

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

<b>Promoting Spectrum Access for Wireless Microphone Operations</b>	)	<b>GN Docket No. 14-166</b>
	)	
	)	
<b>Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions</b>	)	<b>GN Docket No. 12-268</b>
	)	

**To: The Commission**

**COMMENTS OF BROADCAST SPORTS, INCORPORATED**

Broadcast Sports, Incorporated (“BSI”), by counsel, hereby respectfully submits its comments in response to the Commission’s *Notice of Proposed Rulemaking* in the above-captioned proceeding.<sup>1</sup> The *Notice* seeks to address the long term spectrum needs of wireless microphone users who stand to be largely displaced from the UHF television bands, where most wireless microphone operation occurs, due to past auction of the 700 MHz band, the imminent incentive auction of the 600 MHz band, and the consequent repacking of the residual UHF television band between 470 MHz and 608 MHz. As the *Notice* specifies, among many ubiquitous applications throughout the United States, wireless microphones play an important role in enabling broadcasters and video and audio production professionals to serve consumers and broadcast, cable and satellite audiences, providing real-time coverage of live sports, entertainment and newsworthy events. In a series of orders establishing repeatedly modified and increasingly constrictive band plans for the UHF television allocations, the Commission has

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<sup>1</sup> *Notice of Proposed Rulemaking*, FCC 14-145, 29 FCC Rcd. 12343, 79 Fed. Reg. 69387 and 69730 (released September 30, 2014) (the “*Notice*”). By *Order*, DA 14-1801 dated December 10, 2014, the Chief, Office of Engineering and Technology under delegated authority extended the comment date in this proceeding to February 4, 2015. Therefore, these comments are timely filed.

serially, in an *exceptionally* short period of time, substantially reduced the available spectrum for wireless microphones in the UHF television band. That situation will significantly worsen with the impending incentive auction. Given this, it is appropriate and timely that the Commission explore replacement (i.e. additional) spectrum allocations for wireless microphones, wireless intercoms and low power broadcast auxiliary devices, before the shortage in spectrum for these applications at UHF becomes more acute than it is at present. Therefore, in the interests of the viewers of sports, entertainment and other real-time television programming in continuing to receive the level of programming that they are accustomed to receiving and expect, BSI states as follows:

#### **I. Introduction.**

1. BSI is a preeminent producer of video and audio at events around the country for broadcast, cablecast, and satellite transmission to end users. Its work includes production and transmission of video for nationally televised sporting events -- especially professional golf and automobile racing events – but it includes as well production of other newsworthy and entertainment events throughout the United States of all types. Its clients include broadcast, cable and satellite networks and other users of video for point-to-multipoint dissemination. BSI does this pursuant to Commission-issued licenses in the Local Television Transmission Service (“LTTS”); the Low Power Broadcast Auxiliary Service (“LPAS”) and Business/Industrial Land Mobile Radio Service. There is and has been insufficient video channel bandwidth spectrum available in the low microwave range, and insufficient wireless microphone spectrum typically available in a given market due to overcrowding, pursuant to these licenses. BSI must, therefore, rely on the availability of grants of Special Temporary Authority (STA)<sup>2</sup> to permit the use of

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<sup>2</sup> It is, incidentally, necessary to note the ongoing, extremely efficient and professional assistance of the staff of the Experimental Licensing Division of the Office of Engineering and Technology. But for their rapid

other spectrum for these purposes as well. BSI has been able to successfully develop and deploy equipment for non-standard video and wireless microphone frequencies. Nevertheless, the ability of a program producer to conduct basic audio production operations is largely dependent on the regular availability of UHF television band spectrum for wireless microphones that is likely not going to continue to be available in sufficient quantity after the incentive auctions.

