



Talking Points

Title VI of H.R. 5252, *The Wireless Innovation Network Act*, Should Be Deleted or Significantly Revised.

On Feb. 17, 2009, an Act of Congress is turning off an analog television system that has served America for over 50 years. By then, all involved anticipate that it will be seamlessly replaced by the new and improved digital television system. That is our common goal.

America's broadcasters are doing all in their capacity to make that happen. Unfortunately, the Senate Bill, HR 5252, presently being considered which will govern this enormous change-over includes permission to allow technologies to operate within the broadcast spectrum-untested technologies-that most likely will cause interference to the new system.

More than twenty years of planning and testing, billions of dollars already invested are placed at risk to allow unproven and untested commercial users free entry. Please examine the issue. Do the right thing. Insure that the digital transition occurs seamlessly.

I. The Legislation Authorizes Millions of “Certified” Unlicensed Devices to Operate in the TV Band (Channels 2-51) in 270 Days.

Untested Technology: None of these unlicensed devices have been tested in the television band for interference. Spectrum sensing technology, that is supposed to prevent these devices from operating on an occupied TV channel, has *never* been tested in the TV band. Interfering signals will go through walls and may cause interference for miles.

Harms the DTV Transition: Interference occurs at a viewer's television set. Consumers will be spending billions of dollars purchasing new digital equipment between now and 2009. These unlicensed devices will cause interference to new digital TV sets and government-subsidized digital-to-analog converter boxes.

Harms Live News Reporting: The devices will interfere with licensed wireless microphones that are used by news departments to cover live, local news and sports events.

II. Bill Fails to Require Basic Testing *Before* Devices are Legally Authorized to Enter the Band. Government Should Not Legislate Entry Within 270 Days.

The bill gives legal status to unlicensed devices in 270 days without conducting foundational testing as to whether they should be placed in the band. The bill circumvents the traditional FCC process and ignores the scientific work being performed by IEEE, the leading engineering organization in the world. It tries to force the laws of physics by government fiat.

III. The Legislation's Proposed Certification Program Will Not Prevent Interference in the TV Band.

In an effort to avoid interference, the legislation requires that unlicensed devices be "certified" by the FCC. Relying on the certification process will not prevent millions of interfering devices from entering the marketplace.

Certification Will Not Prevent Interfering Devices From Entering the Market:

Manufacturers will simply sell products that do not comply with the rules. For example, NAB tested purportedly certified unlicensed devices used by consumers to transmit audio signals from their satellite radio or MP3 player to their in-dash car radios. Their tests showed that 13 of the 17 wireless devices (76%) exceeded power limits set by the FCC. Six of those devices exceeded the FCC field limit by 2,000%. One device transmitted a signal that was 20,000% stronger than allowed by FCC rules. Despite a certification program, millions of these interfering devices are now in the hands of consumers. The FCC has no ability to find or recall them.

Bill Fails to Require Independent Certification and Field Testing: The bill does not *require* testing that is independent of the manufacturer. Under the bill, the FCC *may* use independent testing. The FCC only tests approximately 10% of all the unlicensed devices used today. Most testing involves self-certification by the device manufacturers. Finally, the legislation fails to mandate that these devices be field tested before reaching the market.

Remote Shut Off Capability Must Be In Every Device: The bill requires that devices have remote shut off capability where they cause harmful interference. However, under the bill, determinations of harmful interference can only be made after the device enters the market. By then it's too late. All devices should have remote shut off capability.

Identification Codes Needed: The bill appears to recognize that the devices must include a means of disabling or modifying the device remotely. However, before a device can be disabled or modified, it must first be found. Accordingly, some form of identifier must be built in to each device.

IV. The Legislation Places Impossible Burdens on Consumers and Broadcasters to Detect and Prevent Interference.

Interference will disrupt TV reception in the home. *However, consumers are not eligible to file complaints under the legislation.* Moreover, it is impossible for consumers to know who or what is causing interference. And, those using unlicensed devices will have no idea they are causing interference.

To file an interference complaint, broadcasters must identify and track down millions of interfering devices throughout the areas they serve. This is an impossible task and will require an army of engineers and resources.

Interference to wireless microphones during live newscasts is problematic. There is no time to track down and correct interference during a live interview, especially during emergency situations.

V. The Legislation Fails to Prohibit Unlicensed Operation on Channels Next to Operating TV Channels (No First Adjacent Channel Operation).

Operating unlicensed devices on the first channel adjacent to an occupied TV channel will cause interference over a wide geographic area (up to 2500 feet). To protect consumers' television sets from interference, unlicensed devices must be prohibited from operating on the first adjacent channel.

VI. The Legislation Should Be Limited to Rural Broadband

While the legislation is justified based on the perceived need for unlicensed rural broadband services, it allows all types of unlicensed devices to operate in all TV markets. This legislation allows *any* type of device, from toys to wireless laptops, to operate in the television band. A \$29 toy will interfere with a \$1000 DTV set.

There is sufficient spectrum in rural areas to provide for unlicensed rural broadband services without causing interference to television sets. The FCC should examine and set aside spectrum for rural broadband services on a market-by-market basis.

CONSUMERS AND TELEVISION STATIONS ARE IN THE MIDDLE OF A VERY DIFFICULT AND EXPENSIVE TRANSITION TO DIGITAL. NOW IS NOT THE TIME TO INTRODUCE MILLIONS OF INTERFERING DEVICES INTO THE TELEVISION BAND. TITLE VI OF H.R. 5252 SHOULD BE DELETED OR SIGNIFICANTLY REVISED.



Detailed Briefing Paper

TITLE VI OF HR 5252: “WIRELESS INNOVATION NETWORKS ACT” SHOULD BE ELIMINATED OR SIGNIFICANTLY REVISED

I. HARMING THE DTV TRANSITION: UNLICENSED DEVICES WILL INTERFERE WITH DIGITAL TELEVISION SETS AND GOVERNMENT SPONSORED CONVERTER BOXES

A. Interference Undermines the DTV Transition

- Consumers have spent billions of dollars on new TVs and digital equipment. This amount will grow to the tens of billions of dollars in the next few years, as consumers prepare for the day that analog television broadcasts are terminated in 2009.
- The key challenge to the digital transition is to get consumers to accept the transition and purchase new digital televisions or digital-to-analog converter boxes. Interference to these receivers may result in consumers returning digital sets to the stores, which undermines the DTV transition.
 - Interference occurs to the *TV set in the home*. Even low powered (100 Mw) devices can overpower or interfere with a DTV receiver.
 - Because digital television is an “all or nothing” service, the impact of interference is dramatic. The picture freezes and the sound goes off. The signal is overwhelmed by the interfering signal and the picture cannot be watched.

