LAWI HW2.1 Antenna

2022/08/29

WNC Wistron NeWeb Corp.

Summary

- **WNC propose**
  - **4 * PCB dualband(2.4G+5G) antennas + 1 * PCB DFS antenna,**
    - ✓ 1 * dualband antenna for ***horizontal polarization, no tilt.***
    - ✓ 3 * dualband antennas for ***vertical polarization, 2 for tilt*25 degree, 1 for tilt 45 degree***
    - ✓ 1 * DFS antenna for ***vertical polarization, tilt 35 degree***
    - ✓ ***=> WIFI : 2.4G/5G is 3V1H; DFS : 1V***
  - **4 * PCB single band 6G antennas**
    - ✓ 1 * 6G antenna for ***horizontal polarization, no tilt***
    - ✓ 1 * 6G antenna for ***horizontal polarization, tilt 10 degree***
    - ✓ 2 * 6G antenna for ***vertical polarization, tilt 40 degree***
    - ✓ ***=> WIFI6E : 2V2H***

LAWI WiFi Antenna Summary Table

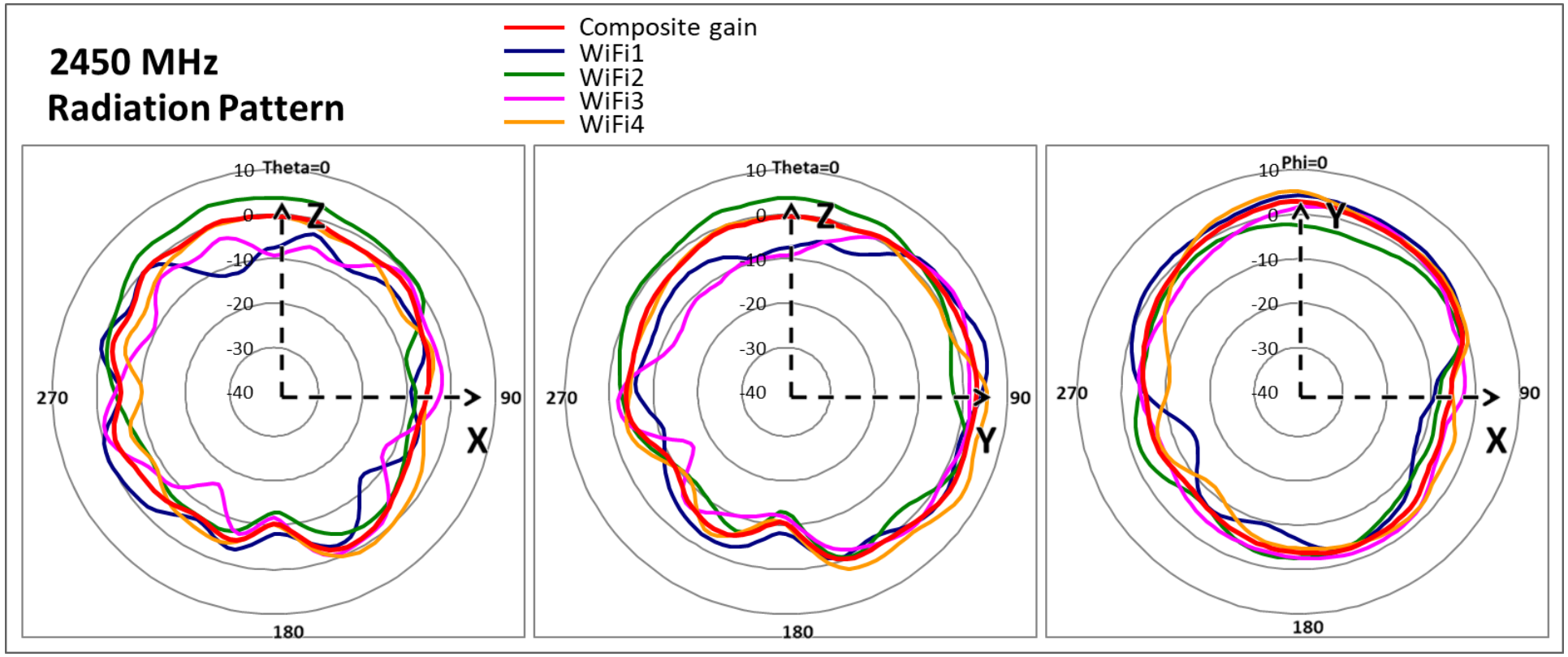
WiFi 9 antennas : dualband(2.4/5G) * 4 + DFS * 1 + 6E *4

