

## TABLE OF CONTENTS

<b>Acknowledgements</b>	xi
<b>Table of Contents</b>	xiii
<b>List of Figures</b>	xix
<b>List of Tables</b>	xxvii
<b>Preface</b>	xxix
<b>CHAPTER 1 INTRODUCTION</b>	
1.1    Introduction	1
1.2    Historical Review	3
1.2.1    Monopole Antenna	5
1.2.2    Fractal Antenna	46
1.2.3    Dipole Antenna	62
<b>CHAPTER 2 ANALYSIS OF UWB MICROSTRIP ANTENNAS</b>	
2.1    Introduction	70
2.2    Advantages of UWB	70
2.3    UWB Antenna Applications	71
2.4    UWB Antenna Challenges	72
2.5    Monopole Antenna	74
2.5.1    Monopole antenna with modified feedline structures	76
2.5.2    Monopole antenna with electromagnetic band gap (EBG)	78
2.5.3    Monopole antenna designed using Genetic Algorithm (GA)	80
2.5.4    Monopole antenna analyzed using FDTD	84
2.5.5    Monopole antenna with conductor backed plane	85
2.5.6    Monopole antenna with defected ground structures	86
2.5.7    Monopole antenna with slot loaded patch	87

2.5.8	Monopole antenna with parasitic patch	90
2.5.9	Effect of feed gap on monopole performance	90
2.5.10	Monopole antenna with equivalent circuit	91
2.5.11	Monopole antenna with split resonators	94
2.6	Fractal Antenna	94
2.6.1	Fractal in Nature	94
2.6.2	Properties of Fractal Antenna	95
2.6.3	Fractal Antenna Geometries	96
2.6.3.1	Appollian gasket fractal	96
2.6.3.2	Minkowski Fractal Geometry	97
2.6.3.3	Sierpinski Carpet Geometry	98
2.6.3.4	Sierpinski Gasket Geometry	99
2.6.3.5	Nested type triangular fractal Geometry	100
2.6.3.6	Hilbert Curves Geometry	101
2.6.3.7	Circular Fractal Geometries	102
2.6.3.8	Descartes circle theorem	104
2.6.3.9	Giusepe Peano Fractal Geometry	104
2.6.3.10	Koch Curve Fractal Geometry	105
2.6.3.11	Pythagorean Tree Fractal Geometry	107
2.6.3.12	Tree Shaped Fractal Geometries	108
2.6.3.13	Penta-Gasket-Khoch (PGK) fractal	110
2.6.3.14	Kernel Array of Microstrip Patches (ReKAMP)	111
2.6.3.15	Square fractal geometries	112
2.6.3.16	Cantor Set fractal geometry	112
2.6.3.17	Other geometries	114

2.6.4	General Applications of Fractal	116
2.6.5	Advantages of Fractal antenna	117
2.7	Dipole antenna	118
2.7.1	UWB Dipole Antenna Geometries	119
2.7.1.1	Uniplanar dipole antenna with single feed location	120
2.7.1.2	Uniplanar dipole antenna with shorted dipole arms	121
2.7.1.3	Uniplanar dipole antenna with balun	121
2.7.1.4	Uniplanar dipole antenna with coplanar strip line	121
2.7.1.5	Uniplanar dipole antenna with tapered slot feed and parasitic element	123
2.7.1.6	Double printed dipole antenna geometries	123
<b>CHAPTER 3</b>	<b>ASYMMETRICALLY CPW-FED LADDER-SHAPED UWB FRACTAL ANTENNA</b>	
3.1	Introduction	125
3.2	Antenna Design	126
3.3	Results and Discussion	130
3.3.1	Reflection Coefficient versus Frequency Characteristics	131
3.3.2	VSWR versus Frequency Characteristics	133
3.3.3	Input Impedance versus Frequency Characteristic	135
3.3.4	Surface Current Density Distribution	135
3.3.5	Far Field Radiation Patterns	137
3.3.6	Gain and Efficiency Characteristics	140
3.3.7	Time Domain Analysis	141
3.3.8	Effect of Different Substrates	145
3.3.9	Comparison with fractal structures	146

**CHAPTER 4 BEVELED UWB MONOPOLE ANTENNA WITH  
SLOT LOADED SEMI-CIRCULAR LIKE GROUND  
PLANE**

4.1	Introduction	148
4.2	Antenna Design	148
4.3	Results and Discussion	153
4.3.1	Reflection Coefficient versus Frequency Characteristics	153
4.3.2	VSWR versus Frequency Characteristics	156
4.3.3	Input Impedance versus Frequency Characteristic	158
4.3.4	Surface Current Density Distribution	158
4.3.5	Far Field Radiation Patterns	160
4.3.6	Gain and Efficiency Characteristics	165
4.3.7	Time Domain Analysis	166
4.3.8	Effect of Different Substrates	169
4.3.9	Comparison with respect to previously reported structures	171

**CHAPTER 5 CRESCENT SHAPED UWB DIPOLE ANTENNA**

5.1	Introduction	173
5.2	Antenna Design	173
5.3	Results and Discussion	176
5.3.1	Reflection Coefficient versus Frequency Characteristics	177
5.3.2	VSWR versus Frequency Characteristics	179
5.3.3	Input Impedance versus Frequency Characteristic	180
5.3.4	Surface Current Density Distribution	180
5.3.5	Far Field Radiation Patterns	182
5.3.6	Gain and Efficiency Characteristics	186
5.3.7	Time Domain Analysis	187

5.3.8	Parametric Analysis	191
5.3.8.1	Effect of Different Substrates	191
5.3.8.2	Different thickness of Substrate, h	192
5.3.8.3	Major axis of elliptical slot, d	193
5.3.8.4	Minor axis of elliptical slot, c	193
5.3.8.5	Elliptical slot location along x axis, L <sub>9</sub>	194
5.3.8.6	Elliptical slot location along y-axis, W <sub>8</sub>	195
5.3.9	Comparison with other structures	196
<b>CHAPTER 6 CONCLUSION AND FUTURE SCOPE</b>		
6.1	Conclusion	198
6.2	Future Scope	203
<b>References</b>		204
<b>List of Publications</b>		248
<b>Publications</b>		
<b>Personal Profile</b>		