B. Interference Will Undermine the Government’s Converter Box Program

- The federal government has allocated \$1.5 billion to subsidize over-the-air digital-to-analog converter boxes. A key objective is to keep the price of these boxes down. Unlicensed devices will interfere with these converter boxes, thereby undermining a key government program.

II. INTERFERENCE COVERS A WIDE GEOGRAPHIC AREA

- Unlicensed device proponents want broadcast channels because they have terrific coverage and the signals can go through walls. The same is true of interference from these devices. Interference, even from low powered portable devices, will extend over a wide area.
 - **Co-channel interference**: If an unlicensed device transmits on a channel being used for TV service, the **interference can range from 2 miles (indoor TV antenna) to 10 miles (outdoor TV antenna)**.
 - **Adjacent channel interference**: A low powered, 100 Mw portable device operating on the first adjacent channel could cause **interference up to 2500 feet from a television set in areas where there is a weak TV signal**.
 - **Out-of-band interference**: A study commissioned by MSTV and conducted by the *Canadian Research Centre* demonstrated that interference could occur up to **78 feet**. For a video demonstration of this study see: <http://www.mstv.org/static.html>.
- Harm Is Significant: Approximately, 19.6 million homes rely exclusively on over-the-air television signals; 73 million television sets are not connected to cable or satellites services; 6-8 million DTV sets with off-air tuners have entered the market.

III. PROPOSED TECHNIQUES TO AVOID INTERFERENCE ARE UNPROVEN

A. Spectrum-Sensing Technology Has Never Been Tested in the Television Band

- Proponents argue that spectrum-sensing technology, which allows the unlicensed device to find vacant channels, will solve the interference problem. This technology does not yet exist and has not been tested in the broadcast television band.
- IEEE, the world's leading engineering organization, is looking at this problem in the context of a fixed unlicensed service for rural areas. It will be testing a "fixed" broadband system this year. Because of technical complexities, IEEE has not developed standards for portable unlicensed devices.
- The Consumers Electronics Association study found that sensing the presence of a DTV signal inside a house on the first floor with an omni-directional indoor antenna *may not be feasible*.

- Devices with spectrum-sensing techniques will not be able to detect weaker broadcast signals, and will incorrectly assume that a channel is vacant even if it is actually occupied. This will lead to widespread interference.
- Other protection methods will not work. For a GPS system to work it must be able to see the satellites. An indoor device cannot see the satellites and therefore, standing alone, cannot effectively prevent operation on a used television channel. Channel location and mapping depends on “mapping” out the used television channels in each market. However, the list of used channels will not be fully known until the end of the digital transition.

B. Spectrum-sensing Technology Developed for Military Radar in the 5 GHz Band is Not Applicable to the TV Broadcast Band

- The spectrum-sensing technology developed for sharing with military radar cannot be readily applied in the TV broadcast band (channels 2-51). It took several years to develop technology for military radar, not 270 days.
- Compared to signals from military radar, broadcast signals are much weaker and difficult to detect. There is *no* evidence that spectrum-sensing technology designed for sharing with military radar systems can detect broadcast signals, especially indoors or where the broadcast signal is weak. Moreover, there is no evidence to suggest that this technology can detect low powered signals from wireless microphones.
- *Under the FCC rules for authorizing equipment, spectrum-sensing devices used to detect military radar frequencies need only be 80% effective. (The government wanted 90%, but that could not be achieved.)* Thus, for every million operating hours, 20% of the time (200,000 hours) these devices will be operating on an “occupied” channel. This may be acceptable for military radars, which are designed to be able to operate even when they’re being jammed. However, this level of interference to consumers’ television sets is unacceptable.
- With military radar, the transmitter and the receiver occupy the same location. Thus, sensing the radar signal tells the unlicensed device how far away it is from the military transmitter and the *radar’s receiver*. Broadcasting is different because TV sets are located in consumers’ homes throughout a market. Spectrum-sensing will not tell the unlicensed device its location relative to a consumer’s *TV receiver*. However, the location of the unlicensed device relative to the TV receiver is the key to resolving interference issues.

IV. TITLE VI, THE “WIN ACT,” DOES NOT PROVIDE SUFFICIENT PROTECTION TO AVOID INTERFERENCE TO DTV SETS

A. The Certification Process Will Not Prevent Interference

- The legislation relies on the Commission’s Part 15 equipment certification process to ensure interfering devices will not enter the marketplace. Once interfering devices enter the marketplace there is no realistic way to retrieve them.
- Certification will not prevent interfering devices from entering the market. Manufacturers will simply sell products that do not comply with the rules. For example, the NAB tested purportedly certified unlicensed devices used by consumers to transmit audio signals from their satellite radio or MP3 player to their in-dash car radio. These tests showed that 13 of the 17 wireless devices (76%) exceeded power limits set by the FCC. Six of those devices exceeded the FCC field limit by 2,000%. One device transmitted a signal that was 20,000% stronger than allowed by FCC rules. Despite a certification program, millions of these interfering devices are now in the hands of consumers. The FCC has no ability to find or recall them.
- If the “WIN Act” is enacted in its current form, it will be the first time the government has allowed millions of unlicensed devices to operate in a band where there are hundreds of millions of existing consumer receivers, *i.e.*, TV sets. Additional protections are necessary to protect consumers:
 - Independent testing should be required: A laboratory that is independent of the device manufacturer must conduct certification testing. The legislation states that the FCC *may* require independent testing. This should be made a requirement.
 - Field-testing must be required: Laboratory tests are necessary but not sufficient to ensure there is no interference. The bill does not require field tests. Field tests must be a requirement.
 - Identification codes needed: The bill appears to recognize that the devices must include a means of disabling or modifying the device remotely. However, before devices can be modified, they must be found. Accordingly, some form of identifier must be built into each device.
 - Remote shut off capability must be in every device: The bill requires that devices have remote shut off capability where they cause harmful interference. However, under the bill, determinations of harmful interference can only be made after the device enters the market. By then it’s too late. All devices should have remote shut off capability.

