ELP 725

Wireless Communication Lab

Experiment 3

ANTENNA RESONANCE AND GAIN BANDWIDTH MEASUREMENTS

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24th January 2019

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1 OBJECTIVES

1. To identify whether an antenna is resonating or non-resonating type.
2. To measure basic antenna's Gain Bandwidth using log periodic antenna.

2 EQUIPMENTS REQUIRED

1. Antenna Digital RF Transmitter, MADL -2.4.
2. Antenna Digital RF Receiver, MADL – 2.4
3. Antenna Tripods.
4. Dipole, Log periodic, Yagi-Uda, Monopole, Folded Dipole and Biconical antennas.

3 OBSERVATIONS

3.1 Observation Table

Frequency (MHz)	Power Received				
	Dipole	Monopole	Folded Dipole	Biconical	Yagi-Uda
450	45.4	55.2	55	53.7	37
460	37	49.7	54.6	56.9	37.6
470	27	46.1	62.4	64.3	43.2
480	29	37.5	68	65.7	43.4
490	37	43.5	73.2	63.8	47.7
500	40	52	67.2	67.9	45.9
510	32	53.4	57.2	70.4	57
520	44	53.2	60.4	72.5	57.9
530	44.1	41	64.7	71.5	53
540	39	37.2	69.5	69	51.1
550	45.7	34	72.4	65.7	53.7
560	50	45	75.4	65	57.6
570	57	54.2	75.6	65	62.3
580	63	60.7	75	67	70.7
590	67	63.1	73.2	65.5	77
600	61	56.9	71.2	59.6	79.2
610	63	51.3	68.9	56.6	75.7
620	59.5	47.1	65.1	55.3	73.9
630	52.5	37	61.1	50.6	70
640	51.4	40.4	59	45.9	71.4
650	53.7	49.1	62.8	53	73.2
660	57.7	46.6	68.5	63.8	76.7
670	61	39.1	70.3	65.4	77.1
680	55.5	35	71	66.8	72
690	47.5	24	70	64.4	65

700	40.4	34.7	68.7	66	60.5
710	41.5	32.4	71.7	68.9	61
720	44.4	31.4	72.7	73.1	64.9
730	34	40.4	74.6	75.7	67
740	54.7	54.4	76	76.2	71.1
750	53.5	54.1	76.2	76.2	67.5

