

# ADSL CPE Annex B

AMAZON-SE Interoperability Report for FW  
3.1.1.1.0.2

## Interoperability Report

Rev. 1.0

Communication Solutions  
Access



Never stop thinking

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## Interoperability Report

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## Table of Contents

	<b>Table of Contents</b>	4
	<b>List of Figures</b>	7
	<b>List of Tables</b>	8
	<b>Preface</b>	16
<b>1</b>	<b>Overall Summary</b>	17
1.1	Test Item – ADSL CPE	17
1.2	Top Level Test Results	18
1.2.1	DSLAMs under Test	18
1.2.2	Summary of Test Results	18
<b>2</b>	<b>Common Test Information</b>	22
2.1	Test Environment	22
2.2	Test Setup	22
2.3	Test Equipment Used	23
<b>3</b>	<b>TR-067 Annex B Test Results</b>	23
3.1	ADSL Performance Test Results	23
3.1.1	INFINEON GEMINAX MAX	23
3.1.1.1	Performance Tests for European Test Set	23
3.1.2	INFINEON GEMINAX MAX	28
3.1.2.1	Performance Tests for European Test Set	28
3.1.3	ALCATEL ASAM 7300 ABLT-F	33
3.1.3.1	Performance Tests for European Test Set	33
3.1.4	LUCENT ANYMEDIA LPA417	38
3.1.4.1	Performance Tests for European Test Set	38
3.1.5	LUCENT ANYMEDIA LPA434	43
3.1.5.1	Performance Tests for European Test Set	43
3.1.6	SIEMENS HiX5300 SUASDL:64:IX	48
3.1.6.1	Performance Tests for European Test Set	48
3.1.7	SIEMENS XPRESSLINK V2.1 SUADSL:32I	52
3.1.7.1	Performance Tests for European Test Set	53
3.1.8	SIEMENS XPRESSLINK V2.1 SUADSL:16I	57
3.1.8.1	Performance Tests for European Test Set	57
3.1.9	ECI HiFocus ATUC-32	62
3.1.9.1	Performance Tests for European Test Set	62
3.1.10	ECI HiFocus ATUC-16	66
3.1.10.1	Performance Tests for European Test Set	67
3.1.11	ERICSSON EDN312XI	71
3.1.11.1	Performance Tests for European Test Set	71
3.1.12	MARCONI AXH600 IX60	76
3.1.12.1	Performance Tests for European Test Set	76
3.1.13	LUCENT STINGER LIPM A2B-72-HB	80
3.1.13.1	Performance Tests for European Test Set	81
<b>4</b>	<b>U-R2 Performance Test Results</b>	86
4.1	INFINEON GEMINAX MAX	86
4.1.1	Performance for ADSL according to U-R2 V7.0	86
4.1.1.1	Tests with Fixed Rate Configuration	86
4.2	INFINEON GEMINAX MAX	88

4.2.1	Performance for ADSL according to U-R2 V6.1	89
4.2.1.1	Tests with Fixed Rate Configuration	89
4.3	ALCATEL ASAM 7300 ABLT-F	91
4.3.1	Performance for ADSL according to U-R2 V6.1	91
4.3.1.1	Tests with Fixed Rate Configuration	92
4.4	LUCENT ANYMEDIA LPA417	94
4.4.1	Performance for ADSL according to U-R2 V6.1	94
4.4.1.1	Tests with Fixed Rate Configuration	95
4.5	SIEMENS HiX5300 SUADSL:64:IX	97
4.5.1	Performance for ADSL according to U-R2 V6.1	97
4.5.1.1	Tests with Fixed Rate Configuration	98
4.6	SIEMENS XPRESSLINK V2.1 SUADSL:32I	100
4.6.1	Performance for ADSL according to U-R2 V6.1	100
4.6.1.1	Tests with Fixed Rate Configuration	100
4.7	SIEMENS XPRESSLINK V2.1 SUADSL:16I	103
4.7.1	Performance for ADSL according to U-R2 V6.1	103
4.7.1.1	Tests with Fixed Rate Configuration	103
4.8	ECI ATUC32	106
4.8.1	Performance for ADSL according to U-R2 V7.0	106
4.8.1.1	Tests with Fixed Rate Configuration	106
4.9	ECI ATUC16	108
4.9.1	Performance for ADSL according to U-R2 V7.0	108
4.9.1.1	Tests with Fixed Rate Configuration	109
4.10	ERICSSON EDN312XI	111
4.10.1	Performance for ADSL according to U-R2 V6.1	111
4.10.1.1	Tests with Fixed Rate Configuration	111
4.11	MARCONI AXH600 IX60	114
4.11.1	Performance for ADSL according to U-R2 V6.1	114
4.11.1.1	Tests with Fixed Rate Configuration	114
<b>5</b>	<b>TR-100 Annex B Performance Test Results</b>	<b>117</b>
5.1	INFINEON GEMINAX MAX	117
5.1.1	ADSL2 Tests	117
5.1.1.1	CPE Margin Verification	117
5.1.1.2	Stresstest	117
5.1.1.3	Loop Tests with Ports Set for Adaptive Rate	118
5.1.1.4	Loop Tests with Ports Set for Fixed Rate	119
5.1.2	ADSL2+ Tests	122
5.1.2.1	CPE Margin Verification	122
5.1.2.2	Loop Tests with Ports Set for Adaptive Rate	122
5.1.2.3	Loop Test with Ports Set for Fixed Rate	124
5.2	INFINEON GMX MAX	127
5.2.1	ADSL2 Tests	127
5.2.1.1	CPE Margin Verification	127
5.2.1.2	Stresstest	128
5.2.1.3	Loop Tests with Ports Set for Adaptive Rate	128
5.2.1.4	Loop Tests with Ports Set for Fixed Rate	129
5.2.2	ADSL2+ Tests	132
5.2.2.1	CPE Margin Verification	132
5.2.2.2	Loop Tests with Ports Set for Adaptive Rate	132
5.2.2.3	Loop Test with Ports Set for Fixed Rate	134
5.3	ALCATEL ASAM 7300 ABLT-F	137



5.3.1	ADSL2 Tests	138
5.3.1.1	CPE Margin Verification	138
5.3.1.2	Stresstest	138
5.3.1.3	Loop Tests with Ports Set for Adaptive Rate	138
5.3.1.4	Loop Tests with Ports Set for Fixed Rate	140
5.3.2	ADSL2+ Tests	142
5.3.2.1	CPE Margin Verification	142
5.3.2.2	Loop Tests with Ports Set for Adaptive Rate	142
5.3.2.3	Loop Test with Ports Set for Fixed Rate	144
5.4	ERICSSON EDN312XI	147
5.4.1	ADSL2 Tests	148
5.4.1.1	Loop Tests with Ports Set for Adaptive Rate	148
5.4.1.2	Loop Tests with Ports Set for Fixed Rate	150
5.4.2	ADSL2+ Tests	152
5.4.2.1	Loop Tests with Ports Set for Adaptive Rate	152
5.4.2.2	Loop Test with Ports Set for Fixed Rate	154
<b>6</b>	<b>Electrical Compatibility Tests</b>	<b>158</b>
6.1	ADSL Test Results	158
6.1.1	PSD Pass Band	158
6.2	ADSL2 Test Results	159
6.2.1	PSD Pass Band	159
6.3	ADSL2+ Test Results	160
6.3.1	PSD Pass Band	160
<b>7</b>	<b>Annex M</b>	<b>161</b>
7.1	ADSL2	161
7.2	ADSL2+	162
<b>8</b>	<b>Annex J</b>	<b>163</b>
8.1	ADSL2	163
8.2	ADSL2+	165
<b>9</b>	<b>Higher Layer Test Cases according TR67</b>	<b>167</b>
9.1	ATM Connectivity Tests	167
9.2	Layer 3 Ethernet RFC 2684 [10] Bridged Mode	168
9.2.1	Packet Throughput Test	168
9.2.2	Packet Latency Tests	169
9.2.3	RFC 2516 [11] PPPoE End-to-End Connectivity Test	169
9.2.4	RFC 2364 [12] PPPoA End-to-End Connectivity Test	171
9.2.5	RFC 2684 [10] End-to-End Connectivity Test	171
9.2.5.1	Verify IP Bridged	171
9.2.6	Usability Test	171
<b>10</b>	<b>Higher Layer Test Cases according TR100</b>	<b>173</b>
10.1	Layer-3 Ethernet RFC 2684 [10] Bridged Mode	173
10.1.1	Packet Throughput Test	173
10.2	RFC 2516 [12] PPPoE Throughput Test	175
10.3	RFC 2364 [13] PPPoA End-to-End Connectivity Test	175
10.4	RFC 2684 [11] IP Bridged End-to-End Connectivity Test	175
10.5	Power Cycle Test	175
	<b>References</b>	<b>176</b>

CONFIDENTIAL

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## List of Figures

Figure 1	Test Setup for Performance Test Cases .....	22
Figure 2	PSD Pass Band .....	158
Figure 3	PSD Pass Band .....	159
Figure 4	PSD Pass Band .....	160

CONFIDENTIAL

## List of Tables

Table 1	CPE System Description	17
Table 2	DSLAMs Passing the TR-067 - Tests against AMAZON SE CPE	18
Table 3	Summary	19
Table 4	Summary 2	21
Table 5	Test Equipment	23
Table 6	DSLAM Description	23
Table 7	CPE Margin Verification Test (Annex B.2.1)	23
Table 8	Stresstest (chapter 8.4)	24
Table 9	White Noise Impairment Only in Fast Mode	24
Table 10	White Noise Impairment Only in Interleaved Mode	24
Table 11	European Noise FB Impairment in Fast Mode	25
Table 12	European Noise FB Impairment in Interleaved Mode	25
Table 13	White Noise Impairment, 864 kbps DS, 160 kbps US	26
Table 14	White Noise Impairment, 4096 kbps DS, 384 kbps US	26
Table 15	European Noise FB Impairment, 864 kbps DS, 160 kbps US	27
Table 16	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	27
Table 17	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	27
Table 18	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	28
Table 19	DSLAM Description	28
Table 20	CPE Margin Verification Test (Annex B.2.1)	28
Table 21	Stresstest (chapter 8.4)	29
Table 22	White Noise Impairment Only in Fast Mode	29
Table 23	White Noise Impairment Only in Interleaved Mode	29
Table 24	European Noise FB Impairment in Fast Mode	30
Table 25	European Noise FB Impairment in Interleaved Mode	30
Table 26	White Noise Impairment, 864 kbps DS, 160 kbps US	31
Table 27	White Noise Impairment, 4096 kbps DS, 384 kbps US	31
Table 28	European Noise FB Impairment, 864 kbps DS, 160 kbps US	32
Table 29	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	32
Table 30	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	32
Table 31	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	33
Table 32	DSLAM Description	33
Table 33	CPE Margin Verification Test (Annex B.2.1)	33
Table 34	Stresstest (chapter 8.4)	34
Table 35	White Noise Impairment Only in Fast Mode	34
Table 36	White Noise Impairment Only in Interleaved Mode	34
Table 37	European Noise FB Impairment in Fast Mode	35
Table 38	European Noise FB Impairment in Interleaved Mode	35
Table 39	White Noise Impairment, 864 kbps DS, 160 kbps US	36
Table 40	White Noise Impairment, 4096 kbps DS, 384 kbps US	36
Table 41	European Noise FB Impairment, 864 kbps DS, 160 kbps US	37
Table 42	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	37
Table 43	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	37
Table 44	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	38
Table 45	DSLAM Description	38
Table 46	CPE Margin Verification Test (Annex B.2.1)	38
Table 47	Stresstest (chapter 8.4)	39
Table 48	White Noise Impairment Only in Fast Mode	39
Table 49	White Noise Impairment Only in Interleaved Mode	39



Table 50	European Noise FB Impairment in Fast Mode	40
Table 51	European Noise FB Impairment in Interleaved Mode	40
Table 52	White Noise Impairment, 864 kbps DS, 160 kbps US	41
Table 53	White Noise Impairment, 4096 kbps DS, 384 kbps US	41
Table 54	European Noise FB Impairment, 864 kbps DS, 160 kbps US	42
Table 55	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	42
Table 56	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	42
Table 57	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	43
Table 58	DSLAM Description	43
Table 59	CPE Margin Verification Test (Annex B.2.1)	43
Table 60	White Noise Impairment Only in Fast Mode	44
Table 61	White Noise Impairment Only in Interleaved Mode	44
Table 62	European Noise FB Impairment in Fast Mode	44
Table 63	European Noise FB Impairment in Interleaved Mode	45
Table 64	White Noise Impairment, 864 kbps DS, 160 kbps US	46
Table 65	White Noise Impairment, 4096 kbps DS, 384 kbps US	46
Table 66	European Noise FB Impairment, 864 kbps DS, 160 kbps US	46
Table 67	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	47
Table 68	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	47
Table 69	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	48
Table 70	DSLAM Description	48
Table 71	White Noise Impairment Only in Fast Mode	48
Table 72	White Noise Impairment Only in Interleaved Mode	49
Table 73	European Noise FB Impairment in Fast Mode	49
Table 74	European Noise FB Impairment in Interleaved Mode	50
Table 75	White Noise Impairment, 864 kbps DS, 160 kbps US	50
Table 76	White Noise Impairment, 4096 kbps DS, 384 kbps US	51
Table 77	European Noise FB Impairment, 864 kbps DS, 160 kbps US	51
Table 78	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	51
Table 79	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	52
Table 80	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	52
Table 81	DSLAM Description	53
Table 82	White Noise Impairment Only in Fast Mode	53
Table 83	White Noise Impairment Only in Interleaved Mode	53
Table 84	European Noise FB Impairment in Fast Mode	54
Table 85	European Noise FB Impairment in Interleaved Mode	54
Table 86	White Noise Impairment, 864 kbps DS, 160 kbps US	55
Table 87	White Noise Impairment, 4096 kbps DS, 384 kbps US	55
Table 88	European Noise FB Impairment, 864 kbps DS, 160 kbps US	56
Table 89	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	56
Table 90	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	56
Table 91	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	57
Table 92	DSLAM Description	57
Table 93	White Noise Impairment Only in Fast Mode	58
Table 94	White Noise Impairment Only in Interleaved Mode	58
Table 95	European Noise FB Impairment in Fast Mode	58
Table 96	European Noise FB Impairment in Interleaved Mode	59
Table 97	White Noise Impairment, 864 kbps DS, 160 kbps US	60
Table 98	White Noise Impairment, 4096 kbps DS, 384 kbps US	60
Table 99	European Noise FB Impairment, 864 kbps DS, 160 kbps US	60
Table 100	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	61

Table 101	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	61
Table 102	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	62
Table 103	DSLAM Description	62
Table 104	White Noise Impairment Only in Fast Mode	62
Table 105	White Noise Impairment Only in Interleaved Mode	63
Table 106	European Noise FB Impairment in Fast Mode	63
Table 107	European Noise FB Impairment in Interleaved Mode	64
Table 108	White Noise Impairment, 864 kbps DS, 160 kbps US	64
Table 109	White Noise Impairment, 4096 kbps DS, 384 kbps US	65
Table 110	European Noise FB Impairment, 864 kbps DS, 160 kbps US	65
Table 111	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	65
Table 112	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	66
Table 113	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	66
Table 114	DSLAM Description	67
Table 115	White Noise Impairment Only in Fast Mode	67
Table 116	White Noise Impairment Only in Interleaved Mode	67
Table 117	European Noise FB Impairment in Fast Mode	68
Table 118	European Noise FB Impairment in Interleaved Mode	68
Table 119	White Noise Impairment, 864 kbps DS, 160 kbps US	69
Table 120	White Noise Impairment, 4096 kbps DS, 384 kbps US	69
Table 121	European Noise FB Impairment, 864 kbps DS, 160 kbps US	70
Table 122	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	70
Table 123	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	70
Table 124	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	71
Table 125	DSLAM Description	71
Table 126	White Noise Impairment Only in Fast Mode	72
Table 127	White Noise Impairment Only in Interleaved Mode	72
Table 128	European Noise FB Impairment in Fast Mode	72
Table 129	European Noise FB Impairment in Interleaved Mode	73
Table 130	White Noise Impairment, 864 kbps DS, 160 kbps US	74
Table 131	White Noise Impairment, 4096 kbps DS, 384 kbps US	74
Table 132	European Noise FB Impairment, 864 kbps DS, 160 kbps US	74
Table 133	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	75
Table 134	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	75
Table 135	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	76
Table 136	DSLAM Description	76
Table 137	White Noise Impairment Only in Fast Mode	76
Table 138	White Noise Impairment Only in Interleaved Mode	77
Table 139	European Noise FB Impairment in Fast Mode	77
Table 140	European Noise FB Impairment in Interleaved Mode	78
Table 141	White Noise Impairment, 864 kbps DS, 160 kbps US	78
Table 142	White Noise Impairment, 4096 kbps DS, 384 kbps US	79
Table 143	European Noise FB Impairment, 864 kbps DS, 160 kbps US	79
Table 144	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	79
Table 145	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	80
Table 146	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	80
Table 147	DSLAM Description	81
Table 148	CPE Margin Verification Test (Annex B.2.1)	81
Table 149	Stresstest (chapter 8.4)	81
Table 150	White Noise Impairment Only in Fast Mode	81
Table 151	White Noise Impairment Only in Interleaved Mode	82

Table 152	European Noise FB Impairment in Fast Mode	82
Table 153	European Noise FB Impairment in Interleaved Mode	83
Table 154	White Noise Impairment, 864 kbps DS, 160 kbps US	83
Table 155	White Noise Impairment, 4096 kbps DS, 384 kbps US	84
Table 156	European Noise FB Impairment, 864 kbps DS, 160 kbps US	84
Table 157	European Noise FB Impairment, 2048 kbps DS, 256 kbps US	85
Table 158	European Noise FB Impairment, 4096 kbps DS, 384 kbps US	85
Table 159	European Noise FB Impairment, 6144 kbps DS, 640 kbps US	85
Table 160	DSLAM Description	86
Table 161	Test Parameters	86
Table 162	Fixed Rate Fast 6 dB	86
Table 163	Fixed Rate Fast 3 dB	87
Table 164	Fixed Rate Interleaved 6 dB	87
Table 165	Fixed Rate Interleaved 3 dB	88
Table 166	DSLAM Description	88
Table 167	Test Parameters	89
Table 168	Fixed Rate Fast 6 dB	89
Table 169	Fixed Rate Fast 3 dB	90
Table 170	Fixed Rate Interleaved 6 dB	90
Table 171	Fixed Rate Interleaved 3 dB	91
Table 172	DSLAM Description	91
Table 173	Test Parameters	91
Table 174	Fixed Rate Fast 6 dB	92
Table 175	Fixed Rate Fast 3 dB	92
Table 176	Fixed Rate Interleaved 6 dB	93
Table 177	Fixed Rate Interleaved 3 dB	94
Table 178	DSLAM Description	94
Table 179	Test Parameters	94
Table 180	Fixed Rate Fast 6 dB	95
Table 181	Fixed Rate Fast 3 dB	95
Table 182	Fixed Rate Interleaved 6 dB	96
Table 183	Fixed Rate Interleaved 3 dB	96
Table 184	DSLAM Description	97
Table 185	Test Parameters	97
Table 186	Fixed Rate Fast 6 dB	98
Table 187	Fixed Rate Fast 3 dB	98
Table 188	Fixed Rate Interleaved 6 dB	99
Table 189	Fixed Rate Interleaved 3 dB	99
Table 190	DSLAM Description	100
Table 191	Test Parameters	100
Table 192	Fixed Rate Fast 6 dB	101
Table 193	Fixed Rate Fast 3 dB	101
Table 194	Fixed Rate Interleaved 6 dB	102
Table 195	Fixed Rate Interleaved 3 dB	102
Table 196	DSLAM Description	103
Table 197	Test Parameters	103
Table 198	Fixed Rate Fast 6 dB	103
Table 199	Fixed Rate Fast 3 dB	104
Table 200	Fixed Rate Interleaved 6 dB	105
Table 201	Fixed Rate Interleaved 3 dB	105
Table 202	DSLAM Description	106

Table 203	Test Parameters	106
Table 204	Fixed Rate Fast 6 dB	106
Table 205	Fixed Rate Fast 3 dB	107
Table 206	Fixed Rate Interleaved 6 dB	107
Table 207	Fixed Rate Interleaved 3 dB	108
Table 208	DSLAM Description	108
Table 209	Test Parameters	109
Table 210	Fixed Rate Fast 6 dB	109
Table 211	Fixed Rate Fast 3 dB	109
Table 212	Fixed Rate Interleaved 6 dB	110
Table 213	Fixed Rate Interleaved 3 dB	110
Table 214	DSLAM Description	111
Table 215	Test Parameters	111
Table 216	Fixed Rate Fast 6 dB	112
Table 217	Fixed Rate Fast 3 dB	112
Table 218	Fixed Rate Interleaved 6 dB	113
Table 219	Fixed Rate Interleaved 3 dB	113
Table 220	DSLAM Description	114
Table 221	Test Parameters	114
Table 222	Fixed Rate Fast 6 dB	114
Table 223	Fixed Rate Fast 3 dB	115
Table 224	Fixed Rate Interleaved 6 dB	116
Table 225	Fixed Rate Interleaved 3 dB	116
Table 226	DSLAM Description	117
Table 227	CPE Margin Verification Test (Annex B.2.1)	117
Table 228	Stresstest (chapter 7.3)	117
Table 229	White Noise Impairment, testprofile B2_RA_F_16000k	118
Table 230	White Noise Impairment, testprofile B2_RA_I_16000k	118
Table 231	Noise FB Impairment, testprofile B2_RA_F_16000k	119
Table 232	Noise FB Impairment, testprofile B2_RA_I_16000k	119
Table 233	White noise fixed rate profile 864k	119
Table 234	White noise fixed rate profile 3456k	120
Table 235	White noise fixed rate profile 7288k	120
Table 236	Noise FB Impairment fixed rate profile 864k	121
Table 237	Noise FB Impairment fixed rate profile 3456k	121
Table 238	Noise FB Impairment fixed rate profile 7288k	121
Table 239	CPE Margin Verification Test (Annex B.2.1)	122
Table 240	White Noise Impairment, testprofile B2P_RA_F_30000k	122
Table 241	White Noise Impairment, testprofile B2P_RA_I_30000k	123
Table 242	Noise FB ADSL2plus impairment, testprofile B2P_RA_F_30000k	123
Table 243	Noise FB ADSL2plus impairment, testprofile B2P_RA_I_30000k,	123
Table 244	White noise fixed rate profile 864k	124
Table 245	White noise fixed rate profile 3456k	124
Table 246	White noise fixed rate profile 7288k	125
Table 247	White noise fixed rate profile 10000k	125
Table 248	Noise FB impairment fixed rate profile 864k	125
Table 249	Noise FB impairment fixed rate profile 3456k	126
Table 250	Noise FB impairment fixed rate profile 7288k	126
Table 251	Noise FB impairment fixed rate profile 10000k	127
Table 252	DSLAM Description	127
Table 253	CPE Margin Verification Test (Annex B.2.1)	127

Table 254	Stresstest (chapter 7.3)	128
Table 255	White Noise Impairment, testprofile B2_RA_F_16000k	128
Table 256	White Noise Impairment, testprofile B2_RA_I_16000k	128
Table 257	Noise FB Impairment, testprofile B2_RA_F_16000k	129
Table 258	Noise FB Impairment, testprofile B2_RA_I_16000k	129
Table 259	White noise fixed rate profile 864k	130
Table 260	White noise fixed rate profile 3456k	130
Table 261	White noise fixed rate profile 7288k	130
Table 262	Noise FB Impairment fixed rate profile 864k	131
Table 263	Noise FB Impairment fixed rate profile 3456k	131
Table 264	Noise FB Impairment fixed rate profile 7288k	132
Table 265	CPE Margin Verification Test (Annex B.2.1)	132
Table 266	White Noise Impairment, testprofile B2P_RA_F_30000k	132
Table 267	White Noise Impairment, testprofile B2P_RA_I_30000k	133
Table 268	Noise FB ADSL2plus impairment, testprofile B2P_RA_F_30000k	133
Table 269	Noise FB ADSL2plus impairment, testprofile B2P_RA_I_30000k,	134
Table 270	White noise fixed rate profile 864k	134
Table 271	White noise fixed rate profile 3456k	135
Table 272	White noise fixed rate profile 7288k	135
Table 273	White noise fixed rate profile 10000k	135
Table 274	Noise FB impairment fixed rate profile 864k	136
Table 275	Noise FB impairment fixed rate profile 3456k	136
Table 276	Noise FB impairment fixed rate profile 7288k	137
Table 277	Noise FB impairment fixed rate profile 10000k	137
Table 278	DSLAM Description	137
Table 279	CPE Margin Verification Test (Annex B.2.1)	138
Table 280	Stresstest (chapter 7.3)	138
Table 281	White Noise Impairment, testprofile B2_RA_F_16000k	138
Table 282	White Noise Impairment, testprofile B2_RA_I_16000k	139
Table 283	Noise FB Impairment, testprofile B2_RA_F_16000k	139
Table 284	Noise FB Impairment, testprofile B2_RA_I_16000k	139
Table 285	White noise fixed rate profile 864k	140
Table 286	White noise fixed rate profile 3456k	140
Table 287	White noise fixed rate profile 7288k	141
Table 288	Noise FB Impairment fixed rate profile 864k	141
Table 289	Noise FB Impairment fixed rate profile 3456k	141
Table 290	Noise FB Impairment fixed rate profile 7288k	142
Table 291	CPE Margin Verification Test (Annex B.2.1)	142
Table 292	White Noise Impairment, testprofile B2P_RA_F_30000k	143
Table 293	White Noise Impairment, testprofile B2P_RA_I_30000k	143
Table 294	Noise FB ADSL2plus impairment, testprofile B2P_RA_F_30000k	143
Table 295	Noise FB ADSL2plus impairment, testprofile B2P_RA_I_30000k,	144
Table 296	White noise fixed rate profile 864k	144
Table 297	White noise fixed rate profile 3456k	145
Table 298	White noise fixed rate profile 7288k	145
Table 299	White noise fixed rate profile 10000k	146
Table 300	Noise FB impairment fixed rate profile 864k	146
Table 301	Noise FB impairment fixed rate profile 3456k	146
Table 302	Noise FB impairment fixed rate profile 7288k	147
Table 303	Noise FB impairment fixed rate profile 10000k	147
Table 304	DSLAM Description	148



Table 305	White Noise Impairment, testprofile B2_RA_F_16000k	148
Table 306	White Noise Impairment, testprofile B2_RA_I_16000k	148
Table 307	Noise FB Impairment, testprofile B2_RA_F_16000k	149
Table 308	Noise FB Impairment, testprofile B2_RA_I_16000k	149
Table 309	White noise fixed rate profile 864k	150
Table 310	White noise fixed rate profile 3456k	150
Table 311	White noise fixed rate profile 7288k	151
Table 312	Noise FB Impairment fixed rate profile 864k	151
Table 313	Noise FB Impairment fixed rate profile 3456k	151
Table 314	Noise FB Impairment fixed rate profile 7288k	152
Table 315	White Noise Impairment, testprofile B2P_RA_F_30000k	152
Table 316	White Noise Impairment, testprofile B2P_RA_I_30000k	153
Table 317	Noise FB ADSL2plus impairment, testprofile B2P_RA_F_30000k	153
Table 318	Noise FB ADSL2plus impairment, testprofile B2P_RA_I_30000k,	154
Table 319	White noise fixed rate profile 864k	154
Table 320	White noise fixed rate profile 3456k	154
Table 321	White noise fixed rate profile 7288k	155
Table 322	White noise fixed rate profile 10000k	155
Table 323	Noise FB impairment fixed rate profile 864k	156
Table 324	Noise FB impairment fixed rate profile 3456k	156
Table 325	Noise FB impairment fixed rate profile 7288k	156
Table 326	Noise FB impairment fixed rate profile 10000k	157
Table 327	ADSL2 Annex M (Mask 1-3)	161
Table 328	ADSL2 Annex M (Mask 4-6)	161
Table 329	ADSL2 Annex M (Mask 7-9)	162
Table 330	ADSL2+ Annex M (Mask 1-3)	162
Table 331	ADSL2+ Annex M (Mask 4-6)	162
Table 332	ADSL2+ Annex M (Mask 7-9)	163
Table 333	ADSL2 Annex M (Mask 1-3)	163
Table 334	ADSL2 Annex M (Mask 4-6)	164
Table 335	ADSL2 Annex M (Mask 7-9)	164
Table 336	ADSL2+ Annex M (Mask 1-3)	165
Table 337	ADSL2+ Annex M (Mask 4-6)	165
Table 338	ADSL2+ Annex M (Mask 7-9)	166
Table 339	Higher Layer Test Results	167
Table 340	Throughput Test Results: Connect Rates DS: 384 kbps US: 128 kbps	168
Table 341	Throughput Test Results: Connect Rates DS: 1536 kbps US: 384 kbps	168
Table 342	Throughput Test Results: Connect Rates DS: 8000 kbps US: 800 kbps	169
Table 343	Latency Test Results with Multiple Frame Sizes	169
Table 344	Latency Test Results with Multiple Train Rates	169
Table 345	PPPoE	170
Table 346	PPPoA	171
Table 347	Verify IP Bridged RFC 2684 [10]	171
Table 348	Usability Test Summary	171
Table 349	10/100 Ethernet Auto-negotiation Expected Results Table	172
Table 350	Throughput Test Results: Connect Rates DS: 12000 kbit/s US: 800 kbit/s	173
Table 351	Throughput Test Results: Connect Rates DS: 18000 kbit/s US: 800 kbit/s	173
Table 352	Throughput Test Results: Connect Rates DS: 24000 kbit/s US: 800 kbit/s	174
Table 353	PPPoE Packet Throughput Test	175
Table 354	PPPoA	175
Table 355	Verify IP Bridged RFC 2684 [11]	175



Table 356	Power Cycle Test . . . . .	175
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## **Preface**

This document shows the interoperability test results of AMAZON SE against different DSLAMs/Linecard combinations according to TR-067 Annex B, U-R2 6.1/7.0 and TR100 Annex B. The document is split into the following sections:

- Overall summary which provides all essential information regarding the performed tests and the test results in pass/fail criteria
- Common test information which shows the details about the used equipment and environmental conditions
- Detailed performance test results which provides all the information according to TR-067 Annex B, U-R2, TR100 Annex B and as well as all the information regarding the functional and physical tests
- Electrical compatibility tests in accordance to TR-067
- Performance test results for Annex M and Annex J
- Higher Layer test results according to TR-067 and TR-100
- References which provide an overview about the used standards

# 1 Overall Summary

This chapter provides an overview about the interoperability tests which were performed in order to exclude any malfunction of the AMAZON CPE.

## 1.1 Test Item – ADSL CPE

Brief description of the CPE system under test can be found in [Table 1](#).

**Table 1 CPE System Description**

<b>CPE General Information</b>	
Vendor information (product name and revision)	AMAZON-SE (Reference Board)
SW version	ECOS V2.2.1 (for some Higher layer tests SW 3.4.3.4 was used)
FW version	3.1.1.1.0.2
Modem form (interfaces)	Ethernet, USB
Industry Standards Supported	G992.1, G992.3, G992.5, TS 101 388
Chip set (Vendor, HW and Firmware)	AMAZON-SE, Infineon Technologies
<b>ADSL Characteristics</b>	
Support of S = ½	Yes
Support of framing modes	Yes
Support of Trellis	Yes
Support of bit swap	Yes
Support of fast path	Yes
Support of interleaved path	Yes
Power Cut Back implemented?	Yes
Dying Gasp	Yes
<b>ATM Characteristics</b>	
Maximum No. of VC's	15
VPI/VCI Ranges	0/65535
SVC	No
Multicast Support	Yes
F4/F5 OAM Loopback	Yes
UBR supported	Yes
CBR supported	Yes
VBR supported	Yes
ILMI	Only ILMI 4.0 auto-configuration
<b>Protocols</b>	
RFC 1483 or 2684 IP Bridging	RFC2684 bridging
RFC 1483 or 2684 IP Routing	RFC2684 bridging
Bridge filter	Yes
LLC-SNAP	Yes
VC-MUX	Yes
DHCP Client	Yes
DHCP Server	Yes

**Table 1 CPE System Description (cont'd)**

NAT	Yes
PAT	Yes
RFC 2364 PPPoA	Yes
RFC 2516 PPPoE	Yes
PAP	Yes
CHAP	Yes
Classical IP RFC 1577	Yes
Other supported Protocols	IGMP proxy, DDNS, DHCP relay, DNS relay, Firewall, ALGs, RIP 1/2, Static Routing, SSH server, Telnet Server, FTP server, TFTP server

## 1.2 Top Level Test Results

This chapter provides top-level results for the CPE interoperability tests conducted at the CPE interoperability test labs of Infineon Technologies AG in Munich. The top-level result is designed to provide a quick look at the interoperability of an ATU-C / ATU-R pair.

