

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

In the Matter of:	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
	)	GN Docket No. 17-183

**COMMENTS OF  
THE SOCIETY OF BROADCAST ENGINEERS, INC.**

May 25, 2022

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**I. INTRODUCTION AND SUMMARY**

The Society of Broadcast Engineers (SBE)<sup>1</sup> responds to the Commission’s Public Notice<sup>2</sup> inviting comments in connection with the remand by the United States Court of Appeals for the District of Columbia Circuit<sup>3</sup> of the Commission’s 6 GHz Report and Order.<sup>4</sup> The D.C. Circuit directed the Commission on remand to “respond to the . . . concerns” raised by the National Association of Broadcasters (NAB) “about interference in the 2.4 GHz band”<sup>5</sup> and the implications, if any, of that established interference for the Commission’s Order opening the 6 GHz band to unlicensed uses. The Notice seeks comment on that narrow issue.

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<sup>1</sup> The Society of Broadcast Engineers (SBE) is the national association of broadcast engineers and technical communications professionals with over 5,000 members worldwide.

<sup>2</sup> *Office of Engineering and Technology Seeks Comment Following Court Remand of 6 GHz Band Order*, ET Docket No. 18-295, GN Docket No. 17-183, DA 22-253 (Mar. 10, 2022) (*Notice*).

<sup>3</sup> *AT&T Servs., Inc. v. FCC*, 21 F.4th 841 (D.C. Cir. 2021).

<sup>4</sup> *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852 (2020) (*6 GHz Report and Order or Order*).

<sup>5</sup> *AT&T Servs.*, 21 F.4th at 853.

SBE reiterates here the arguments—which have now come to fruition—SBE made in response to the Commission’s Notice of Proposed Rulemaking underlying the *Order*: The Commission failed to establish an effective mechanism for protecting important broadcast auxiliary services (BAS) in the 6425–6525 MHz (U-NII-6) and 6875–7125 MHz (U-NII-8) bands from interference by unlicensed mobile indoor devices—and ignored real-world evidence that proves the point.

The FCC’s conclusion that a contention-based protocol (CBP) is sufficient to protect BAS against the risk of harmful interference from unlicensed, low-power indoor mobile devices ignored directly relevant empirical evidence of interference with BAS caused by unlicensed devices in the 2.4 GHz band. That interference was first reported decades ago and is still ongoing despite the implementation of CBP in that band. As the D.C. Circuit correctly recognized, the Commission did not acknowledge or address concerns raised by commenters about the decades-long experience with interference in the 2.4 GHz band, let alone did it explain how a contention-based protocol that has failed for decades to protect BAS operations in other spectrum can effectively prevent interference with and protect BAS operations at 6 GHz.<sup>6</sup>

The longstanding and increasingly problematic interference in the 2.4 GHz band is ample justification for the Commission to protect incumbent licensees operating in the 6 GHz band by reserving a portion of the band for mobile indoor operations, as NAB has urged. Any other outcome risks intolerable interference with the many invaluable services made available by BAS, and by electronic newsgathering equipment in particular.

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<sup>6</sup> *AT&T Servs.*, 21 F.4th at 853.

## II. BACKGROUND

When broadcasters provide real-time coverage of important, newsworthy events ranging from courtside player interviews at NCAA basketball games to White House press conferences to political rallies, they typically rely on wireless technology to transmit real-time audio and video back to indoor electronic newsgathering receivers via electronic newsgathering (ENG) devices such as portable, battery-powered cameras and microphones.<sup>7</sup> ENG likewise is essential for broadcasters to provide critical, potentially life-saving public safety information and reporting related to severe weather and other emergencies.<sup>8</sup> As the Commission knows well, that journalism cannot effectively reach viewers without reliable and uninterrupted access to spectrum.<sup>9</sup> Swaths of the 6 GHz spectrum are those most commonly employed by broadcasters for transmissions using ENG—in particular, the U-NII-6 and U-NII-8 bands.

As NAB and others have argued throughout this proceeding, allowing unlicensed devices to operate in the 6 GHz band risks significant, disruptive interference with transmissions by licensed ENG devices. ENG devices are mobile, and many operate at low power. Typical power levels for ENG equipment used indoors in the U-NII-6 and U-NII-8 bands are in the range of 50–250 mW—a level comparable to or less than the power levels the Commission has authorized for unlicensed operations in those bands.<sup>10</sup> Some low-power

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<sup>7</sup> See, e.g., 47 C.F.R. § 2.106; 47 C.F.R. Ch. I, Subch. C, Pt. 74.

