Statement for the validity of existing test report data

Date: May 9th, 2011
Subject: Statement for FCC ID: YLF-ABGN-EYE-APU3

Statement for the validity of existing test data

7signal Eye WLAN monitoring unit (FCC ID: YLF-ABGN-EYE-APU3) includes one separately FCC certified Mikrotik Routerboard R52Hn WLAN radio module (FCC ID: TV7R52HN). This is the only RF transmitter in the unit and it is utilized in the monitoring tasks that the Eye unit performs.

Mikrotik Routerboard R52Hn WLAN radio module (FCC ID: TV7R52HN) has been certified with the following test reports:
- FR9N1919AA (RF)
- FR9N1919AB (RF)
- FZ9N1919 (DFS)

Conducted measurements performed for the transmitted signals of Mikrotik WLAN radio module at the output connector are also valid for 7signal Eye unit when they are compensated for the additional loss of 7signal RF switching module. This loss/attenuation is described in the graph below and has been verified with network analyzer.
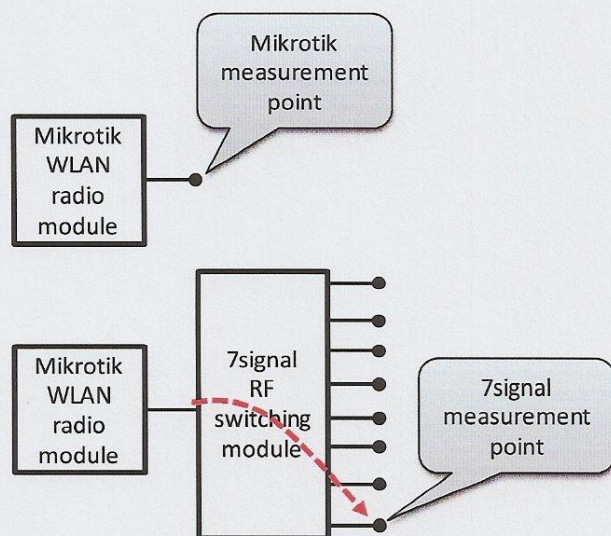
Transmit (LNA bypass) mode attenuation:

2400 MHz	**-7.5 dB**
4900 MHz	**-9.0 dB**
5400 MHz	**-9.7 dB**
5800 MHz	**-11.4 dB**

7signal RF switching card (RFC) impact on the signal:

- RFC switches WLAN radio output to one of the eight alternative output connectors one at a time
- RFC does not perform amplification for the transmitted signal in any part of the board
- When WLAN module transmitter is active, LNA (for receive direction) is automatically bypassed
- RFC card has highly linear behavior (attenuates signals) in transmit direction. Thus the difference between measuring from Mikrotik WLAN radio output and RF switching module output is the absolute signal level caused by this attenuation
- For these reasons, Mikrotik WLAN radio module defines the RF behavior of 7signal Eye unit in conducted measurements and results represent well 7signal Eye unit behaviour

7signal measurements have been made at the connector of a 7signal RF module.

7signal Eye unit has been RF tested in the top and the bottom channel of each sub-band. Mikrotik WLAN test report results on the center channel compensated with the attenuation represent well 7signal unit behavior. These results can be reused from Mikrotik test reports.

Similarly, 7signal Eye unit has been DFS tested on the UNII Worldwide sub-band. Mikrotik WLAN test results for the U-NII-2 sub band similarly represent well 7signal Eye behavior on that band. These results can be reused from Mikrotik test reports.

Test channel mapping and reused data can be seen in the tables 1 & 2.

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Table 1: NII data reuse

Band	Channel	Center frequency (MHz)	Mikrotik FCC test report FR9N1919AA (RF)		Mikrotik FCC test report FZ9N1919 (DFS)		7signal FCC certification testing (RF)		7signal FCC certification testing (DFS)	
			BW 20 MHz	BW 40 MHz	BW 20 MHz	BW 40 MHz	BW 20 MHz	BW 40 MHz	BW 20 MHz	BW 40 MHz
U-NII-1	36	5180	Measured				R: 1-3, M: 5-7			
	38	5190		Measured				R: 1-3, M: 5-7		
	40	5200	Measured				R: 1-3, M: 5-7			
	42	5210								
	44	5220								
	46	5230		Measured				R: 1-3, M: 5-7		
	48	5240	Measured				R: 1-3, M: 5-7			
	52	5260	Measured				R: 1-3, M: 5-7			
U-NII-2 (DFS)	54	5270		Measured				R: 1-3, M: 5-7		
	56	5280							Measured	
	60	5300	Measured				R: 1-3, M: 5-7			
	62	5310		Measured				R: 1-3, M: 5-7		
	64	5320	Measured				R: 1-3, M: 5-7			
	100	5500	Measured		Measured	Measured	R: 1-3, M: 5-7		R: 4	R: 4
U-NII Worldwide (DFS)	102	5510		Measured				R: 1-3, M: 5-7		
	104	5520								
	108	5540								
	110	5550		Measured				R: 1-3, M: 5-7		
	112	5560								
	116	5580	Measured				R: 1-3, M: 5-7			
	120	5600								
	124	5620								
	128	5640								
	132	5660								
	134	5670		Measured				R: 1-3, M: 5-7		
	136	5680						R: 1-3, M: 5-7		
	140	5700	Measured				R: 1-3, M: 5-7			
UNII-3	149	5745					Measured			
	151	5755						Measured		
	153	5765								
	157	5785					Measured			
	159	5795						Measured		
	161	5805					Measured			

