

Summary of Second R&O, Second FNPRM, Order on Recon, and MOO: Use of Spectrum Bands Above 24 GHz For Mobile Radio Services (GN Docket No. 14-177)

November 27, 2017

On November 22, 2017, the Federal Communications Commission (FCC or Commission) released a Second Report and Order (Second R&O), Second Further Notice of Proposed Rulemaking (Second FNPRM), Order on Reconsideration (Order on Recon), and Memorandum, Opinion, and Order (MOO) on expanding flexible use in millimeter wave (mmW) spectrum at or above 24 GHz. Comments responding to the Second FNPRM are due January 23, 2018, and reply comments are due February 22, 2018.

The *Second R&O* (i) makes an additional 1700 megahertz of mmW spectrum available for flexible use in the 24.25-24.45 GHz and 24.75-25.25 GHz bands (24 GHz bands) and 47.2-48.2 GHz band; (ii) clarifies Upper Microwave Flexible Use Service (UMFUS) performance requirements; (iii) establishes mobile spectrum holding policies for mmW spectrum; (iv) authorizes expanded unlicensed use in the 57-71 GHz band on-board aircraft; and (vi) amends certain Part 1 rules.

The *Second FNPRM* seeks comment on (i) proposals to facilitate more flexible Fixed Satellite Service (FSS) use of the 24.75-25.25 GHz band; (ii) additional metric options for mmW licensees to demonstrate compliance with performance obligations; (iii) a proposal to eliminate the pre-auction mobile spectrum holding limits for the 28 GHz, 37 GHz, and 39 GHz bands; and (iv) a proposal to adopt an operability rule for equipment operating in the 24 GHz band.

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The *Order on Recon* (i) rescinds the 5G security and reporting requirements; (ii) amends satellite earth station requirements in the 28 GHz and 39 GHz bands; (iii) maintains unlicensed use of the 64-71 GHz band; (iv) declines to adopt band-specific spectrum holding limits for the 28 GHz, 37 GHz, and 39 GHz bands; (v) affirms UMFUS licensing and performance rules for the 28 GHz and 39 GHz bands; and (vi) clarifies the applicability of Part 30 rules to satellite operations.

The *MOO* (i) maintains the 40-42 GHz and 48.2-50.2 GHz bands for FSS use; (ii) maintains the 70 and 80 GHz bands for fixed wireless use; (iii) affirms satellite earth station operational requirements in the 37.5-40 GHz band; and (iv) declines to adopt use-or-share rules for UMFUS bands; (v) declines to require UMFUS licensees to transmit digital identifiers; (vi) declines to adopt antenna height limits or fixed point-to-point operator coordination criteria; (vii) affirms current power limit rules for mobile and transportable devices; and (viii) affirms the Commission's preference for sharing models and scenarios that consider the statistical probability of interference over the worst-case scenario.

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Second Report and Order

A. Additional Bands

1. 24 GHz Bands (24.25-24.45 GHz and 24.75-25.25 GHz)

Suitability for Mobile Use. The FCC adds a mobile allocation on a primary basis to the 24.25-24.45 GHz and 24.75-25.25 GHz bands. The agency authorizes both mobile and fixed operations the 24 GHz bands under its Part 30 UMFUS rules. (¶¶ 19, 22).

Licensing the 24 GHz Band—Use of Geographic Area Licensing. The Commission will license the 24 GHz band by Partial Economic Areas (PEA). (¶¶ 27-28).

Band Plan. The FCC will license the 24 GHz band in 100 megahertz channels, with the 24.25-24.45 GHz band licensed as two 100 megahertz channels and the 24.75-25.25 GHz band licensed as five 100 megahertz channels. (¶ 34).

Satellite Sharing in the Upper Segment of the 24 GHz Band. The agency maintains its existing earth station siting rules. Thus, Broadcast Satellite Service (BSS) feeder links may still operate in the entire 24.75-25.25 GHz band, and non-BSS Fixed Satellite Service (FSS) earth stations may operate in the 24.75-25.05 GHz portion of the band. (¶¶ 38-39). The Commission seeks further comment on this issue in the *Second FNPRM*.

Mobile Rights for Incumbents. The Commission will convert incumbent terrestrial licenses in the 24 GHz band to UMFUS, which are subject to the agency's Part 30 licensing rules. Incumbent licensees will have until June 1, 2024 or the time of their next license renewal, whichever is later, to demonstrate compliance with Part 30 buildout requirements. (¶¶ 41-42).