- **2.4G** : WiFi_1 / WiFi_2 / WiFi_3 / WiFi_4
- **5G** : WiFi_1 / WiFi_2 / WiFi_3 / WiFi_4
- **DFS** : WiFi_9
- **6E** : WiFi_5 / WiFi_6 / WiFi_7 / WiFi_8

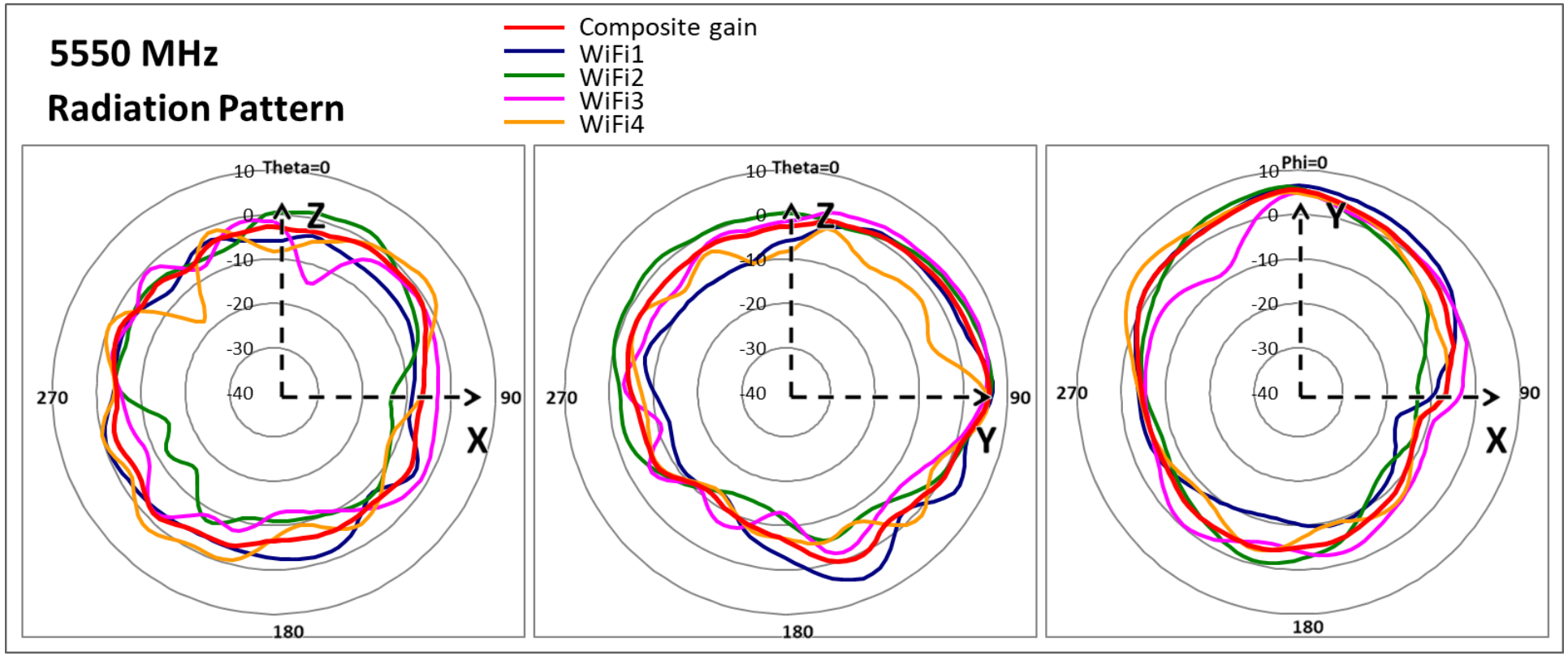
Band	Frequency range	WiFi_1	WiFi_2	WiFi_3	WiFi_4	WiFi_9
2.4G	2400-2500	◎	◎	◎	◎	
5G	5150-5850	◎	◎	◎	◎	
DFS	5150-5850					◎
6E	5930-7125					

