

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**

Washington, DC 20554

In the Matter of	)	
	)	
International Bureau Seeks Comment	)	
On Recommendations Approved By	)	IB Docket No. 16-185
World Radiocommunication Conference	)	
Advisory Committee	)	

To: International Bureau  
CC: Michael Mullinex

**COMMENTS OF  
INTERESTED METEOROLOGICAL EXPERTS**

The interested meteorological experts, as listed below, provide comment in Docket No. 16-185, and specifically regarding the proposed adjacent band limits associated with Agenda Item 1.13 into the Earth exploration-satellite service (passive) EESS (passive) spectrum adjacent to several proposals.

Comments on the FCC proposals from the advisory committee (requested by the International Bureau) for WRC-19 as published on FCC.GOV

The undersigned entities consisting of meteorological experts associated with the operational (e.g., weather forecasting) and scientific uses of Earth exploration-satellite service (EESS) (passive) allocations, from space present the following comments in this proceeding:

- 1) The FCC USA Proposal to CITEL (Inter-American Telecommunications Commission), 1.13\_26\_ghz.doc (posted February 15, 2019) includes protection values proposed for inclusion in (ITU) Resolution 750 (WRC-19) as follows:

In Table 1-1 regarding the EESS (passive band) 23.6 – 24.0 GHz, associated with the “active service band” 24.25 – 24.75 GHz” the documents lists the limits of unwanted

emission power from active service stations in a specified bandwidth within the EESS (passive) band of

- -20 dBW in any 200 MHz of the EESS (passive) band for IMT base stations
- -20 dBW in any 200 MHz of the EESS (passive) band for IMT mobile stations

The undersigned experts believe the proposed protection values, presented without detailed rationale in the subject document, are considerably less stringent than values required to protect U.S. meteorological satellite remote sensing operations, which are critical for accurate and timely severe weather forecasting. We further believe that the proposed protection values have not been adequately analyzed and vetted through U.S. stakeholder agencies and departments prior to the preparatory meetings in advance of WRC-19.

Meteorological use of this band consists of passive remote sensing measurements of small changes in the Earth's atmosphere (e.g.: wind speed & direction, temperature and moisture content as a function of altitude). This data, measured constantly by U.S. and other satellites, is critical for accurate global weather forecast models. If active transmissions in this band or in adjacent bands cause interference, the resulting corrupted data cannot be used in forecast models. The U.S. has made billions of dollars of investment in satellites, supercomputers, weather forecast modeling and first-responder infrastructure and cannot accept the risk that passive microwave data will no longer be trustworthy or perhaps even available.

None of the undersigned experts are direct participants in the ITU regulatory process and would look to the World Meteorological Organization (WMO) or the IEEE Committee on Radio Frequencies (CORF) to provide inputs into regulatory studies on topics associated with passive remote sensing. These undersigned experts would also assume that Federal agencies, working in concert with the Federal regulator of spectrum (U.S. Department of Commerce, National Telecommunications and Information Administration) would work to provide a comprehensive view that could include the interests of Federal users of meteorological information. It is not clear what happened in this case, yet recent press reports indicate this process may not have covered all the issues of concern<sup>1</sup>.

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<sup>1</sup> See the following articles:

<https://www.washingtonpost.com/weather/2019/03/13/fcc-auction-off-wireless-spectrum-that-could-interfere-with-vital-weather-data-rejecting-requests-us-house-science-agencies>

<https://spacenews.com/5g-trumps-weather-in-spectrum-debate/>

<https://science.house.gov/news/press-releases/chairwoman-johnson-and-ranking-member-lucas-request-delay-5g-spectrum-auction>

The WMO, in its contribution to the ITU study process, cited protection levels in the 24 GHz band that are much more stringent than those proposed in these FCC documents.

The WMO cited an analysis that “concludes that EESS (passive) sensor protection will require the IMT-2020 stations operated in the 24.25 – 24.75 GHz band to respect the following maximum unwanted emission levels in the band 23.6 – 24 GHz:

- For Base Stations: -54 dBW/200 MHz
- For User Equipment (e.g. Mobiles): -50 dBW/ 200 MHz

The WMO also noted that compatibility studies from five other ITU members with similar assumptions let to a range of necessary IMT-2020 unwanted emission levels.

- For Base Stations: - 42 to -49 dBW/200 MHz
- For User Equipment: -38 to -45 dBW/200 MHz

Yet this FCC proposal recommends without any detailed explanation -20 dBW/200 MHz. The undersigned experts question the vast differences in the values above when compared with the FCC recommendation for CITELE.

Simple mathematics can adjust the -20 dBW/200 MHz value as one referenced in 1 MHz, and then change dBW to dBm to yield -13 dBm/MHz. Is it a coincidence that this value is what is stated in part 47 of the Code of Federal Regulations in section 30.203 that sets the Emission Limits for the FCC’s Upper Microwave Flexible Use Services (UMFUS)? This service applies to the current ongoing FCC domestic auction in the 24 GHz band, and one might assume would be applied to any future band the FCC might auction as a result of selection at the ITU’s WRC-19. A value of -13 dBm/MHz (same as – 20 dBW/200 MHz) would enable the manufacturers to use existing base stations and user equipment designs that comply with this value, without any modification, as they implement 5G in newly auctioned bands.

