



### 3.3 Contention Based Protocol

#### 3.3.1 Regulation

§15.407(d)(6): Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

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Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

**Table 1. Criteria to determine number of times detection threshold test may be performed**

<b>If</b>	<b>Number of Tests</b>	<b>Placement of Incumbent Transmission</b>
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ( $f_{c1} = f_{c2}$ )
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within $BW_{EUT}$
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within $BW_{EUT}$	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

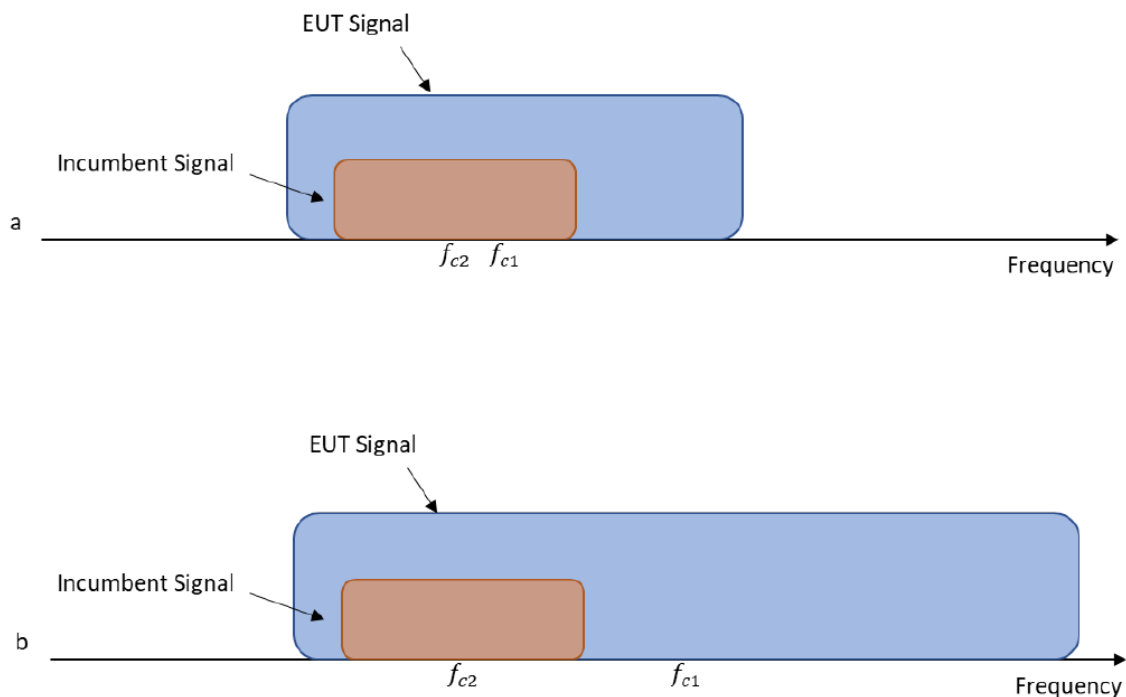
where:

$BW_{EUT}$ : Transmission bandwidth of EUT signal

$BW_{Inc}$ : Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

$f_{c1}$ : Center frequency of EUT transmission

$f_{c2}$ : Center frequency of simulated incumbent signal



**Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it**

### 3.3.2 Test Procedure

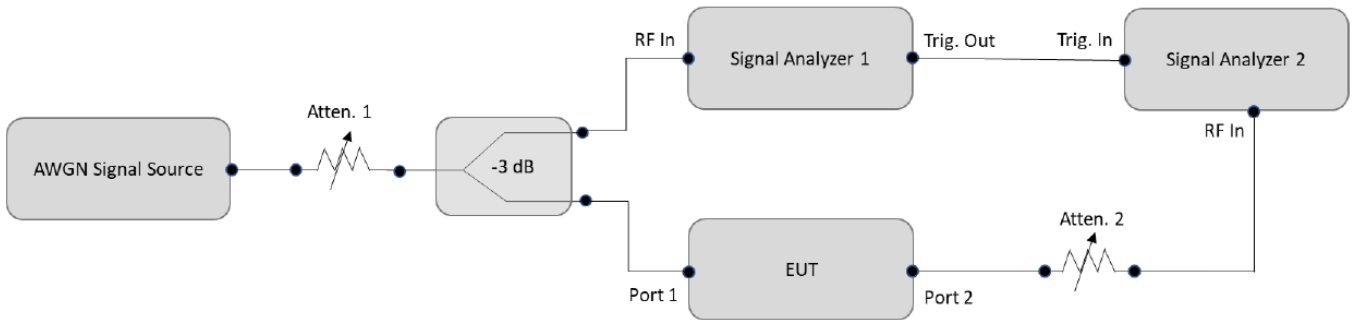
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1. To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency  $f_{c2}$ ) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed
2. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
3. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
4. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
5. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center frequency for the AWGN signal and repeat the process.

