



# PUBLIC NOTICE

Federal Communications Commission  
445 12<sup>th</sup> St., S.W.  
Washington, D.C. 20554

News Media Information 202 / 418-0500  
Internet: <https://www.fcc.gov>  
TTY: 1-888-835-5322

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## THE OFFICE OF ENGINEERING & TECHNOLOGY AND THE WIRELESS TELECOMMUNICATIONS BUREAU SEEK COMMENT ON EMISSION LIMITS FOR THE 24.25-27.5 GHz BAND

ET Docket No. 21-186; GN Docket No. 14-177

**Comment Date: [30 days after date of publication in the Federal Register]**  
**Reply Comment Date: [60 days after date of publications in the Federal Register]**

By this Public Notice, we seek comment on implementing certain of the decisions of the World Radiocommunication Conference held by the International Telecommunication Union (ITU) in 2019 (WRC-19) regarding the 24.25-27.5 GHz band. Specifically, we seek comment on aligning Parts 2 and 30 of the FCC's rules with the unwanted emissions limits into the passive 23.6-24.0 GHz band that were adopted at WRC-19.

*Background.* The 23.6-24.0 GHz band is allocated for the Earth Exploration Satellite Service (passive), Space Research Service (passive), and Radio Astronomy Service on a primary basis.<sup>1</sup> Passive sensors located on satellites are used to take measurements in this band of water vapor and cloud liquid water that are used in weather forecasting.<sup>2</sup> These passive sensors are designed to receive and measure natural emissions produced by the Earth's surface and its atmosphere.<sup>3</sup> As these sensors receive all natural and man-made emissions in general, passive sensors may not be able to differentiate these two sources of signals.

Within the 24.25-27.5 GHz band, the 24.25-24.45 GHz and 24.75-25.25 GHz bands are allocated to the Mobile Service for non-Federal use and the 25.25-27.5 GHz band is allocated to the Mobile Service for Federal use.<sup>4</sup> In 2017, the Commission established service rules for fixed and mobile operation in the 24.25-24.45 GHz and 24.75-25.25 GHz bands (collectively, 24 GHz band) under the Upper Microwave Flexible Use Service (UMFUS).<sup>5</sup> The Commission applied the UMFUS rules, including the technical

<sup>1</sup> 47 CFR § 2.106.

<sup>2</sup> *Handbook on Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction*, ITU Radiocommunications Bureau, at 75, 78 (2017) [https://library.wmo.int/doc\\_num.php?explnum\\_id=3793](https://library.wmo.int/doc_num.php?explnum_id=3793).

<sup>3</sup> *Id.* at 73.

<sup>4</sup> 47 CFR § 2.106.

<sup>5</sup> *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988, 10994-11002, paras. 15-42 (2017) (*Spectrum Frontiers Second R&O*). The Commission auctioned the 24 GHz UMFUS licenses in 2019. *See Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes;*

(continued....)

rules, to the 24 GHz band.<sup>6</sup> The UMFUS rules specify that emissions outside of a licensee's assigned frequency block must be limited to -13 dBm/MHz.<sup>7</sup> With respect to the passive systems operating in the 23.6-24 GHz band, the Commission noted that ongoing international studies include analyses to determine International Mobile Telecommunications (IMT)<sup>8</sup> out-of-band emission limits necessary to protect passive sensors onboard weather satellites in that band, and it acknowledged that the Commission's UMFUS rules might be revisited once these international studies have been completed.<sup>9</sup>

WRC-19 allocated 24.25-25.25 GHz to mobile (except aeronautical) on a primary basis in Regions 1 and 2, globally identified the 24.25-27.5 GHz band for IMT, and established limits of unwanted emissions that apply to IMT in the 24.25-27.5 GHz band to protect Earth Exploration-Satellite Service (EESS) passive systems in the 23.6-24.0 GHz band from harmful interference.<sup>10</sup> To protect EESS passive systems, WRC-19 modified a footnote to the International Table of Allocations to specify that Resolution 750 (Rev. WRC-19) applies to the 24.25-27.5 GHz band.<sup>11</sup> Resolution 750 specifies unwanted emission limits as the amount of power that may be radiated into any 200 megahertz of the 23.6-24.0 GHz passive band by IMT base stations and IMT mobile stations operating in the 24.25-27.5 GHz band. Resolution 750 specifies unwanted emission limits in terms of Total Radiated Power (TRP)<sup>12</sup> that currently apply to IMT stations and stricter emission limits that are effective for IMT stations brought into use after September 1, 2027.<sup>13</sup> These unwanted emission limits are shown in Table 1.