2. The video and audio produced by BSI and other program production companies is now done in high-definition digital formats using state-of-the art equipment, and the audio captured using current wireless microphone technology is of sufficient quality that the television viewer is placed at the scene of events as they occur. For example, the viewer is placed inside a series of race cars at NASCAR races, with views forward and aft from the car. Due to the use of wireless microphones, the viewer has virtually the same visual and aural experience as does the driver. This is only one example of the experience that television viewers have enjoyed and have come to expect, and which is now possible due to the use of UHF wireless microphone spectrum. Similarly, at Academy Awards ceremonies, other sporting events or political conventions, the overall quality of the production that viewers now enjoy and appreciate is directly related to the ability to use broadcast-quality wireless microphones in very large numbers. Due to the nature of the events at which BSI produces video, and the methodologies used, there are typically between 120 and 250 wireless microphones used. The current bandwidth of broadcast-quality wireless microphones is approximately 200 kilohertz per microphone. This translates to approximately 24 to 40 MHz of UHF television spectrum at a given event. At some events such as the NFL Super

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responsiveness and appreciation of the continuing need for grants of Special Temporary Authority for video and audio production purposes, televised events such as NASCAR races, professional golf tournaments and other professional sports events would not be possible due to the overcrowding of Broadcast Auxiliary spectrum generally and wireless microphone spectrum in particular.

Bowl® or the political conventions, even greater numbers of wireless microphones must be utilized at any given time during the event.

3. The viewing public indirectly and video providers directly rely heavily on the ability of video production companies to provide audio and video coverage of major sports, entertainment and other events in real time. The Commission must reasonably accommodate ongoing wireless microphone and other low-power broadcast auxiliary operations<sup>3</sup>, *both* in the residual UHF television bands and elsewhere in bands that provide equivalent functionality. To do otherwise will substantially disrupt the beneficial production services to the public as they are now being provided which the viewing public expects, and on which they depend. For the reasons set forth herein, BSI supports the domestic allocation of certain additional spectrum for low power broadcast auxiliary service licensees.

## **II. There is an Acute Shortage of Broadcast-Quality UHF Television Wireless Microphone Spectrum**

4. Recent rulemaking proceedings, starting with the Commission's effort to implement commercial and public safety broadband and interoperable narrowband public safety facilities in the band 698-806 MHz, have, separately and cumulatively, had an exceptionally significant adverse effect on the availability of spectrum for wireless microphones. Without any practical opportunity for program production entities thus far to adapt to each incremental regulatory change, the Commission has repeatedly altered the plan for wireless microphones, and in the process has eliminated any certainty about the near-term and long-term ability to conduct program production of sports and entertainment programming due to an inadequate amount of residual UHF spectrum for these devices. This is true even though broadcasters and program

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<sup>3</sup> Low power auxiliary stations are short-path transmit devices. They are, in addition to wireless microphones, used for purposes such as cue and control communications, and synchronization of TV camera signals. 47 C.F.R. § 74.801 *et seq.*

producers have only had access to the UHF TV bands for this purpose since 1987.<sup>4</sup> Since that time, use of wireless microphones has skyrocketed, due to the ever-increasing expectations of the public for enhanced broadcast coverage of news, emergency situations and sports and event coverage. To provide a sense of the magnitude of the spectrum needs for wireless microphones needed at major sporting and entertainment events, consider the following table<sup>5</sup> showing the number of wireless microphones needed in Europe at the 2012 Olympics and during various years of the Tour de France:

**Table 1: Number of Links for the Olympic Games**

Event	Radiomicrophone IEM	Service Links	Video Links						Total Video Links
			1 GHz	2 GHz	3 GHz	4.5 – 6 GHz	10 GHz	Above 20 GHz	
London Olympics 2012	7520 (1)	6876	-	434	82	160	2	0	678

(1) 7520 corresponds to the number of coordinated Radiomicrophones and IEM assignments.