### 1.2.1 DSLAMs under Test

**Table 2 DSLAMs Passing the TR-067 - Tests against AMAZON SE CPE**

DSLAM	Line Card	Line Card Firmware/Software Version	Chip Set
Evaluation System	IDES3300	7.1B.04	INFINEON GEMINAX MAX
Evaluation System	IDES3300	7.11.0d	INFINEON GEMINAX MAX
Alcatel ASAM 7300	ABLT-F	R4.7.0.8.4	Broadcom
Lucent AnyMedia	LPA417	1.29.00.0	AC5
Lucent AnyMedia	LPA434	1.29.00.0	Globespan
Siemens H1000	SUADSL:64:IX	CAPS 1.2.2.112_ur2	INFINEON GEMINAX BIS
Siemens XpressLink	SUADSL:16I	CAPS 1.0.3.3	TI 4100C
Siemens XpressLink	SUADSL:32I	CAPS 1.0.3.3	TI AC5
ECi HiFocus	ATUC-16	A2_8.10.03	ADI 930
ECi HiFocus	ATUC-32	A3_8.10.05	ADI Anaconda
Ericsson ECN320	EDN312xi	2.3R2A	Broadcom
Marconi AXH 600	ADSL i60	5.52	Centillum
Lucent Stinger	LIPM-A2B-72-HB	TAOS 9.9.226	Conexant

### 1.2.2 Summary of Test Results

This section provides a summary of the test results in the following areas.

- Tests according to TR-067 Annex B
- Tests according to U-R2 V6.1 / 7.0
- Tests according to TR-100 Annex B
- Electrical compatibility tests
- Further functional tests

Summary of test results obtained for TR-067, U-R2 and TR-100 is shown in table 3 and 4.

**Table 3 Summary**

		GEMINAX-MAX 7.1B.04			GEMINAX-MAX 7.11.0d			Alcatel; ABLT-F Broadcom			ECI ADI Anaconda	ECI ADI 930
		ADSL	ADSL2	ADSL2+	ADSL	ADSL2	ADSL2+	ADSL	ADSL2	ADSL2+	ADSL	ADSL
ADSL Transmission System (U-R2)												
	Duplexing Method (non overlapped spectrum)	pass										
	Interleaver	pass										
	Target Noise Margin	pass										
	Retrain Margin	pass										
	Layer 1 State Reporting	pass										
8.1.6	Connector Pin Out	pass										
ADSL Functionality Tests												
8.1.1	Basic Functional Bit Swap Test	pass										
8.1.2	Verification of CRC reporting by ATU-R	pass										
8.1.3	Check ADSL Diagnostic Tools	pass <sup>1)</sup>										
8.1.4	Dying gasp	pass										
8.1.8	ATU-R Register Reporting via EOC	pass										
8.1.9	Request Downstream Power Cutback	pass										
8.2	Sudden Application of RFI	fail										
8.3	DSL Noise Spikes/Surges Tests	pass										
8.4	Stress Test	pass			pass			pass				
TR100 7.1	Bitswap Performance Test		pass									
TR100 7.3	Stress Test		pass			pass			pass			
TR100 7.4	Verification of CRC reporting by ATU-R		pass	pass								
Electrical Compatibility Test												
8.5.1	Analog Front End Power	pass										
8.5.2	PSD Measurements	pass										
8.5.3	Longitudinal Balance - LCL	pass										
8.5.4	Longitudinal Balance - LOV	pass										
Performance Requirements TR-067												
B.2.1	CPE Margin verification tests	pass			pass			pass				
B.2.4	Loop Tests with Ports Set for Adaptive Rate											
	B.2.4.1 White Noise Impairment Only	pass			pass			pass			pass	fail <sup>2)</sup>
	B.2.4.2 Noise FB impairment	pass			pass			pass			pass	pass
B.2.5	Loop Tests with Ports Set for Fixed Rate											
	B.2.5.1 White Noise Impairment Only	pass			pass			pass			pass	pass
	B.2.5.2 European noise FB Impairments	pass			pass			pass			pass	pass
Performance Requirements U-R2												
	2.3.2 b) European noise FB Impairment Fixed Rates	pass			pass			pass			pass	fail <sup>3)</sup>
Performance Requirements TR-100												
B.2/3.1	CPE Margin verification tests		pass	pass		pass	pass		pass	pass		
B.2/3.4	Loop Tests with Ports Set for Adaptive Rate											

**Table 3 Summary**

		GEMINAX-MAX 7.1B.04			GEMINAX-MAX 7.11.0d			Alcatel; ABLT-F Broadcom			ECI ADI Anaconda	ECI ADI 930
		ADSL	ADSL2	ADSL2+	ADSL	ADSL2	ADSL2+	ADSL	ADSL2	ADSL2+	ADSL	ADSL
	B.2.4.1 White Noise Impairment		pass	pass		pass	pass		pass	pass		
	B.2.4.2 Noise FB impairment		fail <sup>4)</sup>	fail <sup>4)</sup>		fail <sup>4)</sup>	fail <sup>4)</sup>		fail <sup>5)</sup>	fail <sup>5)</sup>		
B.2/3.5	Loop Tests with Ports Set for Fixed Rate											
	B.2.5.1 White Noise Impairment		pass	pass		pass	pass		pass	pass		
	B.2.5.2 European noise FB Impairments		fail <sup>4)</sup>	fail <sup>4)</sup>		pass	pass		fail <sup>5)</sup>	fail <sup>5)</sup>		
	B.2.5.3 Target noise margin consideration		pass	pass								
B.2/3.6	Performance in L2 mode		pass	pass		pass	pass					
B.3.7	Performance with configured RFIBANDs			pass			pass			pass		
B.3.8	ADSL2+ cabinet application			pass			pass			pass		
Further Functional Tests												
	multiple trainings	pass	pass	pass								
	DELT		pass	pass								
	Annex M: loopreach tests for all masks		pass	pass								
	Annex J: loopreach tests for all masks		pass	pass								
	Multimode tests (configuration from CO y/n)		pass	pass								
	Integer INP		pass	pass								
	Enhanced INP		pass	pass								
	50m Test	pass	pass	pass								
	L2/L3 Power Mode		pass	pass								
	Auto SRA		pass	pass								
	Data transfer (Higher layer tests)	pass	pass	pass								
	Enhanced US tones			pass								
	VDSL2 Noise Test			pass								
	Dynamic temperature test	pass	pass	pass								

- 1) no software implementation of upstream and downstream cell rate
- 2) fail due to non-connect on longest RA white noise loop in fast mode only. This is a known CO issue.
- 3) fail due to non-connect of 448/96kbps fixed rate on 3000m loop in interleaved 3db mode only. This is a known CO issue.
- 4) fail due to minor violation of the margin criterion (5.9dB instead of 6dB) only.
- 5) fail due to minor violation of the margin criterion only.



Table 4 Summary 2

		Siemens TI AC5	Siemens TI 4100C	Siemens H1000 GMX.bis	Lucent AnyMedia GSPN	Lucent AnyMedia TI AC5	Marconi	Ericsson ECN320			Lucent Stinger LIPM- A2B-HB
		ADSL	ADSL	ADSL	ADSL	ADSL	ADSL	ADSL	ADSL2	ADSL2+	ADSL
ADSL Functionality Tests											
8.4	Stress Test				pass						pass
Performance Requirements TR-067											
B.2.1	CPE Margin verification tests				pass	pass					pass
B.2.4	Loop Tests with Ports Set for Adaptive Rate										
	B.2.4.1 White Noise Impairment Only	fail <sup>(1)</sup>	fail <sup>(2)</sup>	pass	pass	fail <sup>(1)</sup>	pass	fail <sup>(1)</sup>			fail <sup>(1)</sup>
	B.2.4.2 Noise FB impairment	fail <sup>(3)</sup>	fail <sup>(4)</sup>	pass	pass	fail <sup>(5)</sup>	pass	pass			fail <sup>(1)</sup>
B.2.5	Loop Tests with Ports Set for Fixed Rate										
	B.2.5.1 White Noise Impairment Only	fail <sup>(6)</sup>	fail <sup>(2)</sup>	pass	pass	pass	pass	pass			pass
	B.2.5.2 European noise FB Impairments	pass	pass	pass	pass	fail <sup>(7)</sup>	pass	pass			pass
Performance Requirements U-R2											
	2.3.2 b) European noise FB Impairment Fixed Rates	pass	pass	pass	pass		pass	pass			
Performance Requirements TR-100											
B.2/3.4	Loop Tests with Ports Set for Adaptive Rate										
	B.2.4.1 White Noise Impairment								fail <sup>(1)</sup>	fail <sup>(1)</sup>	
	B.2.4.2 Noise FB impairment								fail <sup>(8)</sup>	fail <sup>(8)</sup>	
B.2/3.5	Loop Tests with Ports Set for Fixed Rate										
	B.2.5.1 White Noise Impairment								pass	pass	
	B.2.5.2 European noise FB Impairments								fail <sup>(8)</sup>	fail <sup>(8)</sup>	

- 1) fail due to low upstream rates on longer loops only. Known CO issue.
- 2) fail due known upstream limitation of the CO used only.
- 3) fail due to low upstream rates on longer loops and low downstream rate on 500m loop. Known CO issue.
- 4) fail due to low downstream rates on loops 250-750m.
- 5) fail due to low downstream rates on loops 250-1250m.
- 6) fail due to non-connect of 4096/384kbps fixed-rate on 3000m loop in interleaved mode only. The upstream rate limitation which leads to this fail is a known CO issue.
- 7) fail due to non-connect of 6144/640kbps fixed-rate on short loops caused by low downstream performance on shorter loops with FB noise impairment.
- 8) fail due to minor violation of the margin criterion only.

## 2 Common Test Information

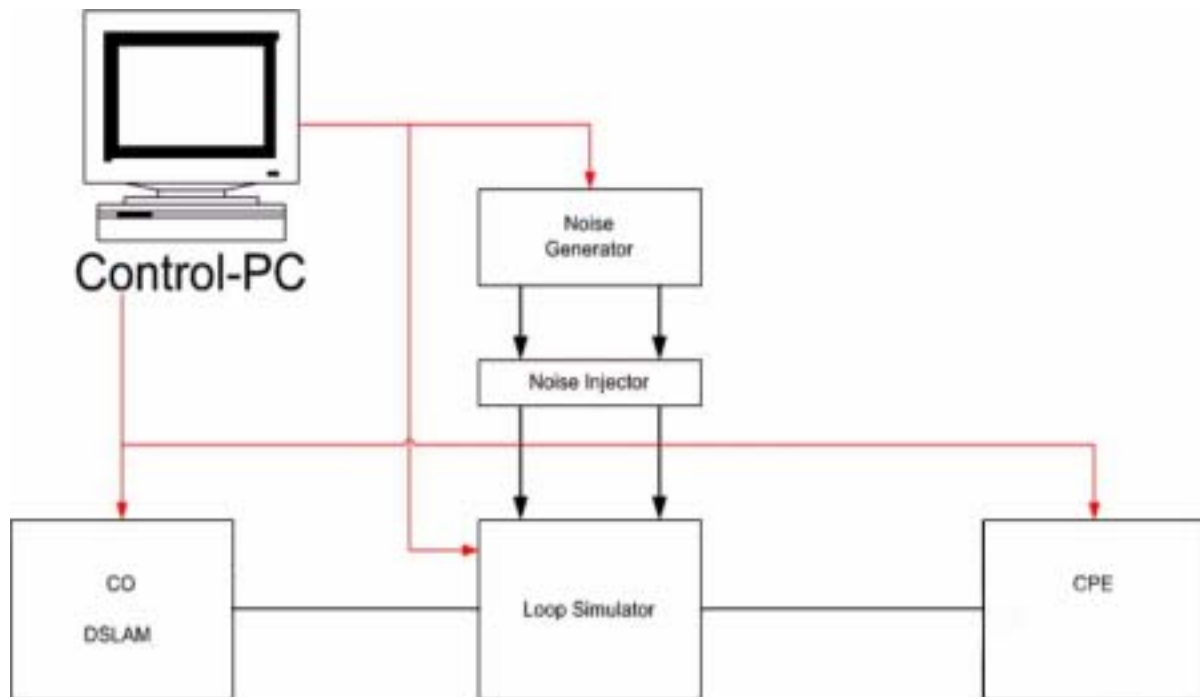
### 2.1 Test Environment

The values for temperature, power supply and further relevant parameters of the test environment were taken according to TR-067

Temperature	Within the limits of 20°C ... 25°C
Power Supply	Within the limits of 230V
Further Parameters	-

### 2.2 Test Setup

The following test setups were used to perform the respective tests.



**Figure 1 Test Setup for Performance Test Cases**

## 2.3 Test Equipment Used

The test equipment which was used during the tests is listed in [Table 4](#).

**Table 5 Test Equipment**

Test Equipment	Manufacturer	Comments
Loop Simulator DLS 414E	Spirent Communications	S/N DL43980, Calibration till 09/30/08 S/N DL43979, Calibration till 09/30/08 S/N DL44124, Calibration till 09/30/07
Noise Signal Generator DLS 5204	Spirent Communications	S/N D520353, Calibration till 09/30/08 S/N D520352, Calibration till 09/30/08 S/N D520429, Calibration till 09/30/07

## 3 TR-067 Annex B Test Results

### 3.1 ADSL Performance Test Results

#### 3.1.1 INFINEON GEMINAX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 6 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.1B.04.00.28
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5, TS 101 388
Chip set	GEMINAX-D MAX v1.3

#### 3.1.1.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

**Table 7 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7296	7296	6	3	5	0	0.0E+00	1.5E-07
CPE	2500	2080	3328	3328	6	1.5	15	1	0.05E-07	1.5E-07
CPE	2850	768	1824	1824	6	1.5	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

## Stresstest

**Table 8 Stresstest (chapter 8.4)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
3600	2018	2018	6	2	480	11	0.028E-07	1.5E-07

The test is passed according to TR-067.

## White Noise Impairment Only in Fast Mode

**Table 9 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1376.0	10.8	7616.0	8128.0	18.5
500	768.0	1376.0	11.5	7616.0	8128.0	20.0
1000	768.0	1376.0	10.4	7616.0	8128.0	19.0
1500	768.0	1376.0	7.9	7616.0	8128.0	17.5
2000	768.0	1312.0	6.1	7616.0	8128.0	13.0
2500	768.0	1152.0	5.9	6144.0	8032.0	6.0
3000	576.0	928.0	6.3	3648.0	5632.0	6.0
3500	384.0	704.0	6.3	1760.0	3296.0	6.0
3800	288.0	512.0	6.4	608.0	2432.0	6.5

This test is passed according to TR-067

## White Noise Impairment Only in Interleaved Mode

**Table 10 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	896.0	29.0	7616.0	7616.0	21.0
500	768.0	896.0	29.1	7616.0	7616.0	22.0
1000	768.0	896.0	25.5	7616.0	7616.0	21.0
1500	768.0	896.0	22.7	7616.0	7616.0	19.5
2000	768.0	896.0	19.4	7616.0	7616.0	15.0
2500	768.0	896.0	14.0	6144.0	7616.0	7.5
3000	672.0	896.0	7.8	4096.0	5760.0	6.0
3500	480.0	704.0	6.6	2208.0	3392.0	7.0
3750	384.0	608.0	6.5	1184.0	2560.0	7.0
4000	288.0	448.0	6.6	320.0	1920.0	7.5

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 11 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1280.0	6.3	4864.0	5888.0	6.0
250	768.0	1248.0	6.1	5792.0	5792.0	6.0
500	768.0	1184.0	6.8	6752.0	7136.0	6.0
750	768.0	1120.0	6.1	7136.0	7904.0	6.0
1000	768.0	1024.0	6.0	7200.0	8032.0	6.0
1250	736.0	896.0	6.4	6976.0	7744.0	6.0
1500	672.0	800.0	6.0	6496.0	7296.0	6.0
1750	576.0	672.0	6.0	5408.0	6592.0	6.0
2000	480.0	544.0	6.7	4320.0	5632.0	6.0
2500	256.0	320.0	6.7	2176.0	3328.0	6.0
2750	128.0	224.0	6.1	1120.0	2016.0	6.0
2900	64.0	160.0	6.8	192.0	1408.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 12 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	896.0	18.1	4864.0	6112.0	6.0
250	768.0	896.0	17.1	5792.0	5984.0	6.0
500	768.0	896.0	15.0	6752.0	7040.0	7.0
750	768.0	896.0	13.0	7136.0	7616.0	7.5
1000	768.0	896.0	10.3	7200.0	7616.0	8.0
1250	768.0	896.0	7.1	6976.0	7616.0	7.0
1500	704.0	800.0	6.7	6624.0	7232.0	6.5
1750	608.0	704.0	6.1	5824.0	6528.0	7.0
2000	512.0	576.0	6.4	4800.0	5856.0	6.0
2500	320.0	384.0	6.1	2528.0	3424.0	7.0
2750	192.0	256.0	6.8	1504.0	2176.0	6.0
2900	128.0	192.0	6.6	768.0	1632.0	6.0

This test is passed according to TR-067

### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 13 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	50.9	38.5	YES	51.8	41.0
500	YES	48.2	40.5	YES	50.7	42.5
1000	YES	47.7	40.5	YES	48.3	41.5
2000	YES	40.9	33.5	YES	40.8	35.5
3000	YES	27.8	29.5	YES	29.3	31.5
3600	YES	20.1	19.5			
3700				YES	20.1	21.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 14 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	42.9	32.0	YES	43.1	31.5
500	YES	41.7	32.0	YES	44.0	33.0
1000	YES	40.3	33.0	YES	41.1	32.0
2000	YES	32.7	28.5	YES	33.4	28.5
2900	YES	22.3	14.5			
3000				YES	22.4	13.0

This test is passed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US



Table 15 European Noise FB Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	38.7	26.0	YES	39.3	28.0
500	YES	35.6	31.0	YES	36.4	31.0
1000	YES	30.6	31.0	YES	31.3	31.0
2000	YES	18.2	27.5	YES	19.1	29.5
2650	YES	9.6	14.0			
2750				YES	9.7	14.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Table 16 European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	35.3	21.5	YES	36.9	23.0
500	YES	32.8	26.5	YES	34.1	27.5
1000	YES	27.7	30.0	YES	28.9	31.0
2000	YES	15.2	21.0	YES	16.5	22.5
2400	YES	10.1	13.0			
2500				YES	10.0	12.5

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

Table 17 European Noise FB Impairment, 4096 kbps DS, 384 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.3	13.0	YES	32.2	13.5
500	YES	28.3	18.0	YES	29.4	18.5
1000	YES	23.3	21.5	YES	24.2	22.0
1500	YES	17.3	18.5	YES	18.7	19.0
1950	YES	11.5	13.0			
2050				YES	11.6	11.5

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 18 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	18.9	13.0	YES	19.8	13.0
1000	YES	16.3	13.5	YES	17.2	14.0
1250	YES	13.1	12.5	YES	14.1	12.5
1400	YES	11.4	11.0			
1500				YES	11.0	11.0

This test is passed according to TR-067

### 3.1.2 INFINEON GEMINAX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 19 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.11.0d.0.8
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	GEMINAX-D MAX v1.3

#### 3.1.2.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

**Table 20 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7392	7392	6.8	3	5	0	0.0E+00	1.5E-07
CPE	2500	2080	3392	3392	6	1.5	15	17	8.4E-08	1.5E-07
CPE	2850	768	1856	1856	6	1	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

## Stresstest

**Table 21 Stresstest (chapter 8.4)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
3600	2080	2080	6.5	1.5	480	75	1.878E-08	1.5E-07

The test is passed according to TR-067.

## White Noise Impairment Only in Fast Mode

**Table 22 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	14.8	7616.0	8128.0	17.0
500	768.0	1024.0	17.1	7616.0	8128.0	17.0
1000	768.0	1024.0	18.1	7616.0	8128.0	17.0
1500	768.0	1024.0	12.9	7616.0	8128.0	16.5
2000	768.0	1024.0	12.2	7616.0	8128.0	13.0
2500	768.0	1024.0	9.9	6144.0	8096.0	6.0
3000	576.0	928.0	6.6	3648.0	5728.0	6.0
3500	384.0	704.0	6.7	1760.0	3360.0	6.5
3800	288.0	544.0	6.8	608.0	2432.0	6.0

This test is passed according to TR-067

## White Noise Impairment Only in Interleaved Mode

**Table 23 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	8.7	7616.0	8896.0	16.5
500	768.0	1024.0	17.3	7616.0	8896.0	16.5
1000	768.0	1024.0	15.9	7616.0	8704.0	16.5
1500	768.0	1024.0	13.7	7616.0	8736.0	16.0
2000	768.0	1024.0	13.7	7616.0	8704.0	11.0
2500	768.0	1024.0	9.7	6144.0	7872.0	8.0
3000	672.0	928.0	7.1	4096.0	5984.0	6.5
3500	480.0	736.0	6.1	2208.0	3456.0	7.0
3750	384.0	640.0	6.2	1184.0	2624.0	7.5
4000	288.0	480.0	6.6	320.0	2144.0	6.5

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 24 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	6.6	4864.0	5952.0	6.0
250	768.0	1024.0	11.4	5792.0	6368.0	6.0
500	768.0	1024.0	9.9	6752.0	7200.0	6.0
750	768.0	960.0	6.6	7136.0	7840.0	6.0
1000	768.0	992.0	6.0	7200.0	8096.0	6.0
1250	736.0	864.0	6.8	6976.0	7776.0	6.0
1500	672.0	768.0	6.1	6496.0	7360.0	6.0
1750	576.0	640.0	6.1	5408.0	6656.0	6.0
2000	480.0	544.0	6.2	4320.0	5696.0	6.0
2500	256.0	288.0	7.3	2176.0	3360.0	6.0
2750	128.0	192.0	7.1	1120.0	2048.0	6.0
2900	64.0	128.0	7.0	192.0	1440.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 25 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	12.4	4864.0	6240.0	6.5
250	768.0	1024.0	10.0	5792.0	6656.0	6.5
500	768.0	992.0	6.7	6752.0	7520.0	6.5
750	768.0	1024.0	7.5	7136.0	7872.0	7.0
1000	768.0	992.0	6.2	7200.0	8160.0	6.5
1250	768.0	928.0	6.0	6976.0	7872.0	7.0
1500	704.0	800.0	6.5	6624.0	7616.0	6.5
1750	608.0	640.0	7.1	5824.0	6944.0	6.5
2000	512.0	544.0	6.9	4800.0	5984.0	6.5
2500	320.0	384.0	6.2	2528.0	3488.0	7.0
2750	192.0	256.0	6.8	1504.0	2240.0	6.0
2900	128.0	192.0	6.7	768.0	1856.0	6.0

This test is passed according to TR-067

### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 26 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	35.1	38.5	YES	37.2	40.5
500	YES	39.7	40.5	YES	36.2	42.0
1000	YES	40.5	40.0	YES	40.4	43.0
2000	YES	36.3	34.5	YES	39.8	36.0
3000	YES	17.8	20.0	YES	17.2	21.5
3600	YES	16.8	18.5			
3700				YES	17.0	18.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 27 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.8	25.5	YES	31.1	25.5
500	YES	32.1	25.5	YES	29.1	28.5
1000	YES	27.4	25.0	YES	34.1	28.5
2000	YES	29.7	18.0	YES	29.7	19.5
2900	YES	16.2	15.5			
3000				YES	15.6	15.5

This test is passed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 28 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	33.7	16.0	YES	33.7	16.5
500	YES	29.4	19.5	YES	33.7	22.0
1000	YES	16.9	24.5	YES	16.8	26.0
2000	YES	16.3	16.0	YES	16.6	17.5
2650	YES	9.6	14.5			
2750				YES	9.0	14.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 29 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.5	16.0	YES	31.3	16.0
500	YES	28.2	16.5	YES	29.3	16.0
1000	YES	17.0	18.5	YES	16.8	19.5
2000	YES	15.4	16.0	YES	16.3	16.0
2400	YES	9.6	13.0			
2500				YES	9.7	13.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 30 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	27.4	13.5	YES	26.0	15.0
500	YES	24.1	16.0	YES	26.4	16.0
1000	YES	16.8	16.0	YES	16.5	16.0
1500	YES	16.2	16.0	YES	16.3	16.0
1950	YES	10.9	13.0			
2050				YES	11.7	13.0

This test is passed according to TR-067



European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 31 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	15.9	13.0	YES	16.3	14.0
1000	YES	15.5	13.5	YES	15.7	14.5
1250	YES	12.7	12.5	YES	14.0	14.0
1400	YES	11.2	11.5			
1500				YES	10.9	12.0

This test is passed according to TR-067

### 3.1.3 ALCATEL ASAM 7300 ABLT-F

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 32 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Alcatel ASAM7300
FW Version	L7D6AA47.065 (R4.7.0.8.4)
Line Card Type, Version	ABLT_F
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

#### 3.1.3.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

**Table 33 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7456	7456	6.5	3	5	0	0.0E+00	1.5E-07
CPE	2500	3232	3232	3392	6	1.5	15	0	0.0E+00	1.5E-07
CPE	2850	1856	1856	1856	6	1.5	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

## Stresstest

**Table 34 Stresstest (chapter 8.4)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
3600	1856	1856	6.5	2	480	8	2.2E-09	1.5E-07

The test is passed according to TR-067.

## White Noise Impairment Only in Fast Mode

**Table 35 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	19.2	7616.0	8128.0	18.5
500	768.0	1024.0	18.5	7616.0	8128.0	19.5
1000	768.0	1024.0	19.5	7616.0	8128.0	20.0
1500	768.0	1024.0	18.0	7616.0	8128.0	18.5
2000	768.0	1024.0	12.5	7616.0	8128.0	14.5
2500	768.0	1024.0	9.0	6144.0	8000.0	6.0
3000	576.0	896.0	6.8	3648.0	5632.0	6.5
3500	384.0	704.0	6.1	1760.0	3328.0	6.5
3800	288.0	544.0	6.5	608.0	2400.0	6.5

This test is passed according to TR-067

## White Noise Impairment Only in Interleaved Mode

**Table 36 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	18.7	7616.0	10464.0	10.0
500	768.0	1024.0	18.8	7616.0	10464.0	11.5
1000	768.0	1024.0	17.8	7616.0	10464.0	11.5
1500	768.0	1024.0	17.1	7616.0	10464.0	10.0
2000	768.0	1024.0	13.0	7616.0	9952.0	8.0
2500	768.0	1024.0	8.5	6144.0	8096.0	6.5
3000	672.0	896.0	7.8	4096.0	5504.0	7.5
3500	480.0	672.0	7.1	2208.0	3584.0	6.5
3750	384.0	576.0	7.0	1184.0	2656.0	6.5
4000	288.0	480.0	7.0	320.0	1952.0	7.0

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 37 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	13.0	4864.0	5920.0	6.0
250	768.0	1024.0	12.0	5792.0	5856.0	6.0
500	768.0	1024.0	10.5	6752.0	6784.0	6.0
750	768.0	1024.0	8.0	7136.0	8032.0	6.0
1000	768.0	992.0	6.6	7200.0	8128.0	6.5
1250	736.0	896.0	6.5	6976.0	7936.0	6.0
1500	672.0	800.0	6.2	6496.0	7456.0	6.0
1750	576.0	672.0	6.6	5408.0	6656.0	6.0
2000	480.0	576.0	6.5	4320.0	5696.0	6.0
2500	256.0	352.0	6.5	2176.0	3168.0	6.0
2750	128.0	256.0	6.2	1120.0	1920.0	6.0
2900	64.0	192.0	6.0	192.0	1408.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 38 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	12.6	4864.0	5760.0	7.0
250	768.0	1024.0	11.7	5792.0	5728.0	7.0
500	768.0	1024.0	10.2	6752.0	7008.0	7.5
750	768.0	1024.0	8.2	7136.0	8224.0	6.5
1000	768.0	992.0	6.8	7200.0	8352.0	6.5
1250	768.0	896.0	7.6	6976.0	8032.0	6.5
1500	704.0	800.0	7.2	6624.0	7232.0	7.5
1750	608.0	704.0	7.0	5824.0	6432.0	7.5
2000	512.0	576.0	7.6	4800.0	5536.0	7.0
2500	320.0	384.0	7.6	2528.0	3360.0	6.5
2750	192.0	288.0	7.0	1504.0	2208.0	6.0
2900	128.0	224.0	7.0	768.0	1696.0	6.0

This test is passed according to TR-067

### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 39 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	46.0	39.0	YES	48.0	39.0
500	YES	47.2	40.0	YES	46.8	41.5
1000	YES	47.2	40.5	YES	46.0	41.5
2000	YES	42.7	34.0	YES	42.5	35.0
3000	YES	30.5	30.0	YES	29.7	30.5
3600	YES	21.8	21.0			
3700				YES	20.5	21.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 40 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	39.3	32.0	YES	40.5	32.0
500	YES	38.5	32.0	YES	40.3	33.0
1000	YES	39.8	32.0	YES	40.0	32.5
2000	YES	32.0	30.5	YES	33.1	31.0
2900	YES	22.7	14.0			
3000				YES	22.0	13.5

This test is passed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 41 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	38.0	26.5	YES	39.0	28.0
500	YES	35.6	31.0	YES	36.1	31.0
1000	YES	30.8	31.0	YES	31.5	31.0
2000	YES	18.5	27.5	YES	19.3	29.0
2650	YES	10.2	14.5			
2750				YES	10.5	14.5

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 42 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	35.7	21.0	YES	36.0	22.5
500	YES	33.0	26.5	YES	33.2	28.0
1000	YES	28.2	30.5	YES	29.0	31.0
2000	YES	16.0	21.0	YES	16.6	22.5
2400	YES	10.6	13.5			
2500				YES	11.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 43 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.1	13.0	YES	32.2	14.0
500	YES	29.1	18.5	YES	29.7	19.0
1000	YES	24.2	22.5	YES	25.0	23.5
1500	YES	18.5	19.5	YES	19.0	20.5
1950	YES	12.6	13.0			
2050				YES	12.0	12.5

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 44 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	19.5	13.5	YES	20.0	14.0
1000	YES	16.8	14.0	YES	17.5	15.0
1250	YES	13.8	13.0	YES	14.2	14.0
1400	YES	12.1	12.0			
1500				YES	11.5	12.0

This test is passed according to TR-067

### 3.1.4 LUCENT ANYMEDIA LPA417

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 45 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Lucent AnyMedia
FW Version	LPA417p1.023 (1.29.00.0)
Line Card Type, Version	LPA417
Industry Standards Supported	G.992.1
Chip set	GSPN

#### 3.1.4.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

**Table 46 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7136	7136	6	3	5	0	0.0E+00	1.5E-07
CPE	2500	2080	3136	3136	6	2	15	0	0.0E+00	1.5E-07
CPE	2850	768	1824	1824	6	2	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

## Stresstest

**Table 47 Stresstest (chapter 8.4)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
3600	1664	1664	7	2	480	0	0.0E+00	1.5E-07

The test is passed according to TR-067.

