ELP 725

Wireless Communication Lab

Experiment 3

ANTENNA RESONANCE AND GAIN BANDWIDTH MEASUREMENTS

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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

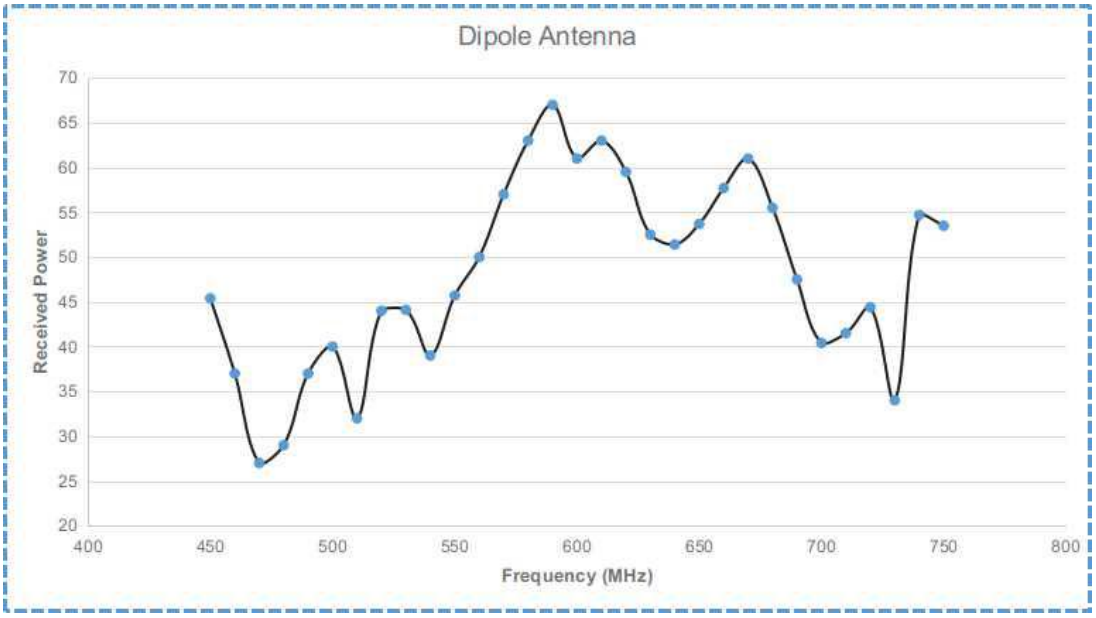

Figure 1:Gain Bandwidth Plot of Dipole Antenna

4.2 Monopole Antenna

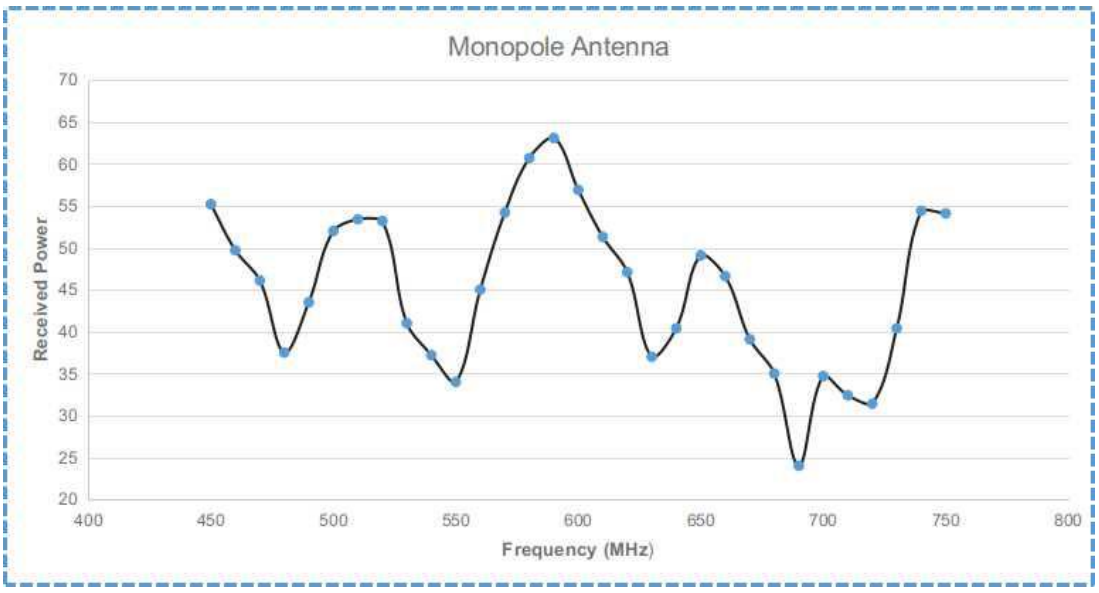

Figure 2:Gain Bandwidth Plot of Monopole Antenna

4.3 Folded Dipole

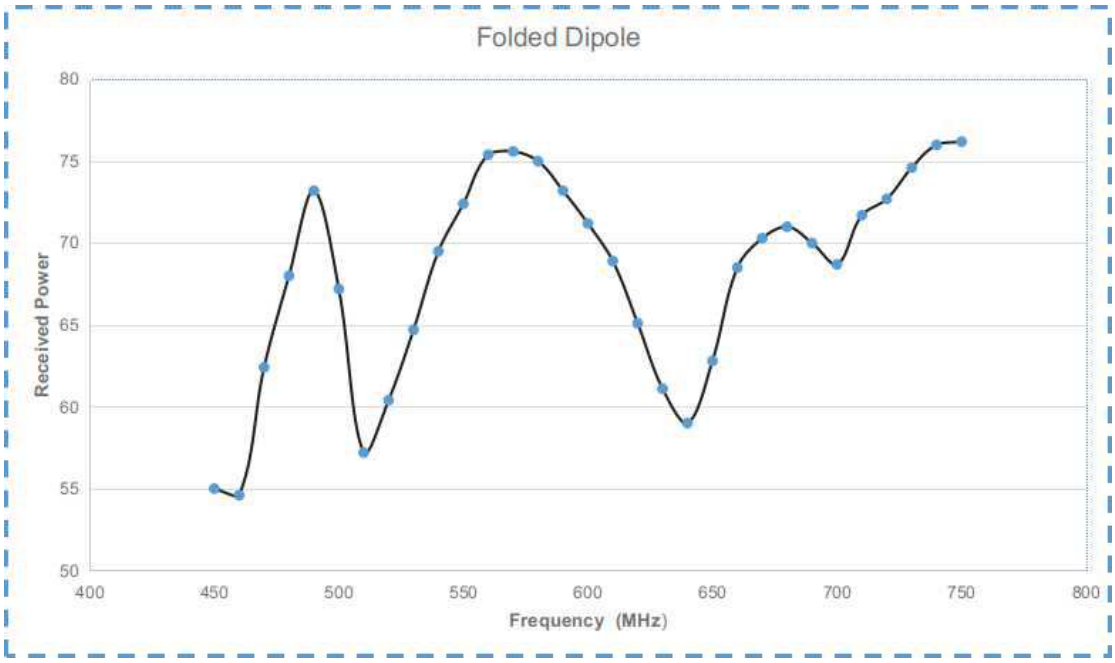

Figure 3:Gain Bandwidth Plot of Folded Dipole Antenna

4.4 Biconical Antenna

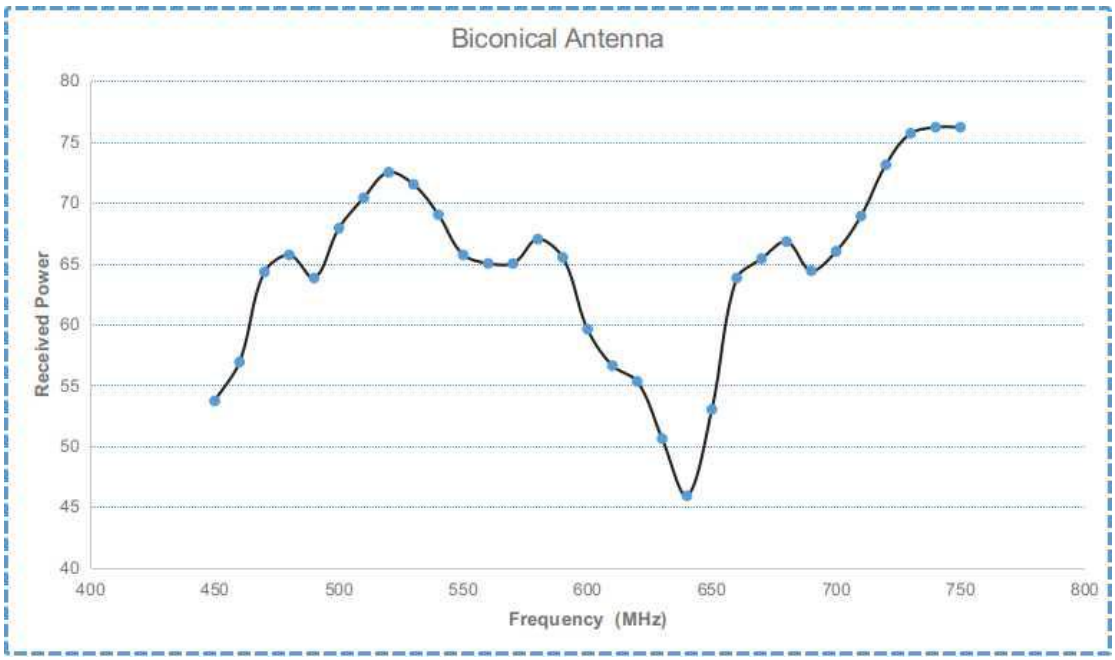