**Table 2: Spectrum usage for the Tour de France**

Event	Radiomicrophone IEM	Service Links	Video Links						Total Video Links
			1 GHz	2 GHz	3 GHz	4.5 – 6 GHz	10 GHz	Above 20 GHz	
Tour de France 2007	365	No information							

<sup>4</sup> See generally Review of Subpart H, Part 74 of the Commission’s Rules, Low Power Auxiliary Stations, MM Docket No. 86-12, *First Report and Order*, 2 FCC Rcd 345 (1987). That 1987 Report and Order recognized the growing use of wireless microphones for broadcast and production purposes. Access to the UHF TV bands was permitted in order to alleviate overcrowding of the limited TV channels previously available for wireless microphones in major cities. Licensed wireless microphones were permitted at channels 14-69 (470-806 MHz except channel 37, 608-614 MHz) as well as on lower VHF TV channels 2-6 (54-72 MHz and 78-88 MHz bands) on a secondary basis.

<sup>5</sup> Source: CEPT Electronic Communications Committee (ECC) Report 204, *Spectrum Use and Future Requirements for Programme Making and Special Events (PMSE)*. Radiomicrophones referred to are principally UHF wireless microphones. IEM refers to “in-ear monitoring”.

Tour de France 2010	456	NA	4	20	4	0	0	0	28
Tour de France 2011	463	NA	3	23	9	0	0	0	35
Tour de France 2012	452	NA	4	17	11	0	0	0	32 (1)
Tour de France 2013	576	No information							

In the last five years, notwithstanding the increasing need for wireless microphones, access to these bands by program producers and broadcasters has been sharply curtailed and stands to be further reduced.

5. On January 14, 2010, a scant twenty-five years after UHF wireless microphones were first authorized in the UHF TV bands, the Commission adopted a *Report and Order and Further Notice of Proposed Rule Making (Wireless Microphone R&O/FNPRM)* addressing the rules for wireless microphones, in-ear monitors and other low power auxiliary devices that operate in the TV bands.<sup>6</sup> In that proceeding, the Commission prohibited the manufacture, import, sale, lease, offer for sale or lease, or shipment of wireless microphones and other low power auxiliary stations intended for use in the so-called “700 MHz” Band (TV channels 52-69, 698-806 MHz) in the United States. It was required that all wireless microphones cease operations in the 700 MHz band no later than June 12, 2010. The Commission acknowledged that wireless microphones and related devices are used for important functions, and noted that many wireless microphones were being operated by entities and persons ineligible for a Part 74 license. Therefore, along with the migration of full-power TV stations, Class A TV stations, TV

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<sup>6</sup> See *Report and Order and Further Notice of Proposed Rule Making* in WT Docket Nos. 08-166 and 08-167 and ET Docket No. 10-24, 25 FCC Rcd 643 (2010).

translators, TV boosters and Low-power TV stations to available channels below 698 MHz (the so-called “core TV channels”) wireless microphones had to migrate downward as well.”<sup>7</sup> This greatly reduced the number of channels available for wireless microphone operation, and the downward migration was completed less than five years ago. A very large number of wireless microphones were operating in the 700 MHz band and that equipment had to be modified or replaced with equipment that was not capable of operation above 698 MHz. Program producers, at great expense, bought new equipment that operated below 698 MHz but not above that frequency. That equipment of course has a long service life and an extended amortization schedule.

6. Meanwhile, at the low end of the UHF TV band, channels 14-20 (470-512 MHz) are used in eleven major markets in the United States<sup>8</sup> for important land mobile radio communications. That band is fully deployed for that purpose in those markets and no wireless microphone operation is permitted there. There are numerous additional uses made of the UHF television broadcast band below 698 MHz. As noted in the *Second Memorandum Opinion and Order* in the White Spaces Docket<sup>9</sup> at ¶ 8:

In addition, medical telemetry equipment is permitted to operate on an unlicensed basis on any vacant TV channel in the range of channels 7-46, and unlicensed remote control devices are allowed to operate on any TV channel above 70 MHz (*i.e.*, above channel 4), except for channel 37. TV channel 37 (608-614 MHz) is allocated for radio astronomy and the wireless medical telemetry service (WMTS) and is not used for TV broadcasting. The Offshore Radiotelephone Service uses channels 15-17 in certain regions along the Gulf of Mexico...

(footnotes omitted)

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<sup>7</sup> *i.e.* to TV channels 2-51, excluding channel 37.