<sup>8</sup> Crucial uses of the 6 GHz band aren't limited to ENG operations: BAS use in the band also extends to fixed point-to-point microwave link (STL and TSL) operations, and the entertainment industry also uses 6 GHz spectrum both for fixed links and for mobile operations within venues.

<sup>9</sup> As multiple commenters have noted throughout this proceeding, and as explained further below, the 6 GHz band is extremely congested. Such congestion is not limited to BAS operations; common carriers operating in the band are also affected by lack of reliable, interference-free spectrum.

<sup>10</sup> *6 GHz Report and Order*, 35 FCC Rcd at 3860.

ENG devices operate near the ground, with a correspondingly low probability of detection by an unlicensed system using a CBP. And many mobile systems operate with little or no margin for interference.<sup>11</sup> The Commission’s conclusion that a CBP nevertheless will protect against interference with ENG systems operating indoors cannot be squared with real-world data reflecting the failure of CBP to protect ENG transmissions in another band of spectrum.

### III. REAL-WORLD EXPERIENCE ESTABLISHES ONGOING INTERFERENCE TO ENG EQUIPMENT FROM RLANS IN THE 2.4 GHZ BAND

This is not the first time the Commission has proposed to open certain swaths of spectrum for unlicensed use after concluding that risks of interference are low to non-existent. More than 30 years ago, the Commission approved the use of spectrum in the 2.4 GHz band by unlicensed devices. In response to concerns raised by broadcasters about interference with incumbent licensees operating in that band, the Commission assured users that a CBP would provide appropriate and reliable safeguards against interference and that if interference occurred, it would be halted. Those assurances have proven to be empty.

SBE and others have previously reported that ENG operations at 2450-2483.5 MHz are often impossible even today due to harmful interference from Part 15 unlicensed devices, including Wi-Fi systems using the 802.11 standard—which itself requires the use of a contention-based protocol.<sup>12</sup> In 1985, when the Commission initially adopted rules that permitted “low-powered, limited range devices to be authorized under Part 15 of the Rules,”

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<sup>11</sup> Spectrum sharing between *fixed* links and unlicensed systems (for example in the bands U-NII-5 and U-NII-7) is possible only because the locations of the fixed transmitters and receivers can be precisely known and because those fixed links are engineered to tolerate some level of interference. Those inherent protections are non-existent for mobile BAS.

<sup>12</sup> See, e.g., Comments of SBE, ET Docket No. 03-108 (May 3, 2004) ¶ 2; Comments of SBE, ET Docket No. 18-295 (Feb. 15, 2019) ¶ 3; Comments of NAB, ET Docket No. 18-295 (Feb. 15, 2019) at 11.

broadcasters were assured that unlicensed operations in shared spectrum would be allowed “only on a noninterference basis to other operations that have been authorized [for] the use of these bands under other Parts of the Rules. They must not cause any harmful interference to these operations . . . .”<sup>13</sup> Despite the Commission’s assurances and notwithstanding its rules, harmful interference has been ongoing for years in the 2.4 GHz bands, where BAS Channels 8 and 9 (2450-2467 and 2467-2483.5 MHz) overlap with or suffer from out-of-band emissions from Wi-Fi Channels 9 and 10 (2449.5-2454.5 and 2454.5-2459.5 MHz).

SBE’s own recent research confirms that interference detrimental to incumbent licensees operating in the 2.4 GHz band is ongoing decades after the Commission assured broadcasters that licensed uses would be protected. In January and March 2022, SBE’s National Frequency Coordination manager conducted an informal survey of a number of local frequency coordinators to determine whether BAS Channels 8 and 9 could routinely and reliably be used for ENG in their markets. In a few cases, some local coordinators indicated that those channels could be used reliably for ground-to-air operations only (such as a return link from a traffic helicopter), but in the majority of markets those channels were reported to be unusable due to harmful interference from Wi-Fi systems. Coordinators reported harmful interference in at least 13 markets: Albany, Chicago, Indianapolis, Los Angeles, Louisville, Milwaukee, Minneapolis, Nashville, New York City, Palm Beach, Phoenix, Raleigh, and San Francisco.