Band	Frequency range	WiFi_5	WiFi_6	WiFi_7	WiFi_8
2.4G	2400-2500				
5G	5150-5850				
DFS	5150-5850				
6E	5930-7125	◎	◎	◎	◎

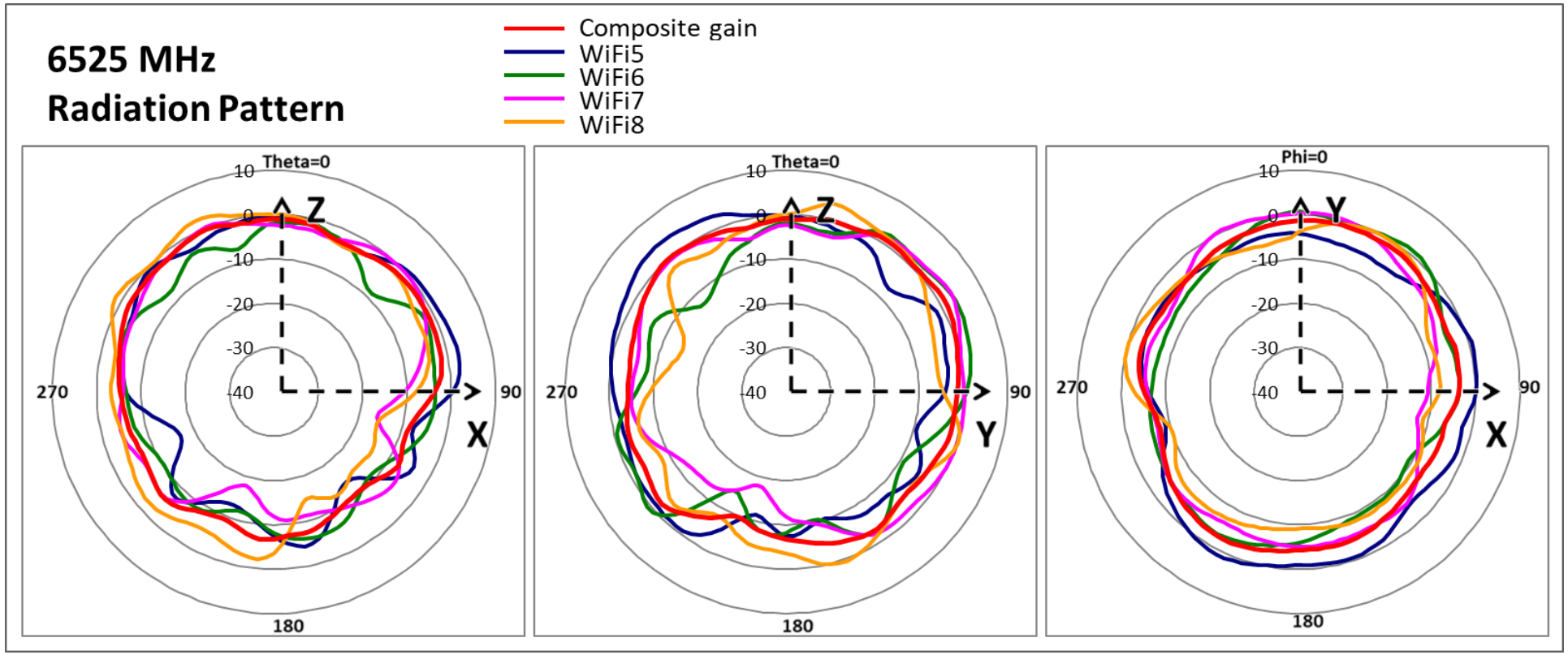
Radiation Pattern –Dual bandWiFi_1/2/3/4 – 2.4 GHz



