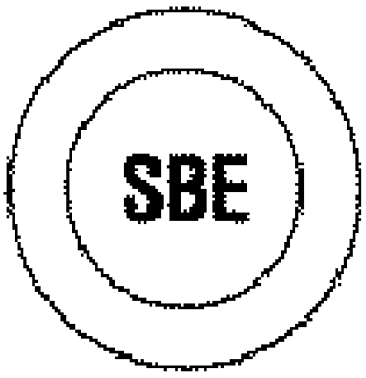
Comments of the
Society of Broadcast Engineers, Inc.

ET Docket 02-135
Spectrum Policy
Task Force

July 8, 2002



SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC. 20554

In the Matter of	)	
	)	
Spectrum Policy Task Force	)	ET Docket No. 02-135
	)	DA 02-1311
	)	

To: The Commission

Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members world wide, hereby respectfully submits its comments in the above-captioned public notice relating to the Commission's Spectrum Policy Task Force ("SPTF").

I. BAS Spectrum Plays an Important Role

1. Broadcast Auxiliary Services ("BAS") spectrum is the critical infrastructure that allows broadcasters to get breaking news from the event to listeners and viewers in a timely manner. Countless emergencies, including those that occurred on September 11, 2001, have shown that this is a key element to preventing panic.[1] As the name implies, "terrorists" gain their ends not so much by their evil acts, but by the terror those acts impart in the targeted group. A counter to this is timely information. The timely distribution of news, even bad news, is key to preventing fear from overwhelming the public and rising to panic beyond the government's ability to cope.

2. Leading sociologists who specialize in warnings tell us that once we know a personal danger exits, or need confirmation in case of doubt, we crave what amounts to verification information that is only available real time through radio and TV news.[2] A likely result of

---

[1] Panic, or the possibility thereof in the face of terrorism, has been the subject of much study by the sociological community for many years. While research does not clearly support panic as an inevitable result of terrorist acts, SBE argues that it is not impossible and in light of the events of September 11, 2001, we now have to be as prepared as possible for situations and outcomes that were thought to be impossible prior to September 11, 2001.

[2] Mileti, D.S. and J.H. Sorensen, 1990: *Communication of Public Emergency Warnings: A Social Science Perspective and State of the Art Assessment*. Oak Ridge National Laboratory.

Mileti, D.S., 1999: *Disasters By Design: A Reassessment of Natural Hazards in the United States*.

Nigg, J.M., 1995: *Risk Communication and Warning Systems*. Horlick-Jones, T.A. Amandola, and R. Casale, editors, Natural Risk and Civil Protection. London, E & FN Spon, pp. 269–382.

interruptions of normal news flow would be a rising lack of confidence, not in the news media, but in government itself.

3. BAS supports all of the "immediacy" news media. Broadcast radio and television, including cable television (*i.e.*, CARS Pickup stations), are all supported by the same limited bits of BAS spectrum, and there is no other (non-military, at least) spectrum allocated with the ability to carry large amounts of information to the public, with little notice, from a site chosen by enemies of the United States. Further, since both broadcast and cable rely on the same BAS spectrum, it is not possible to allow disruption of BAS under the false assumption that it would only disrupt broadcast, and that cable television systems that use BAS and/or CARS microwave links to relay signals to cable headends and/or to hubs could continue to operate and serve the need alone. As SBE has documented to the Commission on numerous occasions, the technical investment both in dollars and expertise in this part of the broadcast infrastructure is huge. Public safety (police eye-in-the-sky, or Tactical Video Downlink ("TVDL")) shares limited spectrum with broadcasters, though SBE has been cooperating with public safety users in trying to get public safety its own exclusive spectrum.[3] Motion picture producers repeatedly have targeted BAS spectrum for their own purposes. Citizens Band ("CB"), Family Radio Service ("FRS"), and a very few business radio channels allow limited information to be transmitted on an itinerant basis, but subject to disruptions and interference inappropriate for the public airwaves. One reason the amateur service ("ham" radio) is so valuable in mitigating effects of disasters is that amateurs can go anywhere and communicate. Unfortunately, the amount of information that can be so carried in the amateur bands would be limited, and eligibility to operate in such bands is rightfully limited to persons holding FCC amateur radios licenses valid only for non-commercial use.

4. New technologies and communications models based on them have not yet proven themselves to be reliable in times of disaster. On September 11, 2001, immediate broadcast news coverage was available (even where transmitters were destroyed, because many TV stations additionally have direct feeds to cable television headends, although clearly broadcast TV needs more attention to multi-siting of transmitters), whereas most news sites on the Internet suffered

---

Ward, Peter (editor), 1990: *Effective Disaster Warnings*. National Science and Technology Council, Committee on Environment and Natural Resources, Washington, DC.