## White Noise Impairment Only in Fast Mode

**Table 48 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	9.0	7616.0	8064.0	11.0
500	768.0	1024.0	9.0	7616.0	8064.0	11.0
1000	768.0	1024.0	8.0	7616.0	8064.0	11.0
1500	768.0	1024.0	8.0	7616.0	8064.0	12.0
2000	768.0	960.0	8.0	7616.0	8064.0	10.0
2500	768.0	832.0	8.0	6144.0	7680.0	6.0
3000	576.0	704.0	7.0	3648.0	5376.0	6.0
3500	384.0	512.0	7.0	1760.0	3040.0	7.0
3800	288.0	384.0	7.0	608.0	2080.0	7.0

This test is passed according to TR-067

## White Noise Impairment Only in Interleaved Mode

**Table 49 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	11.0	7616.0	8064.0	12.0
500	768.0	1024.0	9.0	7616.0	8064.0	12.0
1000	768.0	1024.0	8.0	7616.0	8064.0	13.0
1500	768.0	1024.0	8.0	7616.0	8064.0	13.0
2000	768.0	1024.0	7.0	7616.0	8064.0	12.0
2500	768.0	896.0	9.0	6144.0	7616.0	7.0
3000	672.0	768.0	8.0	4096.0	5536.0	6.0
3500	480.0	544.0	8.0	2208.0	3360.0	7.0
3750	384.0	416.0	9.0	1184.0	2432.0	7.0
4000	288.0	384.0	7.0	320.0	1792.0	7.0

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 50 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	8.0	4864.0	7104.0	6.0
250	768.0	1024.0	7.0	5792.0	7040.0	6.0
500	768.0	928.0	8.0	6752.0	6976.0	6.0
750	768.0	928.0	8.0	7136.0	6784.0	6.0
1000	768.0	864.0	8.0	7200.0	6560.0	6.0
1250	736.0	832.0	7.0	6976.0	7616.0	6.0
1500	672.0	736.0	7.0	6496.0	7168.0	6.0
1750	576.0	608.0	7.0	5408.0	6432.0	6.0
2000	480.0	512.0	7.0	4320.0	5504.0	6.0
2500	256.0	288.0	7.0	2176.0	3168.0	6.0
2750	128.0	160.0	8.0	1120.0	1856.0	6.0
2900	64.0	128.0	7.0	192.0	1408.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 51 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	992.0	8.0	4864.0	7232.0	6.0
250	768.0	1024.0	9.0	5792.0	7168.0	6.0
500	768.0	992.0	8.0	6752.0	7072.0	6.0
750	768.0	960.0	7.0	7136.0	6880.0	6.0
1000	768.0	960.0	8.0	7200.0	6656.0	6.0
1250	768.0	896.0	7.0	6976.0	7616.0	7.0
1500	704.0	832.0	7.0	6624.0	7296.0	6.0
1750	608.0	704.0	7.0	5824.0	6560.0	6.0
2000	512.0	544.0	9.0	4800.0	5632.0	6.0
2500	320.0	416.0	7.0	2528.0	3520.0	6.0
2750	192.0	256.0	8.0	1504.0	2208.0	6.0
2900	128.0	224.0	8.0	768.0	1824.0	6.0

This test is passed according to TR-067



### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 52 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	35.0	33.0	YES	36.0	35.0
500	YES	33.0	33.0	YES	35.0	35.0
1000	YES	34.0	33.0	YES	36.0	35.0
2000	YES	31.0	34.0	YES	34.0	36.0
3000	YES	24.0	28.0	YES	26.0	30.0
3600	YES	17.0	18.0			
3700				YES	18.0	19.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 53 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	27.0	27.0	YES	29.0	27.0
500	YES	27.0	27.0	YES	27.0	27.0
1000	YES	27.0	27.0	YES	29.0	27.0
2000	YES	24.0	26.0	YES	26.0	26.0
2900	YES	17.0	14.0			
3000				YES	19.0	12.0

This test is passed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 54 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	33.0	31.0	YES	34.0	31.0
500	YES	32.0	31.0	YES	33.0	31.0
1000	YES	29.0	31.0	YES	31.0	31.0
2000	YES	18.0	28.0	YES	20.0	30.0
2650	YES	9.0	14.0			
2750				YES	10.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 55 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.0	27.0	YES	32.0	28.0
500	YES	29.0	26.0	YES	31.0	27.0
1000	YES	26.0	24.0	YES	28.0	26.0
2000	YES	15.0	21.0	YES	17.0	22.0
2400	YES	10.0	13.0			
2500				YES	11.0	12.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 56 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	26.0	18.0	YES	29.0	19.0
500	YES	24.0	18.0	YES	27.0	18.0
1000	YES	22.0	16.0	YES	25.0	16.0
1500	YES	17.0	19.0	YES	19.0	19.0
1950	YES	11.0	13.0			
2050				YES	13.0	11.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 57 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	15.0	9.0	YES	18.0	9.0
1000	YES	15.0	8.0	YES	18.0	8.0
1250	YES	13.0	12.0	YES	15.0	12.0
1400	YES	11.0	11.0			
1500				YES	11.0	11.0

This test is passed according to TR-067

### 3.1.5 LUCENT ANYMEDIA LPA434

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 58 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Lucent AnyMedia
FW Version	LPA434p1.007 (1.29.00.0)
Line Card Type, Version	LPA434
Industry Standards Supported	G.992.1
Chip set	TI AC5

#### 3.1.5.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

**Table 59 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7296	7296	6	3	5	2	1.4E-08	1.5E-07
CPE	2500	2080	3328	3328	6	1	15	1	5.0E-09	1.5E-07
CPE	2850	768	1600	1600	7	2	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

### White Noise Impairment Only in Fast Mode

**Table 60 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	19.0	7616.0	8128.0	11.0
500	768.0	1024.0	17.0	7616.0	8128.0	11.0
1000	768.0	1024.0	15.0	7616.0	8128.0	12.0
1500	768.0	960.0	7.0	7616.0	8128.0	15.0
2000	768.0	736.0	8.0	7616.0	8128.0	12.0
2500	768.0	640.0	7.0	6144.0	7872.0	6.0
3000	576.0	416.0	8.0	3648.0	5504.0	6.0
3500	384.0	256.0	8.0	1760.0	3296.0	7.0
3800	288.0	160.0	8.0	608.0	2272.0	7.0

This test is failed according to TR-067

### White Noise Impairment Only in Interleaved Mode

**Table 61 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	16.0	7616.0	8128.0	13.0
500	768.0	1024.0	17.0	7616.0	8128.0	12.0
1000	768.0	1024.0	14.0	7616.0	8128.0	13.0
1500	768.0	928.0	7.0	7616.0	8128.0	15.0
2000	768.0	704.0	8.0	7616.0	8128.0	13.0
2500	768.0	608.0	8.0	6144.0	8096.0	7.0
3000	672.0	416.0	8.0	4096.0	5824.0	7.0
3500	480.0	224.0	7.0	2208.0	3552.0	8.0
3750	384.0	160.0	7.0	1184.0	2528.0	8.0
4000	288.0	128.0	6.0	320.0	1568.0	10.0

This test is failed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 62 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	14.0	4864.0	5664.0	6.0
250	768.0	1024.0	13.0	5792.0	5632.0	6.0

**Table 62 European Noise FB Impairment in Fast Mode (cont'd)**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
500	768.0	1024.0	11.0	6752.0	5504.0	6.0
750	768.0	1024.0	9.0	7136.0	5376.0	6.0
1000	768.0	992.0	6.0	7200.0	5664.0	6.0
1250	736.0	832.0	6.0	6976.0	6784.0	6.0
1500	672.0	704.0	6.0	6496.0	7296.0	6.0
1750	576.0	576.0	7.0	5408.0	6560.0	6.0
2000	480.0	480.0	7.0	4320.0	5600.0	6.0
2500	256.0	320.0	6.0	2176.0	3392.0	6.0
2750	128.0	192.0	7.0	1120.0	2016.0	6.0
2900	64.0	160.0	6.0	192.0	1440.0	6.0

This test is failed according to TR-067

#### European Noise FB Impairment in Interleaved Mode

**Table 63 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	12.0	4864.0	5984.0	7.0
250	768.0	1024.0	12.0	5792.0	5920.0	7.0
500	768.0	1024.0	10.0	6752.0	5856.0	7.0
750	768.0	1024.0	8.0	7136.0	5696.0	7.0
1000	768.0	960.0	6.0	7200.0	5952.0	7.0
1250	768.0	800.0	6.0	6976.0	7072.0	7.0
1500	704.0	672.0	7.0	6624.0	7584.0	7.0
1750	608.0	576.0	6.0	5824.0	6880.0	7.0
2000	512.0	480.0	6.0	4800.0	5920.0	7.0
2500	320.0	288.0	6.0	2528.0	3584.0	7.0
2750	192.0	160.0	7.0	1504.0	2336.0	6.0
2900	128.0	128.0	6.0	768.0	1568.0	7.0

This test is failed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

Table 64 White Noise Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	34.0	YES	31.0	36.0
500	YES	31.0	34.0	YES	31.0	36.0
1000	YES	31.0	36.0	YES	23.0	39.0
2000	YES	30.0	36.0	YES	28.0	39.0
3000	YES	20.0	29.0	YES	19.0	31.0
3600	YES	7.0	20.0			
3700				YES	8.0	21.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

Table 65 White Noise Impairment, 4096 kbps DS, 384 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	28.0	YES	31.0	29.0
500	YES	31.0	28.0	YES	31.0	29.0
1000	YES	31.0	28.0	YES	31.0	30.0
2000	YES	19.0	28.0	YES	18.0	29.0
2900	YES	11.0	14.0			
3000				YES	9.0	13.0

This test is passed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

Table 66 European Noise FB Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	26.0	YES	31.0	29.0
500	YES	31.0	26.0	YES	31.0	28.0
1000	YES	30.0	27.0	YES	25.0	30.0
2000	YES	17.0	28.0	YES	16.0	31.0

**Table 66 European Noise FB Impairment, 864 kbps DS, 160 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2650	YES	9.0	15.0			
2750				YES	7.0	15.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 67 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	20.0	YES	31.0	22.0
500	YES	31.0	20.0	YES	31.0	21.0
1000	YES	27.0	21.0	YES	27.0	22.0
2000	YES	14.0	21.0	YES	13.0	23.0
2400	YES	9.0	14.0			
2500				YES	7.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 68 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	13.0	YES	31.0	14.0
500	YES	29.0	12.0	YES	28.0	13.0
1000	YES	23.0	12.0	YES	22.0	14.0
1500	YES	16.0	19.0	YES	15.0	20.0
1950	YES	10.0	13.0			
2050				YES	8.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 69 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	NO	0.0	0.0	NO	0.0	0.0
1000	NO	0.0	0.0	YES	15.0	6.0
1250	YES	12.0	9.0	YES	11.0	10.0
1400	YES	11.0	10.0			
1500				YES	7.0	12.0

This test is failed according to TR-067

### 3.1.6 SIEMENS HiX5300 SUADSL:64:IX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 70 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens HiX5300
FW Version	3.18.0a.46 (V.1.2.2.112_ur2)
Line Card Type, Version	SUADSL:64:IX
Industry Standards Supported	G.992.1
Chip set	IFX Geminax.BIS

#### 3.1.6.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### White Noise Impairment Only in Fast Mode

**Table 71 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	17.5	7616.0	8128.0	16.0
500	768.0	1024.0	17.5	7616.0	8128.0	17.5
1000	768.0	1024.0	17.0	7616.0	8128.0	20.0
1500	768.0	1024.0	15.5	7616.0	8128.0	19.0
2000	768.0	1024.0	12.0	7616.0	8128.0	13.0
2500	768.0	1024.0	6.5	6144.0	8000.0	6.0
3000	576.0	768.0	7.0	3648.0	5408.0	6.0
3500	384.0	544.0	7.0	1760.0	3008.0	6.0
3800	288.0	384.0	6.5	608.0	2368.0	6.0



This test is passed according to TR-067

### White Noise Impairment Only in Interleaved Mode

**Table 72 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	17.5	7616.0	7616.0	18.5
500	768.0	1024.0	17.0	7616.0	7616.0	20.0
1000	768.0	1024.0	15.5	7616.0	7616.0	22.0
1500	768.0	1024.0	14.5	7616.0	7616.0	21.5
2000	768.0	1024.0	10.5	7616.0	7616.0	16.0
2500	768.0	992.0	6.0	6144.0	7616.0	8.0
3000	672.0	832.0	5.5	4096.0	5600.0	6.0
3500	480.0	576.0	7.0	2208.0	3104.0	7.0
3750	384.0	448.0	6.0	1184.0	2496.0	7.0
4000	288.0	352.0	6.5	320.0	1856.0	7.5

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 73 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	12.5	4864.0	5664.0	6.0
250	768.0	1024.0	9.5	5792.0	5600.0	6.0
500	768.0	1024.0	10.0	6752.0	6656.0	6.0
750	768.0	1024.0	7.5	7136.0	7520.0	6.0
1000	768.0	992.0	7.0	7200.0	8128.0	6.0
1250	736.0	896.0	6.5	6976.0	7840.0	6.0
1500	672.0	768.0	6.5	6496.0	7424.0	6.0
1750	576.0	672.0	6.5	5408.0	6656.0	6.0
2000	480.0	576.0	6.5	4320.0	5728.0	6.0
2500	256.0	320.0	7.0	2176.0	3392.0	6.0
2750	128.0	224.0	6.0	1120.0	2048.0	6.0
2900	64.0	128.0	7.5	192.0	1472.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 74 European Noise FB Impairment in Interleaved Mode**

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	11.0	4864.0	5600.0	7.0
250	768.0	1024.0	11.5	5792.0	5536.0	7.0
500	768.0	1024.0	9.5	6752.0	6528.0	7.0
750	768.0	1024.0	8.0	7136.0	7616.0	6.0
1000	768.0	992.0	6.5	7200.0	7616.0	8.5
1250	768.0	864.0	6.0	6976.0	7616.0	7.5
1500	704.0	832.0	6.5	6624.0	7360.0	6.5
1750	608.0	704.0	6.5	5824.0	6624.0	6.5
2000	512.0	608.0	6.0	4800.0	5664.0	7.0
2500	320.0	384.0	6.5	2528.0	3520.0	6.5
2750	192.0	256.0	6.5	1504.0	2208.0	6.5
2900	128.0	192.0	6.5	768.0	1664.0	6.5

This test is passed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 75 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	45.0	34.0	YES	46.0	36.5
500	YES	44.5	36.0	YES	46.0	38.5
1000	YES	44.0	39.0	YES	45.0	41.0
2000	YES	37.0	34.0	YES	38.0	36.5
3000	YES	24.5	29.5	YES	26.0	31.0
3600	YES	16.0	19.0			
3700				YES	17.0	20.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 76 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	37.0	31.0	YES	37.0	31.5
500	YES	37.5	31.5	YES	36.5	32.0
1000	YES	36.5	32.5	YES	37.5	33.0
2000	YES	30.0	29.0	YES	31.0	30.0
2900	YES	19.5	13.5			
3000				YES	19.0	12.0

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 77 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	37.0	25.5	YES	38.0	27.5
500	YES	34.5	29.5	YES	35.5	31.0
1000	YES	30.0	31.0	YES	31.0	31.0
2000	YES	18.0	28.0	YES	19.0	30.5
2650	YES	9.5	14.5			
2750				YES	9.5	14.5

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 78 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.5	20.5	YES	35.5	22.0
500	YES	32.0	24.0	YES	32.5	26.0
1000	YES	27.0	30.0	YES	28.5	31.0
2000	YES	15.0	21.5	YES	16.0	23.0

**Table 78 European Noise FB Impairment, 2048 kbps DS, 256 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2400	YES	10.0	14.0			
2500				YES	10.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 79 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	30.0	12.5	YES	31.5	13.0
500	YES	28.0	16.0	YES	29.5	16.5
1000	YES	23.5	22.0	YES	25.0	22.5
1500	YES	17.5	19.0	YES	19.0	19.5
1950	YES	12.0	13.5			
2050				YES	12.5	12.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 80 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	18.5	11.0	YES	19.5	12.0
1000	YES	16.0	14.0	YES	17.0	14.5
1250	YES	13.5	12.5	YES	14.5	13.0
1400	YES	12.0	11.5			
1500				YES	11.5	11.5

This test is passed according to TR-067

### 3.1.7 SIEMENS XPRESSLINK V2.1 SUADSL:32I

The DSLAM system, which the CPE system was tested against, is described in the table below

Table 81 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens XpressLink
FW Version	3.76.5a (CAPS 1.0.3.3)
Line Card Type, Version	SUADSL:32I
Industry Standards Supported	G.992.1
Chip set	TI AC5

### 3.1.7.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### White Noise Impairment Only in Fast Mode

Table 82 White Noise Impairment Only in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	18.0	7616.0	8160.0	12.0
500	768.0	1024.0	15.0	7616.0	8160.0	14.0
1000	768.0	1024.0	9.0	7616.0	8160.0	17.0
1500	768.0	864.0	7.0	7616.0	8160.0	18.0
2000	768.0	672.0	6.0	7616.0	8160.0	14.0
2500	768.0	544.0	7.0	6144.0	8160.0	6.0
3000	576.0	352.0	6.0	3648.0	5856.0	6.0
3500	384.0	192.0	6.0	1760.0	3616.0	7.0
3800	288.0	128.0	5.0	608.0	2528.0	7.0

This test is failed according to TR-067

#### White Noise Impairment Only in Interleaved Mode

Table 83 White Noise Impairment Only in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	16.0	7616.0	8160.0	12.0
500	768.0	1024.0	13.0	7616.0	8160.0	14.0
1000	768.0	1024.0	8.0	7616.0	8160.0	17.0
1500	768.0	896.0	7.0	7616.0	8160.0	17.0
2000	768.0	672.0	7.0	7616.0	8160.0	14.0
2500	768.0	544.0	7.0	6144.0	8160.0	7.0
3000	672.0	352.0	6.0	4096.0	5952.0	6.0
3500	480.0	192.0	6.0	2208.0	3840.0	6.0

**Table 83 White Noise Impairment Only in Interleaved Mode (cont'd)**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
3750	384.0	128.0	6.0	1184.0	2880.0	7.0
4000	288.0	96.0	5.0	320.0	1888.0	7.0

This test is failed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 84 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	12.0	4864.0	5888.0	6.0
250	768.0	1024.0	11.0	5792.0	5888.0	6.0
500	768.0	1024.0	9.0	6752.0	6336.0	6.0
750	768.0	992.0	8.0	7136.0	7168.0	6.0
1000	768.0	896.0	7.0	7200.0	8160.0	7.0
1250	736.0	736.0	8.0	6976.0	8160.0	6.0
1500	672.0	672.0	8.0	6496.0	7616.0	6.0
1750	576.0	544.0	7.0	5408.0	6912.0	6.0
2000	480.0	448.0	7.0	4320.0	5984.0	6.0
2500	256.0	288.0	6.0	2176.0	3552.0	6.0
2750	128.0	160.0	6.0	1120.0	2400.0	6.0
2900	64.0	128.0	6.0	192.0	1696.0	6.0

This test is failed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 85 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	11.0	4864.0	6080.0	6.0
250	768.0	1024.0	10.0	5792.0	6048.0	6.0
500	768.0	1024.0	8.0	6752.0	6496.0	6.0
750	768.0	928.0	8.0	7136.0	7232.0	6.0
1000	768.0	896.0	7.0	7200.0	8160.0	7.0
1250	768.0	800.0	6.0	6976.0	8160.0	6.0
1500	704.0	640.0	8.0	6624.0	7712.0	6.0
1750	608.0	576.0	7.0	5824.0	7008.0	6.0
2000	512.0	480.0	7.0	4800.0	6080.0	6.0
2500	320.0	288.0	7.0	2528.0	3808.0	6.0

**Table 85 European Noise FB Impairment in Interleaved Mode (cont'd)**

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
2750	192.0	192.0	7.0	1504.0	2752.0	6.0
2900	128.0	160.0	6.0	768.0	2080.0	6.0

This test is failed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 86 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	33.0	YES	31.0	36.0
500	YES	31.0	36.0	YES	31.0	38.0
1000	YES	31.0	41.0	YES	31.0	43.0
2000	YES	24.0	37.0	YES	25.0	38.0
3000	YES	13.0	31.0	YES	15.0	32.0
3600	YES	6.0	21.0			
3700				YES	6.0	21.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 87 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	28.0	YES	31.0	29.0
500	YES	31.0	30.0	YES	31.0	31.0
1000	YES	27.0	32.0	YES	28.0	32.0
2000	YES	15.0	30.0	YES	16.0	30.0
2900	YES	6.0	15.0			
3000				NO	0.0	0.0

This test is failed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 88 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	27.0	YES	31.0	29.0
500	YES	30.0	28.0	YES	30.0	30.0
1000	YES	28.0	31.0	YES	29.0	31.0
2000	YES	16.0	29.0	YES	16.0	31.0
2650	YES	8.0	15.0			
2750				YES	7.0	15.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 89 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	21.0	YES	31.0	23.0
500	YES	30.0	23.0	YES	30.0	25.0
1000	YES	25.0	31.0	YES	26.0	31.0
2000	YES	13.0	22.0	YES	14.0	24.0
2400	YES	8.0	14.0			
2500				YES	8.0	14.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 90 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	13.0	YES	31.0	14.0
500	YES	27.0	14.0	YES	28.0	16.0
1000	YES	21.0	23.0	YES	22.0	24.0
1500	YES	15.0	20.0	YES	16.0	21.0



**Table 90 European Noise FB Impairment, 4096 kbps DS, 384 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
1950	YES	9.0	14.0			
2050				YES	9.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 91 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	18.0	10.0	YES	18.0	10.0
1000	YES	14.0	15.0	YES	14.0	15.0
1250	YES	11.0	14.0	YES	11.0	14.0
1400	YES	9.0	13.0			
1500				YES	8.0	12.0

This test is passed according to TR-067

### 3.1.8 SIEMENS XPRESSLINK V2.1 SUADSL:16I

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 92 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens XpressLink
FW Version	4.46 (CAPS 1.0.3.3)
Line Card Type, Version	SUADSL:16I
Industry Standards Supported	G.992.1
Chip set	TI 4100C

#### 3.1.8.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### White Noise Impairment Only in Fast Mode

Table 93 White Noise Impairment Only in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	800.0	9.0	7616.0	8160.0	17.0
500	768.0	800.0	16.0	7616.0	8160.0	18.0
1000	768.0	800.0	13.0	7616.0	8160.0	19.0
1500	768.0	800.0	11.0	7616.0	8160.0	18.0
2000	768.0	768.0	6.0	7616.0	8160.0	13.0
2500	768.0	544.0	7.0	6144.0	7904.0	6.0
3000	576.0	320.0	6.0	3648.0	5472.0	6.0
3500	384.0	64.0	6.0	1760.0	3232.0	7.0
3800	288.0	0	0.0	608.0	0	0.0

This test is failed according to TR-067

#### White Noise Impairment Only in Interleaved Mode

Table 94 White Noise Impairment Only in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	800.0	16.0	7616.0	8160.0	17.0
500	768.0	800.0	14.0	7616.0	8160.0	19.0
1000	768.0	800.0	16.0	7616.0	8160.0	19.0
1500	768.0	800.0	12.0	7616.0	8160.0	18.0
2000	768.0	800.0	6.0	7616.0	8160.0	14.0
2500	768.0	576.0	6.0	6144.0	8160.0	6.0
3000	672.0	352.0	6.0	4096.0	5888.0	6.0
3500	480.0	128.0	5.0	2208.0	3520.0	7.0
3750	384.0	0	0.0	1184.0	0	0.0
4000	288.0	0	0.0	320.0	0	0.0

This test is failed according to TR-067

#### European Noise FB Impairment in Fast Mode

Table 95 European Noise FB Impairment in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	800.0	10.0	4864.0	5760.0	6.0
250	768.0	800.0	13.0	5792.0	5696.0	6.0
500	768.0	800.0	11.0	6752.0	6112.0	6.0
750	768.0	800.0	11.0	7136.0	6880.0	6.0

**Table 95 European Noise FB Impairment in Fast Mode (cont'd)**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1000	768.0	800.0	10.0	7200.0	7648.0	6.0
1250	736.0	800.0	7.0	6976.0	7552.0	6.0
1500	672.0	736.0	6.0	6496.0	7104.0	6.0
1750	576.0	608.0	7.0	5408.0	6400.0	6.0
2000	480.0	480.0	8.0	4320.0	5472.0	6.0
2500	256.0	288.0	7.0	2176.0	3136.0	6.0
2750	128.0	192.0	6.0	1120.0	1824.0	6.0
2900	64.0	128.0	6.0	192.0	1408.0	6.0

This test is failed according to TR-067

#### European Noise FB Impairment in Interleaved Mode

**Table 96 European Noise FB Impairment in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	800.0	6.0	4864.0	6048.0	6.0
250	768.0	800.0	8.0	5792.0	5984.0	6.0
500	768.0	800.0	13.0	6752.0	6400.0	6.0
750	768.0	800.0	13.0	7136.0	7104.0	6.0
1000	768.0	800.0	10.0	7200.0	7776.0	6.0
1250	768.0	800.0	6.0	6976.0	7936.0	6.0
1500	704.0	736.0	7.0	6624.0	7616.0	6.0
1750	608.0	640.0	7.0	5824.0	6784.0	6.0
2000	512.0	512.0	7.0	4800.0	5952.0	6.0
2500	320.0	320.0	7.0	2528.0	3808.0	6.0
2750	192.0	224.0	6.0	1504.0	2496.0	6.0
2900	128.0	160.0	5.0	768.0	1856.0	6.0

This test is failed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 97 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	37.0	YES	31.0	43.0
500	YES	29.0	39.0	YES	31.0	44.0
1000	YES	31.0	39.0	YES	31.0	45.0
2000	YES	28.0	36.0	YES	27.0	38.0
3000	YES	10.0	29.0	YES	12.0	31.0
3600	NO	0.0	0.0			
3700				NO	0.0	0.0

This test is failed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 98 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.0	32.0	YES	29.0	32.0
500	YES	28.0	32.0	YES	29.0	33.0
1000	YES	30.0	32.0	YES	31.0	32.0
2000	YES	17.0	30.0	YES	18.0	31.0
2900	YES	5.0	14.0			
3000				YES	5.0	14.0

This test is failed according to TR-067

### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 99 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	27.0	YES	31.0	29.0
500	YES	31.0	27.0	YES	31.0	30.0
1000	YES	28.0	31.0	YES	29.0	31.0
2000	YES	17.0	27.0	YES	17.0	31.0

**Table 99 European Noise FB Impairment, 864 kbps DS, 160 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2650	YES	8.0	14.0			
2750				YES	7.0	15.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 100 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	30.0	21.0	YES	31.0	24.0
500	YES	29.0	23.0	YES	29.0	25.0
1000	YES	25.0	29.0	YES	26.0	31.0
2000	YES	14.0	20.0	YES	15.0	24.0
2400	YES	9.0	13.0			
2500				YES	9.0	14.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 101 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.0	13.0	YES	27.0	14.0
500	YES	25.0	14.0	YES	26.0	16.0
1000	YES	22.0	20.0	YES	22.0	22.0
1500	YES	16.0	18.0	YES	15.0	21.0
1950	YES	11.0	12.0			
2050				YES	10.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 102 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	16.0	9.0	YES	17.0	10.0
1000	YES	14.0	12.0	YES	13.0	13.0
1250	YES	11.0	11.0	YES	11.0	14.0
1400	YES	10.0	10.0			
1500				YES	10.0	12.0

This test is passed according to TR-067

### 3.1.9 ECI HiFocus ATUC-32

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 103 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	ECI HiFocus
FW Version	404bea60 (A3_8.10.05)
Line Card Type, Version	ATUC-32
Industry Standards Supported	G.992.1
Chip set	ADI Anaconda

#### 3.1.9.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### White Noise Impairment Only in Fast Mode

**Table 104 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	6.0	7616.0	8128.0	16.0
500	768.0	1024.0	6.0	7616.0	8128.0	18.0
1000	768.0	1056.0	6.0	7616.0	8128.0	19.0
1500	768.0	1056.0	6.0	7616.0	8128.0	18.0
2000	768.0	1024.0	6.0	7616.0	8128.0	14.0
2500	768.0	896.0	6.0	6144.0	7936.0	6.0
3000	576.0	768.0	6.0	3648.0	5728.0	6.0
3500	384.0	544.0	6.0	1760.0	3296.0	7.0
3800	288.0	416.0	6.0	608.0	2272.0	6.0

This test is passed according to TR-067

### White Noise Impairment Only in Interleaved Mode

**Table 105 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	6.0	7616.0	8128.0	16.0
500	768.0	1024.0	7.0	7616.0	8128.0	18.0
1000	768.0	1024.0	6.0	7616.0	8128.0	19.0
1500	768.0	1024.0	7.0	7616.0	8128.0	18.0
2000	768.0	992.0	6.0	7616.0	8128.0	14.0
2500	768.0	928.0	6.0	6144.0	7584.0	8.0
3000	672.0	736.0	6.0	4096.0	5856.0	6.0
3500	480.0	480.0	6.0	2208.0	3232.0	7.0
3750	384.0	416.0	7.0	1184.0	2496.0	7.0
4000	288.0	320.0	6.0	320.0	1632.0	7.0

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 106 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	7.0	4864.0	5504.0	6.0
250	768.0	1024.0	7.0	5792.0	5952.0	6.0
500	768.0	1024.0	6.0	6752.0	7776.0	6.0
750	768.0	992.0	6.0	7136.0	8128.0	6.0
1000	768.0	960.0	6.0	7200.0	7904.0	6.0
1250	736.0	896.0	6.0	6976.0	7616.0	6.0
1500	672.0	800.0	6.0	6496.0	7200.0	6.0
1750	576.0	704.0	6.0	5408.0	6528.0	6.0
2000	480.0	608.0	6.0	4320.0	5664.0	6.0
2500	256.0	384.0	6.0	2176.0	3328.0	6.0
2750	128.0	256.0	6.0	1120.0	2080.0	6.0
2900	64.0	160.0	6.0	192.0	1504.0	6.0

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 107 European Noise FB Impairment in Interleaved Mode**

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	7.0	4864.0	5568.0	6.0
250	768.0	1024.0	6.0	5792.0	6016.0	6.0
500	768.0	992.0	8.0	6752.0	7616.0	7.0
750	768.0	992.0	6.0	7136.0	7584.0	9.0
1000	768.0	928.0	6.0	7200.0	7584.0	8.0
1250	768.0	864.0	6.0	6976.0	7424.0	7.0
1500	704.0	800.0	6.0	6624.0	7040.0	7.0
1750	608.0	704.0	6.0	5824.0	6592.0	6.0
2000	512.0	608.0	6.0	4800.0	5728.0	6.0
2500	320.0	384.0	6.0	2528.0	3232.0	7.0
2750	192.0	288.0	6.0	1504.0	2016.0	6.0
2900	128.0	192.0	7.0	768.0	1600.0	7.0

This test is passed according to TR-067

**Fixed Rate with White Noise Impairment Only**

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 108 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.0	45.0	YES	32.0	48.0
500	YES	29.0	48.0	YES	31.0	52.0
1000	YES	29.0	49.0	YES	32.0	52.0
2000	YES	28.0	44.0	YES	30.0	47.0
3000	YES	21.0	29.0	YES	22.0	33.0
3600	YES	12.0	20.0			
3700				YES	13.0	21.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US



Table 109 White Noise Impairment, 4096 kbps DS, 384 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	23.0	31.0	YES	25.0	32.0
500	YES	24.0	35.0	YES	24.0	35.0
1000	YES	22.0	35.0	YES	23.0	36.0
2000	YES	23.0	30.0	YES	23.0	30.0
2900	YES	17.0	15.0			
3000				YES	16.0	14.0

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

Table 110 European Noise FB Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	26.0	YES	32.0	28.0
500	YES	28.0	35.0	YES	30.0	37.0
1000	YES	27.0	36.0	YES	29.0	39.0
2000	YES	18.0	27.0	YES	19.0	31.0
2650	YES	9.0	15.0			
2750				YES	10.0	15.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Table 111 European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	26.0	21.0	YES	27.0	22.0
500	YES	25.0	30.0	YES	28.0	31.0
1000	YES	25.0	30.0	YES	25.0	32.0
2000	YES	15.0	21.0	YES	16.0	23.0

**Table 111 European Noise FB Impairment, 2048 kbps DS, 256 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2400	YES	10.0	13.0			
2500				YES	10.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 112 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	23.0	12.0	YES	24.0	12.0
500	YES	22.0	21.0	YES	24.0	22.0
1000	YES	21.0	22.0	YES	22.0	22.0
1500	YES	17.0	19.0	YES	18.0	19.0
1950	YES	12.0	13.0			
2050				YES	12.0	12.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 113 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	15.0	14.0	YES	16.0	15.0
1000	YES	14.0	13.0	YES	14.0	14.0
1250	YES	12.0	12.0	YES	13.0	13.0
1400	YES	11.0	11.0			
1500				YES	11.0	11.0

This test is passed according to TR-067

### 3.1.10 ECI HiFocus ATUC-16

The DSLAM system, which the CPE system was tested against, is described in the table below

Table 114 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	ECI HiFocus
FW Version	31edbe02 (A2_8.10.03)
Line Card Type, Version	ATUC-16
Industry Standards Supported	G.992.1
Chip set	ADI930