<sup>8</sup> This spectrum is used to support critical public safety communications and provide regional interoperability among first responders. The markets are: Boston, Chicago, Dallas, Houston, Los Angeles, Miami, New York, Philadelphia, Pittsburgh, San Francisco, and Washington, D.C.

<sup>9</sup> *Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket No. 02-380, *Second Memorandum Opinion and Order*, 25 FCC Rcd 18661 (2010) (the White Spaces Docket). *See also Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, *Third Memorandum Opinion and Order*, 27 FCC Rcd 3692 (2012).

The compression of all of these uses into the band 512-698 MHz, plus the Commission's recent addition of TV White Spaces Devices (TVBDs) to the mix and the accommodation (essentially legalization) of unlicensed wireless microphone users in that same spectrum has made operation of wireless microphones for production of broadcast quality audio exceptionally difficult, despite real-time channel sharing procedures used among local and national broadcasters and program producers.

7. The Commission provided some short-lived protection for wireless microphones by reserving two UHF TV Channels for them. In the *Second Memorandum Opinion and Order* in the White Spaces Docket. There, at ¶ 29, the Commission stated that it “continue[s] to recognize that wireless microphones are currently used in many different venues where people gather for events large and small and many consumers and businesses have come to rely on these devices.” It had previously reserved two channels in the range 14-51 in the markets where PLMRS and CMRS systems operate “to make sure that frequencies are available for wireless microphones.”<sup>10</sup> Importantly, the Commission held in September of 2010 that it was “...*expanding the reservation of two channels in the range 14-51 to all markets nationwide as suggested by several petitioners. This will provide frequencies where a limited but substantial number of wireless microphones can be operated on any basis without the potential for interference from TV bands devices. It will also ensure that frequencies are available everywhere for licensed wireless microphones used on a roving basis to operate without risk of receiving harmful interference from [White Space Devices].*”<sup>11</sup> The Commission also provided for a nominal separation distance between TVBDs and sites of venues and events where large numbers of unlicensed wireless microphones are used by permitting such sites to be registered in the TV bands

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<sup>10</sup> See *Second Report and Order*, 23 FCC Rcd 16860 (2009) at ¶ 151.

<sup>11</sup> *Second Memorandum Opinion and Order*, 25 FCC Rcd 18661 at 18674 (2010).

databases. It noted that, at any particular location, a number of TV channels would not be available for TVBDs due to the application of the various interference protection requirements under the rules. Therefore, the Commission concluded, “a significant amount of spectrum will be available on which wireless microphones can be operated as they have in the past without concern for interference from TVBDs.” Because of these accommodations, and specifically because of the reservation of the two channels per market for wireless microphone operation,<sup>12</sup> program production companies could continue to conduct event production activities to some extent as necessary.

8. The Commission’s short-lived accommodation for wireless microphones in the TV White Spaces Docket was necessary but insufficient in any case. As the Commission later acknowledged,<sup>13</sup> there is at any given news or entertainment event the typical need for more than 100 wireless microphones.<sup>14</sup> Because in any given urbanized area there are many unlicensed wireless microphones as well as licensed ones, and because the Commission did not limit the

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<sup>12</sup> See, 47 C.F.R. §15.707(a) (prohibiting white space devices on the first channel above and the first channel below channel 37 that are available, or if a channel is not available above and below channel 37, prohibiting white space devices on the first two channels nearest to channel 37).

<sup>13</sup> In *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, GN Docket No. 12-268 (released October 2, 2012) (“*Incentive Auctions NPRM*”), the Commission stated that:

Licensed LPAS [low power broadcast auxiliary service devices] may operate on vacant channels allocated to television broadcasting. In the UHF band, co-channel LPAS operations must be separated by a distance of at least 113 kilometers (70 miles) from the television station. Unlicensed wireless microphones are permitted similar types of operations on this unused spectrum. Wireless microphones operate in a relatively narrow bandwidth and often are technically capable of choosing different frequencies among multiple vacant channels available for operation. Many wireless microphones are used regularly and predictably (*e.g.*, at television studios, movie studio lots, or major sporting events facilities), but at times the location of their operation changes (*e.g.*, covering news events in different places). The nature of wireless microphones and their use is such that they operate for relatively short intervals at different times, and the specific frequencies they use for operation often change, even when used at one location. Theatrical and sports productions and other major events often use more than 100 wireless microphones, which in certain locations could use most if not all of the UHF channels available to them in the television bands.