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*Winning Bidders Announced for Auction 102*, Public Notice, 34 FCC Rcd 4294 (OEA/WTB 2019). The Commission granted a total of 2,904 24 GHz UMFUS licenses to 29 applicants. See *Wireless Telecommunications Bureau Grants 24 GHz Band Upper Microwave Flexible Use Service Licenses*, Public Notice, 34 FCC Rcd 12079 (WTB 2019); *Wireless Telecommunications Bureau Grants 24 GHz Band Upper Microwave Flexible Use Service Licenses*, Public Notice, 35 FCC Rcd 614 (WTB 2020); *Wireless Telecommunications Bureau Grants 24 GHz Band Upper Microwave Flexible Use Service Licenses*, Public Notice, 35 FCC Rcd 8821 (WTB 2020).

<sup>6</sup> See 47 CFR Part 30, Subpart C.

<sup>7</sup> 47 CFR § 30.203(a). In the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower. As the 23.6-24 GHz passive band is 250 megahertz away from the UMFUS bands, the -5 dBm/MHz will not apply within that passive band for UMFUS licensees.

<sup>8</sup> IMT is the generic term used by the ITU to designate broadband mobile systems and encompasses IMT-2000, IMT-Advanced and IMT-2020. See <https://www.itu.int/en/ITU-R/Documents/ITU-R-FAQ-IMT.pdf> (last visited March 2, 2021).

<sup>9</sup> *Spectrum Frontiers 2nd R&O*, 32 FCC Rcd at 10997, para. 22. See also *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, 33 FCC Rcd 5576, 5581-62, para. 15 (2018).

<sup>10</sup> ITU Radio Regulations (2020), Resolution 750 (Rev.WRC-19), Table 1, Vol. 3 at 519, <https://www.itu.int/en/myitu/Publications/2020/09/02/14/23/Radio-Regulations-2020>. Resolution 750 specifies limits of unwanted emission power for IMT base stations and mobile stations.

<sup>11</sup> ITU Radio Regulations (2020), footnote 5.338A, Vol. 1 at 100.

<sup>12</sup> ITU Radio Regulations (2020), Resolution 750 (Rev.WRC-19), Note 5, Vol. 3 at 522.

<sup>13</sup> For IMT base stations and mobile stations brought into use prior to September 1, 2027, the more relaxed unwanted emission limits will continue to apply. ITU Radio Regulations (2020), Resolution 750 (Rev.WRC-19), Table 1, Vol. 3 at 519, 522.

Table 1: WRC-19 Resolution 750 Unwanted emissions permitted within any 200 megahertz in the 23.6-24 GHz passive band		
Type of Station	Current TRP Limits	TRP Limits After Sept. 1, 2027
IMT Base Stations	-33 dBW	-39 dBW
IMT Mobile Stations	-29 dBW	-35 dBW

The WRC-19 Final Acts updated the ITU Radio Regulations, including Resolution 750.<sup>14</sup> NTIA, FCC, and the Department of State share responsibility for implementing the WRC Final Acts in the United States. The Commission has authority to implement the changes to the Radio Regulations through its rulemaking proceedings. Given the importance of limiting unwanted emissions into the passive 23.6-24.0 GHz band, we seek to develop a record on implementing the changes to the emission limit in Resolution 750 applicable to active services in the 24 GHz band.

*Discussion.* The Office of Engineering and Technology and the Wireless Telecommunications Bureau seek comment broadly on implementing certain of the WRC-19 outcomes with respect to the 24.25-27.5 GHz band. Noting that the United States is a signatory to the treaty text of the Radio Regulations, we seek comment on modifying the Commission's rules in response to the unwanted emission limits and international allocation table footnotes adopted for the 24.25-27.5 GHz band at the WRC-19. These rule changes could include, for example, adding footnotes to the United States Table of Frequency Allocations or aligning the Commission's technical rules.<sup>15</sup>

Appropriate out-of-band emission limits in the 24.25-27.5 GHz band are important to protect passive sensing operations in the 23.6-24.0 GHz band. The limits adopted at WRC-19 are to be measured within a 200-megahertz bandwidth within the 400-megahertz 23.6-24 GHz passive band. For comparison with the Resolution 750 unwanted emission limit, a signal at -13 dBm/MHz (conductive or TRP)<sup>16</sup> would result in -20 dBW within a 200-megahertz bandwidth. However, we note that the -13 dBm/MHz emission limit applies at the edge of the UMFUS band—*i.e.* 24.25 GHz.<sup>17</sup> Given this, we seek to understand what level of emissions can be expected within the 23.6-24 GHz band from UMFUS transmitters, and whether and to what extent harmful interference to passive systems operating in the 23.6-24.0 GHz band is expected to occur from new 5G deployments at the current UMFUS limit.