### 3.1.10.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### White Noise Impairment Only in Fast Mode

Table 115 White Noise Impairment Only in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1152.0	7.0	7616.0	8128.0	16.0
500	768.0	1152.0	6.0	7616.0	8128.0	19.0
1000	768.0	1088.0	6.0	7616.0	8128.0	18.0
1500	768.0	1088.0	7.0	7616.0	8128.0	17.0
2000	768.0	1088.0	6.0	7616.0	8128.0	13.0
2500	768.0	1024.0	7.0	6144.0	7648.0	6.0
3000	576.0	864.0	6.0	3648.0	5184.0	6.0
3500	384.0	640.0	7.0	1760.0	2816.0	6.0
3800	288.0	0	0.0	608.0	0	0.0

This test is failed according to TR-067

#### White Noise Impairment Only in Interleaved Mode

Table 116 White Noise Impairment Only in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	9.0	7616.0	8128.0	16.0
500	768.0	1024.0	8.0	7616.0	8128.0	19.0
1000	768.0	1024.0	8.0	7616.0	8128.0	18.0
1500	768.0	1024.0	8.0	7616.0	8128.0	17.0
2000	768.0	1024.0	7.0	7616.0	8128.0	13.0
2500	768.0	1024.0	6.0	6144.0	7456.0	7.0
3000	672.0	864.0	7.0	4096.0	5280.0	6.0
3500	480.0	672.0	6.0	2208.0	2720.0	7.0

Table 116 White Noise Impairment Only in Interleaved Mode (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
3750	384.0	576.0	6.0	1184.0	2112.0	7.0
4000	288.0	448.0	7.0	320.0	1344.0	7.0

This test is passed according to TR-067

#### European Noise FB Impairment in Fast Mode

Table 117 European Noise FB Impairment in Fast Mode

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1088.0	6.0	4864.0	5408.0	6.0
250	768.0	928.0	6.0	5792.0	7264.0	6.0
500	768.0	1056.0	6.0	6752.0	8128.0	6.0
750	768.0	992.0	6.0	7136.0	7968.0	6.0
1000	768.0	960.0	6.0	7200.0	7744.0	6.0
1250	736.0	896.0	6.0	6976.0	7424.0	6.0
1500	672.0	800.0	7.0	6496.0	6976.0	6.0
1750	576.0	704.0	7.0	5408.0	6240.0	6.0
2000	480.0	608.0	6.0	4320.0	5312.0	6.0
2500	256.0	384.0	6.0	2176.0	3040.0	6.0
2750	128.0	256.0	6.0	1120.0	1792.0	6.0
2900	64.0	160.0	7.0	192.0	1344.0	6.0

This test is passed according to TR-067

#### European Noise FB Impairment in Interleaved Mode

Table 118 European Noise FB Impairment in Interleaved Mode

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1024.0	8.0	4864.0	5472.0	6.0
250	768.0	960.0	7.0	5792.0	7104.0	7.0
500	768.0	1024.0	6.0	6752.0	8128.0	6.0
750	768.0	992.0	6.0	7136.0	7584.0	8.0
1000	768.0	928.0	7.0	7200.0	7584.0	7.0
1250	768.0	864.0	6.0	6976.0	7232.0	7.0
1500	704.0	800.0	6.0	6624.0	7040.0	6.0
1750	608.0	704.0	6.0	5824.0	6304.0	6.0
2000	512.0	608.0	7.0	4800.0	5376.0	6.0
2500	320.0	384.0	7.0	2528.0	2944.0	6.0

Table 118 European Noise FB Impairment in Interleaved Mode (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
2750	192.0	256.0	6.0	1504.0	2080.0	6.0
2900	128.0	224.0	6.0	768.0	1504.0	6.0

This test is passed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

Table 119 White Noise Impairment, 864 kbps DS, 160 kbps US

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	32.0	46.0	YES	35.0	50.0
500	YES	32.0	48.0	YES	33.0	53.0
1000	YES	31.0	48.0	YES	31.0	53.0
2000	YES	29.0	42.0	YES	32.0	46.0
3000	YES	26.0	26.0	YES	27.0	29.0
3600	YES	19.0	16.0			
3700				YES	20.0	17.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

Table 120 White Noise Impairment, 4096 kbps DS, 384 kbps US

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.0	32.0	YES	28.0	33.0
500	YES	26.0	35.0	YES	27.0	36.0
1000	YES	24.0	35.0	YES	25.0	35.0
2000	YES	25.0	29.0	YES	26.0	29.0
2900	YES	21.0	12.0			
3000				YES	20.0	11.0

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 121 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	25.0	YES	32.0	27.0
500	YES	29.0	36.0	YES	32.0	39.0
1000	YES	27.0	35.0	YES	28.0	38.0
2000	YES	18.0	26.0	YES	19.0	29.0
2650	YES	9.0	12.0			
2750				YES	9.0	13.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 122 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	20.0	YES	30.0	21.0
500	YES	26.0	31.0	YES	29.0	32.0
1000	YES	24.0	29.0	YES	26.0	31.0
2000	YES	14.0	20.0	YES	17.0	21.0
2400	YES	10.0	12.0			
2500				YES	10.0	12.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 123 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.0	11.0	YES	26.0	12.0
500	YES	23.0	22.0	YES	25.0	23.0
1000	YES	21.0	21.0	YES	22.0	21.0
1500	YES	17.0	17.0	YES	18.0	18.0

**Table 123 European Noise FB Impairment, 4096 kbps DS, 384 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
1950	YES	12.0	11.0			
2050				YES	12.0	10.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 124 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	15.0	13.0	YES	16.0	14.0
1000	YES	14.0	12.0	YES	14.0	13.0
1250	YES	12.0	11.0	YES	13.0	11.0
1400	YES	11.0	10.0			
1500				YES	11.0	9.0

This test is passed according to TR-067

### 3.1.11 ERICSSON EDN312XI

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 125 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Ericsson
FW Version	CXC 132 8112 R1B13 (2.3R2A)
Line Card Type, Version	EDN312xi
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

#### 3.1.11.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### White Noise Impairment Only in Fast Mode

Table 126 White Noise Impairment Only in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1376.0	6.7	7616.0	8128.0	21.0
500	768.0	1376.0	8.1	7616.0	8128.0	19.5
1000	768.0	1344.0	6.3	7616.0	8128.0	20.5
1500	768.0	1184.0	6.9	7616.0	8128.0	19.0
2000	768.0	960.0	7.0	7616.0	8128.0	15.0
2500	768.0	768.0	6.7	6144.0	8128.0	6.5
3000	576.0	576.0	6.3	3648.0	5632.0	6.5
3500	384.0	384.0	5.5	1760.0	3264.0	6.5
3800	288.0	224.0	6.4	608.0	2336.0	6.5

This test is failed according to TR-067

#### White Noise Impairment Only in Interleaved Mode

Table 127 White Noise Impairment Only in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1408.0	6.8	7616.0	10912.0	9.5
500	768.0	1376.0	7.2	7616.0	10400.0	12.0
1000	768.0	1344.0	6.2	7616.0	10848.0	10.0
1500	768.0	1152.0	7.1	7616.0	10848.0	8.5
2000	768.0	960.0	6.9	7616.0	10080.0	7.5
2500	768.0	800.0	6.4	6144.0	8224.0	6.5
3000	672.0	576.0	6.3	4096.0	5472.0	7.5
3500	480.0	384.0	7.9	2208.0	3488.0	6.5
3750	384.0	288.0	7.9	1184.0	2528.0	7.0
4000	288.0	192.0	7.0	320.0	1888.0	7.0

This test is failed according to TR-067

#### European Noise FB Impairment in Fast Mode

Table 128 European Noise FB Impairment in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1216.0	6.8	4864.0	5920.0	6.0
250	768.0	1216.0	6.7	5792.0	5824.0	6.0
500	768.0	1152.0	6.5	6752.0	6720.0	6.0
750	768.0	1088.0	6.3	7136.0	7520.0	6.0



Table 128 European Noise FB Impairment in Fast Mode (cont'd)

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1000	768.0	992.0	6.6	7200.0	8128.0	6.0
1250	736.0	896.0	6.3	6976.0	7808.0	6.0
1500	672.0	800.0	6.1	6496.0	7328.0	6.0
1750	576.0	672.0	6.7	5408.0	6624.0	6.0
2000	480.0	576.0	6.4	4320.0	5664.0	6.0
2500	256.0	352.0	6.5	2176.0	3200.0	6.0
2750	128.0	224.0	6.8	1120.0	1920.0	6.0
2900	64.0	192.0	6.2	192.0	1408.0	6.0

This test is passed according to TR-067

#### European Noise FB Impairment in Interleaved Mode

Table 129 European Noise FB Impairment in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	1216.0	6.9	4864.0	5760.0	7.0
250	768.0	1216.0	6.3	5792.0	5664.0	7.0
500	768.0	1152.0	6.6	6752.0	6528.0	7.0
750	768.0	1088.0	6.6	7136.0	7776.0	6.0
1000	768.0	992.0	6.6	7200.0	8288.0	6.5
1250	768.0	896.0	6.4	6976.0	7968.0	6.5
1500	704.0	800.0	6.1	6624.0	7136.0	7.5
1750	608.0	672.0	6.6	5824.0	6400.0	7.0
2000	512.0	576.0	6.3	4800.0	5568.0	7.0
2500	320.0	384.0	7.6	2528.0	3424.0	6.5
2750	192.0	288.0	7.2	1504.0	2240.0	6.0
2900	128.0	224.0	7.1	768.0	1728.0	6.0

This test is passed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

Table 130 White Noise Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	37.0	41.5	YES	36.9	41.0
500	YES	36.4	40.0	YES	36.4	40.0
1000	YES	34.7	41.0	YES	34.8	41.0
2000	YES	33.3	34.0	YES	33.4	34.5
3000	YES	19.2	28.5	YES	19.0	28.5
3600	YES	11.4	19.0			
3700				YES	9.7	19.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

Table 131 White Noise Impairment, 4096 kbps DS, 384 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.8	32.0	YES	34.3	32.0
500	YES	34.1	32.0	YES	34.5	31.5
1000	YES	33.7	32.0	YES	33.8	32.0
2000	YES	24.3	30.5	YES	24.4	31.0
2900	YES	13.5	14.5			
3000				YES	12.3	12.5

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

Table 132 European Noise FB Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	32.3	27.0	YES	32.1	27.0
500	YES	31.5	30.0	YES	31.6	29.5
1000	YES	30.8	31.0	YES	30.9	31.0
2000	YES	18.4	27.5	YES	18.4	27.5

**Table 132 European Noise FB Impairment, 864 kbps DS, 160 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2650	YES	9.7	14.5			
2750				YES	8.9	12.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 133 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.9	21.5	YES	32.2	21.0
500	YES	31.4	24.0	YES	31.4	24.0
1000	YES	28.1	30.0	YES	28.2	30.0
2000	YES	15.9	21.0	YES	15.7	21.0
2400	YES	10.8	13.5			
2500				YES	9.1	11.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 134 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.2	13.0	YES	30.9	13.0
500	YES	29.1	16.0	YES	28.9	16.5
1000	YES	24.3	21.5	YES	24.3	21.5
1500	YES	18.3	19.0	YES	18.3	19.0
1950	YES	12.5	13.0			
2050				YES	11.3	11.5

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 135 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	19.2	11.5	YES	19.4	11.5
1000	YES	16.7	13.5	YES	16.7	13.5
1250	YES	13.7	12.5	YES	13.7	12.5
1400	YES	12.1	11.5			
1500				YES	10.8	10.5

This test is passed according to TR-067

### 3.1.12 MARCONI AXH600 IX60

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 136 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Marconi AXH600
FW Version	014105 (5.52)
Line Card Type, Version	ix60
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Centillium

#### 3.1.12.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### White Noise Impairment Only in Fast Mode

**Table 137 White Noise Impairment Only in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	864.0	16.1	7616.0	8128.0	18.0
500	768.0	864.0	17.0	7616.0	8128.0	18.0
1000	768.0	864.0	12.7	7616.0	8128.0	17.5
1500	768.0	864.0	13.1	7616.0	8128.0	16.5
2000	768.0	864.0	10.2	7616.0	8128.0	12.0
2500	768.0	800.0	6.5	6144.0	7424.0	7.0
3000	576.0	608.0	6.1	3648.0	5024.0	7.0
3500	384.0	384.0	6.2	1760.0	2816.0	7.5
3800	288.0	288.0	6.1	608.0	2080.0	7.5

This test is passed according to TR-067

### White Noise Impairment Only in Interleaved Mode

**Table 138 White Noise Impairment Only in Interleaved Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	864.0	17.7	7616.0	8128.0	18.0
500	768.0	864.0	15.2	7616.0	8128.0	18.0
1000	768.0	864.0	14.6	7616.0	8128.0	17.0
1500	768.0	864.0	14.2	7616.0	8128.0	16.5
2000	768.0	864.0	11.3	7616.0	8128.0	12.0
2500	768.0	864.0	5.7	6144.0	7392.0	7.5
3000	672.0	640.0	5.7	4096.0	5056.0	7.5
3500	480.0	416.0	5.8	2208.0	3008.0	7.5
3750	384.0	352.0	7.1	1184.0	2208.0	7.5
4000	288.0	224.0	7.1	320.0	1728.0	8.0

This test is passed according to TR-067

### European Noise FB Impairment in Fast Mode

**Table 139 European Noise FB Impairment in Fast Mode**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	864.0	13.6	4864.0	5184.0	7.0
250	768.0	864.0	13.5	5792.0	5088.0	7.0
500	768.0	864.0	12.5	6752.0	6432.0	7.0
750	768.0	864.0	10.0	7136.0	7712.0	7.0
1000	768.0	864.0	9.0	7200.0	7520.0	7.0
1250	736.0	864.0	6.0	6976.0	7232.0	7.0
1500	672.0	768.0	6.5	6496.0	6816.0	7.0
1750	576.0	672.0	6.1	5408.0	6144.0	7.0
2000	480.0	576.0	5.8	4320.0	5248.0	7.0
2500	256.0	384.0	5.8	2176.0	2912.0	6.5
2750	128.0	256.0	5.8	1120.0	1600.0	7.0
2900	64.0	192.0	6.5	192.0	1152.0	7.5

This test is passed according to TR-067

### European Noise FB Impairment in Interleaved Mode

**Table 140 European Noise FB Impairment in Interleaved Mode**

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	864.0	14.7	4864.0	5120.0	7.5
250	768.0	864.0	14.6	5792.0	5056.0	7.5
500	768.0	864.0	13.2	6752.0	6400.0	7.5
750	768.0	864.0	11.0	7136.0	7680.0	8.0
1000	768.0	864.0	9.1	7200.0	7520.0	7.5
1250	768.0	864.0	7.3	6976.0	7232.0	7.5
1500	704.0	864.0	5.7	6624.0	6816.0	7.5
1750	608.0	864.0	6.5	5824.0	6080.0	7.5
2000	512.0	608.0	6.1	4800.0	5184.0	7.5
2500	320.0	384.0	6.1	2528.0	3136.0	7.5
2750	192.0	320.0	6.2	1504.0	1888.0	7.0
2900	128.0	256.0	6.2	768.0	1440.0	7.5

This test is passed according to TR-067

#### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

**Table 141 White Noise Impairment, 864 kbps DS, 160 kbps US**

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	31.0	YES	31.0	31.0
500	YES	31.0	31.0	YES	31.0	31.0
1000	YES	31.0	31.0	YES	31.0	31.0
2000	YES	31.0	31.0	YES	31.0	31.0
3000	YES	19.5	27.5	YES	21.2	30.0
3600	YES	12.3	18.5			
3700				YES	13.3	19.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

Table 142 White Noise Impairment, 4096 kbps DS, 384 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.7	31.0	YES	31.0	31.0
500	YES	30.7	31.0	YES	31.0	31.0
1000	YES	26.7	31.0	YES	28.6	31.0
2000	YES	23.6	28.0	YES	25.3	28.5
2900	YES	14.1	12.5			
3000				YES	14.0	11.5

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

Table 143 European Noise FB Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	24.5	YES	31.0	27.5
500	YES	31.0	30.0	YES	31.0	31.0
1000	YES	29.3	31.0	YES	30.2	31.0
2000	YES	18.1	27.0	YES	20.0	29.5
2650	YES	10.7	12.5			
2750				YES	11.1	13.5

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Table 144 European Noise FB Impairment, 2048 kbps DS, 256 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	30.8	19.5	YES	31.0	21.0
500	YES	29.6	24.0	YES	31.0	26.5
1000	YES	25.8	29.0	YES	27.1	30.5
2000	YES	15.0	20.0	YES	16.7	22.0

**Table 144 European Noise FB Impairment, 2048 kbps DS, 256 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2400	YES	11.0	12.0			
2500				YES	10.7	12.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 145 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	27.2	11.0	YES	29.1	12.0
500	YES	25.6	16.0	YES	28.5	17.0
1000	YES	21.8	20.0	YES	23.3	21.0
1500	YES	16.8	17.5	YES	19.1	18.5
1950	YES	11.8	12.0			
2050				YES	12.8	10.5

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 146 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	16.0	12.5	YES	17.2	14.0
1000	YES	14.7	12.0	YES	15.1	13.0
1250	YES	12.1	11.0	YES	13.7	12.0
1400	YES	11.1	10.0			
1500				YES	11.2	10.0

This test is passed according to TR-067

### 3.1.13 LUCENT STINGER LIPM A2B-72-HB

The DSLAM system, which the CPE system was tested against, is described in the table below



Table 147 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Lucent Stinger
FW Version	E11.1.23 (TAOS 9.9.226)
Line Card Type, Version	LIPM-A2B-72-HB
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Conexant

### 3.1.13.1 Performance Tests for European Test Set

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### CPE Margin Verification

Table 148 CPE Margin Verification Test (Annex B.2.1)

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	1500	6400	7648	7648	6	2	5	0	0.0E+00	1.5E-07
CPE	2500	2080	3168	3168	6	1	15	0	0.0E+00	1.5E-07
CPE	2850	768	1856	1856	6	1	45	0	0.0E+00	1.75E-07

The test is passed according to TR-067.

#### Stresstest

Table 149 Stresstest (chapter 8.4)

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
3600	1600	1600	7	2	480	0	0.0E+00	1.5E-07

The test is passed according to TR-067.

#### White Noise Impairment Only in Fast Mode

Table 150 White Noise Impairment Only in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	928.0	7.0	7616.0	8128.0	16.0
500	768.0	928.0	8.0	7616.0	8128.0	17.0
1000	768.0	928.0	7.0	7616.0	8128.0	17.0

Table 150 White Noise Impairment Only in Fast Mode (cont'd)

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1500	768.0	832.0	7.0	7616.0	8128.0	16.0
2000	768.0	800.0	7.0	7616.0	8128.0	14.0
2500	768.0	672.0	7.0	6144.0	7904.0	6.0
3000	576.0	512.0	7.0	3648.0	5472.0	6.0
3500	384.0	320.0	7.0	1760.0	3040.0	7.0
3800	288.0	192.0	7.0	608.0	2016.0	7.0

This test is failed according to TR-067

### White Noise Impairment Only in Interleaved Mode

Table 151 White Noise Impairment Only in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	960.0	7.0	7616.0	8064.0	17.0
500	768.0	896.0	8.0	7616.0	8064.0	19.0
1000	768.0	928.0	6.0	7616.0	8064.0	19.0
1500	768.0	896.0	8.0	7616.0	8064.0	18.0
2000	768.0	896.0	7.0	7616.0	8064.0	15.0
2500	768.0	736.0	8.0	6144.0	8064.0	7.0
3000	672.0	608.0	7.0	4096.0	5568.0	6.0
3500	480.0	416.0	7.0	2208.0	3360.0	7.0
3750	384.0	288.0	8.0	1184.0	2400.0	7.0
4000	288.0	160.0	8.0	320.0	1664.0	7.0

This test is failed according to TR-067

### European Noise FB Impairment in Fast Mode

Table 152 European Noise FB Impairment in Fast Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	832.0	8.0	4864.0	6048.0	6.0
250	768.0	896.0	6.0	5792.0	6976.0	6.0
500	768.0	864.0	7.0	6752.0	7840.0	6.0
750	768.0	800.0	7.0	7136.0	8128.0	7.0
1000	768.0	768.0	6.0	7200.0	8128.0	7.0
1250	736.0	672.0	7.0	6976.0	7936.0	6.0
1500	672.0	576.0	7.0	6496.0	7392.0	6.0
1750	576.0	512.0	7.0	5408.0	6560.0	6.0

Table 152 European Noise FB Impairment in Fast Mode (cont'd)

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
2000	480.0	416.0	7.0	4320.0	5568.0	6.0
2500	256.0	192.0	8.0	2176.0	3168.0	6.0
2750	128.0	128.0	7.0	1120.0	1888.0	6.0
2900	64.0	64.0	7.0	192.0	1344.0	6.0

This test is failed according to TR-067

### European Noise FB Impairment in Interleaved Mode

Table 153 European Noise FB Impairment in Interleaved Mode

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	768.0	896.0	9.0	4864.0	6176.0	6.0
250	768.0	896.0	9.0	5792.0	7104.0	6.0
500	768.0	896.0	8.0	6752.0	8064.0	6.0
750	768.0	864.0	7.0	7136.0	8064.0	9.0
1000	768.0	832.0	7.0	7200.0	8064.0	8.0
1250	768.0	736.0	7.0	6976.0	8064.0	6.0
1500	704.0	672.0	7.0	6624.0	7488.0	6.0
1750	608.0	576.0	7.0	5824.0	6688.0	6.0
2000	512.0	480.0	7.0	4800.0	5664.0	6.0
2500	320.0	320.0	7.0	2528.0	3520.0	6.0
2750	192.0	224.0	7.0	1504.0	2208.0	6.0
2900	128.0	128.0	8.0	768.0	1664.0	6.0

This test is failed according to TR-067

### Fixed Rate with White Noise Impairment Only

White noise at -140 dBm/Hz is applied at both ends of the loop

White Noise Impairment, 864 kbps DS, 160 kbps US

Table 154 White Noise Impairment, 864 kbps DS, 160 kbps US

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	33.0	38.0	YES	36.0	40.0
500	YES	33.0	39.0	YES	36.0	41.0
1000	YES	32.0	39.0	YES	23.0	42.0
2000	YES	32.0	35.0	YES	32.0	36.0

**Table 154 White Noise Impairment, 864 kbps DS, 160 kbps US (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
3000	YES	22.0	28.0	YES	24.0	29.0
3600	YES	13.0	17.0			
3700				YES	14.0	18.0

This test is passed according to TR-067

White Noise Impairment, 4096 kbps DS, 384 kbps US

**Table 155 White Noise Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.0	31.0	YES	29.0	31.0
500	YES	25.0	31.0	YES	28.0	31.0
1000	YES	24.0	31.0	YES	28.0	31.0
2000	YES	22.0	29.0	YES	25.0	28.0
2900	YES	14.0	14.0			
3000				YES	15.0	12.0

This test is passed according to TR-067

#### Fixed Rate with European Noise FB Impairment

Noise is applied according to TR-067 B.2.5.2 at both ends of the loop

European Noise FB Impairment, 864 kbps DS, 160 kbps US

**Table 156 European Noise FB Impairment, 864 kbps DS, 160 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.0	27.0	YES	33.0	30.0
500	YES	30.0	31.0	YES	32.0	31.0
1000	YES	27.0	31.0	YES	30.0	31.0
2000	YES	16.0	27.0	YES	19.0	29.0
2650	YES	7.0	14.0			
2750				YES	9.0	14.0

This test is passed according to TR-067

European Noise FB Impairment, 2048 kbps DS, 256 kbps US

**Table 157 European Noise FB Impairment, 2048 kbps DS, 256 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	22.0	YES	31.0	24.0
500	YES	27.0	29.0	YES	30.0	30.0
1000	YES	24.0	31.0	YES	28.0	31.0
2000	YES	12.0	21.0	YES	16.0	22.0
2400	YES	7.0	13.0			
2500				YES	9.0	12.0

This test is passed according to TR-067

European Noise FB Impairment, 4096 kbps DS, 384 kbps US

**Table 158 European Noise FB Impairment, 4096 kbps DS, 384 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	24.0	14.0	YES	27.0	14.0
500	YES	23.0	21.0	YES	26.0	21.0
1000	YES	19.0	22.0	YES	23.0	23.0
1500	YES	14.0	19.0	YES	17.0	19.0
1950	YES	8.0	12.0			
2050				YES	10.0	11.0

This test is passed according to TR-067

European Noise FB Impairment, 6144 kbps DS, 640 kbps US

**Table 159 European Noise FB Impairment, 6144 kbps DS, 640 kbps US**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
750	YES	13.0	15.0	YES	16.0	16.0
1000	YES	11.0	14.0	YES	13.0	15.0
1250	YES	8.0	13.0	YES	10.0	13.0
1400	YES	7.0	12.0			
1500				YES	8.0	11.0

This test is passed according to TR-067

## 4 U-R2 Performance Test Results

The following chapter describes the test results which were obtained in testing the AMAZON-SE reference board against different DSLAMs in the Infineon Interoperability and Qualification Laboratory.

### 4.1 INFINEON GEMINAX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 160 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.1B.04.00.28
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5, TS 101 388
Chip set	GEMINAX-D MAX v1.3

#### 4.1.1 Performance for ADSL according to U-R2 V7.0

The test were performed using the parameters in the table below:

**Table 161 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### 4.1.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 162 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2800	96.0	96.0	448.0	448.0	6	9.9	6	13.0
2700	160.0	160.0	864.0	864.0	6	9.4	6	13.0
2450	288.0	288.0	864.0	864.0	6	8.7	6	18.5
2700	160.0	160.0	1184.0	1184.0	6	9.0	6	11.5
2450	288.0	288.0	1184.0	1184.0	6	8.4	6	16.5
2550	224.0	224.0	1728.0	1728.0	6	9.1	6	12.0
2050	448.0	448.0	1728.0	1728.0	6	8.8	6	21.5
2450	224.0	224.0	2304.0	2304.0	6	10.4	6	11.0

Table 162 Fixed Rate Fast 6 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2050	448.0	448.0	2304.0	2304.0	6	8.7	6	18.5
2050	448.0	448.0	2560.0	2560.0	6	8.6	6	17.5
1700	576.0	576.0	2560.0	2560.0	6	9.5	6	22.5
2050	448.0	448.0	3456.0	3456.0	6	8.6	6	14.0
1700	576.0	576.0	3456.0	3456.0	6	9.6	6	19.5
1400	640.0	640.0	6656.0	6656.0	6	11.4	6	9.0

The test is passed according to UR2 according to UR2v7

Table 163 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	3	8.6	3	11.0
2800	160.0	160.0	864.0	864.0	3	8.0	3	11.0
2550	288.0	288.0	864.0	864.0	3	7.3	3	16.0
2800	160.0	160.0	1184.0	1184.0	3	8.0	3	10.0
2550	288.0	288.0	1184.0	1184.0	3	7.1	3	14.5
2650	224.0	224.0	1728.0	1728.0	3	7.7	3	9.5
2200	448.0	448.0	1728.0	1728.0	3	6.8	3	18.5
2550	224.0	224.0	2304.0	2304.0	3	8.9	3	9.0
2200	448.0	448.0	2304.0	2304.0	3	6.8	3	16.0
2200	448.0	448.0	2560.0	2560.0	3	6.7	3	15.0
1900	576.0	576.0	2560.0	2560.0	3	6.9	3	20.0
2200	448.0	448.0	3456.0	3456.0	3	6.7	3	11.0
1900	576.0	576.0	3456.0	3456.0	3	6.9	3	16.5
1600	640.0	640.0	6656.0	6656.0	3	8.9	3	7.5

The test is passed according to UR2v7

Table 164 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	6	9.9	6	14.0
2800	160.0	160.0	864.0	864.0	6	9.1	6	13.0
2550	288.0	288.0	864.0	864.0	6	8.1	6	18.5
2800	160.0	160.0	1184.0	1184.0	6	9.3	6	11.5
2550	288.0	288.0	1184.0	1184.0	6	8.1	6	16.5
2650	224.0	224.0	1728.0	1728.0	6	8.9	6	11.5
2150	448.0	448.0	1728.0	1728.0	6	8.3	6	21.0
2550	224.0	224.0	2304.0	2304.0	6	10.1	6	10.0
2150	448.0	448.0	2304.0	2304.0	6	8.0	6	18.5

**Table 164 Fixed Rate Interleaved 6 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2150	448.0	448.0	2560.0	2560.0	6	8.1	6	17.0
1800	576.0	576.0	2560.0	2560.0	6	9.0	6	23.0
2150	448.0	448.0	3456.0	3456.0	6	8.0	6	13.5
1800	576.0	576.0	3456.0	3456.0	6	8.8	6	19.5
1450	640.0	640.0	6656.0	6656.0	6	11.6	6	9.0

The test is passed according to UR2v7.