Some of the frequency coordinators surveyed by SBE provided spectrum plots to illustrate the extent of the interference. As one example, Figure 1 shows the Wi-Fi

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<sup>13</sup> *In Re Authorization of Spread Spectrum & Other Wideband Emissions Not Presently Provided for in the FCC Rules & Regulations*, First Report and Order, 101 FCC 2d 419, 426 (1985).

interference in BAS Channels 8 and 9 (and a portion of 10) at a site in Milwaukee. It is important to recognize that this interference occurs *during* ENG transmissions, despite a listen-before-talk CBP that is designed and intended to detect and avoid incumbent transmissions, including ENG.



Figure 1. Milwaukee

Substantial record evidence, including the data compiled by SBE’s survey, confirms that harmful Wi-Fi interference to ENG systems operating in the 2.4 GHz band continues to this day, despite a requirement in the Wi-Fi standard that unlicensed devices use a CBP—the same ineffective CBP that the *Order* assures broadcasters will be used at 6 GHz to protect against interference.<sup>14</sup>

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<sup>14</sup> The results of SBE’s survey are consistent with assessments of interference with incumbent devices caused by Wi-Fi equipment operating in the 6 GHz band. As one example, the field measurements conducted by Lockard and White on behalf of Southern Company demonstrate that 6 GHz Wi-Fi equipment fails to detect fixed-service systems and degrades the performance of those systems. See Letter from Southern Company Services, Inc. to Marlene H. Dortch, ET Docket No. 18-295 (June 23, 2021) & attach. A (“Test Report of the Effects of 6 GHz Unlicensed RLAN Units on Fortson to Columbus Microwave Link, June 21, 2021”).

#### IV. THE COMMISSION IGNORED EVIDENCE OF LONG-STANDING INTERFERENCE TO ENG DEVICES FROM UNLICENSED OPERATIONS IN THE 2.4 GHZ BAND

More than once during these proceedings, NAB has drawn the Commission's attention to the ongoing interference in the 2.4 GHz band:

As NAB has repeatedly noted, and as the Commission has steadfastly ignored, broadcasters have already seen this scenario play out in the 2.5 GHz BAS band. Portions of that band are now considered unusable for most BAS use cases precisely because there is no fast and reliable means for identifying the cause of harmful interference and shutting it down.<sup>15</sup>

The implications for this proceeding are obvious: If CBP has been insufficient to guard against interference in the 2.4 GHz band for many years, the same "safeguards" cannot be expected to protect against interference with licensed BAS operating in the 6 GHz band.

NAB made exactly that point to the Commission more than two years ago:

Despite assurances, despite rules to the contrary, despite modulation systems designed to minimize interference, and despite a "listen-before-talk" protocol that is supposed to prevent interference with licensed incumbents, the penetration of Wi-Fi has so polluted the shared portion of the 2.4 GHz band as to render it unusable for ENG . . . . [T]he Commission has both evidence and

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<sup>15</sup> Reply Comments of the National Association of Broadcasters, ET Docket No. 18-295 (July 27, 2020) at 5. See also, e.g., Comments of the National Association of Broadcasters, ET Docket No. 18-295 (June 29, 2020) at 6-7 ("[T]he present contention-based protocol used by most Wi-Fi systems, CSMA/CA, has been ineffective in eliminating interference to BAS Channels A8 and A9, which share spectrum with 2.4 GHz unlicensed systems."); Letter from Patrick McFadden to Marlene H. Dortch, ET Docket No. 18-295 (Apr. 10, 2020) at 3-4; Letter from Patrick McFadden to Marlene H. Dortch, ET Docket No. 18-295 (Mar. 27, 2020) at 1-2 ("[A] failure to resolve serious concerns over fundamentally incompatible operations [in the 6 GHz band] could lead to a repeat of the Commission's experience in the 2.4 GHz band."); Letter from Patrick McFadden to Marlene H. Dortch, ET Docket No. 18-295 (Mar. 23, 2020); Comments of the National Association of Broadcasters, ET Docket No. 18-295 (Feb. 15, 2019) at 11-12 ("The ubiquitous and uncoordinated use of [BAS Channels 8 and 9] by unlicensed Wi-Fi devices, mostly used indoors, has rendered licensed operations at [those Channels] practically impossible. There is no reason to believe that interference to similar BAS operations in the proposed U-NII-6 and U-NII-8 bands would be less likely to suffer interference from unlicensed operations within and near those bands."). Other commenters have made the same point. See, e.g., Comments of Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (EIBASS), ET Docket No. 18-295 (Feb. 15, 2019) ¶¶ 17-22 (providing examples of Part 15 devices interfering with BAS operations).



