

Table of Contents

Symbols and Abbreviations	5
1 Introduction	11
2 Antenna Concepts for Direct To Home Reception	15
2.1 Transmission parameters of geostationary satellites	15
2.2 Requirements to reception equipment	17
2.2.1 Geometrical aspects	17
2.2.2 Technical aspects	18
2.3 Conventional concept.....	20
2.3.1 Configuration	20
2.3.2 Additional characteristics and requirements	21
2.4 Further existing concepts	24
2.5 Novel concept	27
2.5.1 Motivation and configuration.....	27
2.5.2 Design procedure	28
3 Microstrip Antennas	31
3.1 Introduction	31
3.2 Fundamental characteristics	32
3.3 Feeding techniques	33
3.4 Methods of analysis.....	35
3.4.1 Introduction.....	35
3.4.2 Approximation models.....	36
3.4.3 Method of Moments.....	40
3.4.4 Design equations	41
3.5 Methods of bandwidth extension	43
3.5.1 Bandwidth considerations	43
3.5.2 Survey of existing methods.....	44

3.5.3 Preliminary investigations.....	51
3.5.4 Concluding remarks	56
4 Dual Polarised and Broadband Planar Feeds	57
4.1 Introduction	57
4.2 Examination of EMC antennas	57
4.2.1 Configurations.....	57
4.2.2 Design and optimisation.....	60
4.3 Measurement results.....	69
4.3.1 Scattering parameters	69
4.3.2 Radiation pattern and gain	70
4.4 Combination of planar feed and parabolic reflector	73
5 Improvement of Beam Forming Capabilities	77
5.1 Configurations.....	77
5.2 Design and optimisation.....	79
5.3 Measurement results.....	81
5.3.1 Scattering parameters	81
5.3.2 Radiation pattern and gain	82
5.4 Combination of improved planar feed and parabolic reflector	85
5.4.1 Offset reflectors.....	85
5.4.2 Measurement settings.....	87
5.4.3 Secondary radiation pattern.....	88
5.4.4 Quality of reception antenna	92
6 Antenna Array Feeds	97
6.1 Choice of appropriate single antenna element	97
6.2 Dimensioning	98
6.3 Fixed aligned antenna array feed	101
6.3.1 Design of two feeding networks on the same substrate layer	101
6.3.2 Measurement results	104
6.3.3 Combination with parabolic reflector	107
6.4 Phased antenna array feed.....	111

7	Summary	115
A	Appendix	119
A1	Data sheet of applied substrate.....	119
A2	Photos of conventional feed and realised planar feeds.....	120
A3	Secondary radiation patterns of different feeds and reflectors.....	123
	References	131