**Table 165 Fixed Rate Interleaved 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
3000	96.0	96.0	448.0	448.0	3	8.1	3	12.5
2900	160.0	160.0	864.0	864.0	3	7.9	3	10.5
2650	288.0	288.0	864.0	864.0	3	6.9	3	16.0
2900	160.0	160.0	1184.0	1184.0	3	7.8	3	9.5
2650	288.0	288.0	1184.0	1184.0	3	6.8	3	14.0
2750	224.0	224.0	1728.0	1728.0	3	7.4	3	9.5
2300	448.0	448.0	1728.0	1728.0	3	6.3	3	18.5
2650	224.0	224.0	2304.0	2304.0	3	8.8	3	8.5
2300	448.0	448.0	2304.0	2304.0	3	6.2	3	15.5
2300	448.0	448.0	2560.0	2560.0	3	6.1	3	14.5
2000	576.0	576.0	2560.0	2560.0	3	6.5	3	20.0
2300	448.0	448.0	3456.0	3456.0	3	6.3	3	10.5
2000	576.0	576.0	3456.0	3456.0	3	6.5	3	16.5
1650	640.0	640.0	6656.0	6656.0	3	9.1	3	7.5

The test is passed according to UR2v7

## 4.2 INFINEON GEMINAX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 166 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.11.0d.0.8
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	GEMINAX-D MAX v1.3



## 4.2.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 167 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

### 1. Tests with Fixed Rate Configuration

#### 4.2.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 168 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	11.0	6	9.5
1600	576.0	576.0	6016.0	6016.0	6	10.5	6	10.5
1700	576.0	576.0	2560.0	2560.0	6	9.0	6	23.0
1700	576.0	576.0	3456.0	3456.0	6	8.9	6	19.5
2050	448.0	448.0	1728.0	1728.0	6	8.5	6	21.5
2050	448.0	448.0	2304.0	2304.0	6	8.3	6	19.0
2050	448.0	448.0	2560.0	2560.0	6	8.6	6	18.0
2050	448.0	448.0	3456.0	3456.0	6	8.3	6	14.0
2050	384.0	384.0	4032.0	4032.0	6	10.3	6	12.0
2450	288.0	288.0	1184.0	1184.0	6	8.3	6	16.5
2450	224.0	224.0	2304.0	2304.0	6	9.6	6	11.5
2450	288.0	288.0	864.0	864.0	6	8.2	6	18.5
2500	224.0	224.0	2016.0	2016.0	6	9.4	6	11.5
2550	224.0	224.0	1728.0	1728.0	6	8.9	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	9.1	6	12.0
2700	160.0	160.0	864.0	864.0	6	9.2	6	13.0
2800	96.0	96.0	448.0	448.0	6	10.1	6	13.0

Test is passed according U-R2v61

Table 169 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	8.3	3	7.5
1800	576.0	576.0	6016.0	6016.0	3	7.8	3	8.0
1900	576.0	576.0	2560.0	2560.0	3	6.4	3	20.5
1900	576.0	576.0	3456.0	3456.0	3	6.5	3	17.0
2200	448.0	448.0	1728.0	1728.0	3	6.6	3	18.5
2200	448.0	448.0	2304.0	2304.0	3	6.4	3	16.0
2200	448.0	448.0	2560.0	2560.0	3	6.5	3	15.0
2200	448.0	448.0	3456.0	3456.0	3	6.6	3	11.5
2200	384.0	384.0	4032.0	4032.0	3	8.3	3	9.0
2550	288.0	288.0	1184.0	1184.0	3	6.3	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	8.7	3	9.5
2550	288.0	288.0	864.0	864.0	3	6.7	3	16.0
2600	224.0	224.0	2016.0	2016.0	3	8.3	3	9.5
2650	224.0	224.0	1728.0	1728.0	3	7.3	3	10.0
2800	160.0	160.0	1184.0	1184.0	3	7.6	3	10.0
2800	160.0	160.0	864.0	864.0	3	7.7	3	11.5
2900	96.0	96.0	448.0	448.0	3	8.9	3	11.5

Test is passed according U-R2v61

Table 170 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	11.3	6	10.5
1700	576.0	576.0	6016.0	6016.0	6	9.8	6	11.0
1800	576.0	576.0	2560.0	2560.0	6	8.5	6	23.5
1800	576.0	576.0	3456.0	3456.0	6	8.7	6	20.0
2150	448.0	448.0	1728.0	1728.0	6	8.3	6	21.0
2150	448.0	448.0	2304.0	2304.0	6	8.1	6	18.5
2150	448.0	448.0	2560.0	2560.0	6	8.3	6	17.5
2150	448.0	448.0	3456.0	3456.0	6	8.3	6	14.0
2150	384.0	384.0	4032.0	4032.0	6	10.4	6	11.5
2550	288.0	288.0	1184.0	1184.0	6	8.3	6	16.5
2550	224.0	224.0	2304.0	2304.0	6	10.4	6	11.0
2550	288.0	288.0	864.0	864.0	6	8.2	6	18.5
2600	224.0	224.0	2016.0	2016.0	6	9.4	6	11.0
2650	224.0	224.0	1728.0	1728.0	6	9.0	6	11.0
2800	160.0	160.0	1184.0	1184.0	6	9.3	6	12.0
2800	160.0	160.0	864.0	864.0	6	9.0	6	13.0
2900	96.0	96.0	448.0	448.0	6	9.9	6	13.0

Test is passed according U-R2v61

**Table 171 Fixed Rate Interleaved 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	9.0	3	8.5
1900	576.0	576.0	6016.0	6016.0	3	7.7	3	8.0
2000	576.0	576.0	2560.0	2560.0	3	6.2	3	20.5
2000	576.0	576.0	3456.0	3456.0	3	6.3	3	17.0
2300	448.0	448.0	1728.0	1728.0	3	6.1	3	18.0
2300	448.0	448.0	2304.0	2304.0	3	6.3	3	15.5
2300	448.0	448.0	2560.0	2560.0	3	5.9	3	14.5
2300	448.0	448.0	3456.0	3456.0	3	5.9	3	11.5
2300	384.0	384.0	4032.0	4032.0	3	8.6	3	8.5
2650	288.0	288.0	1184.0	1184.0	3	6.5	3	14.5
2650	224.0	224.0	2304.0	2304.0	3	9.0	3	9.0
2650	288.0	288.0	864.0	864.0	3	6.9	3	16.0
2700	224.0	224.0	2016.0	2016.0	3	8.4	3	9.5
2750	224.0	224.0	1728.0	1728.0	3	7.8	3	9.0
2900	160.0	160.0	1184.0	1184.0	3	8.1	3	9.5
2900	160.0	160.0	864.0	864.0	3	7.9	3	10.5
3000	96.0	96.0	448.0	448.0	3	8.4	3	12.5

Test is passed according U-R2v61

## 4.3 ALCATEL ASAM 7300 ABLT-F

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 172 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Alcatel ASAM7300
FW Version	L7D6AA47.065 (R4.7.0.8.4)
Line Card Type, Version	ABLT_F
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

### 4.3.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 173 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
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**Table 173 Test Parameters** (cont'd)

Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

#### 4.3.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 174 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	12.1	6	10.0
1600	576.0	576.0	6016.0	6016.0	6	11.5	6	10.5
1700	576.0	576.0	2560.0	2560.0	6	10.2	6	23.5
1700	576.0	576.0	3456.0	3456.0	6	10.2	6	19.5
2050	448.0	448.0	1728.0	1728.0	6	9.5	6	21.0
2050	448.0	448.0	2304.0	2304.0	6	9.5	6	18.5
2050	448.0	448.0	2560.0	2560.0	6	9.5	6	17.5
2050	448.0	448.0	3456.0	3456.0	6	9.5	6	14.0
2050	384.0	384.0	4032.0	4032.0	6	11.3	6	11.5
2450	288.0	288.0	1184.0	1184.0	6	9.0	6	17.5
2450	224.0	224.0	2304.0	2304.0	6	10.8	6	11.0
2450	288.0	288.0	864.0	864.0	6	9.0	6	18.5
2500	224.0	224.0	2016.0	2016.0	6	10.3	6	11.0
2550	224.0	224.0	1728.0	1728.0	6	9.8	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	9.5	6	11.5
2700	160.0	160.0	864.0	864.0	6	9.6	6	12.5
2800	96.0	96.0	448.0	448.0	6	10.0	6	14.0

Test is passed according U-R2v61

**Table 175 Fixed Rate Fast 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	9.6	3	8.0
1800	576.0	576.0	6016.0	6016.0	3	9.0	3	8.0
1900	576.0	576.0	2560.0	2560.0	3	7.6	3	20.5
1900	576.0	576.0	3456.0	3456.0	3	7.7	3	16.5

Table 175 Fixed Rate Fast 3 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2200	448.0	448.0	1728.0	1728.0	3	7.5	3	18.0
2200	448.0	448.0	2304.0	2304.0	3	7.5	3	15.5
2200	448.0	448.0	2560.0	2560.0	3	7.5	3	14.5
2200	448.0	448.0	3456.0	3456.0	3	7.6	3	11.0
2200	384.0	384.0	4032.0	4032.0	3	9.5	3	8.5
2550	288.0	288.0	1184.0	1184.0	3	7.8	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	9.7	3	9.0
2550	288.0	288.0	864.0	864.0	3	7.7	3	16.5
2600	224.0	224.0	2016.0	2016.0	3	9.0	3	9.0
2650	224.0	224.0	1728.0	1728.0	3	8.1	3	9.5
2800	160.0	160.0	1184.0	1184.0	3	8.2	3	9.5
2800	160.0	160.0	864.0	864.0	3	8.3	3	11.0
2900	96.0	96.0	448.0	448.0	3	8.2	3	11.5

Test is passed according U-R2v61

Table 176 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	12.0	6	10.5
1700	576.0	576.0	6016.0	6016.0	6	10.7	6	10.5
1800	576.0	576.0	2560.0	2560.0	6	9.6	6	23.0
1800	576.0	576.0	3456.0	3456.0	6	9.6	6	19.5
2150	448.0	448.0	1728.0	1728.0	6	8.7	6	20.5
2150	448.0	448.0	2304.0	2304.0	6	8.7	6	18.0
2150	448.0	448.0	2560.0	2560.0	6	8.7	6	17.0
2150	448.0	448.0	3456.0	3456.0	6	8.7	6	13.5
2150	384.0	384.0	4032.0	4032.0	6	10.7	6	10.5
2550	288.0	288.0	1184.0	1184.0	6	9.3	6	16.0
2550	224.0	224.0	2304.0	2304.0	6	11.3	6	10.0
2550	288.0	288.0	864.0	864.0	6	9.2	6	18.5
2600	224.0	224.0	2016.0	2016.0	6	10.5	6	10.5
2650	224.0	224.0	1728.0	1728.0	6	9.8	6	11.0
2800	160.0	160.0	1184.0	1184.0	6	9.8	6	11.5
2800	160.0	160.0	864.0	864.0	6	9.7	6	13.0
2900	96.0	96.0	448.0	448.0	6	10.0	6	13.5

Test is passed according U-R2v61

Table 177 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	9.5	3	8.5
1900	576.0	576.0	6016.0	6016.0	3	8.5	3	7.5
2000	576.0	576.0	2560.0	2560.0	3	7.1	3	20.0
2000	576.0	576.0	3456.0	3456.0	3	7.1	3	16.5
2300	448.0	448.0	1728.0	1728.0	3	7.0	3	18.0
2300	448.0	448.0	2304.0	2304.0	3	7.0	3	15.0
2300	448.0	448.0	2560.0	2560.0	3	6.8	3	14.0
2300	448.0	448.0	3456.0	3456.0	3	6.7	3	10.5
2300	384.0	384.0	4032.0	4032.0	3	8.8	3	7.5
2650	288.0	288.0	1184.0	1184.0	3	7.1	3	14.0
2650	224.0	224.0	2304.0	2304.0	3	8.8	3	8.5
2650	288.0	288.0	864.0	864.0	3	7.0	3	16.0
2700	224.0	224.0	2016.0	2016.0	3	9.2	3	8.5
2750	224.0	224.0	1728.0	1728.0	3	8.5	3	9.5
2900	160.0	160.0	1184.0	1184.0	3	8.3	3	9.5
2900	160.0	160.0	864.0	864.0	3	8.3	3	11.5
3000	96.0	96.0	448.0	448.0	3	9.0	3	11.5

Test is passed according U-R2v61

#### 4.4 LUCENT ANYMEDIA LPA417

The DSLAM system, which the CPE system was tested against, is described in the table below

Table 178 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Lucent AnyMedia
FW Version	LPA417p1.023 (1.29.00.0)
Line Card Type, Version	LPA417
Industry Standards Supported	G.992.1
Chip set	GSPN

##### 4.4.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

Table 179 Test Parameters

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

##### 4.4.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 180 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	11.0	6	9.0
1600	576.0	576.0	6016.0	6016.0	6	11.0	6	10.0
1700	576.0	576.0	2560.0	2560.0	6	10.0	6	23.0
1700	576.0	576.0	3456.0	3456.0	6	10.0	6	19.0
2050	448.0	448.0	1728.0	1728.0	6	8.0	6	21.0
2050	448.0	448.0	2304.0	2304.0	6	8.0	6	19.0
2050	448.0	448.0	2560.0	2560.0	6	8.0	6	17.0
2050	448.0	448.0	3456.0	3456.0	6	8.0	6	14.0
2050	384.0	384.0	4032.0	4032.0	6	10.0	6	11.0
2450	288.0	288.0	1184.0	1184.0	6	8.0	6	17.0
2450	224.0	224.0	2304.0	2304.0	6	10.0	6	11.0
2450	288.0	288.0	864.0	864.0	6	8.0	6	18.0
2500	224.0	224.0	2016.0	2016.0	6	9.0	6	11.0
2550	224.0	224.0	1728.0	1728.0	6	9.0	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	9.0	6	12.0
2700	160.0	160.0	864.0	864.0	6	9.0	6	13.0
2800	96.0	96.0	448.0	448.0	6	10.0	6	13.0

Test is passed according U-R2v61

**Table 181 Fixed Rate Fast 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	8.0	3	7.0
1800	576.0	576.0	6016.0	6016.0	3	7.0	3	7.0
1900	576.0	576.0	2560.0	2560.0	3	6.0	3	20.0
1900	576.0	576.0	3456.0	3456.0	3	6.0	3	16.0
2200	448.0	448.0	1728.0	1728.0	3	6.0	3	18.0
2200	448.0	448.0	2304.0	2304.0	3	6.0	3	16.0
2200	448.0	448.0	2560.0	2560.0	3	6.0	3	15.0
2200	448.0	448.0	3456.0	3456.0	3	6.0	3	11.0
2200	384.0	384.0	4032.0	4032.0	3	7.0	3	9.0

Table 181 Fixed Rate Fast 3 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2550	288.0	288.0	1184.0	1184.0	3	6.0	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	8.0	3	9.0
2550	288.0	288.0	864.0	864.0	3	6.0	3	16.0
2600	224.0	224.0	2016.0	2016.0	3	7.0	3	9.0
2650	224.0	224.0	1728.0	1728.0	3	6.0	3	9.0
2800	160.0	160.0	1184.0	1184.0	3	6.0	3	9.0
2800	160.0	160.0	864.0	864.0	3	6.0	3	11.0
2900	96.0	96.0	448.0	448.0	3	7.0	3	12.0

Test is passed according U-R2v61

Table 182 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	13.0	6	9.0
1700	576.0	576.0	6016.0	6016.0	6	12.0	6	9.0
1800	576.0	576.0	2560.0	2560.0	6	11.0	6	23.0
1800	576.0	576.0	3456.0	3456.0	6	11.0	6	19.0
2150	448.0	448.0	1728.0	1728.0	6	10.0	6	21.0
2150	448.0	448.0	2304.0	2304.0	6	10.0	6	18.0
2150	448.0	448.0	2560.0	2560.0	6	10.0	6	17.0
2150	448.0	448.0	3456.0	3456.0	6	10.0	6	13.0
2150	384.0	384.0	4032.0	4032.0	6	11.0	6	10.0
2550	288.0	288.0	1184.0	1184.0	6	9.0	6	16.0
2550	224.0	224.0	2304.0	2304.0	6	11.0	6	10.0
2550	288.0	288.0	864.0	864.0	6	9.0	6	18.0
2600	224.0	224.0	2016.0	2016.0	6	11.0	6	11.0
2650	224.0	224.0	1728.0	1728.0	6	10.0	6	11.0
2800	160.0	160.0	1184.0	1184.0	6	10.0	6	11.0
2800	160.0	160.0	864.0	864.0	6	10.0	6	13.0
2900	96.0	96.0	448.0	448.0	6	8.0	6	15.0

Test is passed according U-R2v61

Table 183 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	9.0	3	7.0
1900	576.0	576.0	6016.0	6016.0	3	8.0	3	6.0
2000	576.0	576.0	2560.0	2560.0	3	7.0	3	20.0
2000	576.0	576.0	3456.0	3456.0	3	7.0	3	16.0



**Table 183 Fixed Rate Interleaved 3 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2300	448.0	448.0	1728.0	1728.0	3	6.0	3	18.0
2300	448.0	448.0	2304.0	2304.0	3	7.0	3	15.0
2300	448.0	448.0	2560.0	2560.0	3	7.0	3	14.0
2300	448.0	448.0	3456.0	3456.0	3	7.0	3	11.0
2300	384.0	384.0	4032.0	4032.0	3	8.0	3	7.0
2650	288.0	288.0	1184.0	1184.0	3	6.0	3	14.0
2650	224.0	224.0	2304.0	2304.0	3	8.0	3	8.0
2650	288.0	288.0	864.0	864.0	3	6.0	3	16.0
2700	224.0	224.0	2016.0	2016.0	3	8.0	3	9.0
2750	224.0	224.0	1728.0	1728.0	3	7.0	3	9.0
2900	160.0	160.0	1184.0	1184.0	3	7.0	3	10.0
2900	160.0	160.0	864.0	864.0	3	7.0	3	12.0
3000	96.0	96.0	448.0	448.0	3	5.0	3	12.0

Test is passed according U-R2v61

## 4.5 SIEMENS HiX5300 SUADSL:64:IX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 184 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens HiX5300
FW Version	3.18.0a.46 (V.1.2.2.112_ur2)
Line Card Type, Version	SUADSL:64:IX
Industry Standards Supported	G.992.1
Chip set	IFX Geminax.BIS

### 4.5.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 185 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

#### 4.5.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 186 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	12.0	6	9.5
1600	576.0	576.0	6016.0	6016.0	6	11.0	6	10.5
1700	576.0	576.0	2560.0	2560.0	6	10.0	6	23.5
1700	576.0	576.0	3456.0	3456.0	6	10.0	6	19.5
2050	448.0	448.0	1728.0	1728.0	6	9.0	6	22.5
2050	448.0	448.0	2304.0	2304.0	6	9.0	6	19.5
2050	448.0	448.0	2560.0	2560.0	6	9.5	6	18.0
2050	448.0	448.0	3456.0	3456.0	6	9.5	6	14.0
2050	384.0	384.0	4032.0	4032.0	6	11.0	6	12.0
2450	288.0	288.0	1184.0	1184.0	6	8.0	6	17.5
2450	224.0	224.0	2304.0	2304.0	6	10.5	6	11.5
2450	288.0	288.0	864.0	864.0	6	8.5	6	19.0
2500	224.0	224.0	2016.0	2016.0	6	10.0	6	12.0
2550	224.0	224.0	1728.0	1728.0	6	9.5	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	9.5	6	12.0
2700	160.0	160.0	864.0	864.0	6	9.0	6	14.0
2800	96.0	96.0	448.0	448.0	6	10.0	6	14.5

Test is passed according U-R2v61

**Table 187 Fixed Rate Fast 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	9.0	3	8.0
1800	576.0	576.0	6016.0	6016.0	3	9.0	3	8.0
1900	576.0	576.0	2560.0	2560.0	3	7.5	3	20.5
1900	576.0	576.0	3456.0	3456.0	3	7.5	3	17.0
2200	448.0	448.0	1728.0	1728.0	3	7.5	3	19.5
2200	448.0	448.0	2304.0	2304.0	3	7.5	3	16.5
2200	448.0	448.0	2560.0	2560.0	3	7.5	3	15.5
2200	448.0	448.0	3456.0	3456.0	3	7.5	3	11.5
2200	384.0	384.0	4032.0	4032.0	3	9.0	3	9.0
2550	288.0	288.0	1184.0	1184.0	3	7.0	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	9.0	3	9.0
2550	288.0	288.0	864.0	864.0	3	7.5	3	17.0

Table 187 Fixed Rate Fast 3 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2600	224.0	224.0	2016.0	2016.0	3	8.5	3	10.0
2650	224.0	224.0	1728.0	1728.0	3	7.5	3	10.0
2800	160.0	160.0	1184.0	1184.0	3	8.0	3	9.5
2800	160.0	160.0	864.0	864.0	3	8.0	3	11.5
2900	96.0	96.0	448.0	448.0	3	9.0	3	11.5

Test is passed according U-R2v61

Table 188 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	12.0	6	9.5
1700	576.0	576.0	6016.0	6016.0	6	11.0	6	10.0
1800	576.0	576.0	2560.0	2560.0	6	9.5	6	23.5
1800	576.0	576.0	3456.0	3456.0	6	9.5	6	19.5
2150	448.0	448.0	1728.0	1728.0	6	9.0	6	22.0
2150	448.0	448.0	2304.0	2304.0	6	8.5	6	18.5
2150	448.0	448.0	2560.0	2560.0	6	8.5	6	17.5
2150	448.0	448.0	3456.0	3456.0	6	8.5	6	14.0
2150	384.0	384.0	4032.0	4032.0	6	11.0	6	10.5
2550	288.0	288.0	1184.0	1184.0	6	8.5	6	17.5
2550	224.0	224.0	2304.0	2304.0	6	10.0	6	11.0
2550	288.0	288.0	864.0	864.0	6	8.5	6	19.0
2600	224.0	224.0	2016.0	2016.0	6	9.5	6	11.0
2650	224.0	224.0	1728.0	1728.0	6	8.5	6	12.0
2800	160.0	160.0	1184.0	1184.0	6	9.0	6	12.0
2800	160.0	160.0	864.0	864.0	6	9.0	6	14.0
2900	96.0	96.0	448.0	448.0	6	10.0	6	14.0

Test is passed according U-R2v61

Table 189 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	9.5	3	8.0
1900	576.0	576.0	6016.0	6016.0	3	8.5	3	7.0
2000	576.0	576.0	2560.0	2560.0	3	7.0	3	20.5
2000	576.0	576.0	3456.0	3456.0	3	7.0	3	16.5
2300	448.0	448.0	1728.0	1728.0	3	7.0	3	19.0
2300	448.0	448.0	2304.0	2304.0	3	7.0	3	16.0
2300	448.0	448.0	2560.0	2560.0	3	7.0	3	15.0

**Table 189 Fixed Rate Interleaved 3 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2300	448.0	448.0	3456.0	3456.0	3	7.0	3	11.0
2300	384.0	384.0	4032.0	4032.0	3	9.0	3	7.5
2650	288.0	288.0	1184.0	1184.0	3	7.5	3	15.0
2650	224.0	224.0	2304.0	2304.0	3	8.5	3	9.0
2650	288.0	288.0	864.0	864.0	3	7.5	3	17.0
2700	224.0	224.0	2016.0	2016.0	3	8.5	3	9.0
2750	224.0	224.0	1728.0	1728.0	3	7.5	3	10.0
2900	160.0	160.0	1184.0	1184.0	3	8.0	3	9.5
2900	160.0	160.0	864.0	864.0	3	8.0	3	11.5
3000	96.0	96.0	448.0	448.0	3	8.5	3	12.0

Test is passed according U-R2v61

## 4.6 SIEMENS XPRESSLINK V2.1 SUADSL:32I

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 190 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens XpressLink
FW Version	3.76.5a (CAPS 1.0.3.3)
Line Card Type, Version	SUADSL:32I
Industry Standards Supported	G.992.1
Chip set	TI AC5

### 4.6.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 191 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

##### 4.6.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

Table 192 Fixed Rate Fast 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	9.0	6	11.0
1600	576.0	576.0	6016.0	6016.0	6	8.0	6	11.0
1700	576.0	576.0	2560.0	2560.0	6	8.0	6	24.0
1700	576.0	576.0	3456.0	3456.0	6	8.0	6	20.0
2050	448.0	448.0	1728.0	1728.0	6	6.0	6	23.0
2050	448.0	448.0	2304.0	2304.0	6	6.0	6	20.0
2050	448.0	448.0	2560.0	2560.0	6	7.0	6	18.0
2050	448.0	448.0	3456.0	3456.0	6	6.0	6	15.0
2050	384.0	384.0	4032.0	4032.0	6	8.0	6	13.0
2450	288.0	288.0	1184.0	1184.0	6	7.0	6	17.0
2450	224.0	224.0	2304.0	2304.0	6	9.0	6	12.0
2450	288.0	288.0	864.0	864.0	6	7.0	6	18.0
2500	224.0	224.0	2016.0	2016.0	6	8.0	6	12.0
2550	224.0	224.0	1728.0	1728.0	6	7.0	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	7.0	6	12.0
2700	160.0	160.0	864.0	864.0	6	7.0	6	14.0
2800	96.0	96.0	448.0	448.0	6	8.0	6	15.0

Test is passed according U-R2v61

Table 193 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	6.0	3	9.0
1800	576.0	576.0	6016.0	6016.0	3	5.0	3	9.0
1900	576.0	576.0	2560.0	2560.0	3	4.0	3	21.0
1900	576.0	576.0	3456.0	3456.0	3	4.0	3	18.0
2200	448.0	448.0	1728.0	1728.0	3	4.0	3	20.0
2200	448.0	448.0	2304.0	2304.0	3	4.0	3	17.0
2200	448.0	448.0	2560.0	2560.0	3	4.0	3	16.0
2200	448.0	448.0	3456.0	3456.0	3	4.0	3	12.0
2200	384.0	384.0	4032.0	4032.0	3	6.0	3	10.0
2550	288.0	288.0	1184.0	1184.0	3	4.0	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	6.0	3	10.0
2550	288.0	288.0	864.0	864.0	3	4.0	3	17.0
2600	224.0	224.0	2016.0	2016.0	3	6.0	3	10.0
2650	224.0	224.0	1728.0	1728.0	3	5.0	3	10.0
2800	160.0	160.0	1184.0	1184.0	3	5.0	3	11.0
2800	160.0	160.0	864.0	864.0	3	5.0	3	12.0
2900	96.0	96.0	448.0	448.0	3	6.0	3	13.0

Test is passed according U-R2v61

**Table 194 Fixed Rate Interleaved 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	9.0	6	11.0
1700	576.0	576.0	6016.0	6016.0	6	8.0	6	11.0
1800	576.0	576.0	2560.0	2560.0	6	7.0	6	24.0
1800	576.0	576.0	3456.0	3456.0	6	7.0	6	20.0
2150	448.0	448.0	1728.0	1728.0	6	7.0	6	22.0
2150	448.0	448.0	2304.0	2304.0	6	6.0	6	19.0
2150	448.0	448.0	2560.0	2560.0	6	6.0	6	18.0
2150	448.0	448.0	3456.0	3456.0	6	7.0	6	14.0
2150	384.0	384.0	4032.0	4032.0	6	8.0	6	12.0
2550	288.0	288.0	1184.0	1184.0	6	6.0	6	17.0
2550	224.0	224.0	2304.0	2304.0	6	8.0	6	12.0
2550	288.0	288.0	864.0	864.0	6	6.0	6	18.0
2600	224.0	224.0	2016.0	2016.0	6	8.0	6	12.0
2650	224.0	224.0	1728.0	1728.0	6	7.0	6	12.0
2800	160.0	160.0	1184.0	1184.0	6	7.0	6	12.0
2800	160.0	160.0	864.0	864.0	6	7.0	6	15.0
2900	96.0	96.0	448.0	448.0	6	8.0	6	15.0

Test is passed according U-R2v61

**Table 195 Fixed Rate Interleaved 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	5.0	3	9.0
1900	576.0	576.0	6016.0	6016.0	3	4.0	3	8.0
2000	576.0	576.0	2560.0	2560.0	3	3.0	3	21.0
2000	576.0	576.0	3456.0	3456.0	3	3.0	3	17.0
2300	448.0	448.0	1728.0	1728.0	3	3.0	3	19.0
2300	448.0	448.0	2304.0	2304.0	3	3.0	3	17.0
2300	448.0	448.0	2560.0	2560.0	3	3.0	3	16.0
2300	448.0	448.0	3456.0	3456.0	3	3.0	3	12.0
2300	384.0	384.0	4032.0	4032.0	3	5.0	3	9.0
2650	288.0	288.0	1184.0	1184.0	3	4.0	3	15.0
2650	224.0	224.0	2304.0	2304.0	3	6.0	3	10.0
2650	288.0	288.0	864.0	864.0	3	4.0	3	17.0
2700	224.0	224.0	2016.0	2016.0	3	5.0	3	10.0
2750	224.0	224.0	1728.0	1728.0	3	4.0	3	11.0
2900	160.0	160.0	1184.0	1184.0	3	5.0	3	10.0

**Table 195 Fixed Rate Interleaved 3 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	160.0	160.0	864.0	864.0	3	4.0	3	12.0
3000	96.0	96.0	448.0	448.0	3	6.0	3	13.0

Test is passed according U-R2v61

## 4.7 SIEMENS XPRESSLINK V2.1 SUADSL:16I

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 196 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Siemens XpressLink
FW Version	4.46 (CAPS 1.0.3.3)
Line Card Type, Version	SUADSL:16I
Industry Standards Supported	G.992.1
Chip set	TI 4100C

### 4.7.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 197 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

##### 4.7.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 198 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	9.0	6	8.0
1600	576.0	576.0	6016.0	6016.0	6	9.0	6	9.0
1700	576.0	576.0	2560.0	2560.0	6	9.0	6	22.0
1700	576.0	576.0	3456.0	3456.0	6	8.0	6	18.0

Table 198 Fixed Rate Fast 6 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2050	448.0	448.0	1728.0	1728.0	6	8.0	6	20.0
2050	448.0	448.0	2304.0	2304.0	6	8.0	6	18.0
2050	448.0	448.0	2560.0	2560.0	6	8.0	6	17.0
2050	448.0	448.0	3456.0	3456.0	6	8.0	6	13.0
2050	384.0	384.0	4032.0	4032.0	6	10.0	6	11.0
2450	288.0	288.0	1184.0	1184.0	6	7.0	6	16.0
2450	224.0	224.0	2304.0	2304.0	6	9.0	6	10.0
2450	288.0	288.0	864.0	864.0	6	8.0	6	18.0
2500	224.0	224.0	2016.0	2016.0	6	8.0	6	11.0
2550	224.0	224.0	1728.0	1728.0	6	8.0	6	11.0
2700	160.0	160.0	1184.0	1184.0	6	8.0	6	11.0
2700	160.0	160.0	864.0	864.0	6	8.0	6	12.0
2800	96.0	96.0	448.0	448.0	6	9.0	6	13.0

Test is passed according U-R2v61

Table 199 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	7.0	3	7.0
1800	576.0	576.0	6016.0	6016.0	3	8.0	3	7.0
1900	576.0	576.0	2560.0	2560.0	3	6.0	3	19.0
1900	576.0	576.0	3456.0	3456.0	3	6.0	3	16.0
2200	448.0	448.0	1728.0	1728.0	3	7.0	3	18.0
2200	448.0	448.0	2304.0	2304.0	3	6.0	3	15.0
2200	448.0	448.0	2560.0	2560.0	3	6.0	3	14.0
2200	448.0	448.0	3456.0	3456.0	3	6.0	3	10.0
2200	384.0	384.0	4032.0	4032.0	3	8.0	3	8.0
2550	288.0	288.0	1184.0	1184.0	3	6.0	3	14.0
2550	224.0	224.0	2304.0	2304.0	3	8.0	3	8.0
2550	288.0	288.0	864.0	864.0	3	6.0	3	16.0
2600	224.0	224.0	2016.0	2016.0	3	7.0	3	8.0
2650	224.0	224.0	1728.0	1728.0	3	6.0	3	9.0
2800	160.0	160.0	1184.0	1184.0	3	7.0	3	9.0
2800	160.0	160.0	864.0	864.0	3	7.0	3	10.0
2900	96.0	96.0	448.0	448.0	3	7.0	3	11.0

Test is passed according U-R2v61



Table 200 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	9.0	6	10.0
1700	576.0	576.0	6016.0	6016.0	6	9.0	6	10.0
1800	576.0	576.0	2560.0	2560.0	6	8.0	6	24.0
1800	576.0	576.0	3456.0	3456.0	6	8.0	6	20.0
2150	448.0	448.0	1728.0	1728.0	6	8.0	6	22.0
2150	448.0	448.0	2304.0	2304.0	6	7.0	6	19.0
2150	448.0	448.0	2560.0	2560.0	6	8.0	6	18.0
2150	448.0	448.0	3456.0	3456.0	6	7.0	6	14.0
2150	384.0	384.0	4032.0	4032.0	6	9.0	6	11.0
2550	288.0	288.0	1184.0	1184.0	6	7.0	6	18.0
2550	224.0	224.0	2304.0	2304.0	6	9.0	6	12.0
2550	288.0	288.0	864.0	864.0	6	7.0	6	20.0
2600	224.0	224.0	2016.0	2016.0	6	8.0	6	12.0
2650	224.0	224.0	1728.0	1728.0	6	7.0	6	12.0
2800	160.0	160.0	1184.0	1184.0	6	6.0	6	12.0
2800	160.0	160.0	864.0	864.0	6	7.0	6	14.0
2900	96.0	96.0	448.0	448.0	6	8.0	6	14.0

Test is passed according U-R2v61

Table 201 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	8.0	3	8.0
1900	576.0	576.0	6016.0	6016.0	3	7.0	3	7.0
2000	576.0	576.0	2560.0	2560.0	3	6.0	3	21.0
2000	576.0	576.0	3456.0	3456.0	3	6.0	3	17.0
2300	448.0	448.0	1728.0	1728.0	3	6.0	3	19.0
2300	448.0	448.0	2304.0	2304.0	3	6.0	3	16.0
2300	448.0	448.0	2560.0	2560.0	3	6.0	3	15.0
2300	448.0	448.0	3456.0	3456.0	3	6.0	3	11.0
2300	384.0	384.0	4032.0	4032.0	3	7.0	3	9.0
2650	288.0	288.0	1184.0	1184.0	3	6.0	3	15.0
2650	224.0	224.0	2304.0	2304.0	3	7.0	3	9.0
2650	288.0	288.0	864.0	864.0	3	6.0	3	17.0
2700	224.0	224.0	2016.0	2016.0	3	6.0	3	10.0
2750	224.0	224.0	1728.0	1728.0	3	6.0	3	10.0
2900	160.0	160.0	1184.0	1184.0	3	5.0	3	10.0
2900	160.0	160.0	864.0	864.0	3	5.0	3	12.0
3000	96.0	96.0	448.0	448.0	3	6.0	3	12.0

Test is passed according U-R2v61

## 4.8 ECI ATUC32

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 202 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	ECI HiFocus
FW Version	404bea60 (A3_8.10.05)
Line Card Type, Version	ATUC32
Industry Standards Supported	G992.1
Chip set	ADI Anaconda

### 4.8.1 Performance for ADSL according to U-R2 V7.0

The test were performed using the parameters in the table below:

**Table 203 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 4.8.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 204 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2800	96.0	96.0	448.0	448.0	6	9	6	13
2700	160.0	160.0	864.0	864.0	6	9	6	13
2450	288.0	288.0	864.0	864.0	6	9	6	18
2700	160.0	160.0	1184.0	1184.0	6	9	6	12
2450	288.0	288.0	1184.0	1184.0	6	8	6	17
2550	224.0	224.0	1728.0	1728.0	6	9	6	12
2050	448.0	448.0	1728.0	1728.0	6	9	6	22
2450	224.0	224.0	2304.0	2304.0	6	10	6	12
2050	448.0	448.0	2304.0	2304.0	6	9	6	19
2050	448.0	448.0	2560.0	2560.0	6	9	6	18

Table 204 Fixed Rate Fast 6 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1700	576.0	576.0	2560.0	2560.0	6	10	6	23
2050	448.0	448.0	3456.0	3456.0	6	9	6	14
1700	576.0	576.0	3456.0	3456.0	6	9	6	20
1400	640.0	640.0	6656.0	6656.0	6	10	6	9

The test is passed according to UR2v7

Table 205 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	3	8	3	13
2800	160.0	160.0	864.0	864.0	3	7	3	12
2550	288.0	288.0	864.0	864.0	3	7	3	16
2800	160.0	160.0	1184.0	1184.0	3	7	3	9
2550	288.0	288.0	1184.0	1184.0	3	7	3	15
2650	224.0	224.0	1728.0	1728.0	3	7	3	10
2200	448.0	448.0	1728.0	1728.0	3	7	3	19
2550	224.0	224.0	2304.0	2304.0	3	8	3	10
2200	448.0	448.0	2304.0	2304.0	3	7	3	16
2200	448.0	448.0	2560.0	2560.0	3	7	3	15
1900	576.0	576.0	2560.0	2560.0	3	7	3	21
2200	448.0	448.0	3456.0	3456.0	3	7	3	12
1900	576.0	576.0	3456.0	3456.0	3	7	3	17
1600	640.0	640.0	6656.0	6656.0	3	9	3	7

The test is passed according to UR2v7

Table 206 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	6	9	6	15
2800	160.0	160.0	864.0	864.0	6	9	6	14
2550	288.0	288.0	864.0	864.0	6	9	6	19
2800	160.0	160.0	1184.0	1184.0	6	9	6	12
2550	288.0	288.0	1184.0	1184.0	6	8	6	17
2650	224.0	224.0	1728.0	1728.0	6	9	6	12
2150	448.0	448.0	1728.0	1728.0	6	9	6	22
2550	224.0	224.0	2304.0	2304.0	6	10	6	11
2150	448.0	448.0	2304.0	2304.0	6	9	6	18
2150	448.0	448.0	2560.0	2560.0	6	9	6	18
1800	576.0	576.0	2560.0	2560.0	6	10	6	24

**Table 206 Fixed Rate Interleaved 6 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2150	448.0	448.0	3456.0	3456.0	6	9	6	14
1800	576.0	576.0	3456.0	3456.0	6	9	6	20
1450	640.0	640.0	6656.0	6656.0	6	10	6	9

The test is passed according to UR2v7.