experience to demonstrate that uncoordinated operation in spectrum authorized for ENG will cause harmful interference.<sup>16</sup>

The *Order* did not acknowledge, cite, assess, or reconcile that historical evidence. Instead, the Commission doubled down on its conclusion that CBP would provide sufficient protection: “[W]e are requiring 6 GHz unlicensed devices to use a contention-based protocol. We conclude that such a protocol will allow unlicensed devices to sense the energy from nearby indoor licensed operations and avoid using that channel.”<sup>17</sup> In support, the *Order* cited a single study submitted by another commenter:

[W]e conclude the results of the Apple, Broadcom et al. study show the likely potential of contention-based protocols to protect indoor mobile links, including electronic news gathering and Low Power Auxiliary Stations. Thus, we conclude that the risk of harmful interference to indoor electronic news gathering receivers from indoor unlicensed devices is insignificant.<sup>18</sup>

As the D.C. Circuit concluded, though, “that study does not rebut [NAB’s] claims about interference in the 2.4 GHz band.”<sup>19</sup>

To the extent the Commission addressed evidence of interference with BAS by unlicensed devices in the 2.4 GHz band at all, it said only that “instances of harmful interference” with BAS in that band “have been effectively identified and addressed” over time.<sup>20</sup> That bold declaration is unsupported by any record citation or evidence, and it cannot be squared with broadcast engineers’ current, real-world experience with operations in the 2.4 GHz band. The Commission must address the significant and

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<sup>16</sup> Letter from Patrick McFadden to Marlene H. Dortch, ET Docket No. 18-295 (Mar. 23, 2020) at 2-3.

<sup>17</sup> *6 GHz Report and Order*, 35 FCC Rcd at 3915, ¶ 168.

<sup>18</sup> *Id.*

<sup>19</sup> *AT&T Servs.*, 21 F.4th at 853.

<sup>20</sup> *6 GHz Report and Order*, 35 FCC Rcd at 3908, ¶ 147.

ongoing interference with licensed devices, including ENG transmitters, in the 2.4 GHz band, and it must explain why it believes that CBP will protect ENG equipment against interference in the 6 GHz band when it has been flatly insufficient for decades to guard against interference with licensed devices in the 2.4 GHz band. The Commission's failure to grapple with that evidence renders the *Order* arbitrary and unsustainable.

If the Commission were to give proper weight to broadcasters' decades-long experience with the 2.4 GHz band, the conclusion that CBP provides insufficient protection against interference necessarily follows. The most—and perhaps only—straightforward and certain means of protecting licensed BAS operations, including ENG, in the 6 GHz spectrum band is the solution proposed by NAB: Reserve a portion of the 6 GHz band for use by licensed BAS, including ENG, in which unlicensed systems would be prohibited from operating. If a reasonable and reliable means of preventing interference develops in the future, the Commission can consider whether to authorize unlicensed operations in this set-aside spectrum at a later date.

## **V. CONCLUSION**

The Commission's proposals for protecting BAS operations in the U-NII-6 and U-NII-8 bands are plainly insufficient, as long experience with the 2.4 GHz band illustrates. The Commission had before it, but ignored, evidence that licensed operations in that band have been required (and, for the most part, have been unable) to fend off interference from unlicensed devices for decades, despite a requirement in the Wi-Fi standard that unlicensed devices operating in the 2.4 GHz band use a CBP. There is no reason to expect a better outcome at 6 GHz.

The only certain means of protecting BAS operations in the 6 GHz band is an order setting aside a small swath of spectrum in the 6 GHz band for licensed mobile operations. SBE supports NAB's call for such an order.

Respectfully submitted,

**THE SOCIETY OF BROADCAST ENGINEERS,  
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