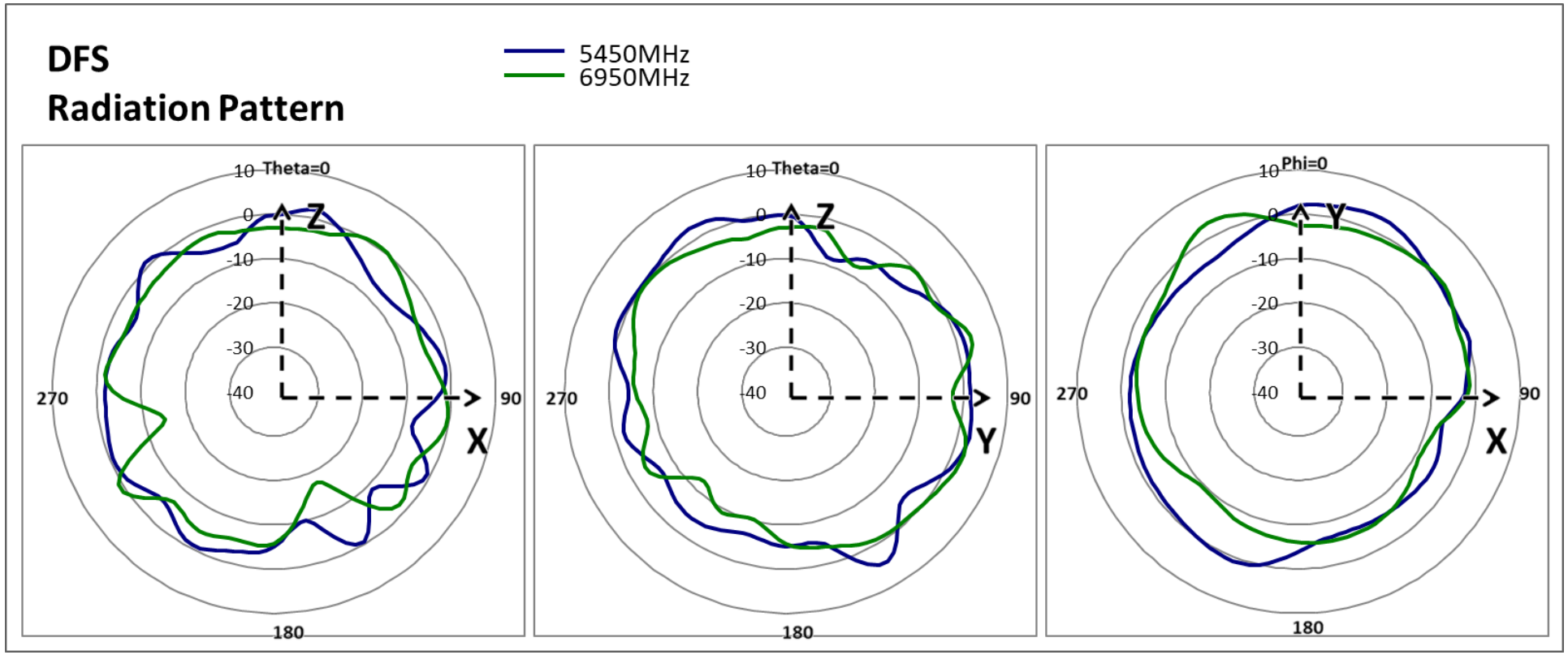
Radiation Pattern –Dual bandWiFi_1/2/3/4 – 5 GHz