B. No Unlicensed Operation on First Adjacent Channels

- Operating an unlicensed device on a channel adjacent to an operational television channel can interfere with a TV set if it is operated up to 2500 feet of the television set. This is more than enough to cause interference throughout a neighborhood. *Unlicensed devices must be prohibited from operating on the first adjacent channel to full service stations, Class A stations, LPTV and translator stations.*

C. The Legislation Imposes an Impossible Burden on Consumers and Television Stations to Detect and Police Interference

- As drafted, only licensees may file interference complaints with the FCC. *Consumers may not file complaints.* Because unlicensed transmissions will interfere with a consumer's television set, the bill should be modified to allow consumer complaints against unlicensed device manufacturers and operators.
- Moreover, to file a complaint, "actual" harmful interference must be verified in the field. This seems to imply that a broadcaster must conduct some type of engineering analysis before the FCC can accept a complaint. This imposes an impossible burden on television stations. Consumers simply will not know where the interference is coming from and when it will occur. Licensees lack the resources to track down millions of interfering devices throughout their service area at all hours of the day or night.

D. FCC's Revocation Authority Must Be Extended

- Once a device is certified, the FCC has a 30-day window to receive petitions for reconsideration. If a mistake is made, the FCC can revoke the certification without a hearing during this 30-day period. After 30 days, the FCC can only revoke the certification after a hearing, and the hearing may take months or years. Given the potential harm, the FCC's authority to revoke the certification without a hearing should be extended well beyond the 30-day period.

V. PROMOTING RURAL BROADBAND IS NOT THE FOCUS OF THE LEGISLATION

- The provisions of Title VI go far beyond facilitating unlicensed rural broadband services. This bill allows *any* type of unlicensed device to be placed in the television band, including radio-controlled toys. The potential for millions of these devices to operate in the TV band makes it more difficult to police interference. A \$29 toy can interfere with a \$1000 TV set.

Moreover, if these devices enter the band first, they could harm subsequent deployment of devices that are designed for rural broadband services.

- There is TV spectrum in rural areas that, if managed properly, could be used for unlicensed wireless broadband without causing interference to TV viewers. With careful planning, this spectrum can be made available for rural broadband use without endangering television reception.

VI. GROUPS EXPRESSING CONCERN WITH THE UNLICENSED DEVICE PROPOSAL

A. Eight Leading Consumer Electronics Manufacturers Express Interference Concerns About Unlicensed Devices:

Sony Electronics, Inc; Panasonic Corporation of North America; JVC Americas Corp; Thomson, Inc; LG Electronics USA, Inc; Hitachi Home Electronics (America), Inc; TTE Corporation; and Samsung Electronics.

B. Trade Associations

National Religious Broadcasters: The key trade association representing all religious broadcasters has written to the committee expressing concern about interference to television sets and wireless microphones used in religious productions.

National Association of Broadcasters: The key trade association representing all broadcasters has expressed interference concerns.

Association of Public Television Stations: The trade association representing public television stations throughout the country has registered its concerns.

National Translator Association: The trade association representing television translators in rural areas throughout the country has registered its opposition and concern about placing unlicensed devices in the television band.

Community Broadcasters Association: The trade association representing the Class A low power television industry has registered its concern about interference from placing unlicensed devices in the TV band.

C. Engineering Organizations

IEEE: In filings before the FCC on this issue, the leading engineering standard-setting organization in the world has expressed concern about interference in the television band. The IEEE 802.22 working group is

working on a fixed broadband solution to facilitate the deployment of a rural broadband service.

Society of Broadcast Engineers: The leading professional society of broadcast engineers has filed a letter registering its opposition to placing unlicensed devices in the television band. SBE is concerned about interference to television receivers and interference to wireless microphones. SBE coordinates the use of licensed wireless microphones for newscasts, news events, and emergency situations throughout the United States.

D. News and Production Organizations

Radio and Television News Directors Association: This leading trade association of news directors registered its concern regarding interference to wireless microphones. These microphones are essential in providing live local news coverage as well as coverage during emergency situations.

News, Sports and Entertainment Production Coalition: *This coalition is made up of the major news and sports organizations in the country.* It includes the major professional sports leagues and the NCAA. The coalition's primary concern is the negative impact unlicensed devices will have on the ability to use wireless microphones and wireless video assist devices in the production of live news and sports programming.

E. Additional Parties Expressing Concern

Coalition for Spectrum Integrity: This coalition made of various trade associations and television broadcasters has registered concern with the FCC about placing unlicensed devices in the television band.

Univision: Spanish language broadcasters are uniquely affected by the proposal to place unlicensed devices in the television band. As a general matter, Hispanic audiences rely more on over-the-air television broadcasting to receive video programming. As a result, they are very concerned about interference to digital television receivers.

QUALCOMM: QUALCOMM has acquired the rights to operate on channel 55 throughout the United States. However, its operations are limited until the end of the digital transition. It is concerned that the interference caused by unlicensed devices will slow down the digital transition.

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June 21, 2006

The Honorable Ted Stevens
Chairman
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United States Senate
522 Hart Senate Office Building
Washington, DC 20510-0201

The Honorable Daniel Inouye
Co-Chairman
Committee on Commerce, Science and Transportation
United States Senate
722 Hart Senate Office Building
Washington, DC 20510-1102

Dear Chairman Stevens and Co-Chairman Inouye:

Let me take this opportunity to congratulate you on S. 2686, the "Communications, Consumers' Choice, and Broadband Deployment Act of 2006." Reshaping the Nation's communications landscape is a difficult task. The complexities of this legislation are enormous and your leadership is most appreciated.

Unfortunately, one part of the legislation, Title VI, the "Wireless Innovation Networks Act," will have the unintended consequence of creating significant interference to digital television receivers. Consumer confidence in digital television reception is a key element in moving forward with the digital transition. We are concerned that the potential for interference to newly acquired digital television sets, and the government-subsidized digital-to-analog converter boxes may place this progress in jeopardy.

The purpose of Title VI is to facilitate the deployment of wireless broadband services in underserved rural areas. The television broadcast industry supports the goal of bringing broadband to those in underserved rural America. We are willing to work with the Committee to craft solutions to this problem, without endangering reception to free over-the-air digital television. There is sufficient spectrum in rural areas to facilitate the deployment of broadband services without jeopardizing the ability of television viewers to receive digital television signals.

Unfortunately, the provisions of Title VI go far beyond promoting rural broadband. As drafted, the bill would allow *any* type of unlicensed use including radio-controlled toys, cordless telephones, and wireless game controllers in all markets across America. In many instances, these unlicensed "toy" devices are likely to significantly

increase interference with television receivers. Ironically, once deployed, these same ubiquitous unlicensed “toy” devices may make it more difficult to use the spectrum for the very broadband operations sought by the legislation.

Interference to consumers’ digital television receivers is our primary concern. Unlicensed devices will be placed in the permanent core TV band, channels 2-51, that local stations will use *after* the digital transition. As a matter of physics, any device transmitting energy in the TV band has the potential to interfere with both digital television sets and the government subsidized digital-to-analog converter boxes. The key issue is whether the legislation effectively prevents such interference from occurring. Despite the best intentions, the legislation as drafted will not prevent or effectively remedy interference.