Table 1 : Observations

4 PLOTS

4.1 Dipole Antenna

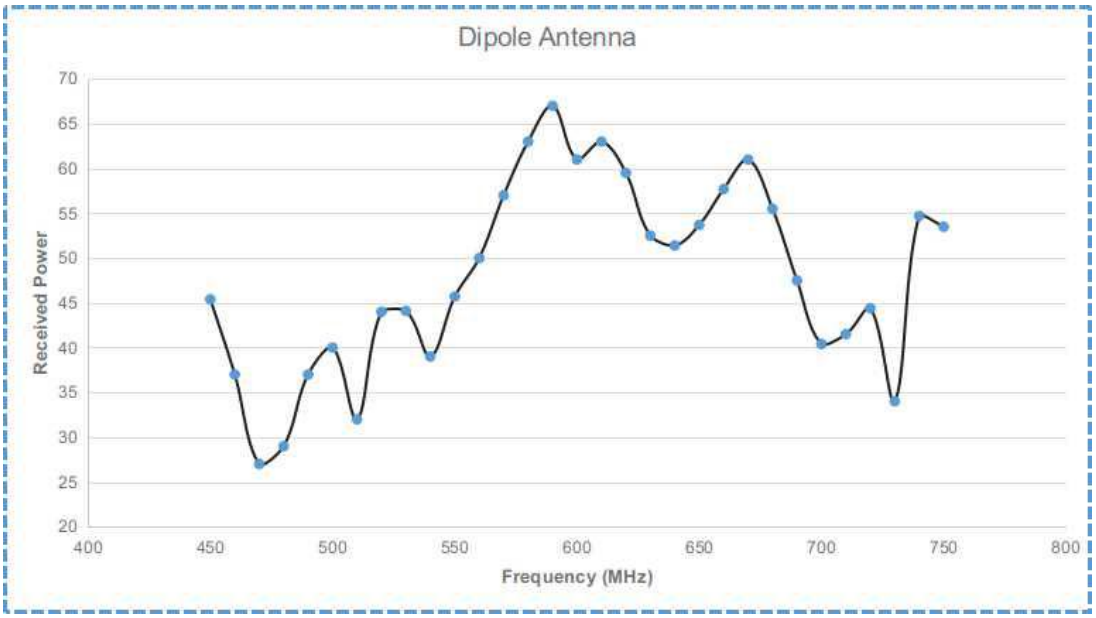

Figure 1: Gain Bandwidth Plot of Dipole Antenna

4.2 Monopole Antenna

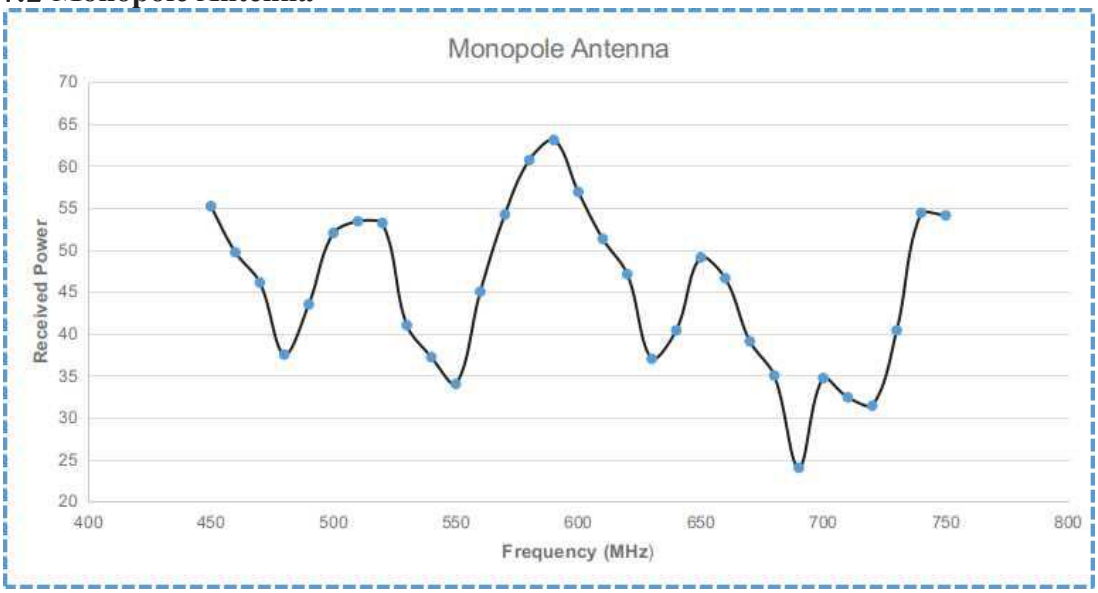

Figure 2: Gain Bandwidth Plot of Monopole Antenna

4.3 Folded Dipole

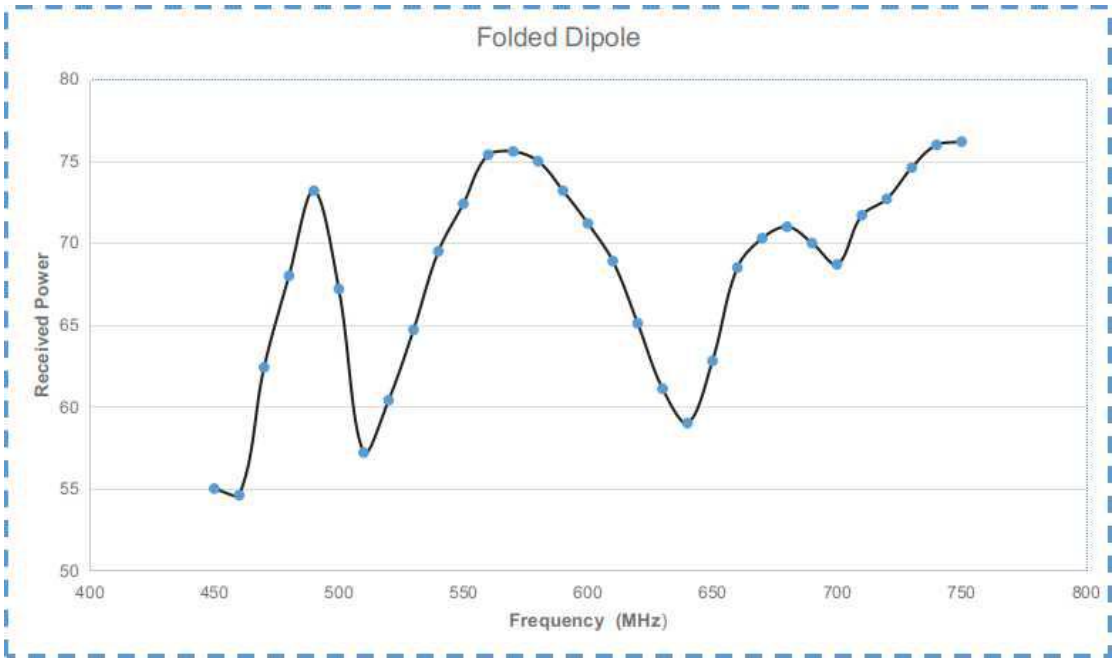

Figure 3: Gain Bandwidth Plot of Folded Dipole Antenna

4.4 Biconical Antenna

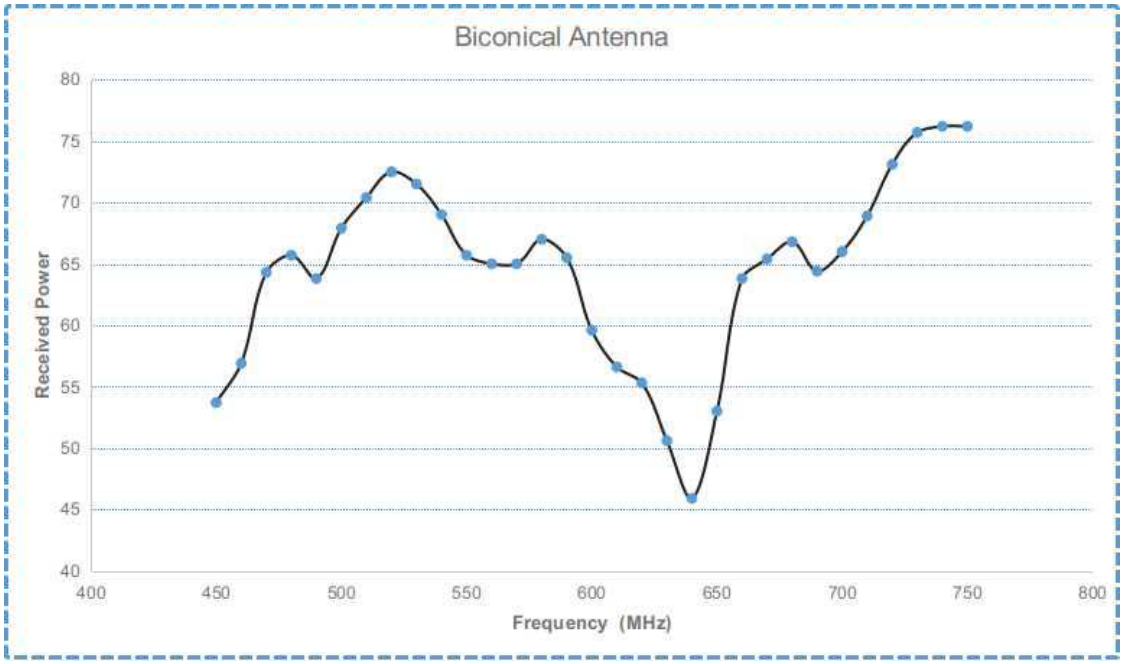

Figure 4: Gain Bandwidth Plot of Biconical Antenna

4.5 Yagi-Uda Antenna

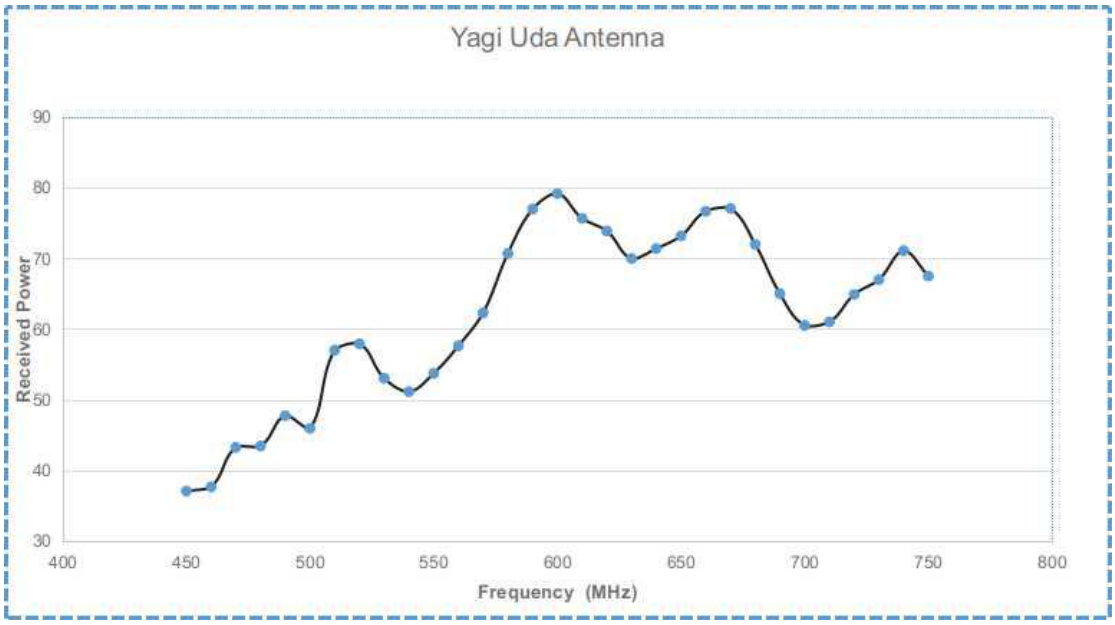

Figure 5: Gain Bandwidth Plot of Yagi-Uda Antenna

4 ANALYSIS

Type of Antenna	Resonance Frequency (MHz)	Bandwidth (MHz)
Dipole	**590**	**14**
Monopole	**590**	**16**
Folded Dipole	**570**	**32**
Biconical	**530**	**36.49**
Yagi Uda	**600**	**20.2**

Table 2 : Analysis

5 CONCLUSIONS