**Table 207 Fixed Rate Interleaved 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
3000	96.0	96.0	448.0	448.0	3	7	3	12
2900	160.0	160.0	864.0	864.0	3	8	3	12
2650	288.0	288.0	864.0	864.0	3	8	3	17
2900	160.0	160.0	1184.0	1184.0	3	7	3	10
2650	288.0	288.0	1184.0	1184.0	3	8	3	15
2750	224.0	224.0	1728.0	1728.0	3	8	3	10
2300	448.0	448.0	1728.0	1728.0	3	6	3	19
2650	224.0	224.0	2304.0	2304.0	3	9	3	9
2300	448.0	448.0	2304.0	2304.0	3	6	3	15
2300	448.0	448.0	2560.0	2560.0	3	6	3	15
2000	576.0	576.0	2560.0	2560.0	3	7	3	21
2300	448.0	448.0	3456.0	3456.0	3	6	3	11
2000	576.0	576.0	3456.0	3456.0	3	7	3	17
1650	640.0	640.0	6656.0	6656.0	3	9	3	7

The test is passed according to UR2v7

## 4.9 ECI ATUC16

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 208 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	ECI HiFocus
FW Version	31edbe02 (A2_8.10.03)
Line Card Type, Version	ATUC16
Industry Standards Supported	G992.1
Chip set	ADI 930

### 4.9.1 Performance for ADSL according to U-R2 V7.0

The test were performed using the parameters in the table below:

**Table 209 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

### 4.9.1.1 Tests with Fixed Rate Configuration

#### European Noise FB impairment

**Table 210 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2800	96.0	96.0	448.0	448.0	6	9	6	14
2700	160.0	160.0	864.0	864.0	6	9	6	12
2450	288.0	288.0	864.0	864.0	6	8	6	18
2700	160.0	160.0	1184.0	1184.0	6	8	6	10
2450	288.0	288.0	1184.0	1184.0	6	9	6	15
2550	224.0	224.0	1728.0	1728.0	6	9	6	10
2050	448.0	448.0	1728.0	1728.0	6	9	6	21
2450	224.0	224.0	2304.0	2304.0	6	10	6	9
2050	448.0	448.0	2304.0	2304.0	6	9	6	17
2050	448.0	448.0	2560.0	2560.0	6	9	6	16
1700	576.0	576.0	2560.0	2560.0	6	10	6	22
2050	448.0	448.0	3456.0	3456.0	6	9	6	12
1700	576.0	576.0	3456.0	3456.0	6	10	6	18
1400	640.0	640.0	6656.0	6656.0	6	11	6	8

The test is passed according to UR2v7

**Table 211 Fixed Rate Fast 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	3	7	3	12
2800	160.0	160.0	864.0	864.0	3	7	3	11
2550	288.0	288.0	864.0	864.0	3	7	3	15
2800	160.0	160.0	1184.0	1184.0	3	7	3	9
2550	288.0	288.0	1184.0	1184.0	3	7	3	13
2650	224.0	224.0	1728.0	1728.0	3	7	3	8
2200	448.0	448.0	1728.0	1728.0	3	7	3	17

Table 211 Fixed Rate Fast 3 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2550	224.0	224.0	2304.0	2304.0	3	9	3	8
2200	448.0	448.0	2304.0	2304.0	3	7	3	15
2200	448.0	448.0	2560.0	2560.0	3	7	3	13
1900	576.0	576.0	2560.0	2560.0	3	7	3	19
2200	448.0	448.0	3456.0	3456.0	3	7	3	10
1900	576.0	576.0	3456.0	3456.0	3	7	3	15
1600	640.0	640.0	6656.0	6656.0	3	9	3	6

The test is passed according to UR2v7

Table 212 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	96.0	96.0	448.0	448.0	6	9	6	14
2800	160.0	160.0	864.0	864.0	6	9	6	12
2550	288.0	288.0	864.0	864.0	6	9	6	18
2800	160.0	160.0	1184.0	1184.0	6	9	6	10
2550	288.0	288.0	1184.0	1184.0	6	9	6	15
2650	224.0	224.0	1728.0	1728.0	6	9	6	10
2150	448.0	448.0	1728.0	1728.0	6	8	6	21
2550	224.0	224.0	2304.0	2304.0	6	11	6	9
2150	448.0	448.0	2304.0	2304.0	6	8	6	17
2150	448.0	448.0	2560.0	2560.0	6	8	6	16
1800	576.0	576.0	2560.0	2560.0	6	10	6	22
2150	448.0	448.0	3456.0	3456.0	6	8	6	12
1800	576.0	576.0	3456.0	3456.0	6	10	6	18
1450	640.0	640.0	6656.0	6656.0	6	12	6	8

The test is passed according to UR2v7

Table 213 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
3000	96.0	0	448.0	0	3	0	3	0
2900	160.0	160.0	864.0	864.0	3	7	3	11
2650	288.0	288.0	864.0	864.0	3	8	3	16
2900	160.0	160.0	1184.0	1184.0	3	8	3	9
2650	288.0	288.0	1184.0	1184.0	3	8	3	14
2750	224.0	224.0	1728.0	1728.0	3	8	3	8
2300	448.0	448.0	1728.0	1728.0	3	7	3	18
2650	224.0	224.0	2304.0	2304.0	3	9	3	7

**Table 213 Fixed Rate Interleaved 3 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2300	448.0	448.0	2304.0	2304.0	3	7	3	14
2300	448.0	448.0	2560.0	2560.0	3	7	3	13
2000	576.0	576.0	2560.0	2560.0	3	7	3	19
2300	448.0	448.0	3456.0	3456.0	3	6	3	9
2000	576.0	576.0	3456.0	3456.0	3	7	3	15
1650	640.0	640.0	6656.0	6656.0	3	9	3	6

The test is failed according to UR2v7

#### 4.10 ERICSSON EDN312XI

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 214 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Ericsson
FW Version	CXC132 8112 R1B13 (2.3R2A)
Line Card Type, Version	EDN312xi
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

##### 4.10.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 215 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

##### 1. Tests with Fixed Rate Configuration

##### 4.10.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

Table 216 Fixed Rate Fast 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	12.1	6	9.5
1600	576.0	576.0	6016.0	6016.0	6	11.4	6	10.0
1700	576.0	576.0	2560.0	2560.0	6	10.3	6	23.0
1700	576.0	576.0	3456.0	3456.0	6	10.1	6	19.5
2050	448.0	448.0	1728.0	1728.0	6	9.4	6	21.0
2050	448.0	448.0	2304.0	2304.0	6	9.3	6	18.5
2050	448.0	448.0	2560.0	2560.0	6	9.4	6	17.5
2050	448.0	448.0	3456.0	3456.0	6	9.3	6	14.0
2050	384.0	384.0	4032.0	4032.0	6	11.0	6	11.5
2450	288.0	288.0	1184.0	1184.0	6	9.0	6	17.5
2450	224.0	224.0	2304.0	2304.0	6	10.7	6	11.0
2450	288.0	288.0	864.0	864.0	6	9.0	6	18.5
2500	224.0	224.0	2016.0	2016.0	6	10.1	6	11.0
2550	224.0	224.0	1728.0	1728.0	6	9.4	6	12.0
2700	160.0	160.0	1184.0	1184.0	6	9.6	6	12.0
2700	160.0	160.0	864.0	864.0	6	9.5	6	13.0
2800	96.0	96.0	448.0	448.0	6	9.5	6	14.0

Test is passed according U-R2v61

Table 217 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	9.5	3	7.5
1800	576.0	576.0	6016.0	6016.0	3	8.8	3	8.0
1900	576.0	576.0	2560.0	2560.0	3	7.7	3	20.0
1900	576.0	576.0	3456.0	3456.0	3	7.6	3	16.5
2200	448.0	448.0	1728.0	1728.0	3	7.3	3	18.0
2200	448.0	448.0	2304.0	2304.0	3	7.4	3	15.5
2200	448.0	448.0	2560.0	2560.0	3	7.5	3	14.5
2200	448.0	448.0	3456.0	3456.0	3	7.4	3	11.0
2200	384.0	384.0	4032.0	4032.0	3	9.2	3	8.5
2550	288.0	288.0	1184.0	1184.0	3	7.7	3	15.0
2550	224.0	224.0	2304.0	2304.0	3	9.4	3	9.0
2550	288.0	288.0	864.0	864.0	3	7.7	3	16.5
2600	224.0	224.0	2016.0	2016.0	3	8.7	3	9.0
2650	224.0	224.0	1728.0	1728.0	3	8.1	3	9.5
2800	160.0	160.0	1184.0	1184.0	3	8.0	3	9.5
2800	160.0	160.0	864.0	864.0	3	8.1	3	11.0
2900	96.0	96.0	448.0	448.0	3	8.1	3	11.5



Test is passed according U-R2v61

**Table 218 Fixed Rate Interleaved 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	11.3	6	9.0
1700	576.0	576.0	6016.0	6016.0	6	10.2	6	9.0
1800	576.0	576.0	2560.0	2560.0	6	8.8	6	21.5
1800	576.0	576.0	3456.0	3456.0	6	9.0	6	18.0
2150	448.0	448.0	1728.0	1728.0	6	8.0	6	19.5
2150	448.0	448.0	2304.0	2304.0	6	8.1	6	16.5
2150	448.0	448.0	2560.0	2560.0	6	8.1	6	15.5
2150	448.0	448.0	3456.0	3456.0	6	8.1	6	12.0
2150	384.0	384.0	4032.0	4032.0	6	9.7	6	9.5
2550	288.0	288.0	1184.0	1184.0	6	7.7	6	15.0
2550	224.0	224.0	2304.0	2304.0	6	9.5	6	9.0
2550	288.0	288.0	864.0	864.0	6	7.6	6	17.0
2600	224.0	224.0	2016.0	2016.0	6	8.8	6	9.0
2650	224.0	224.0	1728.0	1728.0	6	8.1	6	9.5
2800	160.0	160.0	1184.0	1184.0	6	8.0	6	9.0
2800	160.0	160.0	864.0	864.0	6	8.1	6	11.5
2900	96.0	96.0	448.0	448.0	6	8.1	6	12.0

Test is passed according U-R2v61

**Table 219 Fixed Rate Interleaved 3 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	8.8	3	7.0
1900	576.0	576.0	6016.0	6016.0	3	7.6	3	6.0
2000	576.0	576.0	2560.0	2560.0	3	6.3	3	18.5
2000	576.0	576.0	3456.0	3456.0	3	6.3	3	15.0
2300	448.0	448.0	1728.0	1728.0	3	6.2	3	17.0
2300	448.0	448.0	2304.0	2304.0	3	6.1	3	13.5
2300	448.0	448.0	2560.0	2560.0	3	6.2	3	12.5
2300	448.0	448.0	3456.0	3456.0	3	6.2	3	9.0
2300	384.0	384.0	4032.0	4032.0	3	7.9	3	6.5
2650	288.0	288.0	1184.0	1184.0	3	6.5	3	13.0
2650	224.0	224.0	2304.0	2304.0	3	8.0	3	7.0
2650	288.0	288.0	864.0	864.0	3	6.5	3	14.5
2700	224.0	224.0	2016.0	2016.0	3	7.4	3	7.0
2750	224.0	224.0	1728.0	1728.0	3	6.8	3	8.0
2900	160.0	160.0	1184.0	1184.0	3	6.8	3	8.0

**Table 219 Fixed Rate Interleaved 3 dB (cont'd)**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2900	160.0	160.0	864.0	864.0	3	6.9	3	9.0
3000	96.0	96.0	448.0	448.0	3	6.5	3	9.5

Test is passed according U-R2v61

## 4.11 MARCONI AXH600 IX60

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 220 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Marconi AXH600
FW Version	014105 (5.52)
Line Card Type, Version	ix60
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Centillium

### 4.11.1 Performance for ADSL according to U-R2 V6.1

The test were performed using the parameters in the table below:

**Table 221 Test Parameters**

Simulated Loop	ETSI loop # 1 according to ETSI TS 101 388; loop length see the result tables below.
Simulated Noise	ETSI noise model B according to ETSI ETR 328 simultaneously injected at ATU-R and ATU-C-
ISDN Disturbances	Active

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 1. Tests with Fixed Rate Configuration

##### 4.11.1.1 Tests with Fixed Rate Configuration

##### European Noise FB impairment

**Table 222 Fixed Rate Fast 6 dB**

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1400	640.0	640.0	6656.0	6656.0	6	11.3	6	8.0
1600	576.0	576.0	6016.0	6016.0	6	10.3	6	8.0
1700	576.0	576.0	2560.0	2560.0	6	9.3	6	22.0
1700	576.0	576.0	3456.0	3456.0	6	9.5	6	18.0

Table 222 Fixed Rate Fast 6 dB (cont'd)

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
2050	448.0	448.0	1728.0	1728.0	6	9.0	6	20.5
2050	448.0	448.0	2304.0	2304.0	6	8.7	6	17.5
2050	448.0	448.0	2560.0	2560.0	6	8.7	6	16.5
2050	448.0	448.0	3456.0	3456.0	6	8.8	6	13.0
2050	384.0	384.0	4032.0	4032.0	6	10.6	6	10.5
2450	288.0	288.0	1184.0	1184.0	6	9.2	6	15.5
2450	224.0	224.0	2304.0	2304.0	6	11.3	6	9.0
2450	288.0	288.0	864.0	864.0	6	9.1	6	17.5
2500	224.0	224.0	2016.0	2016.0	6	10.8	6	10.5
2550	224.0	224.0	1728.0	1728.0	6	10.0	6	10.5
2700	160.0	160.0	1184.0	1184.0	6	10.2	6	10.5
2700	160.0	160.0	864.0	864.0	6	10.2	6	12.0
2800	96.0	96.0	448.0	448.0	6	10.8	6	12.0

Test is passed according U-R2v61

Table 223 Fixed Rate Fast 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1600	640.0	640.0	6656.0	6656.0	3	9.0	3	6.5
1800	576.0	576.0	6016.0	6016.0	3	8.2	3	6.5
1900	576.0	576.0	2560.0	2560.0	3	7.1	3	19.0
1900	576.0	576.0	3456.0	3456.0	3	6.8	3	15.5
2200	448.0	448.0	1728.0	1728.0	3	6.8	3	17.5
2200	448.0	448.0	2304.0	2304.0	3	6.7	3	15.0
2200	448.0	448.0	2560.0	2560.0	3	6.7	3	14.0
2200	448.0	448.0	3456.0	3456.0	3	6.7	3	10.0
2200	384.0	384.0	4032.0	4032.0	3	8.7	3	8.0
2550	288.0	288.0	1184.0	1184.0	3	7.0	3	14.0
2550	224.0	224.0	2304.0	2304.0	3	9.0	3	8.0
2550	288.0	288.0	864.0	864.0	3	6.8	3	15.0
2600	224.0	224.0	2016.0	2016.0	3	8.5	3	8.5
2650	224.0	224.0	1728.0	1728.0	3	8.6	3	8.5
2800	160.0	160.0	1184.0	1184.0	3	8.7	3	8.5
2800	160.0	160.0	864.0	864.0	3	8.6	3	9.5
2900	96.0	96.0	448.0	448.0	3	9.5	3	11.5

Test is passed according U-R2v61

Table 224 Fixed Rate Interleaved 6 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1450	640.0	640.0	6656.0	6656.0	6	11.7	6	8.5
1700	576.0	576.0	6016.0	6016.0	6	10.5	6	8.5
1800	576.0	576.0	2560.0	2560.0	6	9.5	6	22.5
1800	576.0	576.0	3456.0	3456.0	6	9.6	6	19.0
2150	448.0	448.0	1728.0	1728.0	6	8.5	6	21.0
2150	448.0	448.0	2304.0	2304.0	6	8.7	6	17.5
2150	448.0	448.0	2560.0	2560.0	6	8.7	6	16.5
2150	448.0	448.0	3456.0	3456.0	6	8.7	6	13.0
2150	384.0	384.0	4032.0	4032.0	6	11.3	6	10.0
2550	288.0	288.0	1184.0	1184.0	6	9.2	6	16.0
2550	224.0	224.0	2304.0	2304.0	6	10.7	6	10.0
2550	288.0	288.0	864.0	864.0	6	9.1	6	18.0
2600	224.0	224.0	2016.0	2016.0	6	10.0	6	10.5
2650	224.0	224.0	1728.0	1728.0	6	10.5	6	11.0
2800	160.0	160.0	1184.0	1184.0	6	11.1	6	10.5
2800	160.0	160.0	864.0	864.0	6	11.0	6	12.5
2900	96.0	96.0	448.0	448.0	6	11.7	6	14.0

Test is passed according U-R2v61

Table 225 Fixed Rate Interleaved 3 dB

Loop [m]	US Rate		DS Rate		US Margin		DS Margin	
	Req	Act	Req	Act	Req	Act	Req	Act
1650	640.0	640.0	6656.0	6656.0	3	9.5	3	6.5
1900	576.0	576.0	6016.0	6016.0	3	8.5	3	6.0
2000	576.0	576.0	2560.0	2560.0	3	7.3	3	19.0
2000	576.0	576.0	3456.0	3456.0	3	7.3	3	15.5
2300	448.0	448.0	1728.0	1728.0	3	6.7	3	18.0
2300	448.0	448.0	2304.0	2304.0	3	6.7	3	15.0
2300	448.0	448.0	2560.0	2560.0	3	6.7	3	14.0
2300	448.0	448.0	3456.0	3456.0	3	6.7	3	10.0
2300	384.0	384.0	4032.0	4032.0	3	9.6	3	6.5
2650	288.0	288.0	1184.0	1184.0	3	8.0	3	13.5
2650	224.0	224.0	2304.0	2304.0	3	9.5	3	8.0
2650	288.0	288.0	864.0	864.0	3	7.8	3	15.5
2700	224.0	224.0	2016.0	2016.0	3	8.7	3	8.5
2750	224.0	224.0	1728.0	1728.0	3	8.8	3	9.0
2900	160.0	160.0	1184.0	1184.0	3	9.5	3	9.5
2900	160.0	160.0	864.0	864.0	3	9.5	3	11.5
3000	96.0	96.0	448.0	448.0	3	9.8	3	12.0

Test is passed according U-R2v61

## 5 TR-100 Annex B Performance Test Results

### 5.1 INFINEON GEMINAX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 226 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.1B.04.00.28
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5, TS 101 388
Chip set	GEMINAX-D MAX v1.3

The following sub-chapters describe the conducted performance tests and the results which were obtained.

#### 5.1.1 ADSL2 Tests

##### 5.1.1.1 CPE Margin Verification

**Table 227 CPE Margin Verification Test (Annex B.2.1)**

CPE\CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS\US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	750	7544	7901.32	7901.32	5.9	4.8	5	0	0.0E+00	1.5E-07
CPE	2750	1856	2368.00	2368.00	6.1	1.3	40	0	0.0E+00	1.5E-07

The test is passed according to TR-100.

##### 5.1.1.2 Stresstest

**Table 228 Stresstest (chapter 7.3)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS\US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
2500	6565	6565	6.0	1.7	480	12	0.01E-07	1.5E-07

The test is passed according to TR-100.

### 5.1.1.3 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

**Table 229 White Noise Impairment, testprofile B2\_RA\_F\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1445.21	6.8	10000.0	10689.51	7.7
500	1096.0	1501.28	7.7	10000.0	10873.33	9.4
1000	1096.0	1501.28	6.6	10000.0	10645.55	8.8
1500	1096.0	1389.15	6.1	10000.0	10673.53	8.3
2000	1048.0	1329.11	6.8	8656.0	10245.95	6.0
2500	960.0	1185.23	7.1	6560.0	8177.3	6.2
3000	744.0	965.16	6.3	4064.0	5701.3	6.1
3500	544.0	716.97	6.7	2200.0	3341.26	6.2
4000	344.0	456.86	6.5	720.0	1861.24	6.3

The test is passed according to TR-100.

#### White Noise Impairment in Interleaved Mode

**Table 230 White Noise Impairment, testprofile B2\_RA\_I\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	946.92	25.3	7608.0	9852.21	8.8
500	888.0	946.92	20.6	7608.0	9852.21	9.4
1000	888.0	946.92	26.2	7608.0	9852.21	11.0
1500	888.0	946.92	23.2	7608.0	9848.55	9.9
2000	888.0	946.92	18.5	7608.0	9641.81	6.6
2500	888.0	946.92	13.7	6872.0	8042.26	6.2
3000	776.0	946.92	7.6	4584.0	5764.15	6.2
3500	584.0	736.32	6.6	2536.0	3529.45	6.3
4000	384.0	487.38	6.9	1000.0	2000.0	6.3

The test is passed according to TR-100.

#### Noise FB Impairment in Fast Mode

Table 231 Noise FB Impairment, testprofile B2\_RA\_F\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	1024.0	1249.23	6.1	6470.0	7969.32	5.9
750	960.0	1145.3	6.0	7551.0	7909.31	5.9
1250	800.0	929.2	6.0	7251.0	7681.32	5.9
1750	600.0	701.21	6.1	5963.0	6573.29	6.0
2250	392.0	477.16	6.0	3786.0	4461.28	6.0
2750	176.0	256.83	6.1	1532.0	2005.33	6.3
3000	64.0	156.8	6.1	400.0	1001.12	6.2

The test is failed according to TR-100.

#### Noise FB Impairment in Interleaved Mode

Table 232 Noise FB Impairment, testprofile B2\_RA\_I\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	888.0	946.92	15.8	6434.0	7882.68	5.9
750	888.0	946.92	11.7	7508.0	7827.01	5.9
1250	824.0	946.92	6.3	7334.0	7667.28	5.9
1750	640.0	725.33	6.2	6165.0	6656.56	6.0
2250	432.0	502.86	6.0	4121.0	4640.53	6.0
2750	224.0	287.73	6.0	1861.0	2339.72	6.1
3000	96.0	196.0	6.1	640.0	1271.35	6.2

The test is failed according to TR-100.

#### 5.1.1.4 Loop Tests with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

#### European White Noise, 864 kbps DS, 160 kbps US

Table 233 White noise fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	49.4	38.1	YES	44.0	26.8
500	YES	43.5	40.9	YES	47.4	30.1
1000	YES	47.9	40.0	YES	46.8	29.5
2000	YES	41.5	33.0	YES	40.8	22.5

Table 233 White noise fixed rate profile 864k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
3000	YES	29.9	28.5	YES	28.8	6.3
3900	YES	18.0	13.2			
4000				YES	16.7	7.0

The test is passed according to TR-100.

European White Noise, 3456 kbps DS, 448 kbps US

Table 234 White noise fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	37.2	31.8	YES	35.2	20.1
500	YES	39.6	32.0	YES	38.7	22.9
1000	YES	35.5	32.3	YES	35.8	22.3
2000	YES	31.9	31.1	YES	32.6	15.7
2750	YES	24.0	18.7	YES	24.7	6.3
3150	YES	18.7	11.1			
3200				YES	18.9	6.3

The test is passed according to TR-100.

European White Noise, 7288 kbps DS, 800 kbps US

Table 235 White noise fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	24.6	21.3	YES	33.1	8.9
500	YES	25.9	22.5	YES	30.6	10.8
1000	YES	29.0	19.9	YES	26.8	11.0
2000	YES	21.8	14.9	YES	23.6	6.9
2300	YES	18.8	10.7			
2350				YES	19.3	6.2

The test is passed according to TR-100.



## European FB Noise, 864 kbps DS, 160 kbps US

Table 236 Noise FB Impairment fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	39.3	31.0	YES	39.1	11.9
500	YES	35.7	30.9	YES	36.0	13.0
1000	YES	31.1	30.9	YES	30.9	13.8
2000	YES	19.2	26.4	YES	18.5	6.1
2500	YES	12.6	16.4	YES	12.4	6.4
2750	YES	9.0	11.1			
2850				YES	7.9	6.6

The test is passed according to TR-100.

## European FB Noise, 3456 kbps DS, 448 kbps US

Table 237 Noise FB Impairment fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.9	20.6	YES	30.7	6.0
500	YES	26.8	21.7	YES	27.7	6.2
1000	YES	22.1	23.0	YES	22.9	6.5
1750	YES	12.8	17.4	YES	13.9	6.0
2100	YES	8.6	11.8			
2150				YES	8.7	6.1

The test is passed according to TR-100.

## European FB Noise, 7288 kbps DS, 800 kbps US

Table 238 Noise FB Impairment fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
500	YES	17.0	6.3	YES	18.2	5.9
750	YES	15.1	6.4	YES	15.4	5.9
1000	YES	12.3	6.6	YES	13.1	6.0

Table 238 Noise FB Impairment fixed rate profile 7288k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
1150	YES	10.5	6.3			
1200				YES	10.8	6.0

The test is failed according to TR-100.

## 5.1.2 ADSL2+ Tests

### 5.1.2.1 CPE Margin Verification

Table 239 CPE Margin Verification Test (Annex B.2.1)

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	250	13000	15997.54	15997.54	6.1	3.8	5	0	0.0E+00	1.5E-07
CPE	750	5536	14250.68	14250.68	5.9	2.1	5	0	0.0E+00	1.5E-07
CPE	1750	7640	9279.32	9279.32	6.0	2.3	10	0	0.0E+00	1.5E-07

The test is passed according to TR-100.

### 5.1.2.2 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

Table 240 White Noise Impairment, testprofile B2P\_RA\_F\_30000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1505.25	7.7	24000.0	25614.86	6.2
500	1096.0	1365.33	6.8	24000.0	25222.11	7.4
1000	1096.0	1417.18	6.7	22712.0	23558.76	7.0
1500	1096.0	1433.3	6.3	18112.0	18726.82	6.4
2000	1048.0	1329.11	6.5	12496.0	13209.63	6.1
2500	960.0	1157.19	6.7	7472.0	8968.26	6.1
3000	744.0	945.01	6.8	4000.0	5637.3	6.1
3500	544.0	709.09	7.0	1648.0	3233.29	6.2
4000	344.0	464.67	7.3	504.0	1753.31	6.3

The test is passed according to TR-100.

### White Noise Impairment in Interleaved Mode

**Table 241 White Noise Impairment, testprofile B2P\_RA\_I\_30000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	946.92	25.5	19000.0	20571.27	7.4
500	888.0	946.92	22.9	19000.0	20555.19	8.6
1000	888.0	946.92	24.2	18488.0	19406.55	7.4
1500	888.0	946.92	23.6	16280.0	16438.81	7.2
2000	888.0	946.92	18.8	12328.0	12717.8	6.2
2500	888.0	946.92	13.8	7640.0	8922.79	6.1
3000	776.0	946.92	7.7	4400.0	5749.33	6.2
3500	584.0	732.66	6.9	2000.0	3417.04	6.2
4000	384.0	502.86	7.1	792.0	1909.33	6.4

The test is passed according to TR-100.

### Noise FB Impairment in Fast Mode

**Table 242 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_F\_30000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	1208.0	1365.33	6.1	13000.0	17394.25	5.9
250	1152.0	1281.23	6.0	13000.0	16001.53	5.9
750	1000.0	1109.33	6.2	13000.0	14234.69	5.9
1250	816.0	913.0	6.1	11208.0	12574.13	5.9
1750	600.0	693.33	6.3	7856.0	8924.32	6.1
2500	280.0	360.73	6.2	2760.0	3593.27	6.1
2750	184.0	253.0	6.1	1520.0	2041.31	6.3

The test is failed according to TR-100.

### Noise FB Impairment in Interleaved Mode

**Table 243 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_I\_30000k,**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	888.0	946.92	18.1	13000.0	15757.88	5.9
250	888.0	946.92	15.8	13000.0	14827.04	5.9
750	888.0	946.92	11.5	13000.0	13543.81	5.9
1250	832.0	943.23	6.3	12136.0	12199.79	6.0
1750	640.0	715.23	6.4	9088.0	9243.17	6.1

Table 243 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_I\_30000k, (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
2500	328.0	399.18	6.3	3408.0	3897.36	6.2
3000	128.0	190.99	6.4	1056.0	1267.67	6.2

The test is failed according to TR-100.

### 5.1.2.3 Loop Test with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

European White Noise, 864 kbps DS, 160 kbps US

Table 244 White noise fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	44.6	39.5	YES	48.2	32.1
500	YES	44.2	42.1	YES	43.9	32.7
1000	YES	49.9	40.1	YES	45.6	32.1
2000	YES	42.0	32.4	YES	41.4	25.5
3000	YES	29.7	27.6	YES	29.2	6.4
3700	YES	21.0	15.5			
3800				YES	19.8	9.3

The test is passed according to TR-100.

European White Noise, 3456 kbps DS, 448 kbps US

Table 245 White noise fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	39.6	33.0	YES	35.1	31.5
500	YES	37.4	34.7	YES	38.3	32.4
1000	YES	34.2	31.9	YES	38.1	31.8
2000	YES	32.5	31.1	YES	33.2	19.9
2750	YES	24.0	18.4	YES	24.5	6.2
3000	YES	20.5	13.6			
3100				YES	20.4	6.5

The test is passed according to TR-100.

## European White Noise, 7288 kbps DS, 800 kbps US

Table 246 White noise fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.8	32.0	YES	26.0	23.7
500	YES	31.1	32.7	YES	25.3	25.2
1000	YES	28.0	31.4	YES	31.6	21.7
2000	YES	22.8	19.6	YES	22.8	6.6
2400	YES	17.9	11.9			
2500				YES	17.7	6.5

The test is passed according to TR-100.

## European White Noise, 10000 kbps DS, 832 kbps US

Table 247 White noise fixed rate profile 10000k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	27.7	31.2	YES	26.5	24.8
500	YES	24.9	31.6	YES	30.6	25.8
1000	YES	28.5	29.4	YES	23.3	22.0
1750	YES	24.6	17.2	YES	21.7	8.4
2200	YES	19.7	8.1			
2300				YES	17.1	6.1

The test is passed according to TR-100.