The legislation relies on the FCC’s certification process to prevent interfering devices from entering the marketplace. Unfortunately, this process is far from perfect. In point of fact, the FCC itself approves less than 10% of all equipment, with the vast amount of equipment approved by industry laboratories. ***Ironically, the legislation does not require independent laboratory testing. It does not even require field-testing.*** These critical components are discretionary under the bill.

In other contexts a significant number of the unlicensed devices certified by the FCC have been found to be non-compliant and transmitting at power levels far in excess of authorized limits. Most recently, numerous complaints have been filed with the FCC about interference caused by unlicensed radio devices previously certified by the FCC that are used in connection with satellite radio services. However, millions of these devices are already in the hands of consumers, and it is impossible to reclaim or to turn them off. There are many other similar examples of where inappropriate equipment was allowed into the market under this “rigorous” certification program. This problem merely foreshadows what will happen in the TV band.

The reality is that proponents of unlicensed devices have not undertaken the scientific work to test such unlicensed devices and show that they will not cause interference to licensed broadcast operations. American consumers and broadcasters are merely expected to take it on faith that such non-interfering devices can be built without first testing them and determining that they in fact will work. This is the first time the government will have authorized higher powered unlicensed devices to operate on frequencies already occupied by hundreds of millions of consumer devices, *i.e.*, television sets.

While proponents would have the Committee believe otherwise, in fact, ***research and development and laboratory and field-testing ought to precede the establishment of technical rules by the FCC.*** Billions of dollars were spent by the academic, broadcast, and electronics industries on the testing and research and development that went into the DTV standard *before* the FCC had rules in place for its use. Significant research by the FCC and the TV industry took place before the FCC established rules for cellular radio,

low power FM, MVDDS, and many other services. There is no reason to sidestep this deliberate, scientific approach. However, the legislation does just that -- authorizing unlicensed devices to enter the band in 270 days, and then relying upon the FCC's certification process in the hope of avoiding interference.

The leading engineering standards body in the world, the IEEE, has been pursuing the potential of using the "white spaces" for the provision of broadband services. Leading members of the electronics and communications industry, including Motorola, Thomson, Philips, Samsung, France Telecom, and ETRI, have developed a proposed standard, and the IEEE is currently evaluating and testing this standard to ensure that it will both provide adequate broadband service and not cause interference to licensed operations. This valid and sound engineering approach to developing appropriate unlicensed rules and regulations should be allowed time to do the necessary testing of this broadband technology, and should not be circumvented by allowing unproven unlicensed toys and other devices into the broadcast band in 270 days before testing is complete.

As drafted, the legislation's enforcement process is insufficient to resolve interference problems. Consumers receiving interference on their TV sets are unlikely to know the source of interference, and those consumers using unlicensed devices will not realize they are causing interference. As a result, interference will often be impossible to detect and police. In this regard, the legislation's enforcement provisions are inadequate. The following highlights some of the major problems:

- **Consumers Are Not Eligible to File Interference Complaints:** Despite the fact that interference will occur on television sets in the home, only "licensees" may file an interference complaint.
- **Impossible Enforcement Burden Placed on Incumbent Licensees:** The bill requires that all complaints be verified in the field. Unlicensed devices can continue to operate until "harmful" interference is verified in the field. In other words, licensees must identify and track down millions of interfering devices. This is an impossible task for broadcasters or any other licensees. It will require an army of engineers and resources.
- **No Identification Codes:** The legislation does not require each unlicensed device to transmit an identification code, making it impossible to track down an offending device.
- **Remote Shut Off Not Required for All Devices:** The bill requires a device to contain a "remote shut off" only if it is determined that the device will cause interference. Depending on the location of its use, any device can cause interference. However, the legislation seems to contemplate that certain devices will not need a remote shut off. In these situations interference determinations will be made after the device has entered the market. By then it's too late.

- **No Operation of First Adjacent Channels:** Operating unlicensed devices on the first adjacent channel next to an operating TV channel will cause interference to surrounding TV receivers over a wide area. The legislation does not preclude unlicensed devices from operating on these channels.

The federal government has mandated the transition from analog to digital TV. This transition has required broadcasters to spend billions of dollars converting their stations from analog to digital transmissions. Consumers will spend even more -- tens of billions of dollars on new DTV receivers. For example, if the over 100 million television households spend an average of \$500 on new DTV receivers, this amounts to an investment of over \$50 billion by consumers. This federally mandated investment must be protected from interference from unproven unlicensed technology and should not be jeopardized so that a few large companies can sell chips to be used in toys and games.

Ensuring that the United States is a global leader in the provision of broadband services is a worthy goal. We believe, this goal can be accomplished, especially in rural markets, without causing interference to new digital television receivers and converter boxes. Unfortunately, the legislation goes far beyond promoting rural broadband. It will lead to interference in all markets. Jeopardizing the important benefits of a successful DTV transition to permit unlicensed toys and games is not an appropriate public interest trade off.

I respectfully request that you consider making significant changes to the legislation as the bill moves forward. Significant, additional real world testing is required before unlicensed operations should be authorized to enter the TV band. Further, given the lack of research activity by the proponents of these devices, broadcasters do not believe that it is unreasonable to request waiting until after the DTV channel allotment process is completed by the FCC, and the actual frequency assignments that must be protected are known.

Our desire is to find a solution that will bring broadband to underserved Americans while ensuring that consumers' and broadcasters' investments in the DTV transition are protected. We look forward to working with you and members of the Committee. Together we can find solutions to facilitate rural broadband deployment, while proceeding with the engineering work necessary to avoid interfering with consumers' digital television receivers.

Sincerely,

/s/ David Donovan

David L. Donovan
President

CC: Members of the Senate Committee on Commerce, Science and Transportation



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August 2, 2006

The Honorable Bill Frist
Senate Majority Leader
S-230 Capitol Building
Washington, DC 20510-7010

The Honorable Harry Reid
Senate Minority Leader
S-221 Capitol Building
Washington, DC 20510-7020

Dear Majority Leader Frist and Minority Leader Reid:

On behalf of the more than 20,000 members represented by the National Academy of Recording Arts & Sciences, I am writing you to express our serious concerns with one section of the pending Senate telecommunications legislation (H.R. 5252) as reported by the Senate Committee on Commerce, Science, and Transportation. Title VI (Wireless Innovation Networks) would have a significant negative impact on our members' ability to continue to deliver high quality concert experiences to their fans. While we applaud the efforts of the telecom act and hope it will be brought to the Senate floor, we urge the Senate to strike Title VI until further study can resolve the impact to the arts community.