[3] See WT Docket 00-32, allocating former federal government spectrum at 4.9 GHz to public safety. However, SBE urges the Commission to recognize that both public safety and the news media have legitimate roles to play in time of disaster. As to how much spectrum public safety needs– it seems to be double whatever they've got, regardless. The Commission needs to distinguish between real needs versus wish lists.

severe slowdowns due to overload.[4] Immediate public information to the masses is still supported best by a one-to-many broadcast model, not a peer-to-peer model. The broadcast model does not overload with a drastic increase in users, whereas peer-to-peer models do. Other peer-to-peer models such as the telephone system, cellular and Personal Communication Services ("PCS") providers, and nine-one-one services all overload, but broadcast does not. When a major emergency occurs, most broadcasters transition to immediate and continuous news coverage, forgoing regular commercial operation, exactly as happened on 9/11, as noted by Homeland Security Director Tom Ridge.[5]

5. BAS spectrum plays multiple roles for both radio and TV: 150 MHz and 450 MHz (Part 74 Subpart D) Remote Pickup ("RPU") stations are used to relay voice transmissions from reporters in the field back to their stations, for live broadcast when time is of the essence. RPU frequencies are also used for traffic reporting, cueing, and dispatching, as well as for setting up portable and mobile microwave links for video coverage of live events. In some cases 150 and 450 MHz RPU frequencies are used for relaying Emergency Alert System ("EAS") traffic to civil warning centers or from those centers to EAS Local Primary ("LP") broadcast stations. RPU frequencies are also used for long-duration transmissions, such as remotes from a fair, local sporting events, and incident command centers or emergency operations centers using wider bandwidth BAS Group N_1, R or S channels for extended periods of time.

6. Part 74 Subpart H Low Power Auxiliary stations such as wireless microphones and interrupted fold back ("IFB") licensed links on "vacant" TV channels (which are fast becoming rare in major markets) are the "first" and "last mile" paths used by broadcast talent to directly communicate with both mobile and main studios while in the field.

7. Microwave spectrum is also extensively used by BAS stations. Radio stations use 950 MHz and 18 GHz Subpart E Aural BAS frequencies for studio-to-transmitter links ("STL"), and inter city relay ("ICR") point-to-point paths. Aside from the main transmitter, the STLs are the life line of many radio stations. They are as important as the main transmitter in that if they suffer interference, the main station will also transmit the interference. Further, since they are maintained separately from the public and common carrier system, they can continue to operate when common carrier facilities fail, thus supporting the mission of keeping the broadcast

---

[4] See Mr. Chriss Scherer's *Viewpoint* column, titled "Service Provided," in the October 2001 issue of *BE Radio* magazine. See also Mr. Frank Beacham's *Net Soup* column in the October 17, 2001, issue of *TV Technology* magazine, "Sept. 11: What Worked, What Didn't."

[5] Statement by Mr. Ridge at the "Service to America Summit" at the 2002 NAB Convention, where *Radio World News* quotes Mr. Ridge as stating "After 9/11, you didn't just report the news. You calmed fears."

presence working when all else fails. Even on September 11, 2001, AM radio with many transmitter sites scattered across the Hudson River in New Jersey and FM and TV stations not located at the World Trade Center stayed on the air.

8. TV stations and broadcast network entities ("BNEs") use Subpart F Television BAS frequencies for STL and ICR point-to-point links as well, and also make extensive use of mobile and itinerant TV Pickup ("TVPU") stations. At 2 and 2.5 GHz the primary use in most large cities is TVPU applications, mostly for real-time coordinated electronic news gathering ("ENG") operations. In smaller TV markets these frequencies are also carefully coordinated for point-to-point links. Some TVPU operations also occur at 6.5 GHz, but there are only four available channels. These frequencies are shared with Private Operational Fixed Service ("POFS") stations. The 7, 13 and 18 GHz TV BAS bands are used primarily for point-to-point links. TV Pickups are also used in the 7 and 13 GHz bands, although the need to protect fixed links limits the use of TV Pickup stations in these bands. Especially at 13 GHz, TVPU stations are additionally limited by rain and foliage attenuation. TV Pickup stations are not allowed at 18 GHz as a Part 101 frequency coordination protocol applies to that band.