Radiation Pattern – 6E WiFi_5/6/7/8 – 6 GHz



Radiation Pattern – DFS WiFi_9 – 5 GHz



Procedure to count all 4 antenna's directional (composite) gain

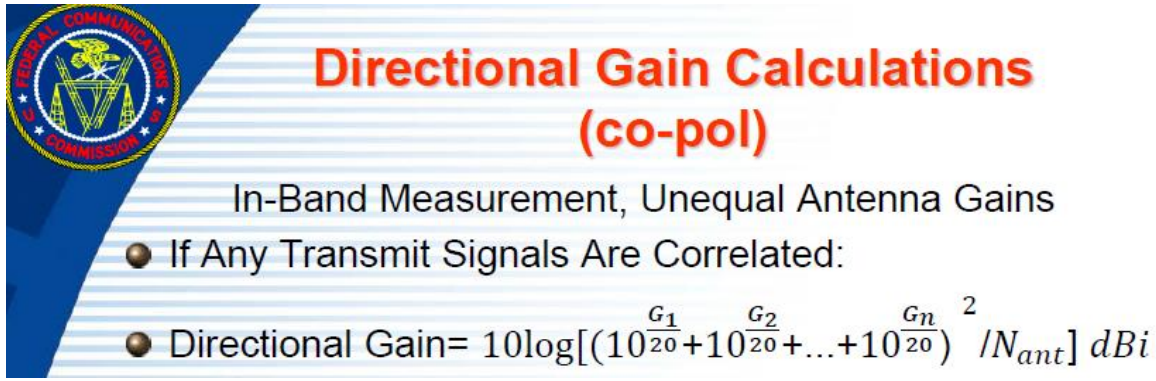
1. Measure 3D pattern of every single antenna by 15deg resolution @ CTIA certified test lab.
2. Pattern test frequency range for all antenna
   - 2400~2500MHz step 10MHz
   - 5150~7125MHz step 25MHz
3. For theta = 0~180 step 15deg; phi =0~345 step 15deg

   First count directional gain for every single angle by correlated directional gain formula.

   Then we get the composite gain of every sampling angle of whole 3D pattern.

   Find the maximum of composite gain of 3D pattern for every frequency point as peak gain(f)

   Filter out the maximum of peak gain(f) among frequency points within each UNII band. Then come out the antenna gain table.



For 2.4/5GHz
composite gain(theta, phi ,f)=
10*log*{{10^[WiFi-1(theta, phi ,f)/20]+
10^[WiFi-2(theta, phi ,f)/20]+
10^[WiFi-3(theta, phi ,f)/20]+
10^[WiFi-4(theta, phi ,f)/20]}^2/4}

For 6GHz
composite gain(theta, phi ,f)=
10*log*{{10^[WiFi-6(theta, phi ,f)/20]+
10^[WiFi-7(theta, phi ,f)/20]+
10^[WiFi-8(theta, phi ,f)/20]+
10^[WiFi-9(theta, phi ,f)/20]}^2/4}

Antenna Gain Table

Note: here antenna gain including pigtail cable loss.

Frequency(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
WiFi_1	6.15	4.38	5.49	5.17	5.49
WiFi_2	5.22	3.21	3.55	5.57	5.48
WiFi_3	4.46	4.16	3.86	4.58	4.07
WiFi_4	4.87	4.01	4.47	5.6	5.91
DG [10*log(Amax^2/Nant)]	6.89	5.91	6.08	6.26	6.17

Frequency(Hz)	6.175G	6.475G	6.7G	7G
WiFi_5	5.53	5.69	6.01	6.01
WiFi_6	4.52	2.62	2.86	3.33
WiFi_7	2.55	3.17	3.17	3.73
WiFi_8	4.07	3.97	3.97	2.64
DG [10*log(Amax^2/Nant)]	5.75	5.22	6.35	5.67

Frequency(Hz)	DFS
WiFi_9	4.54

WNC

Wistron NeWeb Corp.

Thank You!