## European FB Noise, 864 kbps DS, 160 kbps US

Table 248 Noise FB impairment fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	38.9	30.9	YES	38.3	23.8
500	YES	35.6	30.9	YES	35.5	21.2
1000	YES	30.7	29.0	YES	30.4	18.3
1750	YES	21.6	26.9	YES	21.8	12.8

**Table 248 Noise FB impairment fixed rate profile 864k (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2500	YES	12.7	16.7	YES	12.3	6.2
2700	YES	9.7	12.3			
2800				YES	8.4	7.3

The test is passed according to TR-100.

**European FB Noise, 3456 kbps DS, 448 kbps US**

**Table 249 Noise FB impairment fixed rate profile 3456k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.4	28.1	YES	29.9	20.5
500	YES	25.6	25.3	YES	27.2	17.7
1000	YES	21.3	22.5	YES	22.4	15.0
1750	YES	12.6	17.9	YES	13.5	8.7
2050	YES	9.0	14.0			
2150				YES	8.7	6.3

The test is passed according to TR-100.

**European FB Noise, 7288 kbps DS, 800 kbps US**

**Table 250 Noise FB impairment fixed rate profile 7288k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	20.2	20.8	YES	20.6	8.2
500	YES	16.8	17.9	YES	17.5	6.1
1000	YES	12.1	15.0	YES	12.4	6.2
1200	YES	9.6	15.0			
1300				YES	8.9	5.9

The test is failed according to TR-100.

**European FB Noise, 10000 kbps DS, 832 kbps US**

Table 251 Noise FB impairment fixed rate profile 10000k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	19.2	15.7	YES	17.8	8.8
500	YES	16.0	12.7	YES	14.1	6.3
750	YES	13.7	11.6	YES	12.3	5.9
1150	YES	9.1	10.2			
1250				YES	6.9	6.0

The test is failed according to TR-100.

## 5.2 INFINEON GMX MAX

The DSLAM system, which the CPE system was tested against, is described in the table below

Table 252 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	IFX
FW Version	07.11.0d.0.8
Line Card Type, Version	Geminax evaluation board
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	GEMINAX-D MAX v1.3

The following sub-chapters describe the conducted performance tests and the results which were obtained.

### 5.2.1 ADSL2 Tests

#### 5.2.1.1 CPE Margin Verification

Table 253 CPE Margin Verification Test (Annex B.2.1)

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	750	7544	8069.31	8069.31	5.9	4.6	5	0	0.0E+00	1.5E-07
CPE	2750	1856	2464.42	2464.42	6.1	1.4	40	0	0.0E+00	1.5E-07

The test is passed according to TR-100.

### 5.2.1.2 Stresstest

**Table 254 Stresstest (chapter 7.3)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
2500	6597	6597	5.9	2.0	480	21	1.7E-09	1.5E-07

The test is passed according to TR-100.

### 5.2.1.3 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

**Table 255 White Noise Impairment, testprofile B2\_RA\_F\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1477.22	7.4	10000.0	10881.32	7.9
500	1096.0	1493.33	6.9	10000.0	10789.41	7.9
1000	1096.0	1485.16	7.5	10000.0	10761.44	9.0
1500	1096.0	1473.25	6.1	10000.0	10657.54	7.5
2000	1048.0	1433.3	5.9	8656.0	10166.02	5.9
2500	960.0	1193.15	6.1	6560.0	8009.31	6.0
3000	744.0	1009.3	5.9	4064.0	5517.29	6.0
3500	544.0	737.16	6.3	2200.0	3221.33	6.2
4000	344.0	505.25	6.5	720.0	1793.26	6.1

The test is passed according to TR-100.

#### White Noise Impairment in Interleaved Mode

**Table 256 White Noise Impairment, testprofile B2\_RA\_I\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	932.75	25.8	7608.0	7667.28	19.2
500	888.0	932.75	25.4	7608.0	7667.28	19.2
1000	888.0	932.75	24.1	7608.0	7667.28	20.7
1500	888.0	932.75	22.8	7608.0	7667.28	19.4
2000	888.0	932.75	19.5	7608.0	7667.28	13.7
2500	888.0	932.75	14.5	6872.0	7667.28	6.6
3000	776.0	932.75	8.3	4584.0	5647.5	6.1



Table 256 White Noise Impairment, testprofile B2\_RA\_I\_16000k (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
3500	584.0	774.55	6.2	2536.0	3388.75	6.1
4000	384.0	522.99	6.3	1000.0	1895.96	6.2

The test is passed according to TR-100.

#### Noise FB Impairment in Fast Mode

Table 257 Noise FB Impairment, testprofile B2\_RA\_F\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	1024.0	1269.33	6.7	6470.0	8057.33	5.9
750	960.0	1125.18	6.3	7551.0	8061.32	5.9
1250	800.0	917.33	6.0	7251.0	7881.31	5.9
1750	600.0	688.89	6.1	5963.0	6729.3	5.9
2250	392.0	460.76	6.0	3786.0	4597.33	6.1
2750	176.0	245.33	6.0	1532.0	2169.31	6.2
3000	64.0	139.33	6.8	400.0	1117.26	6.2

The test is failed according to TR-100.

#### Noise FB Impairment in Interleaved Mode

Table 258 Noise FB Impairment, testprofile B2\_RA\_I\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	888.0	932.75	16.5	6434.0	7667.28	6.0
750	888.0	932.75	11.7	7508.0	7667.28	6.1
1250	824.0	896.4	6.7	7334.0	7667.28	6.0
1750	640.0	702.86	6.3	6165.0	6731.6	5.9
2250	432.0	480.0	6.4	4121.0	4789.33	6.0
2750	224.0	256.0	6.8	1861.0	2460.72	6.1
3000	96.0	173.33	6.4	640.0	1424.0	6.2

The test is failed according to TR-100.

### 5.2.1.4 Loop Tests with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

#### European White Noise, 864 kbps DS, 160 kbps US

Table 259 White noise fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	44.1	38.1	YES	41.4	36.2
500	YES	45.9	39.1	YES	44.6	37.8
1000	YES	46.2	41.1	YES	44.2	38.4
2000	YES	34.4	33.8	YES	34.0	32.6
3000	YES	30.7	27.7	YES	31.7	25.1
3900	YES	20.2	12.5			
4000				YES	19.1	7.6

The test is passed according to TR-100.

#### European White Noise, 3456 kbps DS, 448 kbps US

Table 260 White noise fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	35.1	32.3	YES	37.7	33.7
500	YES	39.2	32.1	YES	41.3	33.2
1000	YES	35.4	32.5	YES	36.6	32.5
2000	YES	32.4	31.4	YES	32.7	30.8
2750	YES	25.4	18.1	YES	26.1	16.8
3150	YES	19.8	10.4			
3200				YES	20.6	8.2

The test is passed according to TR-100.

#### European White Noise, 7288 kbps DS, 800 kbps US

Table 261 White noise fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.2	19.9	YES	26.0	20.3
500	YES	27.6	20.5	YES	28.4	22.3
1000	YES	28.7	22.2	YES	26.1	20.8
2000	YES	24.6	15.1	YES	24.6	15.2

Table 261 White noise fixed rate profile 7288k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2300	YES	20.7	10.0			
2350				YES	21.0	8.9

The test is passed according to TR-100.

#### European FB Noise, 864 kbps DS, 160 kbps US

Table 262 Noise FB Impairment fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.8	31.1	YES	31.9	31.0
500	YES	31.6	31.1	YES	31.8	31.0
1000	YES	31.2	31.1	YES	31.2	31.0
2000	YES	18.9	27.0	YES	18.9	24.4
2500	YES	12.5	17.1	YES	12.0	14.7
2750	YES	9.1	11.6			
2850				YES	8.2	7.5

The test is passed according to TR-100.

#### European FB Noise, 3456 kbps DS, 448 kbps US

Table 263 Noise FB Impairment fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.9	21.4	YES	30.6	20.2
500	YES	26.7	22.3	YES	27.8	21.4
1000	YES	22.0	23.5	YES	22.9	22.1
1750	YES	12.6	17.9	YES	13.6	16.7
2100	YES	8.6	12.3			
2150				YES	8.7	10.1

The test is passed according to TR-100.

## European FB Noise, 7288 kbps DS, 800 kbps US

Table 264 Noise FB Impairment fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
500	YES	17.7	6.7	YES	18.1	6.6
750	YES	15.1	6.8	YES	15.4	6.7
1000	YES	12.5	7.1	YES	13.0	7.0
1150	YES	10.7	6.5			
1200				YES	10.6	6.5

The test is passed according to TR-100.

## 5.2.2 ADSL2+ Tests

### 5.2.2.1 CPE Margin Verification

Table 265 CPE Margin Verification Test (Annex B.2.1)

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	250	13000	16486.76	16486.76	5.9	3.2	5	0	0.0E+00	1.5E-07
CPE	750	5536	14718.37	14718.37	5.9	2.2	5	0	0.0E+00	1.5E-07
CPE	1750	7640	7667.26 <sup>1)</sup>	7667.26	8.2	3.3	10	0	0.0E+00	1.5E-07

1) low rate due to missing extended framing support of CO used

The test is passed according to TR-100.

### 5.2.2.2 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

Table 266 White Noise Impairment, testprofile B2P\_RA\_F\_30000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1413.21	7.9	24000.0	25638.86	6.7
500	1096.0	1505.25	7.4	24000.0	25466.92	8.0
1000	1096.0	1517.16	6.0	22712.0	23682.71	7.1

Table 266 White Noise Impairment, testprofile B2P\_RA\_F\_30000k (cont'd)

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1500	1096.0	1421.15	6.2	18112.0	18986.69	6.4
2000	1048.0	1289.17	6.2	12496.0	13473.42	6.0
2500	960.0	1057.21	6.3	7472.0	8800.48	6.0
3000	744.0	833.18	6.6	4000.0	5329.28	6.1
3500	544.0	609.12	6.1	1648.0	2889.26	6.1
4000	344.0	400.56	5.3	504.0	1397.33	6.3

The test is passed according to TR-100.

#### White Noise Impairment in Interleaved Mode

Table 267 White Noise Impairment, testprofile B2P\_RA\_I\_30000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	932.75	20.1	7640.0	7667.28	32.5
500	888.0	932.75	25.6	7640.0	7667.28	32.9
1000	888.0	932.75	23.9	7640.0	7667.28	31.5
1500	888.0	932.75	20.9	7640.0	7667.28	27.3
2000	888.0	932.75	17.3	7640.0	7667.28	18.3
2500	888.0	932.75	11.7	7640.0	7667.28	7.6
3000	776.0	849.6	6.1	4400.0	5540.27	6.1
3500	584.0	615.6	6.4	2000.0	3072.0	6.2
4000	384.0	408.89	6.3	792.0	1559.39	6.4

The test is passed according to TR-100.

#### Noise FB Impairment in Fast Mode

Table 268 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_F\_30000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	1208.0	1409.24	5.9	13000.0	17710.07	5.9
250	1152.0	1301.33	6.1	13000.0	16574.71	5.9
750	1000.0	1109.33	6.2	13000.0	14702.38	5.9
1250	816.0	905.10	6.2	11208.0	13309.55	5.9
1750	600.0	693.33	6.1	7856.0	9418.76	6.0
2500	280.0	360.73	6.1	2760.0	3717.29	6.1
2750	184.0	245.33	6.3	1520.0	2093.21	6.2

The test is failed according to TR-100.

### Noise FB Impairment in Interleaved Mode

**Table 269 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_I\_30000k,**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	888.0	932.75	19.6	7640.0	7667.28	21.8
250	888.0	932.75	16.4	7640.0	7667.28	19.8
750	888.0	932.75	11.5	7640.0	7667.28	16.7
1250	832.0	920.92	6.4	7640.0	7667.28	14.5
1750	640.0	706.46	6.3	7640.0	7667.28	8.2
2500	328.0	384.0	6.5	3408.0	4047.21	6.1
3000	128.0	173.33	6.6	1056.0	1219.66	6.2

The test is passed according to TR-100.

### 5.2.2.3 Loop Test with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

#### European White Noise, 864 kbps DS, 160 kbps US

**Table 270 White noise fixed rate profile 864k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	43.1	40.8	YES	46.1	39.8
500	YES	45.3	43.8	YES	47.0	42.5
1000	YES	46.6	41.6	YES	47.3	40.2
2000	YES	37.0	32.4	YES	39.0	32.5
3000	YES	27.4	26.1	YES	28.0	23.6
3700	YES	17.9	13.9			
3800				YES	18.8	9.5

The test is passed according to TR-100.

#### European White Noise, 3456 kbps DS, 448 kbps US

Table 271 White noise fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	40.6	34.2	YES	34.0	33.9
500	YES	38.5	35.5	YES	36.5	35.8
1000	YES	38.9	33.1	YES	37.8	32.6
2000	YES	31.3	31.0	YES	29.7	30.6
2750	YES	21.1	17.0	YES	21.7	15.8
3000	YES	18.7	12.1			
3100				YES	17.3	8.9

The test is passed according to TR-100.

#### European White Noise, 7288 kbps DS, 800 kbps US

Table 272 White noise fixed rate profile 7288k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.5	32.1	YES	26.8	32.3
500	YES	28.0	32.7	YES	24.7	33.1
1000	YES	28.5	31.7	YES	26.9	32.2
2000	YES	19.8	19.3	YES	20.6	19.2
2400	YES	16.2	10.8			
2500				YES	15.6	8.6

The test is passed according to TR-100.

#### European White Noise, 10000 kbps DS, 832 kbps US

Table 273 White noise fixed rate profile 10000k

Loop Length	Fast Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.8	31.5
500	YES	27.8	31.6
1000	YES	26.8	29.6
1750	YES	22.4	16.8
2200	YES	17.0	7.4

The test is passed according to TR-100.

#### European FB Noise, 864 kbps DS, 160 kbps US

**Table 274 Noise FB impairment fixed rate profile 864k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.7	31.0	YES	31.9	31.1
500	YES	31.5	31.0	YES	31.3	31.0
1000	YES	30.7	29.7	YES	30.8	28.6
1750	YES	20.5	27.0	YES	21.8	25.0
2500	YES	11.0	16.4	YES	12.1	14.4
2700	YES	10.1	12.1			
2800				YES	9.1	8.0

The test is passed according to TR-100.

#### European FB Noise, 3456 kbps DS, 448 kbps US

**Table 275 Noise FB impairment fixed rate profile 3456k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.4	28.8	YES	30.4	28.1
500	YES	26.3	26.1	YES	27.2	25.3
1000	YES	21.6	23.3	YES	22.4	22.6
1750	YES	12.9	18.1	YES	13.6	17.3
2050	YES	9.0	14.0			
2150				YES	8.8	11.5

The test is passed according to TR-100.

#### European FB Noise, 7288 kbps DS, 800 kbps US



**Table 276 Noise FB impairment fixed rate profile 7288k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	19.7	20.9	YES	19.6	21.6
500	YES	16.9	18.6	YES	17.4	18.6
1000	YES	12.1	15.9	YES	12.3	16.0
1200	YES	10.0	15.5			
1300				YES	9.1	14.6

The test is passed according to TR-100.

### European FB Noise, 10000 kbps DS, 832 kbps US

**Table 277 Noise FB impairment fixed rate profile 10000k**

Loop Length [m]	Fast Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	19.3	16.5
500	YES	16.0	13.8
750	YES	13.6	12.5
1150	YES	9.4	10.1

The test is passed according to TR-100.

## 5.3 ALCATEL ASAM 7300 ABLT-F

The DSLAM system, which the CPE system was tested against, is described in the table below

**Table 278 DSLAM Description**

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Alcatel ASAM7300
FW Version	L7D6AA47.065 (R4.7.0.8.4)
Line Card Type, Version	ABLT_F
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

The following sub-chapters describe the conducted performance tests and the results which were obtained.

### 5.3.1 ADSL2 Tests

#### 5.3.1.1 CPE Margin Verification

**Table 279 CPE Margin Verification Test (Annex B.2.1)**

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	750	7544	8476	8476	5.8	4.6	5	0	0.0E+00	1.5E-07
CPE	2750	1856	2375	2375	6.1	1.3	40	0	0.0E+00	1.5E-07

The test is passed according to TR-100.

#### 5.3.1.2 Stresstest

**Table 280 Stresstest (chapter 7.3)**

Loop Length (m)	DS Rate (kb/s)		DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
	Start	End	Start	End				
2500	6305	6305	6.2	2.5	480	5	4.1E-10	1.5E-07

The test is passed according to TR-100.

#### 5.3.1.3 Loop Tests with Ports Set for Adaptive Rate

##### White Noise Impairment in Fast Mode

**Table 281 White Noise Impairment, testprofile B2\_RA\_F\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1393.0	9.2	10000.0	11009.0	7.2
500	1096.0	1389.0	8.0	10000.0	11133.0	9.5
1000	1096.0	1393.0	9.1	10000.0	11149.0	9.0
1500	1096.0	1373.0	8.0	10000.0	11161.0	8.0
2000	1048.0	1233.0	7.0	8656.0	10553.0	6.1
2500	960.0	1113.0	7.0	6560.0	7845.0	6.1
3000	744.0	916.0	6.7	4064.0	5625.0	6.1
3500	544.0	661.0	6.6	2200.0	3377.0	6.2
4000	344.0	513.0	6.0	720.0	1661.0	6.5

The test is passed according to TR-100.

### White Noise Impairment in Interleaved Mode

**Table 282 White Noise Impairment, testprofile B2\_RA\_I\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	945.0	22.5	7608.0	10089.0	8.5
500	888.0	945.0	23.5	7608.0	10169.0	11.3
1000	888.0	945.0	21.7	7608.0	10195.0	11.0
1500	888.0	945.0	20.3	7608.0	10173.0	9.2
2000	888.0	945.0	17.7	7608.0	9852.0	6.7
2500	888.0	945.0	11.3	6872.0	7424.0	6.6
3000	776.0	920.0	6.7	4584.0	5807.0	6.0
3500	584.0	709.0	6.7	2536.0	3609.0	6.0
4000	384.0	535.0	6.5	1000.0	1939.0	6.5

The test is passed according to TR-100.

### Noise FB Impairment in Fast Mode

**Table 283 Noise FB Impairment, testprofile B2\_RA\_F\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	1024.0	1229.0	6.2	6470.0	8772.0	5.8
750	960.0	1105.0	6.3	7551.0	8520.0	5.8
1250	800.0	925.0	6.0	7251.0	7929.0	5.8
1750	600.0	713.0	6.0	5963.0	6601.0	6.0
2250	392.0	500.0	5.8	3786.0	4413.0	6.0
2750	176.0	276.0	6.0	1532.0	1933.0	6.2
3000	64.0	178.0	5.6	400.0	1101.0	6.1

The test is failed according to TR-100.

### Noise FB Impairment in Interleaved Mode

**Table 284 Noise FB Impairment, testprofile B2\_RA\_I\_16000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	888.0	945.0	15.0	6434.0	8605.0	6.0
750	888.0	945.0	11.5	7508.0	8515.0	5.8
1250	824.0	938.0	6.2	7334.0	7971.0	5.8
1750	640.0	734.0	6.0	6165.0	6821.0	6.0
2250	432.0	531.0	6.0	4121.0	4721.0	6.0

Table 284 Noise FB Impairment, testprofile B2\_RA\_I\_16000k (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
2750	224.0	333.0	6.0	1861.0	2384.0	6.1
3000	96.0	226.0	6.0	640.0	1403.0	6.1

The test is failed according to TR-100.

#### 5.3.1.4 Loop Tests with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

##### European White Noise, 864 kbps DS, 160 kbps US

Table 285 White noise fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	46.2	49.5	YES	46.3	28.3
500	YES	48.7	51.0	YES	45.5	31.1
1000	YES	46.6	51.0	YES	46.5	31.6
2000	YES	40.5	45.0	YES	40.5	24.6
3000	YES	31.0	28.6	YES	30.2	6.5
3900	YES	19.1	14.0			
4000				YES	17.5	7.5

The test is passed according to TR-100.

##### European White Noise, 3456 kbps DS, 448 kbps US

Table 286 White noise fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	36.0	37.5	YES	38.0	22.7
500	YES	36.1	40.3	YES	36.7	26.7
1000	YES	35.8	40.2	YES	36.5	26.0
2000	YES	31.5	32.8	YES	31.0	19.3
2750	YES	24.1	18.8	YES	22.8	6.3
3150	YES	19.5	10.7			
3200				YES	18.1	6.3

The test is passed according to TR-100.

## European White Noise, 7288 kbps DS, 800 kbps US

Table 287 White noise fixed rate profile 7288k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	26.7	21.3	YES	26.3	10.3
500	YES	26.3	23.7	YES	27.0	10.8
1000	YES	27.0	24.2	YES	25.5	11.2
2000	YES	20.3	16.7	YES	21.2	7.2
2300	YES	17.5	11.0			
2350				YES	17.1	6.2

The test is passed according to TR-100.

## European FB Noise, 864 kbps DS, 160 kbps US

Table 288 Noise FB Impairment fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	38.0	32.5	YES	38.7	11.5
500	YES	35.3	36.8	YES	35.5	17.0
1000	YES	29.8	35.5	YES	31.0	15.3
2000	YES	18.0	26.3	YES	18.5	6.0
2500	YES	11.6	15.8	YES	12.0	6.2
2750	YES	7.2	10.6			
2850				YES	7.5	6.2

The test is passed according to TR-100.

## European FB Noise, 3456 kbps DS, 448 kbps US

Table 289 Noise FB Impairment fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.1	20.7	YES	30.0	6.5
500	YES	26.5	25.0	YES	27.5	11.5
1000	YES	22.0	23.5	YES	22.6	10.0

Table 289 Noise FB Impairment fixed rate profile 3456k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
1750	YES	12.5	17.3	YES	13.3	6.0
2100	YES	8.1	11.2			
2150				YES	8.3	6.0

The test is passed according to TR-100.

European FB Noise, 7288 kbps DS, 800 kbps US

Table 290 Noise FB Impairment fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
500	YES	16.5	9.0	YES	16.8	5.8
750	YES	14.2	8.3	YES	14.7	5.8
1000	YES	11.7	7.5	YES	12.2	6.0
1150	YES	9.7	6.8			
1200				YES	9.8	5.8

The test is failed according to TR-100.

## 5.3.2 ADSL2+ Tests

### 5.3.2.1 CPE Margin Verification

Table 291 CPE Margin Verification Test (Annex B.2.1)

CPE CO	Loop Length (m)	DS Rate (kb/s)			DS Mrg		Test Time (min)	DS US CRC	BER Calc.	BER Exp. (<)
		Exp (>=)	Start	End	Start	End				
CPE	250	13000	16538	16538	5.8	3	5	0	0.0E+00	1.5E-07
CPE	750	5536	14686	14686	5.8	2	5	0	0.0E+00	1.5E-07
CPE	1750	7640	9125	9125	6.0	1.7	10	0	0.0E+00	1.5E-07

The test is passed according to TR-100.

### 5.3.2.2 Loop Tests with Ports Set for Adaptive Rate

### White Noise Impairment in Fast Mode

**Table 292 White Noise Impairment, testprofile B2P\_RA\_F\_30000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1381.0	8.0	24000.0	25302.0	6.2
500	1096.0	1385.0	8.5	24000.0	25002.0	7.2
1000	1096.0	1381.0	8.6	22712.0	23566.0	7.1
1500	1096.0	1377.0	7.5	18112.0	18922.0	6.6
2000	1048.0	1313.0	7.5	12496.0	13397.0	6.0
2500	960.0	1133.0	6.5	7472.0	8716.0	6.2
3000	744.0	916.0	6.8	4000.0	5589.0	6.0
3500	544.0	709.0	6.5	1648.0	3373.0	6.2
4000	344.0	520.0	6.3	504.0	1797.0	6.3

The test is passed according to TR-100.

### White Noise Impairment in Interleaved Mode

**Table 293 White Noise Impairment, testprofile B2P\_RA\_I\_30000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	945.0	22.5	19000.0	20571.0	7.3
500	888.0	945.0	23.8	19000.0	20494.0	8.7
1000	888.0	945.0	23.5	18488.0	19500.0	8.3
1500	888.0	945.0	22.0	16280.0	16455.0	7.2
2000	888.0	945.0	18.0	12328.0	12700.0	6.1
2500	888.0	945.0	13.3	7640.0	8657.0	6.1
3000	776.0	945.0	6.8	4400.0	5749.0	6.2
3500	584.0	734.0	6.2	2000.0	3577.0	6.3
4000	384.0	566.0	6.2	792.0	1939.0	6.3

The test is passed according to TR-100.

### Noise FB Impairment in Fast Mode

**Table 294 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_F\_30000k**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	1208.0	1313.0	6.8	13000.0	17913.0	5.8
250	1152.0	1241.0	6.1	13000.0	16526.0	5.8
750	1000.0	1081.0	6.3	13000.0	14622.0	6.0

**Table 294 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_F\_30000k (cont'd)**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1250	816.0	909.0	6.1	11208.0	12785.0	6.0
1750	600.0	709.0	6.1	7856.0	8940.0	6.0
2500	280.0	385.0	6.0	2760.0	3449.0	6.0
2750	184.0	276.0	5.6	1520.0	2017.0	6.2

The test is failed according to TR-100.

#### Noise FB Impairment in Interleaved Mode

**Table 295 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_I\_30000k,**

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	888.0	945.0	17.5	13000.0	16148.0	6.0
250	888.0	945.0	15.0	13000.0	15271.0	6.0
750	888.0	945.0	10.8	13000.0	13876.0	5.8
1250	832.0	934.0	6.1	12136.0	12390.0	6.0
1750	640.0	731.0	6.0	9088.0	9132.0	6.0
2500	328.0	437.0	6.0	3408.0	3797.0	6.0
3000	128.0	223.0	6.0	1056.0	1347.0	6.1

The test is failed according to TR-100.

#### 5.3.2.3 Loop Test with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

#### European White Noise, 864 kbps DS, 160 kbps US

**Table 296 White noise fixed rate profile 864k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	48.5	51.0	YES	48.5	40.0
500	YES	48.7	51.0	YES	47.5	41.0
1000	YES	48.2	51.0	YES	45.6	38.7
2000	YES	42.7	43.6	YES	43.0	25.0
3000	YES	31.5	28.0	YES	30.5	6.5
3700	YES	21.6	17.5			
3800				YES	20.3	7.5



The test is passed according to TR-100.

#### European White Noise, 3456 kbps DS, 448 kbps US

**Table 297 White noise fixed rate profile 3456k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	36.8	44.3	YES	38.6	37.6
500	YES	36.5	45.5	YES	37.1	38.6
1000	YES	35.6	43.6	YES	37.2	36.0
2000	YES	32.3	32.1	YES	32.8	21.0
2750	YES	24.3	18.0	YES	23.1	6.5
3000	YES	21.5	13.7			
3100				YES	19.7	6.7

The test is passed according to TR-100.

#### European White Noise, 7288 kbps DS, 800 kbps US

**Table 298 White noise fixed rate profile 7288k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	26.0	36.6	YES	25.7	29.5
500	YES	27.1	37.7	YES	27.3	30.1
1000	YES	26.0	35.0	YES	26.5	27.0
2000	YES	21.6	19.5	YES	23.0	9.2
2400	YES	17.5	9.5			
2500				YES	16.0	6.2

The test is passed according to TR-100.

#### European White Noise, 10000 kbps DS, 832 kbps US

Table 299 White noise fixed rate profile 10000k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	26.0	32.0	YES	26.7	22.0
500	YES	25.7	32.6	YES	25.3	22.7
1000	YES	26.1	29.7	YES	26.6	19.5
1750	YES	23.0	17.3	YES	22.0	6.8
2200	YES	19.1	7.7			
2300				YES	18.1	6.1

The test is passed according to TR-100.

#### European FB Noise, 864 kbps DS, 160 kbps US

Table 300 Noise FB impairment fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	37.6	34.5	YES	38.1	24.5
500	YES	34.6	32.1	YES	35.1	21.8
1000	YES	29.3	29.5	YES	30.1	19.0
1750	YES	20.5	25.5	YES	21.3	12.0
2500	YES	11.2	15.1	YES	11.8	6.0
2700	YES	8.5	11.0			
2800				YES	7.8	6.2

The test is passed according to TR-100.

#### European FB Noise, 3456 kbps DS, 448 kbps US

Table 301 Noise FB impairment fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.0	28.2	YES	29.5	22.0
500	YES	26.1	26.1	YES	26.7	19.3
1000	YES	21.5	23.2	YES	22.0	16.6
1750	YES	12.6	17.0	YES	13.1	9.2

**Table 301 Noise FB impairment fixed rate profile 3456k (cont'd)**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2050	YES	8.8	13.0			
2150				YES	8.0	6.0

The test is passed according to TR-100.

#### European FB Noise, 7288 kbps DS, 800 kbps US

**Table 302 Noise FB impairment fixed rate profile 7288k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	18.3	21.2	YES	19.3	14.0
500	YES	16.0	18.5	YES	16.2	11.3
1000	YES	11.2	15.7	YES	11.6	8.5
1200	YES	9.0	14.7			
1300				YES	8.1	6.5

The test is passed according to TR-100.

#### European FB Noise, 10000 kbps DS, 832 kbps US

**Table 303 Noise FB impairment fixed rate profile 10000k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	17.6	16.1	YES	18.5	6.6
500	YES	14.1	13.6	YES	15.3	6.0
750	YES	12.6	12.2	YES	13.3	6.0
1150	YES	8.5	9.8			
1250				YES	8.0	6.0

The test is passed according to TR-100.

## 5.4 ERICSSON EDN312XI

The DSLAM system, which the CPE system was tested against, is described in the table below

Table 304 DSLAM Description

Test Item	Result
<b>DSLAM General Information</b>	
Vendor Information (product name and revision)	Ericsson
FW Version	CXC132 8112 R1B13 (2.3R2A)
Line Card Type, Version	EDN312xi
Industry Standards Supported	G.992.1, G.992.3, G.992.5
Chip set	Broadcom

The following sub-chapters describe the conducted performance tests and the results which were obtained.

## 5.4.1 ADSL2 Tests

### 5.4.1.1 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

Table 305 White Noise Impairment, testprofile B2\_RA\_F\_16000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1385.0	7.3	10000.0	11057.0	8.0
500	1096.0	1373.0	7.2	10000.0	11153.0	9.9
1000	1096.0	1345.0	7.1	10000.0	10829.0	9.9
1500	1096.0	1217.0	7.1	10000.0	10437.0	8.1
2000	1048.0	1085.0	6.9	8657.0	9482.0	6.1
2500	960.0	865.0	6.8	6560.0	7185.0	6.2
3000	744.0	673.0	6.6	4064.0	4777.0	6.3
3500	544.0	477.0	6.4	2200.0	2537.0	6.4
4000	344.0	264.0	6.1	720.0	1053.0	6.7

The test is failed according to TR-100.

#### White Noise Impairment in Interleaved Mode

Table 306 White Noise Impairment, testprofile B2\_RA\_I\_16000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	945.0	21.2	7608.0	10144.0	10.0
500	888.0	945.0	21.0	7608.0	10155.0	11.9

Table 306 White Noise Impairment, testprofile B2\_RA\_I\_16000k (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
1000	888.0	945.0	19.4	7608.0	9925.0	11.8
1500	888.0	945.0	15.5	7608.0	9605.0	9.5
2000	888.0	945.0	11.1	7608.0	9014.0	6.1
2500	888.0	897.0	6.5	6872.0	7158.0	6.2
3000	776.0	698.0	6.6	4584.0	4842.0	6.3
3500	584.0	502.0	6.1	2536.0	2730.0	6.4
4000	384.0	312.0	6.7	1000.0	1271.0	6.6

The test is failed according to TR-100.

#### Noise FB Impairment in Fast Mode

Table 307 Noise FB Impairment, testprofile B2\_RA\_F\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	1024.0	1225.0	6.4	6470.0	8640.0	5.9
750	960.0	1105.0	6.2	7551.0	8345.0	5.9
1250	800.0	921.0	6.1	7251.0	7605.0	5.9
1750	600.0	709.0	6.1	5963.0	6409.0	6.0
2250	392.0	500.0	6.0	3786.0	4249.0	6.0
2750	176.0	272.0	6.0	1532.0	1917.0	6.3
3000	64.0	168.0	5.8	400.0	961.0	6.2

The test is failed according to TR-100.