As a membership organization dedicated to advancing the lives of music makers, the Academy goes to great lengths to cultivate the cultural life of the nation. Music creators and their fans deserve a top-shelf audio experience as part of the overall concert production. Wireless microphones are a central component in our efforts to deliver consumer satisfaction in this area.

As an Academy of arts *and sciences*, our reliance on technology is a major reason why we are concerned about Title VI in H.R. 5252. As currently drafted, the proposed section would allow millions of new and potentially interfering devices to operate in the TV spectrum band (where wireless microphones currently operate) in a mere nine months from the date of enactment – despite the complete lack of any field tests to demonstrate that such devices will not interfere with wireless microphones, or even over-the-air television broadcasts. As Illinois Senator Richard J. Durbin said recently “the FCC and other technical experts ... [must be] allowed sufficient time to thoroughly study and resolve serious interference issues before new services are allowed to be turned on.”

Moreover, the Senate language provides only the thinnest of interference protections for incumbent services like wireless microphones. An “after-the-fact” FCC complaint process

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is, at best, unworkable and would expose our industry to significant new risks of low-or-no quality audio due to new "wireless audio congestion."

Based on all of the aforementioned reasons, the Recording Academy urges the Senate to strike Title VI from H.R. 5252 and revisit the issue in a later Congress when the engineering experts have had sufficient opportunity to iron out all of the potential interference-related issues.

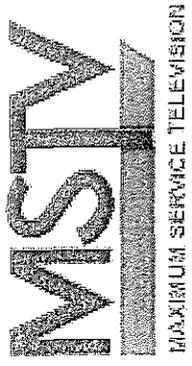
Kind regards,



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Unlicensed Devices in the Television Band

April 12, 2006

Problem

- Interference is caused to consumers' **TV receivers**
- Can't control locations of unlicensed devices or TV receivers
- Can't prevent an unlicensed device from being too close to **TV receiver**

Potential Interference

- **Out-of-band interference**
 - §15.209 limits not sufficient to protect TV operations
 - CRC measurements show **interference at 78 feet**
- **Adjacent channel interference**
 - §73.623 adjacent channel protection limits also required for portable devices
 - 100 mW portable device could cause **interference at distances of 2500 feet**
- **Co-channel interference**
 - If unlicensed device inadvertently transmits on a channel being used for TV service – **interference range of 2 miles (indoor TV antenna) to 10 miles (outdoor TV antenna)**
 - Intel “maximum interference protection range” for 100 mW portable device is 8 km (5 miles). In other words, a potential **interference area of 75 sq. miles!**

Why Can't Adjacent Channels Be Used

- Let's look at a simple model
 - Required adjacent channel protection is D/U of -26 dB (§73.623)
 - DTV service contour is 41 dBu (§73.625)
 - Assume unlicensed device at 100 mW (much less than FCC proposed)
 - Free space propagation model

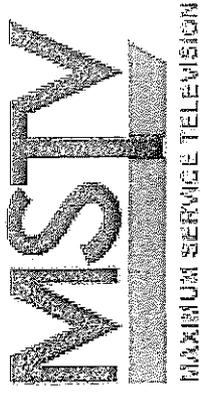
100 mW unlicensed device can cause interference to adjacent channel DTVs up to 780 meters away!



1st Adjacent Channels Can't be Used Without Causing Interference

Unlicensed Device Power	DTV Signal Strength	Interference to DTV Reception
100 mW	41 dBu	780 meters
	59 dBu	100 meters
	69 dBu	30 meters
400 mW (portable device limit with antenna gain)	41 dBu	1560 meters
	59 dBu	200 meters
	69 dBu	60 meters

Note: Grade B signal is 41 dBu and signal required for community of license is 48 dBu.



Spectrum Sensing

Comparison Between 5 GHz and TV Band

5 GHz Spectrum Sensing

- 5 GHz unlicensed devices are only required to detect **strong** radar signals (-62 to -64 dBm)
 - signals are well above receiver sensitivity level and 1000s of times greater than needed to protect TV
- Radar receiver and transmitter are co-located
 - sensing transmitter signal protects receiver
- 5 GHz unlicensed device is required to **detect** radar signal **only 80% of the time**
- **Sensing standards thoroughly tested before devices authorized**

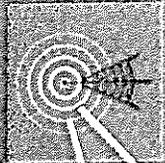
TV Band Spectrum Sensing

Protecting TV reception is fundamentally different technical problem than 5 GHz

- Need to protect consumers TV receivers
- Need to detect at very low levels
 - Receiver performance differences of TV and unlicensed device
 - Hidden Node problem
- Need to detect correctly 100% of time
 - Every failure potentially can cause 75 square miles or more of interference!

Worst Case Hidden Transmitter Scenario

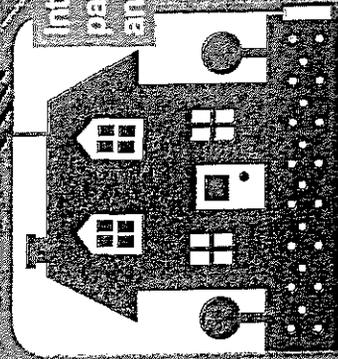
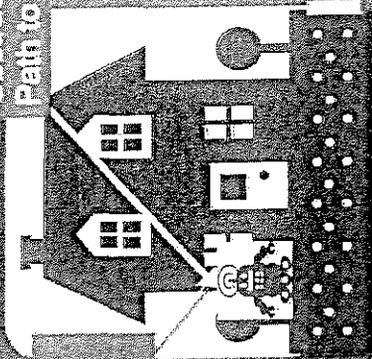
Low probability for detection of occupied channel



Broadcast Station

Unobstructed path to TV -10 dB antenna

Heavily Obstructed Path to CR



Interference path to TV antenna



Co channel avoidance

- DTV D/U ratio -23dB gives moderate interference range therefore detect and avoid
- Detect some feature of Broadcast TV signal
 - Pilot tone, frame sync (DTV)
 - Video carrier, line sync (NTSC)
- Indoor CR scenario (*Hidden Transmitter Problem*)
 - Low antenna gain (0 versus 10 dB)
 - Low antenna height (2 versus 10 m)
 - Building losses (Average 5.7, SD 8.6dB)
 - Multipath (4 to 19 dB)

intel

Low detection threshold

6



Let's Use Intel's Example

Minimum Useable DTV Signal Strength	-83 dBm	
Required Protection Ratio (dB)	-23 dB	
Difference in Antenna Gain (dB)	-10 dB	
	Intel's "very conservative" proposal	Numbers from Intel's slide example
Difference in Antenna Height (dB)	-23 dB	-7 dB
Building Losses (dB)		-5.7dB (8.6 dB SD)
Multipath Losses (dB)		-19 dB
Detection Signal Level	-118 dBm	-126.7 to -135.3 dBm

TV Band Spectrum Sensing

- Sensing will **not** reliably tell you where you are!
- -118 dBm provides only 18 dB of margin for all signal degradation effects
 - Usable DTV signal (-83 dBm) & (-17 dB antenna gain and height differences)
 - Clearly **Not** sufficient for hidden node problem
- Intel proposal of -118 dBm for sensing **will result in** unlicensed devices operating on non-vacant channels and causing **significant interference to TV viewers**

What Does Intel Say If Sensing Is Wrong?