Recognizing that the unwanted emission limits in Resolution 750 and the current out-of-band emission limits in the UMFUS rules are specified differently, and further recognizing the two-phased approach for the unwanted emissions limits that were adopted in WRC-19, we seek information on whether and how equipment intended for use under the UMFUS rules in the 24.25-24.45 GHz and 24.75-25.25 GHz bands can be designed to conform to the Resolution 750 limits—both the current limits and the more restrictive limits that apply to new equipment brought into use after September 1, 2027. Can licensees meet the WRC-19 TRP limits by the relevant deadlines? Is it possible that licensees can meet the -39 dBW limit for IMT base stations and the -35 dBW limit for IMT mobile stations prior to 2027?

<sup>14</sup> The Preamble of the WRC-19 Final Acts states that “[t]he majority of the provisions revised by WRC-19, as contained in the revision of the Radio Regulations referred to in this Preamble, shall enter into force as from 1 January 2021; the remaining provisions shall apply as from the dates indicated in the Resolutions listed in Article 59 of the revised Radio Regulations.” The revision of the Radio Regulations contained in the Final Acts is subject to approval by competent authorities of member states. See [https://www.itu.int/dms\\_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf](https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf).

<sup>15</sup> 47 CFR § 2.106; 47 CFR Part 30.

<sup>16</sup> 47 CFR § 30.203(a).

<sup>17</sup> Consequently, the unwanted emission would naturally decrease from the -13 dBm/MHz limit as the frequency of the emission is further separated from the 24.25 GHz edge of the UMFUS band.

What steps, if any, can the Commission take to help accelerate development and deployment of equipment that complies with the post-2027 limits?

We note that Resolution 750 specifies TRP as the only means of meeting the required emission limits. Are there any difficulties in performing over the air TRP measurements at such low signal levels in the 24.25-24.45 GHz and 24.75-25.25 GHz bands? Consistent with the current UMFUS rules, should a conductive power methodology also be included as an alternative means for equipment certification?

The UMFUS rules allow licensees flexibility as to the services they will deploy and the architecture of their networks. Under these rules licensees will be able to deploy mobile services.<sup>18</sup> Licensees will also have the freedom to implement point-to-point and point-to-multipoint systems.<sup>19</sup> The unwanted emission limits of Resolution 750 apply only to IMT base stations and mobile stations. The Commission's rules do not define IMT and do not require that equipment complying with a particular technical standard be used in a band licensed under the UMFUS rules. If the Commission were to adopt the emission limits in Resolution 750 for the 24.25-27.5 GHz band, how should it determine to what stations these limits will apply? Should they only apply to systems that meet the definition of IMT as specified by the ITU? Should the rules apply to point-to-point and point-to-multipoint equipment licensed under the UMFUS?<sup>20</sup> Should any mobile UMFUS equipment be required to comply with these unwanted emission limits regardless of the technology used, the application, and the density of deployment?

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Interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/>.
- Paper Filers: Parties that choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.
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- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID-19.

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<sup>18</sup> 47 CFR §§ 30.6(a), 30.202(a).

<sup>19</sup> 47 CFR Part 30 Subpart E.

<sup>20</sup> Commission licensees and Federal agencies have deployed nearly 40,000 point-to-point microwave links in the 21.2-23.6 GHz band immediately adjacent to the 23.6-24 GHz passive band that operate with the same unwanted emission limits that apply under the UMFUS rules. There is no indication these point-to-point links have caused harmful interference to passive sensors in 23.6-24 GHz.

- During the time the Commission's building is closed to the general public and until further notice, if more than one docket or rulemaking number appears in the caption of a proceeding, paper filers need not submit two additional copies for each additional docket or rulemaking number; an original and one copy are sufficient.

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*Additional Information.* For further information, contact Nicolas Oros of the Office of Engineering & Technology, at (202) 418-0636, or [Nicholas.Oros@fcc.gov](mailto:Nicholas.Oros@fcc.gov), or John Schauble of the Wireless Telecommunications Bureau, at (202) 418-0797, or [John.Schauble@fcc.gov](mailto:John.Schauble@fcc.gov).

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