



mmW Measurement Topics for Further Investigation

Office of Engineering and
Technology
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NOTE: Corrections made following the presentation



Summary of Technical Rules

● Part 30

– Transmit Power

- The average power of the sum of all antenna elements is limited to a maximum EIRP or EIRP Density of
 - +75 dBm/100 MHz (Fixed and Base Stations)
 - +43 dBm (Mobile Stations)
 - +55 dBm (Transportable Stations)
- For fixed P2P or PMP, the maximum allowable EIRP is as specified in §30.405

– Out of Band Emission (OOBE)

- The conductive power or the total radiated power of any emission outside a licensee's frequency block
 - – 5 dBm/MHz (in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth)
 - –13 dBm/MHz or lower (Elsewhere)
- For fixed P2P or PMP, the mean power of emissions must be attenuated below the transmitter mean output power in accordance with the schedule in §30.404(a)



Summary of Technical Rules

- Part 15 (57- 71 GHz)
 - Transmit Power (other than Field Disturbance Sensors)
 - Maximum EIRP of
 - 40 dBm (Average) and 43 dBm (Peak)
 - 82 dBm (Fixed P2P Located Outdoors)*
 - Maximum Conducted Power of
 - 500 mW
 - 500mW times EBW/100 MHz (for EBW of less than 100 MHz)
 - Transmit Power (Field Disturbance Sensors)
 - Maximum EIRP of
 - 40 dBm (Average) and 43 dBm (Peak) (less than 500 MHz BW)
 - Spurious Emission
 - General Limits as Specified in §15.209 (Radiated Emissions below 40 GHz)
 - 90 pW/cm² (Between 40 GHz and 200 GHz)
 - 10 dBm (Average) and 13 dBm (peak) (Field Disturbance Sensors w/ less than 500 MHz BW)

- *Subject to 2 dB reduction for every dB that the Antenna Gain is less than 51 dBi



Road to Certification of mmW Applications

- Technical Community and Regulatory Bodies are Developing Appropriate Test Procedures
 - Addressing Proper Measurement Methods to Verify Compliance with Above Mentioned Rules
- FCC Looking for Recommendations from Technical Community (C63 mmW WG, etc.)
 - Harmonized Method(s) that are Practical and Accurately Measure Quantities of Interest
- Meanwhile Laboratory Division Accepts Test Reports or Applications Pertaining to mmW Devices or Systems



Road to Certification of mmW Applications

- Given the Challenges and Complexity of Microwave Measurements in mmW Region, the Test Reports are expected to Address Measurement Challenges due to:
 - Electromagnetic Environment
 - Extremely Low Signal Level
 - Large Far Field Distance
 - Size of the Quiet Zone, Operating Frequency of Chamber, etc.
 - Characteristics of RF Elements
 - Integrated Antennas, Large Scale (Massive) MIMO, Beam Forming Capabilities, etc.
 - Limitation in Performance of Test Equipment
 - Dynamic Range in Field Strength or Power Measurement
 - Measurement Bandwidth, FFT Window Size, etc.



Accuracy and Validation of Measurement

- Additionally, the Reports Need to Address the Following,
 - How the Proposed Measurement Method Quantifies its Accuracy?
 - How the Proposed Method Validates the Results?