### 3.3.3 Deviation from Test Standard

No deviation.

### 3.3.4 Test Setup



**Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup**

### 3.3.5 Support Unit used in test configuration

Instrumnet	Brand Name	Model No.	Note
AP	ASUS	GT-AXE11000	FCC ID: MSQ-RTAXJF00 Master device
Notebook	Lenovo	81FV	AP control PC

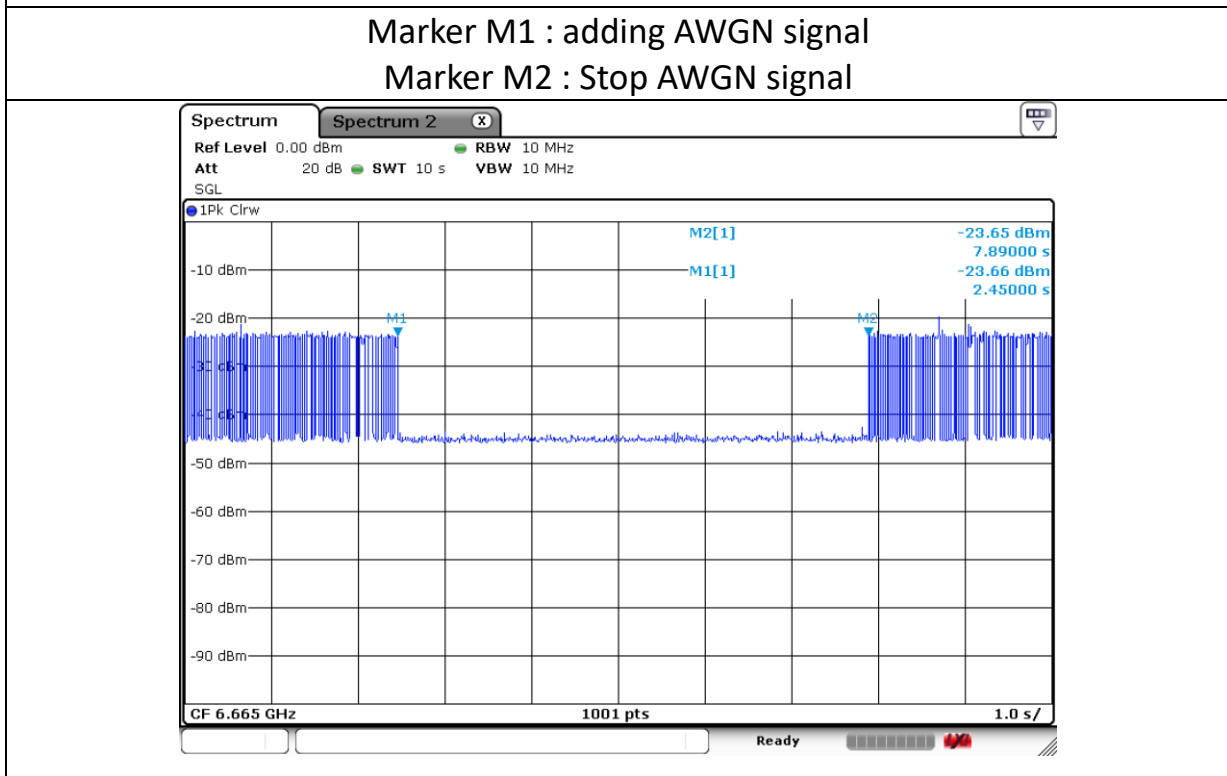
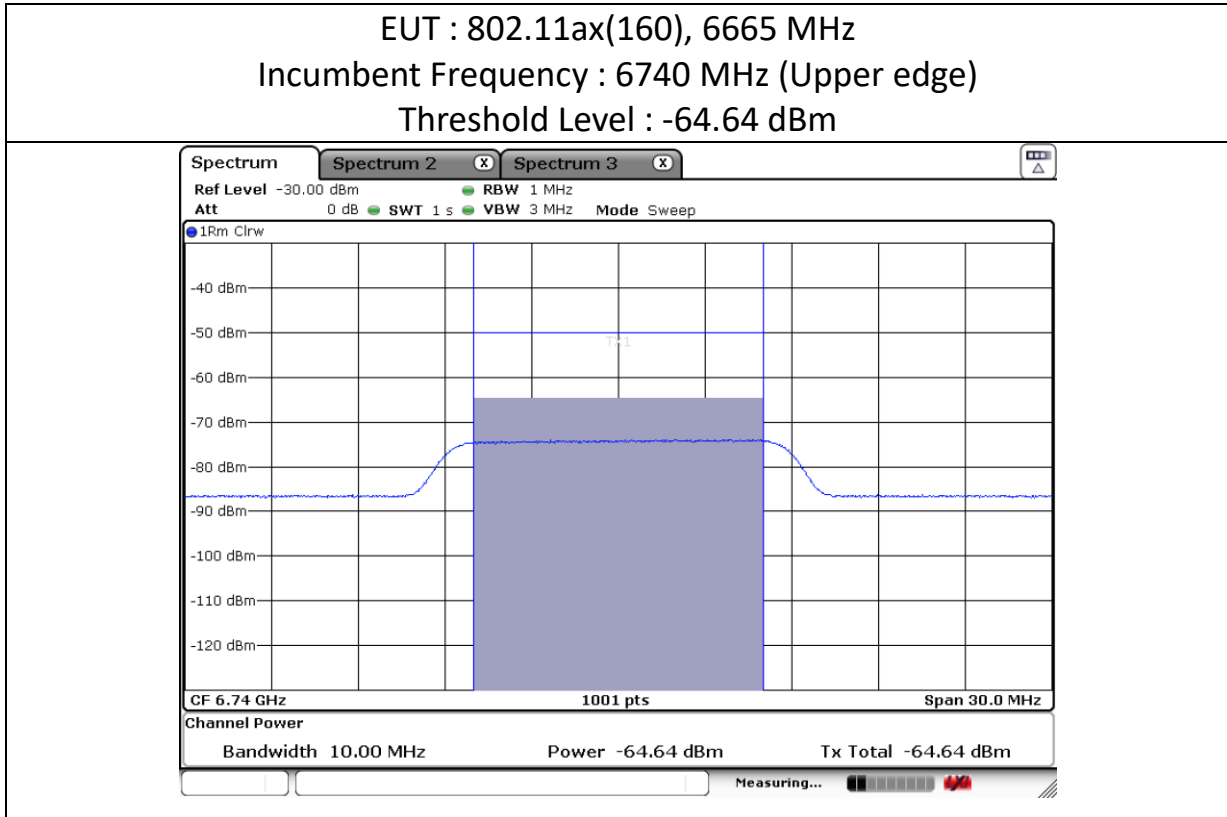