<sup>14</sup> At the largest sporting events and at political conventions, there are typically more than 200 wireless microphones devices in use, often simultaneously. At any given NFL football game there are more than 120 wireless microphones in use. In addition, there are in-ear monitors necessary for audio production use at these events which use a tremendous amount of UHF television spectrum in conjunction with wireless microphones.

reserved channels in a given market to only licensed wireless microphones, not all of the two reserved channels would have been used in any given market. In any case, all of that changed in the *Incentive Auctions* proceeding. In the *Incentive Auctions NPRM*, the Commission recognized that the proposal to auction and repack the UHF TV bands “may reduce the spectrum available in the TV bands for secondary use by licensed and unlicensed wireless microphones and LPAS systems.” It acknowledged that the auction and repacking process would as well reduce the spectrum available for unlicensed TV band white space devices.<sup>15</sup> Thus, by virtue of the radical changes proposed in that proceeding which abandoned even the minimal accommodations for WMs adopted in the 2010 White Spaces proceeding, the Commission created in effect a reversal of the accommodation plan for wireless microphones in less than two years. Video production companies’ substantial investments in current generation equipment in reliance on the availability of the two reserved channels is threatened. Worst of all, production entities would be rendered unable to provide interference-free service to the viewers that expect the same and receive it now. Allowing wireless microphones and TV White Space Devices to operate in minimal guard bands used in large part for TVBDs is seriously inadequate and insufficient. It offers program producers no assurance of interference-free wireless microphone operation. There is a need for the foreseeable future to have regularly available for video production of news, sports and entertainment events -- regardless of the means of multicasting those events to the viewing public -- at least a total of 24 MHz of spectrum for UHF wireless microphones. This would provide a total of 120 channels<sup>16</sup> for WM operation.

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<sup>15</sup> *Incentive Auctions NPRM*, at ¶¶ 221-239.

<sup>16</sup> Not all of those channels could be used at once in any given venue due to adjacent-channel interference; the number of usable channels in a 24 MHz band or bands would likely be more on the order of 60 with current technology.

9. In June of last year, the problem worsened for licensed wireless microphones as the result of the planned auction of the 600 MHz band. In the *Incentive Auctions Report and Order*<sup>17</sup>, the Commission took the following actions: (1) It eliminated the two channels now reserved for wireless microphones, and created but one, to be shared between wireless microphones and TVBDs; (2) It allowed wireless microphones to operate in the “duplex gap”, an 11 MHz segment between base and mobile frequencies (but of that, the Commission set aside 6 MHz for TV White Space Devices and only 4 MHz for licensed wireless microphones); and (3) it permitted *unlicensed* wireless microphones to use a guard band between 7 to 11 MHz wide that will separate TV from wireless operations. In a separate proceeding, the Commission further expanded the pool of Part 74 eligibles for wireless microphones to include venues and professional sound companies that routinely use 50 or more wireless microphones as an integral part of the major productions or events. This expanded pool of eligibles, coupled with sharing with TVBDs in the one UHF television channel to be available for wireless microphones, and the clear warning that wireless microphones will eventually<sup>18</sup> be required to cease operating in the 600 MHz spectrum “repurposed” for wireless broadband, stands to virtually preclude audio production operations without some replacement spectrum.