- Intel states:
 - “Free space interference range (of a 100 mW low power unlicensed device) outside of the Grade B service contour is 8 km (5 miles)” (Intel comments)
 - “maximum interference range required for operation of new wireless “personal/portable” devices is 8 kilometers, resulting in exclusion ranges far less than those of high power “fixed/access” services. (Intel replies 7-8)
- **A potential interference area of more than 75 square miles!**

Future Objectives-Technical

- **Field evaluation of detection reliability**
- **Reduce false detection**
- **Alternative TV detection techniques**
- **Detection techniques for other waveforms**
- **Develop requirements for international TV bands**
 - **Channel Spacing**
 - **OFDM for DTV**
 - **Legacy PAL, Secam & NTSC systems**

intel

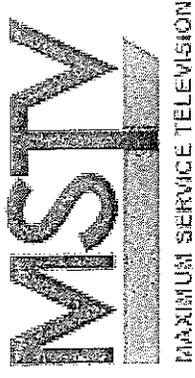
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TV Band Spectrum Sensing

- After two years, no “sensing” technology **field studies** or proof have been submitted to FCC showing that “feature detector” or other technology can reliably detect TV signals even at these unacceptable levels
- IEEE 802.22 evaluation and testing of fixed broadband system to start this year

Technical Bottom-line

- **FCC unlicensed approach not ready**
 - Actual interference performance of DTV sets have not been measured
 - Can't use adjacent channels for fixed or portable unlicensed devices
 - FCC out-of-band limits needs to be tightened
- **Sensing in TV band needs to be tested and proven**
 - No field tests of appropriate sensing levels
 - No testing of sensing reliability
- **Can't legislate a technical solution**
 - Probability of a mistake is high



Proposed Legislative Language for S-2332

Proposed Changes to S2332

- Limited use to wireless broadband devices on a non-interference basis after the DTV transition (Feb. 17, 2009)
- Fully protect licensed services
 - No operation on 1st adjacent
 - Tighten out-of-band emissions
- Promptly remedy complaints by modifying or disabling unlicensed devices
- Unlicensed devices must include the capability of being disabled remotely by manufacturer
- Require FCC certification and field testing of all unlicensed devices prior to deployment

From sportsvideo.org

TOP STORIES

DC legislation to allow unlicensed devices threatens wireless audio, video industry

By Ken Kerschbaumer
Apr 6, 2006, 04:58 PM

DC legislation to allow unlicensed devices threatens wireless audio, video industry
Apr 6, 2006, 04:58 PM

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During the past 30 years the broadcast sports, news, and entertainment industries have come to rely on wireless audio and video technologies to tell more compelling stories and keep the public informed of emergency situations. Without wireless ENG the world would never have seen live aerial images of the devastation of Hurricane Katrina or on-the-street reports from lower Manhattan on Sept. 11.

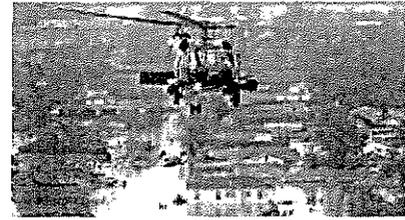
But a flurry of recent bills proposed in both the Congress and the Senate are looking to allow unlicensed wireless devices to be used in "White Spaces" threaten the future of not only wireless ENG but any other service that relies on wireless transmission. In the sports industry, for example, live video from in-car cameras during a NASCAR race, shots from a blimp flying over a stadium, or even a simple interview with a fan in the stands would become a thing of the past if any of the bills are passed.

And that's only the beginning. Professionals who need reliable wireless communication, from a football quarterback, to a security guard, or a football referee, will need to find other means to communicate.

"It would be like the wild, wild west," says Glenn Adamo, VP of media operations for the National Football League of the prospect of unlicensed devices being added to the mix. "We would prefer frequencies be coordinated and we have coordinators in each city who maximize the number of users on the spectrum even though there isn't enough to go around. The last thing any league would want is for unlicensed devices to be allowed."

There are currently three pieces of legislation on the books. In February 2006 Senator Ted Stevens (R-AK) introduced the American Broadband for Communities Act (S. 2332) and Senator George Allen (R-VA) offered up the Wireless Innovation Act of 2006 (S. 2327). Both bills require the FCC to issue an order within 180 days of enactment to allow unlicensed devices to operate in unused broadcast channels. And just this week Congress got into the act as Rep. Jay Inslee (D-WA), Marsha Blackburn (R-TN) and Tammy Baldwin (D-WI) introduced legislation that was identical to the Stevens bill.

Stevens says that broadcasters are allocated hundreds of MHz of spectrum to provide television service across the country but that in any one market some of the spectrum goes unused.



"Some studies have indicated that there is more than 150 MHz of spectrum in Anchorage, Alaska, and Honolulu, Hawaii, that could be used by unlicensed devices for wireless services," he says. "Even in large cities like Boston and Chicago it is estimated that nearly 50 MHz of spectrum goes unused."

Plans to allow unlicensed devices on white space spectrum could interfere with emergency communications and live helicopter video during events like Hurricane Katrina.

The goal of the legislation, says Stevens, is to make it easier for companies to offer broadband services to consumers. "Allowing unlicensed operations in the broadcast band could play a significant role in bringing wireless broadband and home networking to more of our citizens by lowering costs, particularly in Alaska where connectivity is so important due to our remoteness," he says.

While the vision sounds great on paper the concensus among spectrum experts, broadcasters, and manufacturers is that it just won't work. "In the past things that didn't play well together in the spectrum were kept apart," says Jeff Krull, Sennheiser VP of product development. "And that worked well. But the new proposals open up some very real interference problems for devices that operate in those frequencies."

