## Contents

1	Intr	oduction to Digital Satellite Transmission	1
	1.1	Multimedia Application	2
	1.2	Remote Sensing and Earth Observation	2
	1.3	The Second Generation of Digital Video Broadcasting System	2
2	Ove	erall DVB-S2 MODEM architecture	1
	2.1	Modulation and Coding Schemes	1
		2.1.1 Channel Coding and Reliable Communication	2
		2.1.2 Adaptive Coding Modulation	4
	2.2	System Description	6
		2.2.1 Architecture and Sub-Blocks Specifications	6
		2.2.2 Subsystem Description	6
	2.3	Inner and Outer FEC	6
		2.3.1 BCH	7
		2.3.2 LDPC	9
3	Enc	oding Algorithms for DVB-S2 Digital Transmission	17
J	3.1	Encoding Algorithm Description	
	3.2		18
	$\frac{3.2}{3.3}$		19
	5.5		19 19
			$\frac{19}{20}$
			$\frac{20}{21}$
	3.4	*	$\frac{21}{23}$
	3.4	Some Hardware Considerations	20
4	Har	±	25
	4.1	Overall System	25
	4.2	Encoder Description	25
	4.3	Dealing with Each Error Protection	27
	4.4	Interface Description	30
5	Soft	ware Package for VHDL Validation	33
J	5.1	<u>o</u>	33
	-	1	34

	5.3	Galois Fields Creation	39			
	5.4	Decoding BCH	40			
		5.4.1 Error Detection	41			
		5.4.2 Berlekamp-Massey Algorithm	42			
		5.4.3 Chien Search	45			
	5.5	Software Robustness and Validation	45			
$\mathbf{A}$	Gal	ois (or Finite) Fields	47			
	A.1	Algebraic Structures: a Glance	48			
	A.2	How Do We Get Galois Fields?	49			
	A.3	A Mathematical Survey	50			
	A.4	Irreducible and Primitive polynomials	51			
	A.5	Factoring $x^n - 1$	52			
В	Cyc	lic Codes	<b>5</b> 5			
	B.1	Shift Operation	55			
	B.2	Rings of Polynomials and Ideals in Rings	56			
		Algebraic Description				
Bi	Bibliography					