9. Broadcasters are already using their limited BAS spectrum with extraordinary efficiency. For example, broadcasters are able to successfully share the limited number of 2 GHz TV BAS channels between ENG and sports venues because ENG uses these frequencies most heavily during weekdays whereas sports coverage tends to use 2 GHz frequencies on weekends and holidays. Most 13 GHz spectrum in many major markets is occupied by CARS stations. A well-organized real-time coordination effort heavily supported by SBE and dating back to the 1984 Olympics takes care of last-minute requests, spot news, and emergency coverage.

10. It must be understood that several BAS channels, not just one, are needed in any event, primarily for two reasons: diversity and pre-screening. Diversity is important because only one channel allows only one point of view. This can (and does) work when "pool" coverage is sufficient, but each channel can carry only one point of view, editorial or otherwise, at a time. Pre-screening is important because it is necessary to know what is on a channel before switching it to broadcast air, to prevent things from being shown which should not be shown. If a broadcaster attempts to take multiple points of view from an event using just one channel and cold switching between them, it is not possible to know in advance what is seen by the other viewpoint or viewpoints before making it public, which could have unintended and unpleasant consequences.

11. While the Commission has loaned a second, 6 MHz wide channel to TV station licensees

for their government-mandated digital television ("DTV") operation, no additional BAS spectrum for STL and ICR applications, to relay the digital program feed, has been provided. Broadcasters have met this challenge (at considerable expense) by innovative and spectrum-efficient digitally-modulated microwave links. SBE must respectfully point out that this use has been impeded by the FCC's not acting on a rule change[6] that would allow digital modulation in all of the TV BAS and aural microwave bands, rather than just the 6.5 and 18 GHz BAS bands. Major breakthroughs in digitally modulated ENG, using coded orthogonal frequency division multiplexing ("COFDM"), are a technical reality, with hardware presently available, and in use in other countries. However, for BAS, these units cannot be legally used without a case-by-case rule waiver or special temporary authority ("STA") because the Rules only allow analog frequency modulation at 2 and 2.5 GHz (as well as at 7 and 13 GHz). Accordingly, if the Commission wants broadcasters to use this spectrum more efficiently, the first step SBE suggests would be to either immediately complete the ET Docket 01-75 rulemaking, or to issue forthwith a blanket waiver allowing digital modulation in all of the aural and TV BAS microwave bands.

12. SBE is at a loss to understand how a blanket market-driven allocations policy can do anything but cripple BAS use during emergencies. Fire engines and ambulances commandeer traffic lanes during emergencies, and the public commonly accepts such disruption of "commercial" traffic patterns that are made necessary for the common good. SBE submits that there should be similar provisions for emergency lanes on all information highways, as there is now for radio and TV broadcasting. Existing flexible allocations must be preserved, sufficient dedicated spectrum must be sequestered from the refarming process, to make it possible for broadcasters to rise to the best and highest use of their licensed spectrum in the name of public need, in addition to the public interest. During major emergencies, broadcasting literally has the ability to hold the fabric of society together.

13. SBE questions why the Commission is suggesting more unlicensed uses when the models currently in plan are failing from conflict and rising noise levels. The present situation is not unlike what happens when too many conversations occur in the same space. Eventually the noise rises to a point that no one can hear anything. Digital modulation can overcome some of this through redundancy and predictive coding, but even these systems fail when the noise level

[6] Originally RM-9418, from a March 5, 1998, petition for rulemaking by the EIA/TIA. This petition was eventually included in an OET rulemaking, ET Docket 01-75 (Revisions and Updating of the Part 74 BAS Rules). But, more than FOUR YEARS after the filing of the EIA/TIA petition, the FCC Rules still have not been changed to allow digital modulation in all aural and TV BAS microwave bands.

rises beyond a critical threshold, as is already beginning to be seen.

II. BAS Spectrum Is Under Attack in All Bands

14. Unfortunately, SBE sees strong evidence that critical BAS spectrum it has worked so hard to protect and efficiently use is under "attack" in virtually every band. This evidence is summarized in the attached Figure 1. SBE therefore urges the Commission to appreciate how critical BAS frequencies are to keeping the American public informed, and the broadcast component of the nation's infrastructure intact. SBE respectfully reminds the Commission that it has already taken the first step along another path to identify and protect this resource. SBE predicts that BAS integrity will be a key part of what the new FCC Media Security and Reliability Council ("MSRC") will focus on. The act of conveying timely and accurate information to the public is indeed a core component of Homeland Security. Should BAS not be based on primary spectrum allocations, information dissemination through the electronic media would be crippled as a rapid response, counter-terrorism, measure.