Range of frequencies for which antenna gain is reduced by 3dB is specified as Antenna Bandwidth.
Dipole Antenna length was set to 25cm to achieve resonance at 600 MHz. Although, the resonance was obtained at 590Mhz. Similar, other antenna resonance frequency was also calculated. All have been listed above in the analysis table.

6 QUIZ

1. Compare the entire antenna used in this experiment according to their power, directivity and polarity.
Ans :

Antenna	Power Gain(dB)	Polarity
Dipole	-33.9	Linear
Monopole	-46.9	Linear
Folded Dipole	-34.4	Linear
Yagi Uda	-30.8	Linear
Biconical	-38.5	Linear
Log Periodic		Alternating Polarity

2. What determines the accuracy of antenna array?
Ans : Accuracy of an antenna array depends on following factors :-

1. Number of elements.
2. Distance between elements to get same phase difference.
3. Medium where antenna used.
4. Climate change.

3. Why radomes, heater and labelling elements are added in antenna array?
Ans : A radome (which is a blend of radar and dome) is a structural, weather-proof enclosure that protects a microwave (e.g. radar) antenna array. The radome is constructed of material that minimally attenuates the electromagnetic signal transmitted or received by the antenna. In other words, the radome is transparent to radar or radio waves. Radomes protect the antenna surfaces from weather or conceal antenna electronic equipment from public view. The formation of ice and snowfall, especially on parabolic antennas, is a major cause in loss of signal transmitted and reception during winter months or for dishes at high altitude locations. Antenna element heaters are provided in the antenna system to prevent a rise in VSWR caused by ice formation on the radiating arms and to eliminate wind loading due to ice build-up on the elements.