



**DFS New Rules**  
**KDB Publication 905462 D02**  
**Clients without Radar Detection**  
**KDB Publication 905462 D03**  
**TCB Workshop**

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# References

- UNII Docket 13-49
  - [Report and Order FCC 14-30](#)
  - [Addendum FCC 14-1411](#)
- KDB Publication 905462
  - DFS Test Procedure
    - [905462 D02 UNII DFS Compliance Procedures New Rules v01r01](#)
  - Clients Without Radar Detection Capability
    - [905462 D03 UNII Clients Without Radar Detection New Rules v01r01](#)
  - DFS required for U-NII-2A (5250-5350 MHz) and U-NII-2C (5470-5725 MHz) bands §15.407(h)(2)



# DFS - New Requirements

- Radar Detection Threshold
  - Harmonized with ETSI standard

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
<p><b>Note 1:</b> This is the level at the input of the receiver assuming a 0 dBi receive antenna.</p> <p><b>Note 2:</b> Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.</p> <p><b>Note 3:</b> EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.</p>	



# DFS - New Requirements

- Radar Detection BW
  - **100 % OBW** (99% power BW)
  - Bin 0 *fixed* radar waveform (Formerly Bin 1)
  - Step size
    - 5 MHz until detections are reduced
    - 1MHz steps at frequencies where the detection rate begins to fall
- Uniform Spreading no longer required
  - Facilitates use of wider BW devices (eg: 802.11ac)
  - Manual selection of channels permitted (eg: first channel selection in GUI)



# DFS - New Requirements

## ● Channel Loading

- Data must be of the type typically used with the device
- Simulated data traffic permitted
  - Randomized pings of the client
- Minimum channel loading approximately 17% or greater
  - Timing plot required
  - Calculate percentage
    - $\text{Time On}/(\text{Time On} + \text{Time Off})$
- Unicast or Multicast protocol preferred but not required



# DFS - New Requirements

- TDWR band (5600-5650 MHz)
  - **No longer required to block the TDWR band**
  - New Bin 1 waveforms
    - Test A - 15 unique PRI values randomly selected from the list of 23 TDWR PRI values
    - Test B – 15 unique PRI values randomly selected within the range of 518-3066  $\mu$ sec, with a minimum increment of 1  $\mu$ sec (excluding PRI values)
    - Total of 30 trials required with 60% detection



# DFS - New Requirements

- Bin 0 (fixed waveform) is used for radar detection BW, channel move, and channel closing time tests
  - Bin 0 was formerly Bin 1 (fixed waveform)
  - Bin 5 no longer required for these tests
- Software availability
  - [NTIA Bin 0 through Bin 5](#) (May 2014 release)
  - [Hopping Bin 6](#)
- Frame based systems – test at maximum talk/listen ratio specified in User's Manual



# Master (AP) and Client U-NII-1 Band (5150-5250 MHz) §15.407(a)(1)

Condition of Operation			Maximum Conducted TX Power		Maximum EIRP		TX Power Reduction required when Antenna Gain exceeds...		Out-of-band e.i.r.p. (outside 5150-5250 MHz)		Maximum Conducted Power Spectral Density (PSD)	
			AP	Client	AP	Client	AP	Client	AP	Client	AP	Client
Indoor And Outdoor	Fixed	P-t-P	30 dBm (1W)	Note 1	200 W (53 dBm)	Note 1	> 23 dBi	> 6 dBi	≤ -27 dBm/MHz	≤ -27 dBm/MHz	17 dBm/MHz	11 dBm/MHz
	Fixed or Mobile & Portable	P-t-MP	30 dBm (1W)	24 dBm (250 mW)	4 W (36 dBm); ≤ 125 mW for any elevation angle > 30° from horizon	1 W (30 dBm)	> 6 dBi	> 6 dBi	≤ -27 dBm/MHz	≤ -27 dBm/MHz	17 dBm/MHz	11 dBm/MHz
Indoor Only	Mobile & Portable	P-t-MP	30 dBm (1W)	24 dBm (250 mW)	4 W (36 dBm)	1 W (30 dBm)	> 6 dBi	> 6 dBi	≤ -27 dBm/MHz	≤ -27 dBm/MHz	17 dBm/MHz	11 dBm/MHz

Note 1 - Fixed P-t-P devices are typically frame based devices with master (AP) and client modes filed under one FCC ID.



# Indoor/Outdoor Classification for Fixed Devices

- Indoor use requires statement in the grant conditions and any restrictions
- No mixing indoor/outdoor operation by band
  - all bands indoor or all bands outdoor for each antenna type
  - Must describe use and classification in the professional installers manual
- Indoor use requires statement in the grant conditions and any restrictions
  - Example Grant conditions:
    - This device is for indoor use only.
    - This device is restricted to indoor use for select antennas as described in this filing.
- No restrictions on mobile & portable devices



# Note Codes

- Note code 38 or 39 required on all U/NII band line items
  - **Note Code 38:** This device has shown compliance, in all grant-listed U-NII sub-bands, with the new rules for U-NII devices adopted under Docket No. 13-49 and may be marketed, manufactured, installed or imported after the June 2, 2016 transition deadline.
  - **Note Code 39:** This sub-band complies with the new rules for U-NII devices adopted under Docket No. 13-49. This device may not be sold or marketed after June 2, 2016, unless all grant-listed U-NII sub-bands demonstrate compliance with Docket No. 13-49.



# Clients Without Radar Detection Capability

- §15.202 general requirements
  - Client must rely on master to initiate network
- Client restrictions
  - Wi-Fi Direct (Group Owner) or Tunneled Direct Link Setup (TDLS): Peer-to-Pier (PtP) Links for U-NII-2 (DFS) band
    - Communicate with master device directly or operate under control of a master
    - Association with master not required but must be listening to master and follow frequency commands
    - PtP permitted in U-NII-1 and U-NII-3 bands
  - Wi-Fi Hot Spot mode requires DFS if they operate in the DFS band



# Miscellaneous

- Relay Mode (Repeater) while not prohibited is not currently permitted
  - Must show compliance with DFS requirements
- Client beacon test reduced from 30 minutes to 10 minutes
  - When master breaks TX it is to-be-determined how long a client can TX without control signal (beacon) from master
  - Covers situations where a master may stop transmitting a beacon (including channel change commands) to ensure that the client does not transmit any beacons if it does not detect a master



# Questions and Answers

**Thanks!**