Stevens' bill does acknowledge potential problems and it calls for the FCC to craft technical requirements for unlicensed devices in the broadcast band that would protect broadcast stations. In addition, the legislation urges the FCC to further establish an interference complaint resolution process for broadcasters. "I believe that the requirements in the bill will give the broadcasters additional protection while allowing more efficient use of the valuable broadcast spectrum, which is an invaluable public resource," said Stevens.

A fundamental flaw in that approach, says Krull, is that devices operating on different power levels might think the same piece of spectrum is free when it really isn't. "You'll see Blackberry's interfering with microphones and Blue-Tooth devices crashing into WiFi and cordless phones," says Krull.

"The notion that smart technology can solve everything when there has yet to be a smart technology solution that has proven effective is absurd," says Jeanne Walsh Stockman, who represents Shure Bros. at the Washington, DC firm Bingham McCutchen, LLP. "Shure advocates that Congress not rush to judgment and instead let the engineers do their job and work out a technical solution. There's too much at risk."

Sen. Stevens is expected to roll his white spaces bill into a larger piece of

telecommunications legislation that will be introduced following the Easter break. The larger bill is expected to address issues like Internet neutrality and universal service, among other items.

With legislators increasingly intent on broadening wireless access members of the broadcast community believe the industry needs to make its concerns clear. "Everyone in the broadcast industry needs to contact their Senators and Congressmen to urge them to never allow for unlicensed devices to be allowed in TV white space spectrum," says Dave Donovan, president of Maximum Service Television.

Donovan says allowing unlicensed devices into white spaces will also cause interference with over-the-air television reception. "You could be in an apartment and the person upstairs could use a wireless device and prevent you from receiving a TV signal," he explains.

Next week MSTV has scheduled meetings with the House and Senate staff to make its concerns clear. They'll take place on April 10, 11, 12, 13, and 17. Anyone interested in attending should contact Susan Baurenfeind with MSTV via email at sbaurenfeind@mstv.com for more details.

Ardell Hill, Media General Broadcast Group SVP of Broadcast Operations, the wireless needs for broadcasters and networks at events, whether political conventions, sports or news in general, are simply too important to both the broadcaster and the viewer. "Wireless devices are not just a luxury," he says. "Today they're essential to telling the story."

The new legislation compounds an already difficult ENG wireless situation for broadcasters. Broadcasters today are losing the majority of the spectrum they rely on for ENG use because Sprint Nextel is giving up some of its spectrum on the 800 MHz frequency band and moving to the 2 GHz band currently used by broadcasters. Because the 2GHz band has less bandwidth than the 800 MHz band Sprint Nextel is spending approximately \$500 million on digital microwave gear that will help fit more stations into the bandwidth.

"We're already being forced to compress spectrum that is already crowded," says Hill. "And while technology does allow us to create the same number of channels we didn't have enough channels to begin with."

Ken Aagaard, CBS Sports SVP, operations and production services, says who has rights to bandwidth will be an ongoing question for a long time, particularly as the U.S. becomes more of a wireless society. "But no one group can solve the problem-not the government, the FCC, the broadcasters, or the equipment manufacturers. Serious talks are going to have to take place because right now there are two trains on a collision course."

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April 17, 2006

The Hon. Ted Stevens
U.S. Senate
Washington, DC 20510

Dear Senator Stevens:

On behalf of the Radio-Television News Directors Association (RTNDA), I am writing to express concerns about two bills that are pending before the Senate Commerce Committee — S. 2322, the “American Broadband for Communities Act” and S. 2327, the “Wireless Broadband Act of 2006.” While both bills promote important public policy objectives, because they authorize the use of unlicensed devices in the broadcast television band, they will have the unintended consequence of significantly impairing the ability of electronic journalists to cover live news events, particularly during emergency situations.

Among the most important tools for covering breaking news are wireless microphones and wireless video assist devices, which are licensed by the FCC. These are “low powered” devices that operate on the so-called “vacant” television broadcast channels in a market. Unlike unlicensed devices, however, the frequencies these licensed wireless microphones use are subject to extensive frequency coordination.

In each market throughout the country, television, radio and cable news departments are assigned specific frequencies by frequency coordinators. As a result, when news teams are sent out to report on unfolding events and emergencies, the equipment they use does not interfere with the equipment used by others. This pre-coordination is vitally important when emergency situations arise and wireless microphones must work immediately. As “first informers” during critical situations—many involving health and safety—the ability of RTNDA’s members to disseminate information to the public cannot be compromised by equipment that is subject to interference.

Pre-assigned frequencies are also essential to coverage of planned major news events such as political conventions, or sporting events. Large events often require the coordination of several hundred wireless microphones. It can take months of coordination to provide quality coverage.

The fundamental problem with the bills is that they authorize the use of unlicensed wireless devices on the same channels that news departments currently use for licensed wireless microphones and wireless video assist devices. There is little doubt that these unlicensed devices will interfere with the equipment used by electronic journalists.

Proponents of unlicensed devices argue that "spectrum sensing" devices will avoid interference. Studies conducted by SHUR, the major manufacturer of licensed wireless microphone equipment, however, demonstrate that unlicensed devices would, in fact, cause harmful interference to wireless microphones. To the best of RTNDA's knowledge, there is no real world device that is capable of sensing low power devices like wireless microphones. It is RTNDA's understanding that IEEE, the world's leading engineering organization, is in the process of studying the issue now.

RTNDA believes that the legislation will result in millions of devices entering the band, overwhelming the current system. Because they are unlicensed, it will be impossible for professional frequency coordinators to assign frequencies to news departments and provide electronic journalists with any kind of assurance that their wireless microphones will work once they are on-scene. News crews may start their reports, only to discover that their wireless mics have cut-off. The flow of information could suddenly cease during a live newscast or when government officials are relaying important life-saving information.

With millions of devices in the marketplace, it is likely that news crews will have no idea where interference is coming from and that those using unlicensed devices will not realize that they are causing interference. With the interference potentially coming from hundreds of different devices operating in the area of the news crew, it will be difficult if not impossible to correct any interference problems encountered at all, much less quickly.

RTNDA's members provide the American public with immediate and accurate coverage of news events. The role of electronic journalists is critically important during emergency situations where they provide real-time, sometimes life-saving information. The ability of electronic journalists to serve the public in this manner must not be impaired. Accordingly, I urge you to proceed with the utmost caution and not to authorize unlicensed devices in the television band at this time. These devices must be thoroughly tested in both the laboratory and the real world *before* they are permitted to operate in the band.

