in easy to read and understand tabular and graphical formats.

5.3 The Contractor will not draw conclusions from measured data. The goal of this test procedure is to uncover and present factual comparison data for BAS licensees to use in making their own decisions regarding whether or not comparable facilities have been provided by the MSS industry.