Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
Reallocation of 470–512 MHz (T-Band) Spectrum	)	PS Docket No. 13-42
	)	
	)	

COMMENTS OF THE NATIONAL ASSOCIATION OF BROADCASTERS

I. INTRODUCTION AND SUMMARY

The National Association of Broadcasters (NAB)[1] hereby submits the following comments in response to the Commission's Notice of Proposed Rulemaking concerning the reallocation of 470–512 MHz (T-Band) Spectrum.[2]

As an initial matter, NAB agrees with those who have observed that a T-Band auction is almost certainly destined to fail.[3] Accordingly, while we understand the statutory obligation the Commission is under to contemplate an auction, we urge the Commission to consider

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[1] The National Association of Broadcasters (NAB) is the nonprofit trade association that advocates on behalf of free local radio and television stations and broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

[2] *Reallocation of 470-512 MHz (T-Band) Spectrum*, Notice of Proposed Rulemaking, PS Docket No. 13-42, FCC 20-89 (NPRM).

[3] *Chairman Pai Reiterates Call for Repeal of T-Band Auction Mandate*, FCC Statement (May 15, 2020), available at: https://docs.fcc.gov/public/attachments/DOC-364389A1.pdf (An FCC auction of the T-band is a bad idea. But as of today, the law mandates that we do it. It's unfortunate that Commission resources must be dedicated to laying the groundwork for an auction that will likely fail. This is especially true at a time when we are making every effort to keep Americans safe and connected, including allowing expanded temporary use of this very spectrum to help first responders save lives."); Statement of Commissioner Rosenworcel, NPRM at 51 ("So from the start, this auction is destined to fail.")

seeking preliminary bids or taking other actions to ascertain whether auction of limited spectrum has any chance of covering the costs of relocation of incumbents.

Most importantly, as the Commission moves forward, we urge it to ensure that any rules and policies developed as a result of this proceeding ensure that the primary allocation status of television broadcast in this spectrum is not reduced or constrained. The Commission must ensure the continued protection of over-the-air television broadcasting in this spectrum.

II. THE AMOUNT OF SPECTRUM AVAILABLE FOR AUCTION WILL NOT COVER COSTS

Limited sharing between the land-mobile and broadcast (television) services has existed in some markets on TV Channels 14–20 since the 1970s. Because the spectrum being shared was originally allocated for broadcast television use, it is referred to as the "T-Band" – "T" being an abbreviation for Television.

The Middle Class Tax Relief and Job Creation Act of 2012 mandates reallocation and auction of spectrum used by public safety eligibles,[4] but public safety licensees do not represent all land-mobile users in the T-Band. In fact, just four channels (Channels 15 and 16 in Los Angeles, Channel 16 in New York, and Channel 18 in Pittsburgh) are used exclusively by public safety entities.[5] In the remaining shared channels and markets, public safety users are typically interleaved with non-public safety users. The Spectrum Act does not mandate reallocation or auction of any T-Band spectrum other than that used by Public Safety and does not provide a funding mechanism to pay non-public safety users to relocate to alternative

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[4] Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6103, 126 Stat. 156, 205-206 (2012), (codified at 47 U.S.C. § 1413) (Spectrum Act).

[5] National Public Safety Telecommunications Council, "T-Band Report," at 6 (March 15, 2013), available at: http://www.npstc.org/download.jsp?tableId=37&column=217&id=2678&file=T_Band_Report_20130315.pdf.

spectrum. As a practical matter, therefore, a T-Band auction could make available just 12 MHz of spectrum in Los Angeles and a scant 6 MHz in each of New York and Pittsburgh.

Further, the T-Band spectrum (470–512 MHz) is not contiguous with or adjacent to other flexible use spectrum. Presently, the 600 MHz band, the closest flexible use band to the T-Band, begins at 614 MHz – so it is more than 100 MHz separated from the T-Band. While a 100 MHz difference in frequency may not seem like a large amount, the fractional difference in frequency ("fractional bandwidth") between T-Band and the 600 MHz band is over 16 percent. Antennas in consumer devices that are designed for 600 MHz operation typically have fractional bandwidths of less than 10 percent and therefore cannot be efficiently used at T-Band. Separate and physically larger T-Band antennas would necessarily be required, making the T-Band undesirable as a supplement or alternative to other "low-band" flexible use spectrum. The combination of limited geography, limited spectrum, and incompatibility with existing user equipment will effectively make the T-Band an orphan band.