2. 47.2-48.2 GHz Band

Suitability for Mobile Service. The FCC will authorize both fixed and mobile UMFUS operations in the 47.2-48.2 GHz band. (¶ 47).

Licensing the 47.2-48 GHz Band. New UMFUS licenses will be issued using PEA-based geographic area licensing. (¶ 50).

Non-Federal Satellite Terrestrial Sharing—Licensing of Gateway Earth Stations. The FCC permits sharing between terrestrial and FSS earth station uplink operations in the 47.2-48.2 GHz band subject to Section 25.136(d) of the agency's rules. Satellite operators may deploy three FSS earth stations in each county (up to a maximum of 15 earth stations in each PEA). The Commission adopts a new U.S. Table of Allocations footnote specifying interference protection obligations of FSS and UMFUS operations in the band. (¶ 54).

Band Plan. The FCC will license the 47.2-48.2 GHz band as five 200 megahertz blocks. (¶ 59).

B. Performance Requirements—Additional Metrics

The FCC declines to adopt usage-based metrics, finding that it would be premature to establish substantial service requirements for nascent Internet of Things (IoT)-type services. These services are still subject to UMFUS buildout requirements. (¶ 64). The FCC seeks comment on whether to adopt a geographic area coverage metric for fixed and mobile services in the *Second FNPRM*.

The FCC amends its existing Part 30 rules to clarify that the term "fixed point-to-point link" is based on power level, thereby distinguishing "traditional" point-to-point links from the sensor and device connections used in IoT networks for purposes of the agency's substantial service requirement.

Specifically, the FCC will define a "fixed point-to-point link" as point-to-point transmissions where the transmit power exceeds +43 dBm. (¶¶ 65-69).

C. Mobile Spectrum Holdings Policies

The Commission declines to set pre-auction limits on the amount of spectrum an entity may acquire at auction in the 24 GHz and 47 GHz bands. The agency will, however, include the 24 GHz and 47 GHz bands as part of the total mmW spectrum threshold for reviewing proposed secondary market transactions. (¶¶ 73-74). The FCC seeks comment on whether to eliminate the pre-auction limits on the amount of spectrum in the 28 GHz, 37 GHz, and 39 GHz bands that an entity may acquire at auction in its *Second FNPRM*, as well as whether the Commission should review mmW band holdings on a case-by-case basis for initial, post-auction license applications.

D. Part 15 Operation On-Board Aircraft in the 57-71 GHz Band

The FCC amends Part 15 of its rules to permit unlicensed operations in the 57-71 GHz band on-board aircraft. The Commission will now allow up to six, non-overlapping WiGig channels of 2160 megahertz each to operate during flight. (¶¶ 75, 80).

E. Amendments to Certain Part 1 Rules

The Commission amends Section 1.901 (Basis and Purpose) and Section 1.902 (Scope) to clarify that UMFUS is subject to Subpart F of the FCC's rules. (¶ 89).

Second Further Notice of Proposed Rulemaking

A. FSS Use of 24.75-25.25 GHz Band

The FCC seeks comment on the following:

- the agency's proposal to permit FSS earth station operations in the 24.75-25.25 GHz band on a co-primary basis subject to limits in Section 25.136 of the FCC's rules; (¶ 94)
- the agency's proposal to amend various earth station application and licensing requirements to conform with its proposal to permit co-primary FSS operations in the band; (¶ 94)
- the agency's proposal to add a U.S. Table of Allocations footnote specifying FSS and UMFUS interference protection obligations and to eliminate footnote NG535, which provides priority to BSS feeder links, to facilitate use of the 24.75-25.25 GHz band for general FSS uplink operations; (¶ 94)
- the agency's proposal to eliminate Section 25.262(a) orbital-location restrictions for 17/24 GHz BSS space stations; (¶ 94)
- whether the agency should address the potential of aggregate interference from UMFUS operations to satellite receivers in the 24.75-25.25 GHz band; (¶ 95) and
- additional proposals to modify Part 25 of the FCC's rules, consistent with proposals above. (¶¶ 96-97).

B. Performance Requirements—Geographic Area Metric

The Commission requests comment on whether to adopt a geographic area or other performance metric option for assessing deployment of IoT-type services. The FCC seeks comment on whether to adopt, for example, a buildout metric requirement of 25% geographic coverage of the license area or coverage in 25% of a subset of units in the license area, such as census tracts, counties, or some other area. The Commission welcomes comment on the most appropriate metric for evaluating deployment in mmW bands. (¶¶ 99-104).