### **III. Replacement Spectrum for Wireless Microphones Displaced from the UHF Television Bands in a Variety of new Bands is Critically Necessary.**

10. In the *Incentive Auction R&O* the Commission acknowledged that the reduction of available UHF band spectrum will require many wireless microphone users and licensees to

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<sup>17</sup> *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, *Report and Order*, 29 FCC Rcd 6567, 6704 ¶ 316 (2014) (*Incentive Auction R&O*)

<sup>18</sup> The Commission stated that it would “allow wireless microphone users to continue to operate [at 600 MHz] for 39 months following the incentive auction in order to facilitate their transition to other spectrum.” However, to the present time there is no “other spectrum” in which to transition.

make changes in the spectrum that they access and the equipment they use.<sup>19</sup> To facilitate wireless microphone users' ability to make these adjustments, the Commission provided that users could continue to utilize the 600 MHz UHF television spectrum repurposed for wireless services for a three-year period of time while moving to alternative spectrum. The decision in the Incentive Auction proceeding was, however, placing the cart *far* before the horse. Not only was there no spectrum to which program producers could move; the Commission had no idea what the timetable would be for equipment manufacturers to make new equipment available for this three-year transition to whatever replacement spectrum might be made available.

11. That said, the Commission has in the *Notice* in the instant proceeding listed a series of candidate bands which might be made available, and listed as well some different technologies which might be used for short range and low power audio transmissions. Initially, at Paragraph 72 of the *Notice*, the Commission notes the reorganization of the current VHF/UHF television bands after the incentive auction. As a result of this auction, the amount of spectrum allocated for television broadcasting will be reduced and repacked; some will be designated for 600 MHz guard bands (including the duplex gap), and other portions will be auctioned to wireless services. The Notice acknowledges that this will “affect” wireless microphones and asks for comment on the effect of these actions relative to the use of residual VHF and UHF spectrum for wireless microphones. As is discussed above, it is necessary to have a minimum of 24 MHz of spectrum in the UHF television bands regularly available for licensed wireless microphone operation in each market for routine sports and entertainment program production. Additional spectrum must be made available on a short-term basis for major events such as the political conventions, major sporting events, and entertainment events. Since the Commission has made available only 4 MHz per guard band, and has indicated that wireless microphones and TVBDs must share a

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<sup>19</sup> See *Incentive Auction R&O*, 29 FCC Rcd at 6696-6704 ¶¶ 299-315.

single channel at UHF (where even one channel is available), it is apparent that there is not going to be sufficient UHF television spectrum for wireless microphones in the near future.

12. A series of replacement bands are suggested in the *Notice*, few of which offer any solace for licensed program producers. Some, such as 26.100-26.480 MHz and the VHF and UHF Remote Pickup (RPU) bands at 161.625-161.775 MHz, 450-451 MHz and 455-456 MHz, (which are already available for licensed LPAS use on a regulatory basis) are unavailable as a practical matter due to limited bandwidth, existing use and/or the required antenna size. These are not suitable as reaccommodation spectrum for sports or entertainment production. Similarly, the FM broadcast band at 88-108 MHz is not useful for wireless microphones used for program production. There is no room in the FM broadcast band for wireless microphones generally, without fear of interference to and from FM broadcasting. The band 169-172 MHz is a government allocation primarily, though Part 90 eligibles can be licensed on one or more of 8 discrete channels in that segment for wireless microphones up to 50 mW with relatively narrow bandwidths. This VHF spectrum is not useful as replacement spectrum for licensed wireless microphone use because of the lack of sufficient spectrum for the purpose. Coordination in real time would be difficult relative to Federal operations in any case. Because the band 944-952 MHz is heavily occupied by fixed, Part 74 Aural Studio to Transmitter links (STL) and fixed Aural Intercity Relay Links (ICR), and due to the private and common carrier OFS operation at 941-944 MHz and the MAS operation in the 952-960 MHz bands, the availability of spectrum would be limited. The Notice also discusses the 902-928 MHz, 2400-2483.5 MHz and the 5 GHz bands. Each of these bands is subject to unpredictable and generally high noise levels due to military radars, Part 15 and Part 18 devices, and licensed services such as Multilateration

Location Monitoring Service stations at 902-928 MHz. Thus, these bands are generally unsuitable for transmission of production-quality audio.