Even if some alternative use to land-mobile were identified, a T-Band auction would be non-economic. The Spectrum Act makes available any proceeds of a T-Band auction to cover relocation costs of public safety entities, and the costs of such a relocation have been estimated at more than $5.9 billion.[6] By way of comparison, the forward portion of the Broadcast Incentive Auction (FCC Auction 1002) had less than $20 billion in gross proceeds for 70 MHz of nationwide spectrum.[7] Considering just the top 40 PEAs, the FCC reported an average price per MHz-pop of $1.31 for 600 MHz spectrum. Based on that price, in the Los Angeles PEA with about 20 million people, the expected gross proceeds of an auction of 12

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[6] *Id* at 45.

[7] *See* Incentive Auction Dashboard, available at https://auctiondata.fcc.gov/public/projects/1000.

MHz of T-Band spectrum might total about $314 million. Similarly, in New York and Pittsburgh (with a combined population of about 28 million people), an auction of 6 MHz might bring about $220 million. The combined total ($534 million) is less than 10 percent of the estimated relocation cost for public safety. While it's possible that bidders in a T-Band auction might be willing to pay more than $1.31 per MHz-pop, it's unreasonable to expect bidders would pay more than ten times that amount — almost $15 per MHz-pop — for orphan spectrum.

Given the likelihood that a T-Band auction cannot succeed, we urge the Commission to incorporate a mechanism into its auction design that would determine at the outset whether the auction would fail to raise sufficient funds to cover its costs, such as triggering an auction only if upfront payments exceed a certain level or providing for preliminary bids. This approach could help conserve Commission resources that would otherwise be wasted conducting an auction that is ultimately doomed to fail.

III. A MOBILE SERVICE ALLOCATION WILL RESULT IN INTERFERENCE

The NPRM asks whether expansion of the current allocation for the 470-512 MHz band to permit Mobile Service would affect the interference environment in the band.[8] The answer is certainly yes.

While transmitters in the Land Mobile service are by definition located on land and typically located near the ground, a Mobile Service allocation would permit airborne transmitters, which have a much greater potential for causing interference than land-mobile stations. Assuming a spherical (smooth) earth with no terrain features, transmitters may be able to reach a receiver located at the so-called "radio horizon," beyond which the signal is

[8] NPRM at ¶ 13.

blocked by the earth itself. The distance, d_{RH}, to the radio horizon is a function of the transmitter's height above ground, h, and can be approximated as:

$$d_{RH} \approx 4.124\sqrt{h} \qquad (1)$$

where d_{RH} is in kilometers and h is in meters. Thus, a Land Mobile transmitter on a 376-meter (1,234-foot) tower might reach 80 km (49.7 miles). In contrast, a similar transmitter in an airplane at 9,144 meters (30,000 feet) might reach 393 km (244 miles) – almost five times the distance and covering almost 25 times the area. Plainly, the potential for interference from an airborne transmitter is far greater than from a land-based one.

The Commission's rules for T-Band operation limit the geographic area where transmitters can operate by specifying distances beyond which T-Band transmitters are not allowed. These rules are designed to protect television receivers located at greater distances.[9] Those distance restrictions are based on the premise that that T-Band transmitters will be located near ground level, with power levels varying depending upon the associated height above average terrain. By allowing airborne transmitters, the interference distance will increase significantly, resulting in interference to television stations located well outside the defined T-Band market.

As an illustration, a public safety (or other Land Mobile) base station operating on TV Channel 16 in the Los Angeles area must be located within 80 km[10] of the specified set of geographic coordinates that define the geographic center of that urbanized area.[11] Mobile stations must be operated within 48 km of their associated base station(s). Accordingly, all T-

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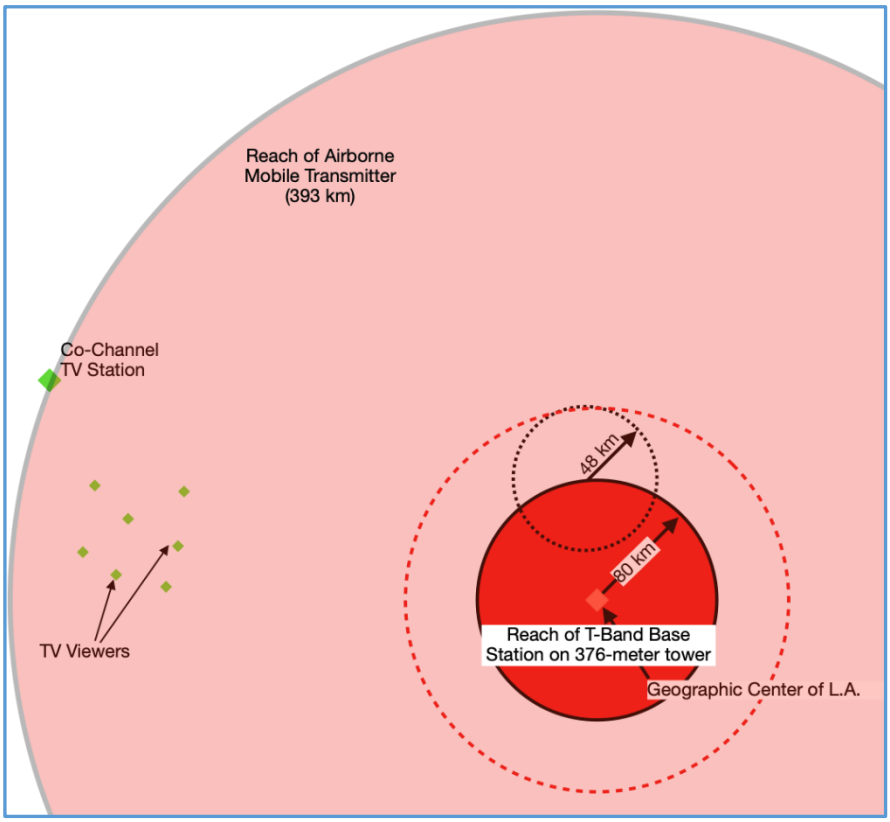
[9] See 47 CFR §90.301 *et seq*.