C. Mobile Spectrum Holdings

The FCC seeks comment on its proposal to eliminate the pre-auction limit of 1250 megahertz for the 28 GHz, 37 GHz, and 39 GHz bands. For commenters advocating in favor of retaining the pre-auction limit, the agency asks for recommendations on how the limit should be implemented and potential consequences of having a pre-auction limit for the 28 GHz, 37 GHz, and 39 GHz bands, but not the 24 GHz or 47.2-48.2 GHz bands. The Commission also seeks comment on whether to apply a case-by-case review of mmW spectrum holdings to post-auction applications for initial mmW licenses in the event pre-auction limits are eliminated. (¶¶ 105-106).

D. Operability in 24 GHz

The Commission proposes to require that equipment operating in the 24 GHz band must be able to operate across the entire 24 GHz band (i.e. on all frequencies in the 24.25-24.45 GHz and 24.75-25.25 GHz bands). The agency seeks comment on this proposed operability rule. (¶ 108).

E. Other Millimeter Wave Bands

The Commission reiterates that other mmW spectrum bands remain under consideration for flexible terrestrial wireless use. The FCC invites comment on any new studies or quantitative data that the agency should consider ahead of future proceedings. The FCC also invites comment on additional mmW bands that have not been raised in this proceeding, but should be considered for flexible use. (¶ 109).

Order on Reconsideration

A. Security

The FCC agrees with several petitioners that security and reporting requirements adopted in the *First R&O* are premature, and the agency therefore rescinds them. The Commission intends to foster network security through further development of voluntary best practices, relying on recommendations from the Communications Security, Reliability, and Interoperability Council. (¶¶ 111-13).

B. Earth Station Siting Rules

1. Background

2. 0.1 Percent Population Limit

The FCC rejects proposals to increase the earth station exclusion zone limit from 0.1 percent population to 0.2 percent in larger markets; however, the FCC will provide additional flexibility in second- and third-tier markets. (¶¶ 124-25, 127).

Limits in the 28 GHz band will be:

- 0.1 percent of population in UMFUS license area, where the population is greater than 450,000 within the UMFUS license area;

- 450 people, where the population is between 6,000 and 450,000 within the UMFUS license area; and
- 7.5 percent of population in the UMFUS license area, where the population is fewer than 6,000 within the UMFUS license area. (¶ 127).

Limits in the 37.5-40 GHz band will be:

- 0.1 percent of population in the PEA, where the population is greater than 2,250,000 within the PEA where the earth station is located;
- 2,250 people, where the population is between 60,000 and 2,250,000 within the PEA where the earth station is located; and
- 3.75 percent of population in the PEA, where the population is fewer than 60,000 within the PEA where the earth station is located. (¶ 127).

3. Other Limits on Earth Station Siting

The FCC denies requests to modify or repeal limitations on deployment of earth stations in certain transit routes or mass gathering locations. The Commission clarifies that earth stations should avoid siting near interstates, other freeways and expressways, and other principal arterial as defined by the U.S. Department of Transportation. The Commission further clarifies that “major event venues” are venues where large numbers of people could gather on a regular basis in a setting where they would expect to use wireless service. (¶¶ 129-33).

4. Numerical Limits on Earth Stations

The Commission declines to eliminate the three earth station per license area for the 28 GHz band. However, the agency will increase the limit from three to 15 earth stations per PEA, but with no more than three earth station locations per county, in the 37.5-40 GHz band. For purposes of complying with the earth station limit, the FCC clarifies that although each location may accommodate multiple earth stations that are either collocated or at contiguous locations, earth station deployments must comply with siting rules and limits on the proliferation of surrounding protection zones. (¶¶ 135, 137, 139).

5. Placement of Additional Antennas at Grandfathered 28 GHz Sites

The FCC rejects requests to exempt additional earth stations at grandfathered 28 GHz sites from the 0.1 percent population limitation rule if they are located within one second (latitude and longitude) of grandfathered sites. (¶ 141).

C. Secondary Status of FSS in 28 GHz Band

The FCC rejects arguments to grant co-primary status to FSS operators in the 28 GHz band, and they will remain secondary to fixed and mobile terrestrial operations in the band. (¶ 144).

D. 28 GHz Aggregate Interference

The FCC declines petitions to establish an overall limit on aggregate interference to satellite receivers in the 28 GHz band. (¶ 147).

E. Base Station Power Limit

The Commission denies requests to reconsider the base station power limit of 75 dBm/100 MHz EIRP for UMFUS. (¶ 151).