#### **IV. The Band 1435-1525 MHz Should Not be Made Available for Wireless Microphones**

13. The *Notice*, beginning at Paragraph 175, discusses options for making available the band 1435-1525 MHz band (1.4 GHz) for certain classes of wireless microphone users. BSI urges that wireless microphones *not* be permitted in this band. Because the band is allocated for aeronautical mobile telemetry (AMT) operations and coordinated for such purpose by the Aerospace and Flight Test Radio Coordinating Council (AFTRCC), there is limited spectrum available in this band for other purposes. As the *Notice* has accurately summarized, broadcasters and program production companies who are in need of video-bandwidth spectrum for transmission of video for televised sporting events, political conventions and other major entertainment often must obtain Special Temporary Authority (STA) to operate wide-bandwidth<sup>20</sup> video equipment in this band on a short-term basis.<sup>21</sup> The need for these video channels for program production (where, and at times when they are not being used for AMT or other Federal government operations) is due to acute spectrum shortages for TV Pickup and video relay in many areas due to normal overloading of the BAS/CARS/LTTS bands at 2025-2110 MHz and 2450-2483.5 MHz. But for the AFTRCC coordinated, “secondary market” STA

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<sup>20</sup> The occupied bandwidth of a COFDM video emission is typically in the range of 8 megahertz.

<sup>21</sup> Paragraph 175 of the *Notice* states as follows:

“In recent years, professional sound engineering companies responsible for major event productions have obtained Special Temporary Authority (STA) to operate wireless microphones and similar audio devices, along with video equipment, on a temporary basis (e.g., a few days or a week) to access this spectrum to supplement their access to other spectrum resources (primarily the TV bands) for coverage of sporting events (e.g., golf tournaments or NASCAR races) at specified locations around the country. (footnote omitted) Generally, as these parties represent in their applications for individual STAs, the spectrum resources otherwise available to them at those locations are insufficient to enable them to provide the desired level of coverage for these scheduled events. Prior to grant of each STA, the applicants must demonstrate that they have fully coordinated their proposed spectrum use with AFTRCC. (footnote omitted) The STAs provide the applicants access to up to 90 megahertz of spectrum in the 1435-1525 MHz band, and only when that spectrum is not subject to AMT use at the specified times and locations. Operators generally use equipment that has been specially developed or modified for use of the 1.4 GHz band spectrum.”

use of the 1.4 GHz band, video production of these major events would not be possible. While as discussed herein, there are and will in the near future be dire shortages of UHF television wireless microphone spectrum that stand to preclude professional program production, the shortages of COFDM video bandwidth channels at events such as NFL football, NASCAR racing, PGA golf tournaments and other similar events threatens access to these events by the viewing public as well. Coordinated STA operation in this band by BSI and others with AFTRCC works very efficiently and is critically necessary. For these reasons, BSI strongly recommends *against* the allocation of the 1.4 GHz band for LPAS or WM use. Should the Commission nevertheless decide to make this band available on a secondary, licensed, coordinated basis, BSI urges that the Commission limit WM use in this band as proposed at Paragraph 177 of the *Notice*:

Because of the importance of ensuring that the AMT systems are protected against harmful interference, and given that most wireless microphone operations can be accommodated within other spectrum, we propose that use of this band be limited to licensed professional users at specified locations and times, and include specified safeguards designed to protect AMT use of the band...Limiting the licensing for these types of applications, which are typically associated with specific locations, should make sharing of the spectrum manageable. Although we would authorize such use on a secondary basis, in this instance we believe that frequency coordination with federal and non-federal users is critical and is consistent with the practice that already has been used for special temporary authority in this band, although on a more limited basis...