### 3.3.5 Test Result

Band	Channel Frequency (MHz)	Channel BW (MHz)	Incumbent Frequency (MHz)		Detection Level (dBm)	Detection Rate (%)	Antenna Gain (dBi)	Threshold Level (dBm)	Margin (dB)
UNII Band 5	6135	20	$F_{c1} = F_{c2}$	6135	-69.14	100	1.52	-60.48	8.66
	6185	160	Lower edge	6110	-70.80	100			10.32
			$F_{c1} = F_{c2}$	6185	-66.41	100			5.93
			Upper edge	6260	-64.35	100			3.87
UNII Band 6	6455	20	$F_{c1} = F_{c2}$	6455	-69.94	100	-1.24	-63.24	6.70
	6505	160	Lower edge	6430	-70.87	100			7.63
			$F_{c1} = F_{c2}$	6505	-67.45	100			4.21
			Upper edge	6580	-64.87	100			1.63
UNII Band 7	6695	20	$F_{c1} = F_{c2}$	6695	-68.65	100	-1.23	-63.23	5.42
	6665	160	Lower edge	6590	-70.54	100			7.31
			$F_{c1} = F_{c2}$	6665	-66.31	100			3.08
			Upper edge	6740	-64.64	100			1.41
UNII Band 8	7015	20	$F_{c1} = F_{c2}$	7015	-68.77	100	-0.99	-62.99	5.78
	6985	160	Lower edge	6910	-71.29	100			8.30
			$F_{c1} = F_{c2}$	6985	-67.43	100			4.44
			Upper edge	7060	-64.57	100			1.58

Note: Threshold Level (dBm) = -62 dBm + Antenna Gain

### 3.3.5.1 Worst Case of Plots Contention Based Protocol





## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services Korea. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

**Test Firm Name : BV CPS ADT Korea Ltd.**

**Address : Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675 KOREA**

**FCC**

**Designation Number : KR0158**

**Test Firm Registration Number : 666061**

**ISED**

**Designation Number : KR0158**

**Test Firm Registration Number : 25944**

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.bureauveritas.co.kr/cps/eaw](http://www.bureauveritas.co.kr/cps/eaw)

The address and road map of all our labs can be found in our web site also.

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