### Meteorological Applications

Frequency bands reserved for EESS (passive) have vastly different uses. However, many are used in conjunction with other microwave band measurements to support specific imagery products or models. Some of these include:

- 23.8 GHz Passive Band: Integrated Water Vapor atmospheric correction, used to support wind speed and wind direction determination

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- 36.5 GHz Passive Band: Imagery, Hurricane Monitoring, Sea Surface Wind Speed and Direction, used to support wind speed, wind direction, hurricane monitoring, soil moisture measurements, snow, sea ice, sea surface temperature, precipitation, water vapor, and imagery
- 50 – 60 GHz Passive Band: Atmospheric Vertical Temperature models (using multiple bands) used to derive the temperature and moisture at different heights in the atmosphere.

All the passive bands are frequency specific; they cannot be moved elsewhere in frequency to perform this detection of weak natural emissions from the atmosphere.

When making decisions related to forecasts and issuing watches, warnings and advisories, forecasters rely heavily on the information from these bands that are inputted to supercomputers that run numerical prediction models. These inputs make a significant difference in refining the quality and accuracy of hazard information to the public and to industry to drive decisions involving safety of life and property, preparation in advance of severe weather, and decisions in weather-sensitive industry sectors that contribute billions of dollars to the U.S. economy.

For the severe winter storm exhibiting cyclone-like winds that impacted the central U.S. on approximately March 13-16, 2019, meteorologists developing warning statements relied on satellite measurements including those in these aforementioned microwave bands to support formulation of their warnings issued starting on March 12 to include ...

a) “POTENT WINTER STORM TAKING AIM AT EASTERN COLORADO ... Satellite imagery and the latest computer forecast models continue showing a very strong storm system developing in the next 24 hours ... this warning continues to describe blizzard conditions, where travel could be difficult, high winds involving tree damage, power outages and road closures.” The forecast office, after noting the local airport clocking a 75 mile per hour wind gust along with heavy snow, stated “and yes, that is the equivalent of a Category 1 Hurricane.”

That storm moved over the Great Plains causing more damage, and ice flows that caused flooding on several rivers in Western Nebraska, from which residents are still feeling the impact. The National Weather Service forecast office in Omaha Nebraska actually had to evacuate from flood waters within the past few days.

b) “Hurricane Harvey” 2017 was termed the most significant tropical cyclone rainfall event in United States history, both in scope and peak rainfall amounts, since reliable rainfall records began around the 1880s<sup>2</sup>. As noted in the storm report, Hurricane Harvey stalled with its center over or near the Texas coast for four days,

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<sup>2</sup> [https://www.nhc.noaa.gov/data/tcr/AL092017\\_Harvey.pdf](https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf)

dropping historic amounts of rainfall of more than 60 inches over southeastern Texas. The report states, “Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), the European Space Agency’s Advanced Scatterometer (ASCAT) and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in construction the best track of Harvey.”

All of the aforementioned sensors feature microwave-based passive remote sensors using many of the bands cited in this letter.

c) Hurricane Sandy (2012) was experienced by millions on the eastern seaboard, and the National Hurricane Center’s report<sup>3</sup> also acknowledges the contribution from polar-orbiting satellites to its forecast accuracy: “Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Tropical Rainfall Measuring Mission (TRMM), Defense Meteorological Satellite Program (DMSP) satellites and the European Advanced Scatterometer (ASCAT) satellite, among others, were also useful in constructing the best track of Sandy.

The Advanced Microwave Scanning Radiometer (AMSR) and most of its variants, operated by NOAA, EUMETSAT, NASA Aqua, Japan’s GCOM-W series and the Jason series of satellites, utilize the 23.6-24 GHz passive band in their design. The newer NOAA-20 and NPP satellites also have this passive band in their Advanced Technology Microwave Sounder, a next generation sensor from the AMSR family.

The undersigned experts could cite many other examples of specific hazardous weather incidents that have relied on the results of the natural measurements in many of these microwave bands. Failure to apply adequate protection of these sensitive spaceborne instruments could have significant impact on the accuracy of weather forecasting, depending upon how many bands and how significant the adjacent band interference levels are with respect to the measurement threshold of a given weather sensor.

We do not believe adequate analysis has been performed to validate the -20 dBW/200 MHz value contained in this FCC CITE proposal, and we express concern that the impact on meteorology has the potential to degrade a key component of data used to inform the public of weather hazards and aid weather-sensitive industries from making the right decisions to continue to fuel the economy in the face of weather threats throughout the Americas.

Satellite data derived from the above noted meteorological satellite sensors is used for weather forecasting in every country in North, South, and Central America.

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<sup>3</sup> [https://www.nhc.noaa.gov/data/tcr/AL182012\\_Sandy.pdf](https://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf)

The experts transmitting this comment urge adoption of a much more stringent adjacent band protection limit, such as the WMO recommendation (For Base Stations: -54 dBW/200 MHz; For User Equipment (e.g. Mobiles): -50 dBW/ 200 MHz), or proposals by space agencies, instead of the apparently arbitrary – 20 dBW/200 MHz value suggested by this proceeding.

Respectfully Submitted,

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