III. Technical Issues

15. SBE does not oppose, in concept, the sharing of spectrum between compatible users. The long-standing sharing of 2 GHz frequencies between the National Aeronautics & Space Administration ("NASA") and 2 GHz ENG is a perfect example of this: NASA uses these frequencies for uplinking from a small number of transmitting sites using very large aperture antennas in remote locations, and for space-to-space, while broadcasters use these frequencies terrestrially. There has been no mutual interference and each user's operations do not constrain the other's use. SBE is opposed to the sharing of BAS frequencies with incompatible users. This incompatibility can be due to bringing in an excessive number of new users to bands that are already crowded in the major markets and remain usable only through the use of sometimes near-heroic, labor-intensive, real-time frequency coordination. Incompatibility can also be caused by trying to mix high-power and low-power services in the same band or adjacent bands. For example, allowing 1,640-watt equivalent isotropic radiated power ("EIRP") PCS base stations[7] to exist next to ENG receive only sites with remotely steerable dishes using low-noise amplifiers does not work well. Legacy receivers are also a factor, as older receivers tend to have less

[7] PCS cell sites are typically spaced 3 to 4 kilometers apart, so the greatest separation a broadcaster in a large city can expect to have is 1.5 to 2 kilometers. While it takes 800 to 1,500 Watts EIRP for a time division multiple access ("TDMA") PCS cell site to work properly, many PCS cell sites are very close to, or in some cases actually co-located with, TV BAS receive antennas. For example, Station WMAR-TV, NTSC Channel 2, Baltimore, Maryland, thought that their 2 GHz TV BAS receiver had failed, only to discover that the real problem was a PCS cell site less than 4 meters from their 2 GHz TV BAS receiving antenna.

resistance to adjacent channel interference. Replacing them, however, is not always a solution, as there is a direct trade-off in design between adjacent channel interference rejection on the one hand and on-channel sensitivity and full channel bandwidth performance on the other, as these two design goals directly conflict with each other. There are no perfect filters, and better filters are both large and expensive, which is why the inexpensive receivers made for public use almost never work well. However the compromise is made, either selectivity or on-channel performance, and sometimes both, are degraded.

16. Indeed, one major and seemingly unrecognized incompatible factor is the disconnect between mobile and itinerant versus nondisruptable uses. Uniquely, broadcasters understand both because they require both (albeit at different times and for different but complementary purposes). For permanent links, such as STLs, broadcasters require high-reliability circuits available continuously. Common carriers understand such circuits, which they use for backbone carriage and distribution in their networks. But broadcasters also need and use the itinerant, on-demand circuits such as RPUs and TV Pickups, for relaying information from the site of any event or emergency to any available connecting or relay location and available with no notice. Carriers expect notice to construct circuits. There is no notice available when an emergency such as a terrorist action or natural disaster strikes, and response must be immediate or it rapidly becomes irrelevant. It may seem that spectrum allocated for this purpose is wasted since it is not in use everywhere 24/7, but unless it is kept open and available, it is not there when needed. Of all the parties proposing (or demanding) to "share" a slice of BAS spectrum, almost none propose anything but nondisruptable, mission-critical, permanent facilities which cannot be displaced as needed for BAS itinerant operations. Until those proposing to "share" BAS spectrum, even on a "secondary basis," are required to have in place means permitting their operations to be terminated immediately for a BAS emergency or news requirement, they must be considered to be proposing to risk public panic for their own pecuniary benefit.

17. Some new radio frequency ("RF") technologies, for example, "trunked" radio systems, fall apart under the BAS model. That is, relatively few users needing channels for extended periods of time, at the same time (*e.g.*, 5, 6 and 10 or 11 PM "news hours"), as opposed to many different users having brief conversations at statistically random times. Trunking works well to increase the number of users on any group of channels as long as conversations are brief. Trunking fails when any user gets long-winded; that is, when transmissions exceed the mathematical limits of the trunk model. Any trunking system operator that allows telephone patch access learns that lesson very quickly. And, of course, the ultimate in "long-winded" that makes a queuing theory model unworkable for broadcasters may be IFB, which provides cues

and orders from the studio to field operations and must be "up" for the entire duration of the event, however long it may be. When AM and FM radio migrate along the expected In-Band, On-Channel ("IBOC") path, any station that does not already use wireless IFB and does live broadcasting from the field will have to do so. The IBOC system requires that the digital main channel and the backward compatible analog "blend" channel both be delayed by seven seconds, mandating IFB use for field work. For BAS, trunking simply does not compute. SBE respectfully places a "red flag" on this issue as broadcasters get closer to an IBOC roll out.