F. Base Station Location Disclosure

The FCC denies requests to establish a database of UMFUS facilities, finding that the burden on UMFUS licensees to maintain and update database information would outweigh any benefit. (¶ 156).

G. 64-71 GHz

The Commission affirms its decision to authorize unlicensed operations across the entire 64-71 GHz band. (¶ 159).

H. Mobile Spectrum Holdings (In-Band Aggregation Limits)

The FCC declines requests to adopt band-specific spectrum holding limits for the 28 GHz, 37 GHz, and 39 GHz bands. (¶ 162).

I. 28 GHz and 39 GHz License Area Sizes

28 GHz Band. The FCC affirms its decision to issue county-based, geographic-area licenses for UMFUS in the 28 GHz band. (¶ 166).

39 GHz Band. The agency also affirms its decision to license areas by PEA in the 39 GHz band. (¶ 170).

J. Performance Requirements for Incumbent Licenses

The Commission declines proposals to reduce its performance requirements or provide incumbent licensees with greater flexibility in satisfying performance rules. (¶ 176).

K. Splitting of 28 GHz Band into Two Licenses

The FCC affirms its decision to divide the 850 megahertz A1 Band into two 425 megahertz segments. (¶ 182).

L. Applicability of Part 30 Rules to Satellite Operations

The Commission clarifies that it did not intend to apply Part 30 technical rules to satellite operations, and the agency amends Section 30.6 to state that these rules do not apply when UMFUS licenses are used in connection with satellite operations. The FCC emphasized that Part 30 licensing rules will nevertheless apply to all UMFUS licenses regardless of use. (¶ 184).

Memorandum Opinion and Order

A. 48.2-50.2 GHz

The FCC declines to authorize fixed and mobile operations in the 48.2-50.2 GHz band. The Commission will reserve the band for FSS. (¶ 189).

B. 40-42 GHz

The FCC declines to propose mobile use in the 40-42 GHz band, reserving spectrum instead for FSS operations. (¶ 192).

C. 71-76 and 81-86 GHz Bands (70/80 GHz Band)

1. Introduction

2. Mobile Use

The FCC declines to authorize mobile use in the 70 GHz and 80 GHz bands, observing that the agency currently has several pending proposals in its wireless backhaul proceeding (WT Docket No. 10-153) to modify existing rules for the 70/80 GHz band. (¶¶ 200-01).

3. Indoor-only Unlicensed Use under Part 15

The FCC declines to authorize indoor-only unlicensed use under Part 15 in the 70/80 GHz bands. The Commission said that further study is needed to ensure that unlicensed use will not harmfully interfere with incumbent operations in the bands. (¶ 206).

D. 37.5-40 GHz Band Satellite Issues

1. Satellite Power Flux Density Limits

The Commission decided not to permit FSS operations at higher power flux density (PFD) limits in the 37.5-40 GHz band and will not change Section 25.208(q) or (r) of the FCC's rules. It determined that the existing limits are necessary to protect fixed systems and emerging IoT services. (¶¶ 214, 216).

2. Authorizing Satellite User Equipment

The FCC affirms its decisions to prohibit ubiquitous deployment of earth station facilities in the 37.7- 40 GHz band and prohibit service to individual consumers. (¶ 219).

E. Performance Requirements—Non-Federal Use-or-Share

The Commission declines to adopt any use-or-share rules for UMFUS bands, finding that administration of such regime would be overly burdensome and may discourage investment. (¶ 225).

F. Digital Station Identification

The FCC rejects proposals to require mmW band licensees or operators to transmit digital identifiers. The Commission indicates that the record lacks support for the adoption of a digital identification mandate. (¶ 237).

G. Technical Issues

Antenna Height. The Commission declines to adopt antenna height limits, maintaining that licensees are in the best position to determine their network configuration and when antenna downtilt is necessary. (¶ 241).

Coordination Criteria at Market Borders for Fixed Point-to-Point Operations. The FCC declines to revise its coordination criteria for point-to-point operations. (¶ 248).

Minimum Bandwidth for Given BS/MS/Transportable Transmit Power Levels. The Commission affirms its current power limit rule for mobile and transportable classes without scaling. (¶ 253). The FCC declines to establish a minimum bandwidth requirement. (¶ 255).

Sharing Analysis and Modeling. The FCC says that it generally agrees with commenters supporting use of models and scenarios that consider the statistical probability of interference based on deployment, propagation, and usage scenarios. The Commission indicates that it will remain flexible when evaluating mmW sharing proposals. (¶ 258).