#### **V. The Best Option for Replacement Spectrum for Wireless Microphones is the Band 6875-7125 MHz.**

14. A very good option for replacement spectrum is to make available for licensed wireless microphone users only, on a coordinated basis, a total of 26 megahertz of bandwidth within the band 6875-7125 MHz (the "7 GHz Band"). This band is currently available for fixed, mobile and itinerant TV BAS, CARS and LTTS operations (and for fixed Part 101 wireless backhaul outside of BAS areas of operation). While the band is heavily used for fixed and

mobile BAS in many large markets, and while mixing fixed or mobile video channels with itinerant wireless microphones would be complicated, the specification of *portions of two* of the ten, 25 MHz-wide channels in this band for wireless microphone operation is practical and would offer a great deal of opportunity for reaccommodation of displaced, short-range wireless microphone users. Wireless microphone operation should use only one channel, preferably the same one in each market, so as to avoid mixing wireless microphones with microwave backhaul services, BAS, CARS or LTTS mobile TV pickup station or fixed BAS operations. The allowing of wireless microphones in this band should have no effect on fixed wireless backhaul operations, which are authorized only in areas where BAS and CARS television pickup operations are not licensed.<sup>22</sup> The channel segments selected for wireless microphone operation in the 7 GHz Band should not include portions of those two, 25 megahertz channels in the middle of the band (channels at 6975-6700 MHz and 6700-7025 MHz) that are reserved nationwide specifically for BAS and CARS to accommodate TV pickup stations covering events that occur outside the license areas of local BAS and CARS operations. Attached hereto as **Appendix A** is a proposed channel plan for 7 GHz that would permit the use of portions of channel 1 and channel 10 thereof without any reduction in the overall number of channels in the 7 GHz band for video transmission using the now-standard 8 MHz bandwidth COFDM emission. Most importantly, the wireless microphone equipment necessary is available right now, as it has been manufactured in Europe for several years now. Coordination would be a simple matter since the SBE frequency coordination program regularly involves coordination of mobile operations in this band now, and all broadcast, broadcast network and video and audio production entities utilize that program to maximize spectrum efficiency and compatible sharing.

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<sup>22</sup> Fixed Service stations are not allowed to locate their paths within the service areas of any previously licensed co-channel TV pickup stations.

15. The only band that offers the additional spectrum that low power auxiliary licensees need in order to continue the same level of audio production for news, sporting and entertainment events that is being conducted now is the 7 GHz Band. Changes in the Part 74 service rules will be necessary in order to permit the use of 26 megahertz of spectrum by Part 74 eligibles in accordance with the attached table offers some nominal replacement for displaced UHF wireless microphones. Given the short range of these devices, and the frequency re-use that is available in that band, low-power auxiliary licensees could “share with themselves” on the same private sector, frequency coordinated basis that exists for the use of BAS mobile shared spectrum now.

## **VI. Conclusions**

16. The Commission has changed the rules repeatedly regarding wireless microphones in a series of proceedings in a very short period of time. Demand for wireless microphones in sports and entertainment programming to the viewing public is on a dramatic increase, but the available UHF television band spectrum available for them is shrinking to levels that will be acute in a very short period of time. Regardless of the means by which the public obtains its video programming, whether by satellite, cable, or over-the-air broadcast, people expect to be inside of NASCAR race vehicles with a view and audio from inside the car. Wireless microphones put people at the sporting events as they occur. They are put on the scene of major emergencies and they are told and shown what is happening as it happens. They have the details of a political convention just as though they were there in person. People expect this sophistication in program production. It is important to preserve this access in making video and audio spectrum allocation decisions.

17. At least 24 MHz should be made available for regular program production daily in the UHF TV bands. In any case, however, additional spectrum should be made available for licensed low power auxiliary use, especially at 6875-7125 MHz. The band 1435-1525 MHz should not be available for wireless microphones, as it is critically necessary video bandwidth spectrum where and when available on a coordinated basis via AFTRCC.

Accordingly, for the reasons stated herein, Broadcast Sports, Incorporated respectfully urges that the Commission make replacement spectrum available for wireless microphones in the band 6875-7125 MHz in a configuration set forth in Appendix A hereto.

Respectfully submitted,

**BROADCAST SPORTS, INCORPORATED**

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## APPENDIX A

Proposed Channel Plan for 6875-7125 MHz