18. Broadcasters have had to invent, out of self defense, radically different coordination models than those for POFS and common carrier users. Broadcasters have routinely reallocated frequencies between users on a moment's notice since the 1984 Olympics. For a more recent example, at the 2001 Super Bowl, the BAS coordinator for the event was able to move an entire market's use of 2 GHz spectrum during a commercial break to accommodate a single user. Such "on the fly" frequency coordination is only possible when all users cooperate and have frequency-agile equipment. This sort of dynamic, high-speed frequency coordination "dance" would never work under the formalized and slow prior coordination notice ("PCN") approach used for Part 101 POFS and common carrier stations. The music would be over before the "dance" even started.

19. SBE notes that, for the most part, public safety users have been able to make a case for keeping their frequencies exclusive due to their "special needs." For the most part, public safety licensees have not had to deal with "coordinator competition"; the Association of Public Safety Communications Officials ("APCO") does it all. SBE hopes that the Commission similarly recognizes the "special needs" of BAS, and does not force unworkable PCN frequency coordination requirements on BAS.

III. Summary

20. BAS plays a behind the scenes, but critical, role in broadcasters' ability to bring information on breaking news events, including real-time information terrorist attacks and natural disasters, to the American people. BAS is a critical element of the entire media infrastructure. Timely news reports can mitigate the desired goals of terrorists. Fear of the known is less likely to cause terror than fear of the unknown. Virtually every BAS band has been under stress by rulemakings that would add new users to already congested bands, with inadequate consideration of the impact. Broadcasters' use of BAS frequencies makes their use of coordination models different from other services, and this reality must be understood and appreciated by the Commission. The Commission has a responsibility to assure overall communications

infrastructure integrity. SBE believes that the Commission should act to protect the remaining BAS spectrum refuge that is a critical element of that responsibility.

List of Figures

21. The following figure has been prepared as a part of these ET Docket 02-135 comments:

    1. Summary of rulemakings impacting BAS spectrum.

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.
General Counsel

July 8, 2002

Booth, Freret, Imlay & Tepper
14356 Cape May Road
Silver Spring, MD 20904
301/384-5525

Summary of Rulemakings Impacting BAS Frequencies

BAS Spectrum	Rulemaking
All	ET Docket 01-75, Revisions and Updating of Part 74 BAS Rules
449 MHz	ET Docket 93-59, Wind Profiler Radars (adjacent channel interference to 450.01 & 450.02 MHz RPU "P" channels and to 450.05 & 450.15 MHz RPU Group N_1 channels)
455–456 MHz	ET Docket 97-214, MSS control links*
698–746 MHz	GN Docket 01-74, Reallocation of TV Channels 52–59
174–216 MHz 470–806 MHz	RM-9418, Wireless Assist Video Devices ("WAVDs") on Unused VHF and UHF TV Channels
174–216 MHz 470–806 MHz	ET Docket 95-177, High-Powered Part 15 Biomedical Telemetry Devices
174–216 MHz 470–806 MHz & 2 GHz	WT Docket 96-86, Public Safety Spectrum Requirements/Public Safety Wireless Advisory Committee ("PSWAC")
2 GHz	IB Docket 01-185, Terrestrial MSS
2 GHz	ET Docket 00-258, Third Generation Wireless Services ("3G")
2 GHz	IB Docket 99-81, MSS Service Rules
2 GHz	ET Docket 95-18, Mobile Satellite Service ("MSS")
2 GHz	ET Docket 92-9, Redevelopment of Spectrum to Encourage Innovative Use of New Telecommunications Technologies
2 GHz	RM-8837, Wireless Fixed Access Local Loop Services ("WFA-LL")
2 GHz	GN Docket 90-314, Personal Communications Services ("PCS")
2.5 GHz	WT Docket 00-19, Part 101 Update
7 GHz	ET Docket 98-142, MSS Service Downlinks
7 GHz	GN Docket 90-357/IB Docket 95-91, Digital Audio Radio Service ("DARS") feeder uplinks
13 GHz	ET Docket 98-206, 13 GHz MSS Feeder Uplinks
13 GHz & 18 GHz	CS Docket 99-250, Private Cable Operator ("PCO") Access to the 13 & 18 GHz CARS Band (shared with TV BAS)

* Terminated on May 13, 2002, without action. However, this does not diminish the point that other parties see BAS frequencies as fertile ground for spectrum grabs.