Sincerely,



Barbara Cochran
President

**NEWS, SPORTS AND ENTERTAINMENT PRODUCTION
COALITION**

March 11, 2005

The Honorable Michael Powell
Chairman
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

RE: ET Docket 04-186 (unlicensed use of TV broadcast bands)

Dear Chairman Powell:

We are concerned about the future of our newsgathering and live sports and entertainment coverage operations. Tens of millions of Americans rely on, and have come to expect, high quality production in live news, sporting and entertainment events. The ability of local radio and television stations, broadcast networks and cable networks to provide a good quality product has been in jeopardy for quite some time. But the Commission's proposed plan in the above-captioned docket to allow new users in the broadcast spectrum poses the most severe threat yet. We ask that before the Commission make any determinations in this docket that it first initiate a rule making proceeding that seeks to dedicate spectrum to services relied upon by those in live newsgathering, sports and entertainment production and broadcast and cable delivery.

The undersigned are representatives of local radio and television stations, broadcast networks, cable networks, sports leagues, news operations, video production companies and manufacturers (as well as trade associations whose members include those entities) actively involved in the production of sporting and news events for the benefit of American television viewers (collectively the "News, Sports and Entertainment Production Coalition"). We have always supported an approach to spectrum policy that marries innovation with respect for the goals and requirements of both established and emerging services. But it is becoming nearly impossible to do our jobs in the face of diminishing spectrum in the Broadcast Auxiliary Service (BAS). We are specifically concerned that the Commission should not allow higher power Part 15 devices to operate on so-called "unused" TV channels, because of the interference and denial of service threats that would be caused to licensed, Part 74, Subpart H, Low Power Auxiliary stations.

At this point, the television channels assigned for use by wireless microphone and wireless video assist devices are highly congested in all metropolitan areas. Interference is the inevitable result of further overcrowding of these existing channels.

Advances in digital technology are not a solution to this problem because digital technology is already being incorporated in wireless microphone use. The limited allocations remain severely overcrowded. The channel bandwidth has been reduced thereby, but the number of channels is nonetheless far too small. The problem is that there are no other bands for wireless microphones available for use in most markets across the United States for providing coverage of breaking news, outdoor sporting events and live entertainment events, in the manner that the public has grown accustomed to viewing.

We believe that the FCC has overlooked the impact of higher power Part 15 devices on so-called "unused" TV channels to Part 74, Subpart H, Low Power Auxiliary stations. These include widely used wireless microphone stations, which operate on the ever scarcer locally vacant VHF and UHF TV channels. Spectrum for wireless microphones and wireless video assist devices, which operate in unused UHF television channels, has been reduced dramatically by use of those channels for DTV, and the loss of UHF channels 52-69. The small guard bands remaining would not be enough by any means. The wireless microphone is one technology that may not necessarily benefit from a move to digital technology. As licensed, Part 74 stations, they are entitled to protection from interference from unlicensed Part 15 devices. We recommend that a permanent and exclusive spectrum allocation be made for these devices so that they can be used reliably in the future.

Wireless microphones are extensively used by broadcasters and cable programmers in support of sports events and electronic news gathering (ENG) operations, and because ENG venues are ever changing, it appears that even "cognitive" or "smart" higher power Part 15 devices attempting to also operate on locally vacant TV channels would never be able to know the location of licensed wireless microphones. Further, because FM wireless microphones do not transmit continuously, but rather only when needed at a news or sporting event venue, allowing higher power Part 15 devices to share the same spectrum could create a denial of service problem to the licensed, higher-priority wireless microphone stations. Licensed users could easily be placed at the mercy of an unlicensed Part 15 device, waiting for the Part 15 device to momentarily "power down."

In most major metropolitan areas there are virtually no vacant TV channels, due to those channels also being used by DTV, Class A, TV translator, LPTV, and some point-to-point TV translator relay stations. The drastically reduced number of "unused" TV channels makes it all the more likely that higher power Part 15 devices operating on TV channels would cause interference to, or denial of service problems to, higher-priority, licensed, stations. If the Commission were to grant the use of broadcast spectrum to unlicensed devices, we could have situations in which: a local radio or TV station or cable news channel covering a local emergency, such as the hurricanes in Florida, would

suddenly lose the picture and audio of its reporters on the scene; interviews with athletes and coaches would be lost and irretrievable, as would be referee calls and coaches' communications with each other during a game; and live news interviews of public officials and others at breaking events might also be lost. The flexibility and creativity that wireless microphones and wireless video assist devices bring to production is invaluable.

In conclusion, we understand the goals of broadening the uses of spectrum, but we ask that you first consider our plight and seek to address it before going forward in this proceeding. We request that you initiate a rule making proceeding that seeks to dedicate a portion of spectrum to devices we use to bring live sports, news and entertainment to American viewers in their homes.

We would appreciate the opportunity to provide further information and demonstrations of the issues discussed above to you and your staff.

Sincerely,

Stacy Brady
Vice President, Field &
Satellite Operations
NBC Network News

Jeffrey Birch
Vice President of Engineering
Viacom Television Stations Group

Shaun Sheehan
Vice President
Tribune Company

Glynn Walden
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<p>Frank Governale Vice President, News Operations CBS News</p>	<p>Justin Smith Vice President of Legal Affairs The Golf Channel</p>
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<p>Michael S. Meehan VP, Sports Operations & Production Planning NBC Universal</p>	<p>Michael Cohen Executive Producer Major League Soccer</p>
<p>Peter Homes Director of Broadcasting & Recording IBEW</p>	<p>Gunther Meisse President Mid-State Television, Inc. WMFD-TV DT Mansfield, Ohio</p>
<p>Daniel L. Brenner SVP, Law and Regulatory Policy NCTA</p>	<p>Dean Hinson President Morris Network of Mississippi, Inc. WXXV-TV DT Gulfport, Mississippi WCBI-TV, LLC WCBI-TV DT Columbus, Mississippi Morris Network, Inc. WMGT-TV DT Macon, Georgia</p>
<p>Gil Kerr Senior Vice President, Broadcasting, Programming & Production PGA Tour</p>	<p>Gunter Marksteiner Individual Licensee and Chief Engineer WHDT-DT Stuart, Florida</p>
<p>Steve Hellmuth SVP, Operations and Technology NBA Entertainment</p>	<p>John Tortora Director, Team Television and Business Affairs National Hockey League</p>
<p>David Donovan President MSTV</p>	
<p>Greg Shaheen VP, Division I Men's Basketball NCAA</p>	

Frank Hawkins
Senior Vice President, Business Affairs
National Football League

Ahren J. Hartman
Technology Director
Shure Incorporated

Edgar C. Reihl, P.E.
Technology Director
Shure Incorporated

cc: Commissioner Kathleen Abernathy
cc: Commissioner Jonathan Adelstein
cc: Commissioner Michael J. Copps
cc: Commissioner Kevin J. Martin