[10] 47 CFR §90.305(a)

[11] 47 CFR §90.303. The relevant coordinates for the Los Angeles area are N34° 03' 15.0", W118° 14' 31.3".

Band operations must be confined to an area within 128 km of the center of the Los Angeles urbanized area as shown in the dashed red circle of Figure 1. Co-channel television stations and their viewers may be located beyond the 128-kilometer radius, as shown in green. As illustrated by the shaded areas, an airborne transmitter would be capable of causing interference to TV viewers far from the urbanized area associated with the T-Band channel.

Figure 1. Present Land-Mobile coverage radius (dark red) versus potential airborne coverage radius (light red). The associated interference areas would be even larger.



The Commission must not allow airborne transmitters in T-Band because of the much larger distances over which they may cause interference to television stations and viewers. Accordingly, we urge the Commission not to add a Mobile Service allocation to the T-Band.

IV. A LARGE NUMBER OF UNCONTROLLED FLEXIBLE USE STATIONS WILL INCREASE THE LIKELIHOOD OF INTERFERENCE, PARTICULARLY UNDER ANOMOLOUS PROPAGATION CONDITIONS

Despite the spacing rules that are designed to prevent interference by separating television broadcast stations and their viewers from T-Band land mobile stations, interference does occur. In the Los Angeles and San Francisco areas, for example, where T-Band base station receivers are often located atop tall mountains, distant co-channel television stations that are also located on tall mountains have caused significant interference. Specifically, a Channel 16 television station allocated to Fresno, California, over 320 kilometers (200 miles) distant from Channel 16 T-Band operations in Los Angeles and over 250 kilometers (160 miles) distant from Channel 16 T-Band operations in San Francisco caused harmful interference to T-Band operations in those areas, including the Los Angeles County Sheriff. The interference could not be corrected by any technical means other than moving the TV station to a different channel.[12] Similarly, there have been numerous reports of interference to Land Mobile T-Band operations, including between a TV station in Southern Virginia and Public Safety systems in New York and New Jersey, a TV station in Baja California and public safety systems in Los Angeles, during times of analogous propagation ("ducting").

While the number of T-Band land mobile stations are relatively limited in number such that technical solutions are sometime possible to allow spectrum sharing between television and Land Mobile systems, flexible use operations would be expected to be much more intensive, resulting in more frequent and more widespread interference that will not be easily corrected. The likelihood of increased interference both risks harming television viewers and

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[12] *See Amendment of Section 73.622(b), Table of Allotments, Digital Television Broadcast Stations (Fresno, California)*, Report and Order, 19 FCC Rcd 21891 (2004).

devalues the T-Band spectrum. The FCC should learn from past experience and avoid uncoordinated sharing in spectrum used by television broadcast stations. Any flexible use licensees at T-Band must expect, and agree to, interference from co-channel television stations. If high power flexible use operations are permitted, operators must agree to mitigate any interference caused to television viewers.

V. CONCLUSION

NAB believes that an auction of such a limited amount of spectrum in a small number of scattered markets is almost certain to fail, and that any rules and policies developed as a result of this proceeding must ensure that the primary allocation status of television broadcast in this spectrum is not reduced or constrained.

To avoid wasting Commission resources, we urge the Commission to seek preliminary bids or take other actions to ascertain whether auction of limited spectrum has any chance of covering the costs of relocation of incumbents. If the Commission nonetheless decides to proceed with an auction, television broadcast stations and their viewers must be fully protected from interference. Such protection would include not permitting airborne transmitters and conditioning any high-power operations on mitigating any interference to television broadcast stations. We look forward to working with the Commission to provide any further information the that may be appropriate.

Respectfully submitted,

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