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Bin 5 Radar Calibration

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5.0 Test Procedure/Results

- 1. A spectrum analyzer is used as a monitor to verify that the UUT has vacated the Channel within the (Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and Channel move. It is also used to monitor UUT transmissions during the Channel Availability Check Time.
- 2. Following is the test setup used to generate the Radar Waveforms, and for all DFS tests described herein.



DFS Test Configuration

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Conducted Setup: Radar Test Waveforms are injected into the Master

DFS Setup: Client/Slave Device (CP-8861)

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The test setup is constructed of the following equipment:

Radar Test Signal Generator National Instruments NI PXI-1042 8-Slot 3U Chassis National Instruments NI PXI-5421 16-Bit 100MS/s Arbitrary Waveform Generator National Instruments NI PXI-5610 2.7GHz RF Upconverter Ascor 7206 PXI 4.9 to 6GHz Upconverter Agilent PXA Spectrum Analyzer, Model N9030A Mini-Circuits ZFSC-2-10G+ Splitter/Combiner (Qty. 2) Mini-Circuits BW-S6W2 6dB Attenuator (Qty. 3) Inmet 10W 30dB Power Attenuator 18GHz (Qty.1) CISCO 16" RF Coaxial Cable-SMA (Qty. 2) Murata MXGS83RK3000 Special RF Test Cable (Qty. 1) Cisco AIR-AP1242AG-A-K9 802.11a/b/g (wireless master) System Under Test: Cisco CP-8861 802.11a/b/g/n/ac (wireless client/slave)

The waveform parameters from within the bounds of the signal type are selected randomly using uniform distribution.

 In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB (-61dBm) but a -62dBm burst was generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client (Slave) Device will associate with the UUT (Master) at 5260MHz & 5500 MHz Stream the WAV test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

At time T_0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -62dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the *DFS Response requirement values table*.

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Channel Closing Transmission Time for Type 1 radar.

Closing Time Close up view (1second)

Channel 5260MHz

Agilent Spectrum Analyzer - Swept SA						
$\begin{array}{c c} \mathbf{X} & \mathbf{L} & \mathbf{RF} & 50 \ \Omega & \mathbf{DC} \\ \mathbf{Markor} & 2 & 174 & 469 & \mathbf{mc} \\ \end{array}$		SENSE:IN	IT #Ava		01:09:03 PM Apr 23, 2014 TRACE 12 3 4 5 6	Peak Search
	PNO: Fast ↔ IFGain:Low	Trig: Video Atten: 6 dB		Type: Tune	TYPE WWWWWW DET PNNNN	Next Peak
Ref Offset -46 dB	1				Mkr2 174.5 ms -112.20 dBm	
					-6 <u>2,99 tBm</u>	Next Pk Right
-80.0						
-90.0						Next Pk Left
-130						Marker Delta
-140						1
Res BW 3.0 MHz	VBW	3.0 MHz		Sweep	Span 0 Hz 1.000 s (8000 pts)	Mkr→CF
MKR MODE TRC SCL X	24.01 ms	-62.44 dBm -112 20 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
3						Mkr→RefLvi
6						
8 9 10						More 1 of 2
11 12 12 12 12 12 12 12 12 12 12 12 12 1						
MSG				STATU:	S	

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Channel Move Time, Channel Closing Transmission Time for Type 1 radar.