M= Measured in this type approval process separately

Reused data points (conductive measurements)   **R**= Results measured and reported by Mikrotik NII or DFS test report are used
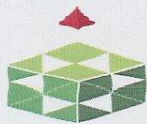
1 **Power spectral density**, chapter 4.4 in Mikrotik test report FR9N1919AA
2 **26 dB spectrum BW**, chapter 4.2 in Mikrotik test report FR9N1919AA
3 **Peak excursion**, chapter 4.5 in Mikrotik test report FR9N1919AA
4 **DFS**, Mikrotik DFS test report FZ9N1919, **channel 100**

Even though some data points are marked "reused", the following measurements are done in all cases in this type approval process

5 **Max conducted power**
6 **Radiated emissions**
7 **Band edge emissions**

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Table 2. DTS data reuse

Channel	Center frequency (MHz)	Mikrotik FCC test report FR9N1919AB (RF)		7signal FCC certification testing (RF)	
		BW 20 MHz	BW 40 MHz	BW 20 MHz	BW 40 MHz
1	2412	Measured		R: 1-2, M: 3-5	
2	2417				
3	2422		Measured		R: 1-2, M: 3-5
4	2427				
5	2432				
6	2437	Measured	Measured	R: 1-2, M: 3-5	R: 1-2, M: 3-5
7	2442				
8	2447				
9	2452		Measured		R: 1-2, M: 3-5
10	2457				
11	2462	Measured		R: 1-2, M: 3-5	

Channel	Center frequency (MHz)	Mikrotik FCC test report FR9N1919AB (RF)		7signal FCC certification testing (RF)	
		BW 20 MHz	BW 40 MHz	BW 20 MHz	BW 40 MHz
149	5745	Measured		R: 1-2, M: 3-5	
151	5755		Measured		R: 1-2, M: 3-5
153	5765				R: 1-2, M: 3-5
157	5785	Measured		R: 1-2, M: 3-5	
159	5795		Measured		R: 1-2, M: 3-5
161	5805			R: 1-2, M: 3-5	R: 1-2, M: 3-5
165	5825	Measured		R: 1-2, M: 3-5	

Reused data points (conductive measurements)

1 **Power spectral density**, chapter 4.3 in Mikrotik test report FR9N1919AB
2 **6 dB spectrum BW**, chapter 4.4 in Mikrotik test report FR9N1919AB

Even though some data points are marked "reused", the following measurements are done in all cases in this type approval process

3 **Max conducted power**
4 **Radiated emissions**
5 **Band edge emissions**

M:= Measured in this type approval process separately

R:= Results measured and reported by Mikrotik DTS test report FR9N1919AB are used

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7signal certification test results can be found in test reports
- 164308A DTS report (15.247)
- 164308B NII report (15.407)
- 164308C DFS report

Conclusions

7signal Eye unit RF behavior is defined by the Mikrotik WLAN radio card that has received FCC approval separately. Mikrotik WLAN radio RF performance compliance is proven in test reports on the top, bottom and center channels. New measurements for 7signal Eye unit proofs, that 7signal Eye meets FCC RF requirements at the top and bottom channels of each sub-band. Mikrotik WLAN module RF test data in the sub-band center channels can be used as a part of FCC approval.

7signal Eye unit DFS behavior is defined by the Mikrotik WLAN radio card that has separately received FCC DFS approval for sub-bands U-NII-2 and U-NII-Worldwide. New measurements show that 7signal Eye meets DFS requirements at U–NII-2 sub band. Mikrotik WLAN module DFS test data on the U-NII Worldwide sub-band can be used as a part of the FCC approval.

Sincerely,

By: _____   _____

Veli-Pekka Ketonen
CTO