Figure 4: Gain Bandwidth Plot of Biconical Antenna

4.5 Yagi-Uda Antenna

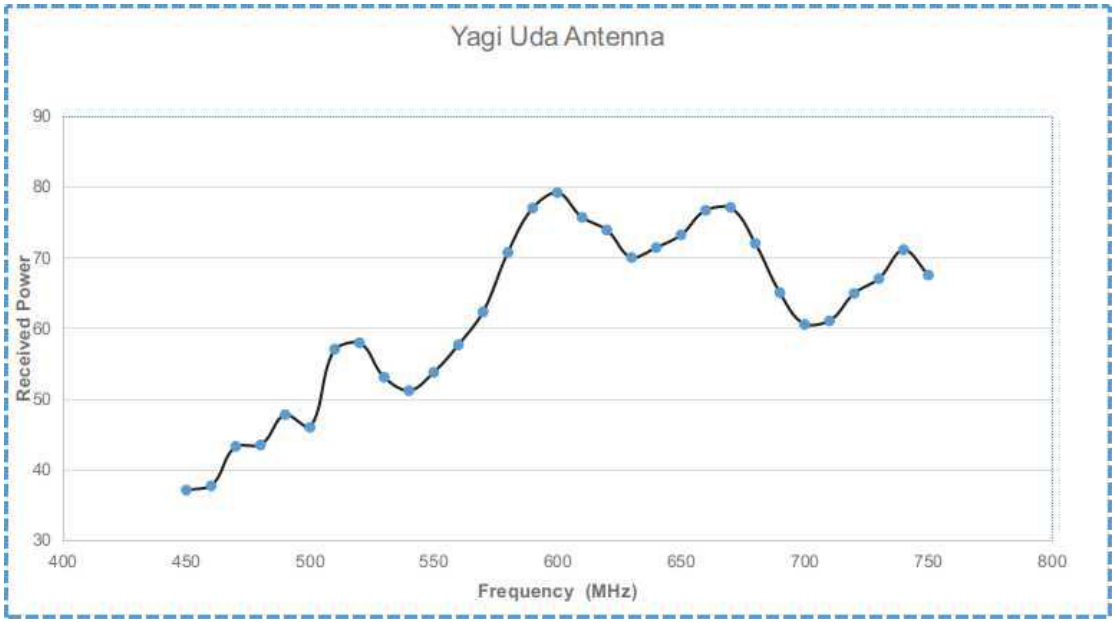

Figure 5: Gain Bandwidth Plot of Yagi-Uda Antenna

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

Bandwidth is taken as range of frequencies at 3dB down (that of peak) gain.
For dipole, length of dipole was set for 600Mhz resonant frequency i.e. length was 25cm but Resonating frequency obtained was 590Mhz. For yagi Uda antenna we got the resonating frequency at 600Mhz.

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 : Phase difference between the waves which are fed to antenna, Path difference, Number of elements in an antenna array, Medium in which antenna is placed. These are the parameters on which accuracy of antenna depends on.

3. Why radomes, heater and labelling elements are added in antenna array?

Ans : A radome (the word is a contraction of radar and dome) is a structural, weatherproof enclosure that protects an antenna. It is often used to prevent the ice and freezing rain from accumulating directly onto the metal surface of antenna. Antenna element heaters are provided 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.