Channel 5260MHz

Agilent Spectrum Ana	ılyzer - Swept SA							
Marker 2 196.	50 Ω DC .907 ms		SENSE:	INT #Avg	ALIGNAUTO	01:19:25 PM TRACE	Apr 23, 2014	Marker
L}		PNO: Fast ↔ IFGain:Low	Trig: Video Atten: 6 dB			TYPE DET	WWWWWW PNNNNN	Marker Table
Ref 10 dB/div Ref	Offset -46 dB -50.00 dBm					Mkr2 19 -111.0	6.9 ms 5 dBm	<u>On</u> Off
-60.0 + -70.0 +							-6 <u>2,00 dBp</u>	Marker Count
-80.0								Counto
-100 2	an and have an all had been provided by the strength of the st	a far hanna a far ha fa fa fa ta ta ta ta		ومروار والمروان المروان والمرور	Sam bartan baran da ta a dal separata da	و و ال و و و و و و و و و و و و و و و و و		Markers On <u>Off</u>
-120								
-130								
Center 5.26000 Res BW 3.0 M	00000 GHz Hz	VBW	3.0 MHz		Sweep	Sp 10.00 s (8	an 0 Hz 000 pts)	
MKR MODE TRC SCL	X	20.00 ms	Y -62.45 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION	VALUE	
2 N 1 C 3 4 5 6 7		196.9 ms	-111.05 dBm					All Markers Off
8 9 10 11 12								More 2 of 2
MSG					STATU:	S		

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Channel Closing Transmission Time for Type 1 radar.

Closing Time Close up view (1second)

Channel 5260MHz

Agilent Spectr	rum Analyzer - Swept SA						
Marker 2	RF 50 Ω DC		SENSE	EINT #Ave	ALIGNAUTO	06:28:12 PM Apr 22, 2014 TRACE 1 2 3 4 5 6	Marker
4	10111021113	PNO: Fast IFGain:Low	Trig: Video Atten: 6 dB	1		TYPE WWWWWW DET P N N N N N	Marker Table
10 dB/div	Ref Offset -46 dB Ref -50.00 dBm	1				Mkr2 131.1 ms -111.91 dBm	<u>On</u> Off
-60.0 1 -70.0						-62,00 EBE	Marker Count
-90.0	2						Couple Markers On <u>Off</u>
-120							
Center 5.: Res BW 3	500000000 GHz).0 MHz	VBV	V 3.0 MHz		Sweep	Span 0 Hz 1.000 s (8000 pts)	
MKR MODE TR	RC SCL X	23.98 ms	Y -61.93 dBn -111 91 dBn	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
3 4 5 6 7							All Markers Off
8 9 9 10 11 12							More 2 of 2
MSG						S	

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Marker

Select Marker

1

Normal

Delta

Fixed

Off

More 1 of 2

Properties

DET PNNNN

Span 0 Hz Sweep 10.00 s (8000 pts)

STATUS

Channel Move Time, Channel Closing Transmission Time for Type 1 radar.

Agilent Spectrum Analyzer - Swept SA 06:07:38 PM Apr 22, 2014 TRACE 1 2 3 4 5 6 Marker 1 100.016 ms #Avg Type: RMS Trig: Video PNO: Fast IFGain:Low hi Atten: 6 dB Mkr1 100.0 ms Ref Offset -46 dB Ref -50.00 dBm -110.94 dBm 10 dB/div Log

VBW 3.0 MHz

Channel 5500MHz

Center 5.500000000 GHz Res BW 3.0 MHz

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2

Channel Move Time, Channel Closing Transmission Time for Type 2 radar

Agilent Spectrum Analyzer - Swept SA 1 01:24:13 PM Apr 23, 2014 TRACE 1 2 3 4 5 6 Marker Marker 2 50.6331 ms #Avg Type: RMS Trig: Video PNO: Fast IFGain:Low hè DET PINNNN Atten: 6 dB Select Marker Mkr2 50.63 ms Ref Offset -46 dB Ref -50.00 dBm -111.42 dBm 10 dB/div Log [1 Normal Delta 2 **Fixed** Center 5.260000000 GHz Span 0 Hz Res BW 3.0 MHz VBW 3.0 MHz Sweep 10.00 s (8000 pts) Off MKR MODE TRC SCL FUNCTION FUNCTION WIDTH FUNCTION VALUE 1.250 ms 50.63 ms -62.45 dBm -111.42 dBm 1 N 1 t N 1 t 3 **Properties** 4 5 6 8 More 9 10 1 of 2 12 STATUS

Channel 5260MHz

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