

5G Spectrum

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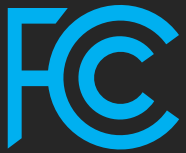
- Future millimeter wave bands
 - Technological Advisory Council (TAC) recommendation to study millimeter wave spectrum
 - Notice of Inquiry (NOI) in October 2014
 - Received comments from multiple industries and academia, 66 comments and reply comments
 - Notice of Proposed Rulemaking October 2015.

Spectrum Frontiers NOI



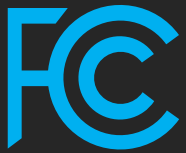
- Explored a number of bands above 24 GHz, asking questions in three areas
- What bands?
 - Physical properties
 - Existing uses
- What licensing models?
 - Licensed
 - Unlicensed
 - Innovative hybrids
- What technical rules?
 - Maintain flexibility for antenna arrays, massive MIMO, etc.

NOI Frequency Bands



Band	Comments
24 GHz	<ul style="list-style-type: none">• No mobile allocation• Two band segments, 24.25-24.45 GHz and 25.05-25.25 GHz• Licensed in geographic areas to fixed services
LMDS	<ul style="list-style-type: none">• Co-primary for fixed and mobile• Three band segments, 27.5-28.35 GHz, 29.1-29.25 GHz, and 31-31.3 GHz• Licensed on geographical basis• FSS sharing possible
37/42 GHz	<ul style="list-style-type: none">• Co-primary for fixed and mobile (but not authorized for mobile)• Large contiguous bands 37-38.6 (1.6 GHz) and 42-42.5 (0.5 GHz)• Larger contiguous block possible by combining with 39 GHz band• Federal use
39 GHz	<ul style="list-style-type: none">• Co-primary for fixed and mobile• Large contiguous bands 38.6-40.0 (1.4 GHz)• Licensed by Economic Area
60 GHz	<ul style="list-style-type: none">• Co-primary for fixed and mobile• Large contiguous bands 57-64 (7 GHz) and 64-71 (7 GHz)• Unlicensed operation in the 57-64 GHz band (IEEE 802.11ad)
70/80 GHz	<ul style="list-style-type: none">• Co-primary for fixed and mobile• Large contiguous bands 71-76 (5 GHz) and 81-86 (5 GHz)• Non-exclusive licensed operation, database aided spectrum coordination

Upcoming NPRM



- NPRM
 - The NPRM is an opportunity to take another step toward creating a regulatory environment in which 5G technologies can flourish
 - further support flexible use spectrum policies and innovative licensing schemes.
 - The NPRM proposes a mix of licensed and unlicensed, and creates opportunities for sharing among different kinds of users and use cases: fixed/mobile/FSS/government; terrestrial/satellite; indoor/outdoor; carrier network/private network.
 - The NPRM proposes to create new fixed & mobile licenses in a subset of the bands in the NOI including:
 - 27.5-28.35 GHz (28 GHz band)
 - 38.6-40 GHz (39 GHz band)
 - 37-38.6 GHz band (37 GHz band)
 - The Commission may include additional bands at adoption.

Thank You