#### Noise FB Impairment in Interleaved Mode

Table 308 Noise FB Impairment, testprofile B2\_RA\_I\_16000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
250	888.0	945.0	15.3	6434.0	8504.0	5.9
750	888.0	945.0	11.4	7508.0	8250.0	5.9
1250	824.0	934.0	6.3	7334.0	7612.0	5.9
1750	640.0	731.0	6.2	6165.0	6436.0	5.9
2250	432.0	531.0	6.1	4121.0	4367.0	6.0
2750	224.0	333.0	6.0	1861.0	2208.0	6.2
3000	96.0	223.0	6.1	640.0	1226.0	6.2

The test is failed according to TR-100.

### 5.4.1.2 Loop Tests with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

European White Noise, 864 kbps DS, 160 kbps US

**Table 309 White noise fixed rate profile 864k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.6	50.7	YES	34.9	29.8
500	YES	32.8	51.1	YES	32.8	32.3
1000	YES	31.8	51.1	YES	32.1	31.8
2000	YES	32.2	45.0	YES	30.9	24.2
3000	YES	20.7	26.9	YES	20.2	6.6
3900	YES	8.4	12.2			
4000				YES	8.1	7.1

The test is passed according to TR-100.

European White Noise, 3456 kbps DS, 448 kbps US

**Table 310 White noise fixed rate profile 3456k**

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.0	38.4	YES	34.8	24.7
500	YES	33.2	40.6	YES	33.0	26.7
1000	YES	29.8	40.3	YES	30.6	26.3
2000	YES	23.4	32.6	YES	24.4	18.3
2750	YES	14.4	18.3	YES	14.2	6.5
3150	YES	9.6	10.3			
3200				YES	9.3	6.6

The test is passed according to TR-100.

European White Noise, 7288 kbps DS, 800 kbps US

Table 311 White noise fixed rate profile 7288k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.6	21.6	YES	24.8	9.9
500	YES	24.4	24.1	YES	25.0	11.5
1000	YES	23.1	24.6	YES	23.0	10.8
2000	YES	12.4	16.4	YES	13.2	6.7
2300	YES	9.6	10.9			
2350				YES	9.7	6.4

The test is passed according to TR-100.

#### European FB Noise, 864 kbps DS, 160 kbps US

Table 312 Noise FB Impairment fixed rate profile 864k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.8	32.1	YES	31.6	11.8
500	YES	31.4	36.3	YES	31.4	15.9
1000	YES	31.4	34.9	YES	31.5	14.4
2000	YES	18.6	26.2	YES	19.5	6.1
2500	YES	11.8	16.2	YES	13.2	6.2
2750	YES	9.1	10.7			
2850				YES	8.5	6.6

The test is passed according to TR-100.

#### European FB Noise, 3456 kbps DS, 448 kbps US

Table 313 Noise FB Impairment fixed rate profile 3456k

Loop Length	Fast Mode			Interleaved Mode		
[m]	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	28.3	20.4	YES	30.2	6.6
500	YES	27.5	24.4	YES	27.8	10.7
1000	YES	22.8	23.0	YES	23.6	9.0
1750	YES	13.6	17.2	YES	14.2	6.6

Table 313 Noise FB Impairment fixed rate profile 3456k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2100	YES	9.3	11.5			
2150				YES	9.2	6.1

The test is passed according to TR-100.

#### European FB Noise, 7288 kbps DS, 800 kbps US

Table 314 Noise FB Impairment fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
500	YES	17.1	8.5	YES	17.7	6.1
750	YES	14.9	7.8	YES	15.5	6.0
1000	YES	12.4	6.9	YES	13.1	5.9
1150	YES	10.7	6.5			
1200				YES	10.8	6.0

The test is failed according to TR-100.

## 5.4.2 ADSL2+ Tests

### 5.4.2.1 Loop Tests with Ports Set for Adaptive Rate

#### White Noise Impairment in Fast Mode

Table 315 White Noise Impairment, testprofile B2P\_RA\_F\_30000k

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	1096.0	1393.0	8.1	24000.0	25786.0	7.4
500	1096.0	1385.0	7.2	24000.0	25714.0	8.6
1000	1096.0	1337.0	7.3	22712.0	23722.0	7.7
1500	1096.0	1229.0	6.5	18112.0	18914.0	6.7
2000	1048.0	1073.0	6.8	12496.0	12578.0	6.3
2500	960.0	909.0	6.6	7472.0	7837.0	6.3
3000	744.0	677.0	6.2	4000.0	4569.0	6.4



Table 315 White Noise Impairment, testprofile B2P\_RA\_F\_30000k (cont'd)

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
3500	544.0	477.0	6.3	1648.0	2361.0	6.3
4000	344.0	260.0	6.3	504.0	1081.0	6.7

The test is failed according to TR-100.

#### White Noise Impairment in Interleaved Mode

Table 316 White Noise Impairment, testprofile B2P\_RA\_I\_30000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
0	888.0	945.0	21.3	19000.0	20571.0	8.8
500	888.0	945.0	21.1	19000.0	20571.0	10.1
1000	888.0	945.0	19.2	18488.0	19665.0	8.5
1500	888.0	945.0	15.7	16280.0	16603.0	7.0
2000	888.0	945.0	10.6	12328.0	12035.0	6.3
2500	888.0	905.0	6.5	7640.0	7942.0	6.2
3000	776.0	698.0	6.6	4400.0	4789.0	6.3
3500	584.0	506.0	6.5	2000.0	2588.0	6.4
4000	384.0	323.0	6.0	792.0	1187.0	6.5

The test is failed according to TR-100.

#### Noise FB Impairment in Fast Mode

Table 317 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_F\_30000k

Loop Length	Upstream			Downstream		
[m]	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	1208.0	1297.0	6.9	13000.0	17925.0	6.0
250	1152.0	1241.0	6.3	13000.0	16646.0	5.9
750	1000.0	1081.0	6.2	13000.0	14622.0	6.0
1250	816.0	913.0	6.1	11208.0	12893.0	6.0
1750	600.0	713.0	6.1	7856.0	8756.0	6.1
2500	280.0	400.0	5.9	2760.0	3325.0	6.1
2750	184.0	281.0	6.0	1520.0	1781.0	6.3

The test is failed according to TR-100.

#### Noise FB Impairment in Interleaved Mode

Table 318 Noise FB ADSL2plus impairment, testprofile B2P\_RA\_I\_30000k,

Loop Length [m]	Upstream			Downstream		
	Rate Req.	Rate Act.	Margin	Rate Req.	Rate Act.	Margin
100	888.0	945.0	17.8	13000.0	16000.0	6.0
250	888.0	945.0	15.2	13000.0	15399.0	5.9
750	888.0	945.0	10.9	13000.0	13883.0	5.9
1250	832.0	931.0	6.2	12136.0	12475.0	6.0
1750	640.0	734.0	6.0	9088.0	9268.0	6.1
2500	328.0	451.0	5.8	3408.0	3652.0	6.1
3000	128.0	226.0	6.0	1056.0	1047.0	6.3

The test is failed according to TR-100.

#### 5.4.2.2 Loop Test with Ports Set for Fixed Rate

White noise at -140 dBm/Hz is applied at both ends of the loop

European White Noise, 864 kbps DS, 160 kbps US

Table 319 White noise fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.8	51.1	YES	34.1	42.1
500	YES	33.1	51.1	YES	33.9	43.7
1000	YES	32.8	51.1	YES	32.2	40.7
2000	YES	32.6	43.5	YES	32.7	25.0
3000	YES	21.3	25.7	YES	21.4	6.6
3700	YES	11.8	14.1			
3800				YES	11.2	6.9

The test is passed according to TR-100.

European White Noise, 3456 kbps DS, 448 kbps US

Table 320 White noise fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	34.1	46.8	YES	34.9	39.8
500	YES	32.5	47.5	YES	33.0	40.3
1000	YES	30.6	45.4	YES	33.5	37.1

Table 320 White noise fixed rate profile 3456k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
2000	YES	24.5	31.7	YES	25.6	20.7
2750	YES	15.9	16.8	YES	15.7	6.4
3000	YES	12.3	12.1			
3100				YES	11.1	6.6

The test is passed according to TR-100.

#### European White Noise, 7288 kbps DS, 800 kbps US

Table 321 White noise fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	25.8	39.0	YES	25.1	31.7
500	YES	24.4	39.9	YES	24.6	32.3
1000	YES	23.7	36.0	YES	23.5	28.4
2000	YES	14.6	19.3	YES	14.4	9.4
2400	YES	9.1	10.9			
2500				YES	8.3	6.5

The test is passed according to TR-100.

#### European White Noise, 10000 kbps DS, 832 kbps US

Table 322 White noise fixed rate profile 10000k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	24.6	33.7	YES	25.5	24.1
500	YES	23.6	34.7	YES	23.8	25.1
1000	YES	22.4	30.6	YES	22.7	20.8
1750	YES	14.5	17.5	YES	15.7	6.8
2200	YES	10.6	7.8			
2300				YES	10.3	6.3

The test is passed according to TR-100.

## European FB Noise, 864 kbps DS, 160 kbps US

Table 323 Noise FB impairment fixed rate profile 864k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	31.6	34.9	YES	31.8	24.9
500	YES	32.6	32.1	YES	31.7	22.0
1000	YES	30.9	29.5	YES	31.3	19.3
1750	YES	21.9	25.3	YES	22.5	12.1
2500	YES	12.6	15.1	YES	13.2	6.2
2700	YES	10.1	10.9			
2800				YES	9.2	6.3

The test is passed according to TR-100.

## European FB Noise, 3456 kbps DS, 448 kbps US

Table 324 Noise FB impairment fixed rate profile 3456k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	29.7	28.9	YES	29.4	22.7
500	YES	26.8	26.4	YES	27.8	19.7
1000	YES	22.5	23.5	YES	23.2	17.0
1750	YES	13.5	16.9	YES	14.3	9.4
2050	YES	9.8	12.8			
2150				YES	9.3	6.2

The test is passed according to TR-100.

## European FB Noise, 7288 kbps DS, 800 kbps US

Table 325 Noise FB impairment fixed rate profile 7288k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	19.5	21.7	YES	20.0	14.5
500	YES	16.8	18.8	YES	17.2	11.6
1000	YES	12.3	16.0	YES	12.7	8.8

Table 325 Noise FB impairment fixed rate profile 7288k (cont'd)

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
1200	YES	9.9	15.0			
1300				YES	9.2	7.0

The test is passed according to TR-100.

#### European FB Noise, 10000 kbps DS, 832 kbps US

Table 326 Noise FB impairment fixed rate profile 10000k

Loop Length [m]	Fast Mode			Interleaved Mode		
	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)	Modem Trained (Y/N)	Upstream Noise Margin (dB)	Dnstream Noise Margin (dB)
0	YES	18.4	16.8	YES	19.2	7.0
500	YES	14.9	13.9	YES	16.4	5.9
750	YES	13.4	12.6	YES	14.3	6.0
1150	YES	9.1	10.2			
1250				YES	9.0	6.0

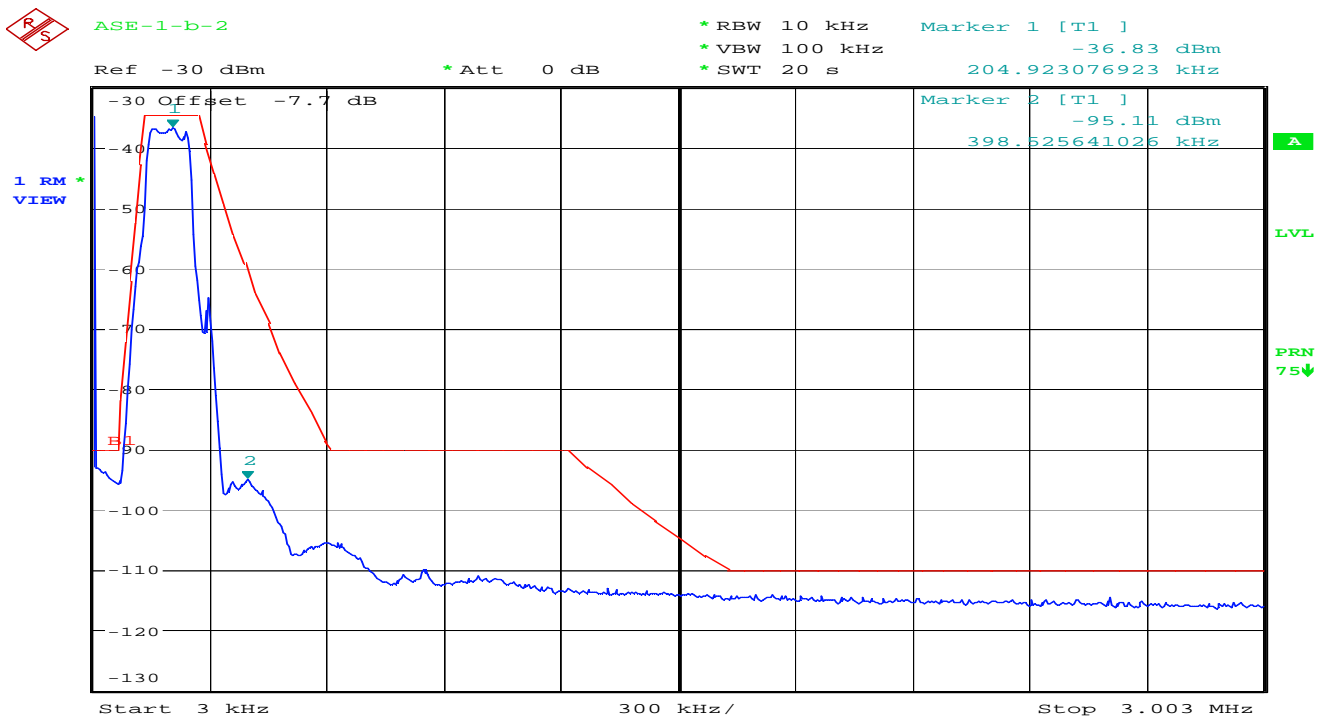
The test is failed according to TR-100.

## 6 Electrical Compatibility Tests

The following sub-chapters describe the results of the electrical compatibility tests against the GEMINAX-MAX evaluation system.

### 6.1 ADSL Test Results

#### 6.1.1 PSD Pass Band



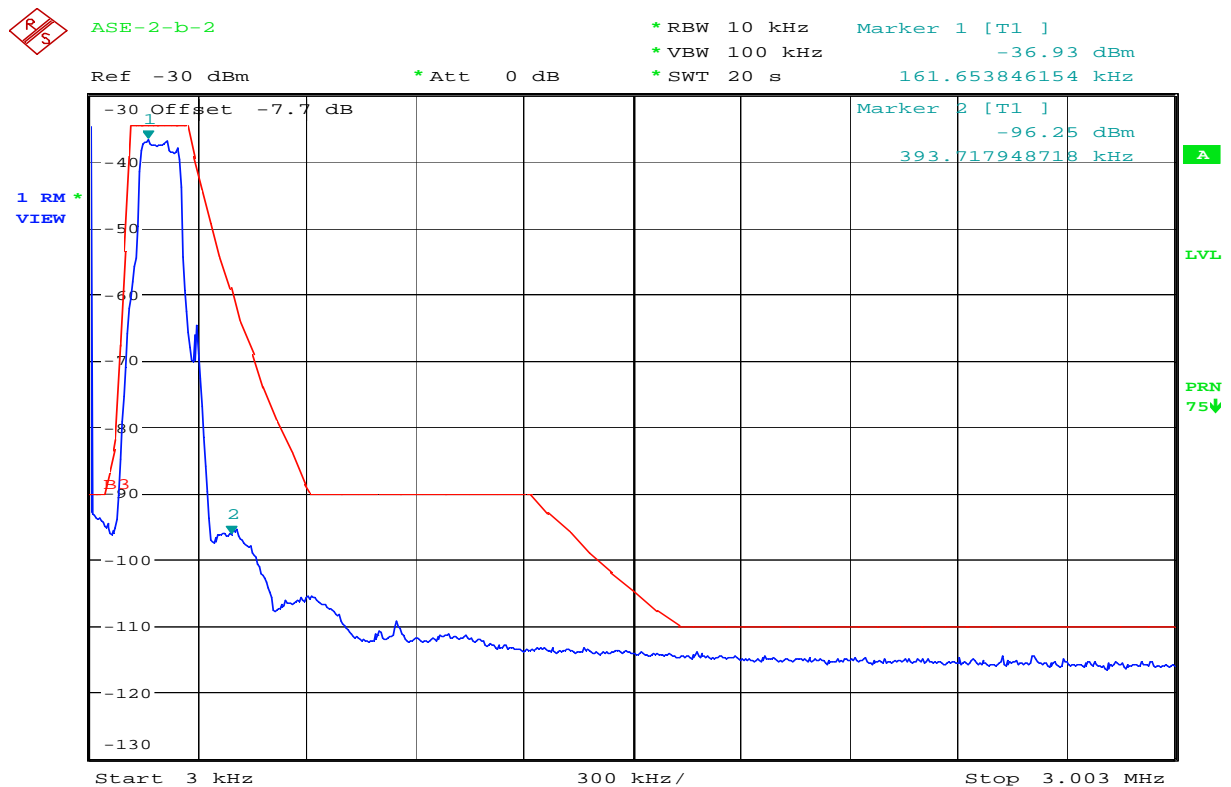
Date: 27.NOV.2007 12:18:20

**Figure 2 PSD Pass Band**

The test is passed.

## 6.2 ADSL2 Test Results

### 6.2.1 PSD Pass Band



Date: 27.NOV.2007 12:09:27

**Figure 3 PSD Pass Band**

The test is passed.

## 6.3 ADSL2+ Test Results

### 6.3.1 PSD Pass Band



Date: 12.NOV.2007 18:33:35

**Figure 4 PSD Pass Band**

The test is passed.



## 7 Annex M

All the following Annex M tests were done against GEMINAX-MAX (FW 7.17.03, fast path) on straight 0.4mm loops with white noise impairment (-140dBm/Hz).

### 7.1 ADSL2

**Table 327 ADSL2 Annex M (Mask 1-3)**

Loop 0.4mm	992.3_M: Mask 1 (EU-32)		992.3_M: Mask 2 (EU-36)		992.3_M: Mask 3 (EU-40)	
	US	DS	US	DS	US	DS
0	1323.88	10928.85	1579.9	10908.87	1784	10868.89
400	1336	10768.96	1551.88	10744.97	1784	10768.96
800	1355.88	10740.98	1579.9	10691.61	1799.93	10683.61
1200	1336	10736.98	1599.96	10756.96	1811.88	10720.99
1600	1395.84	10752.97	1599.96	10756.96	1823.96	10748.97
2000	1391.86	10271.94	1575.92	10279.93	1816	10295.92
2400	1355.88	8835.33	1535.96	8763.4	1735.93	8807.36
2800	1215.95	6899.97	1439.96	6899.97	1631.96	6876
3200	1151.94	4911.96	1291.88	4911.96	1491.85	4903.97
3600	1035.84	3111.96	1167.83	3128	1307.98	3115.95
4000	903.86	2087.94	1011.77	2079.97	1127.89	2079.97
4400	763.96	975.8	871.85	979.77	955.97	975.8
4800	611.84	579.83	671.9	551.76	747.78	248

**Table 328 ADSL2 Annex M (Mask 4-6)**

Loop 0.4mm	992.3_M: Mask 4 (EU-44)		992.3_M: Mask 5 (EU-48)		992.3_M: Mask 6 (EU-52)	
	US	DS	US	DS	US	DS
0	1995.92	10928.85	2227.9	10924.85	2463.97	10924.85
400	2003.89	10772.95	2239.97	10744.97	2479.92	10772.95
800	2011.98	10760.96	2264	10764.96	2471.95	10732.98
1200	2040	10720.99	2235.99	10732.98	2495.97	10699.6
1600	2047.97	10752.97	2264	10756.96	2451.91	10659.63
2000	2059.92	10287.92	2259.9	10279.93	2479.92	10279.93
2400	1947.98	8791.37	2131.89	8815.35	2311.94	8787.38
2800	1816	6872	1979.98	6872	2139.99	6851.99
3200	1631.96	4879.96	1775.89	4903.97	1919.97	4883.95
3600	1427.84	3103.98	1539.94	3103.98	1647.88	3107.97
4000	1219.92	2072	1299.83	2067.89	1383.91	2072
4400	1027.91	963.9	1087.94	963.9	1163.86	971.83
4800	807.84	231.43	831.92	223.71	879.78	159.6

Table 329 ADSL2 Annex M (Mask 7-9)

Loop 0.4mm	992.3_M: Mask 7 (EU-56)		992.3_M: Mask 8 (EU-60)		992.3_M: Mask 9 (EU-64)	
m	US	DS	US	DS	US	DS
0	2699.94	10856.9	2843.99	10908.87	2975.98	10928.85
400	2680	10768.96	2919.96	10764.96	3067.99	10699.6
800	2715.99	10736.98	2923.95	10740.98	3027.93	10756.96
1200	2735.93	10720.99	2943.98	10667.63	3067.99	10720.99
1600	2719.98	10768.96	2951.96	10663.63	3067.99	10712.99
2000	2691.96	10283.93	2872	10255.95	2943.98	10239.96
2400	2503.95	8791.37	2680	8755.41	2763.94	8711.45
2800	2307.96	6840	2443.93	6835.97	2559.97	6819.99
3200	2040	4863.99	2163.9	4851.95	2259.9	4839.97
3600	1747.87	3083.95	1839.89	3071.98	1883.98	3055.94
4000	1464	2051.95	1507.94	2043.98	1543.92	2015.97
4400	1191.89	952	1219.92	947.76	1235.82	895.93
4800	907.82	555.71	907.82	515.81	915.75	487.73

## 7.2 ADSL2+

Table 330 ADSL2+ Annex M (Mask 1-3)

Loop 0.4mm	992.5_M: Mask 1 (EU-32)		992.5_M: Mask 2 (EU-36)		992.5_M: Mask 3 (EU-40)	
m	US	DS	US	DS	US	DS
0	1343.95	25640.82	1563.98	25556.84	1784	25564.84
400	1311.95	25516.85	1539.94	25496.86	1795.95	25508.85
800	1331.83	24668.56	1547.9	24680.55	1811.88	24708.54
1200	1363.83	21884.85	1551.88	21772.88	1803.91	21848.86
1600	1355.88	18076.91	1603.94	18116.89	1807.89	18116.89
2000	1383.91	14200.04	1571.94	14196.04	1835.91	14180.05
2400	1323.88	10511.75	1523.85	10511.75	1720	10511.75
2800	1208	7535.97	1435.98	7535.97	1599.96	7527.98
3200	1135.83	5131.97	1275.98	5131.97	1464	5127.98
3600	1003.84	3291.99	1155.92	3288	1267.82	3279.94
4000	891.96	2239.97	991.94	2239.97	1091.91	2227.9
4400	755.7	1291.88	847.77	1295.85	927.93	1287.9
4800	583.78	667.95	651.75	611.84	719.73	335.4

Table 331 ADSL2+ Annex M (Mask 4-6)

Loop 0.4mm	992.5_M: Mask 4 (EU-44)		992.5_M: Mask 5 (EU-48)		992.5_M: Mask 6 (EU-52)	
m	US	DS	US	DS	US	DS
0	1987.95	25648.81	2219.93	25556.84	2463.97	25556.84
400	2008	25504.85	2232	25532.85	2435.96	25468.86

**Table 331 ADSL2+ Annex M (Mask 4-6) (cont'd)**

Loop 0.4mm	992.5_M: Mask 4 (EU-44)		992.5_M: Mask 5 (EU-48)		992.5_M: Mask 6 (EU-52)	
800	2019.95	24648.56	2259.9	24648.56	2483.91	24528.6
1200	2015.97	21748.89	2243.96	21856.85	2475.94	21688.91
1600	2040	18056.92	2267.99	18152.88	2499.96	18340.8
2000	2031.9	14176.05	2247.94	14172.06	2435.96	14176.05
2400	1935.9	10503.76	2111.97	10507.75	2283.93	10463.79
2800	1775.89	7539.97	1931.92	7512	2099.89	7484
3200	1599.96	5103.96	1739.91	5103.96	1859.95	5083.99
3600	1407.95	3275.95	1511.91	3263.98	1599.96	3275.95
4000	1183.95	2219.93	1272	2215.94	1339.98	2207.97
4400	1003.84	1267.82	1071.82	1267.82	1107.79	1267.82
4800	771.88	319.8	811.8	303.33	824	655.7

**Table 332 ADSL2+ Annex M (Mask 7-9)**

Loop 0.4mm	992.5_M: Mask 7 (EU-56)		992.5_M: Mask 8 (EU-60)		992.5_M: Mask 9 (EU-64)	
m	US	DS	US	DS	US	DS
0	2691.96	25636.82	2879.98	25584.83	3043.97	25560.84
400	2699.94	25452.87	2895.93	25480.86	3067.99	25492.86
800	2719.98	24700.55	2904	24608.57	3035.99	24664.56
1200	2715.99	21668.92	2936	21696.91	3067.99	21788.88
1600	2715.99	18140.88	2947.97	18148.88	3067.99	18172.87
2000	2648	14144.07	2840	14120.09	2943.98	14244.02
2400	2471.95	10491.76	2623.98	10455.79	2763.94	10443.8
2800	2239.97	7471.97	2383.92	7471.97	2483.91	7452
3200	1987.95	5083.99	2083.95	5075.96	2147.96	5063.97
3600	1695.96	3247.94	1767.93	3247.94	1799.93	3243.95
4000	1400	2200	1467.98	2187.93	1487.87	2155.93
4400	1151.94	1255.9	1176	1240	1187.92	1240
4800	867.89	655.7	871.85	643.85	879.78	595.61

## 8 Annex J

All the following Annex J tests were done against GEMINAX-MAX (FW 7.17.03, fast path) on straight 0.4mm loops with white noise impairment (-140dBm/Hz).

### 8.1 ADSL2

**Table 333 ADSL2 Annex M (Mask 1-3)**

Loop 0.4mm	992.3_M: Mask 1 (EU-32)		992.3_M: Mask 2 (EU-36)		992.3_M: Mask 3 (EU-40)	
m	US	DS	US	DS	US	DS
0	1283.93	10732.98	1483.89	10635.65	1803.91	10631.65
400	1247.95	10511.75	1511.91	10599.68	1835.91	10699.6

Table 333 ADSL2 Annex M (Mask 1-3) (cont'd)

Loop 0.4mm	992.3_M: Mask 1 (EU-32)		992.3_M: Mask 2 (EU-36)		992.3_M: Mask 3 (EU-40)	
800	1272	10567.71	1483.89	10527.74	1775.89	10663.63
1200	1255.9	10555.71	1459.84	10615.67	1727.96	10487.77
1600	1219.92	10571.7	1455.87	10519.74	1639.92	10531.73
2000	1163.86	10223.97	1363.83	10243.96	1523.85	10239.96
2400	1055.94	8940.98	1247.95	8915.25	1391.86	8924.99
2800	911.79	7055.97	1095.88	7059.97	1235.82	7047.98
3200	807.84	5095.97	935.86	5112	1019.97	5099.97
3600	664	3263.98	763.96	3239.96	831.92	3247.94
4000	511.88	2211.96	571.94	2207.97	635.95	2203.99
4400	371.36	1331.83	0	0	435.46	1323.88
4800	0	0	0	0	108.27	376

Table 334 ADSL2 Annex M (Mask 4-6)

Loop 0.4mm	992.3_M: Mask 4 (EU-44)		992.3_M: Mask 5 (EU-48)		992.3_M: Mask 6 (EU-52)	
m	US	DS	US	DS	US	DS
0	2031.9	10691.61	2247.94	10740.98	2447.92	10764.96
400	2051.95	10828.92	2291.9	10647.64	2479.92	10744.97
800	2019.95	10635.65	2255.91	10651.64	2483.91	10691.61
1200	1991.94	10551.72	2211.96	10559.71	2399.97	10599.68
1600	1912	10603.68	2127.91	10511.75	2299.99	10551.72
2000	1763.95	10235.97	1939.88	10251.95	2087.94	10251.95
2400	1579.9	8944.98	1755.98	8944.98	1867.91	8940.98
2800	1359.86	7068	1499.98	7039.99	1599.96	7055.97
3200	1131.86	5112	1235.82	5099.97	1291.88	5087.99
3600	915.75	3243.95	963.9	3231.98	1027.91	3231.98
4000	667.95	2207.97	699.95	2200	739.87	2195.9
4400	483.8	1327.85	499.53	1315.93	523.69	1307.98
4800	0	0	323.7	331.5	0	0

Table 335 ADSL2 Annex M (Mask 7-9)

Loop 0.4mm	992.3_M: Mask 7 (EU-56)		992.3_M: Mask 8 (EU-60)		992.3_M: Mask 9 (EU-64)	
m	US	DS	US	DS	US	DS
0	2699.94	10687.61	2895.93	10691.61	2851.97	10695.6
400	2712	10772.95	2847.98	10820.92	2855.96	10611.67
800	2719.98	10539.73	2883.97	10595.68	2919.96	10732.98
1200	2616	10511.75	2811.99	10551.72	2819.97	10615.67
1600	2520	10691.61	2667.94	10511.75	2659.96	10603.68
2000	2287.92	10259.95	2395.99	10211.98	2395.99	10251.95
2400	2027.92	8883.28	2119.94	8887.28	2127.91	8899.27
2800	1675.9	7023.97	1775.89	7015.98	1767.93	7027.97
3200	1383.91	5059.98	1419.89	5059.98	1423.86	5067.97

Table 335 ADSL2 Annex M (Mask 7-9)

Loop 0.4mm	992.3_M: Mask 7 (EU-56)		992.3_M: Mask 8 (EU-60)		992.3_M: Mask 9 (EU-64)	
3600	1055.94	3224	1112	3199.98	1091.91	3195.99
4000	0	0	771.88	2171.99	760	2175.97
4400	531.56	1304	483.8	1304	507.94	1287.9
4800	0	0	0	0	0	0

## 8.2 ADSL2+

Table 336 ADSL2+ Annex M (Mask 1-3)

Loop 0.4mm	992.5_M: Mask 1 (EU-32)		992.5_M: Mask 2 (EU-36)		992.5_M: Mask 3 (EU-40)	
m	US	DS	US	DS	US	DS
0	1279.95	25608.82	1491.85	25540.84	1839.89	25548.84
400	1263.85	25508.85	1507.94	25504.85	1863.93	25488.86
800	1331.83	24680.55	1555.85	24696.55	1843.88	24656.56
1200	1323.88	21844.86	1523.85	21900.84	1695.96	21748.89
1600	1219.92	18020.93	1459.84	18024.93	1691.98	18028.93
2000	1191.89	14072.11	1383.91	14052.12	1571.94	14072.11
2400	1103.82	10379.85	1272	10411.83	1432	10399.84
2800	984	7439.97	1107.79	7452	1247.95	7435.98
3200	824	5055.99	959.93	5035.97	1063.88	5039.96
3600	671.9	3151.94	799.92	3147.95	867.89	3135.98
4000	527.63	2131.89	603.95	2123.92	647.8	2119.94
4400	387.75	1243.97	431.54	1231.84	395.58	1223.89
4800	280	632	315.9	643.85	312	295.56

Table 337 ADSL2+ Annex M (Mask 4-6)

Loop 0.4mm	992.5_M: Mask 4 (EU-44)		992.5_M: Mask 5 (EU-48)		992.5_M: Mask 6 (EU-52)	
m	US	DS	US	DS	US	DS
0	2055.94	25556.84	2287.92	25604.83	2491.99	25492.86
400	2095.91	25480.86	2296	25468.86	2495.97	25496.86
800	2107.98	24664.56	2303.97	24696.55	2527.97	24688.55
1200	2008	21844.86	2267.99	21852.86	2467.96	21868.85
1600	1947.98	17952.96	2159.91	17972.95	2331.99	18120.89
2000	1784	14072.11	1979.98	14044.13	2136	14068.11
2400	1603.94	10375.86	1767.93	10363.87	1915.98	10367.86
2800	1407.95	7431.98	1507.94	7403.98	1607.92	7399.98
3200	1155.92	5035.97	1259.87	5003.97	1336	5011.96
3600	943.79	3139.97	999.87	3143.96	1048	3128
4000	723.68	2111.97	743.83	2115.95	760	2107.98
4400	483.8	1223.89	531.56	1215.95	495.6	1215.95
4800	295.56	263.5	335.4	244.8	0	0

Table 338 ADSL2+ Annex M (Mask 7-9)

Loop 0.4mm	992.5_M: Mask 7 (EU-56)		992.5_M: Mask 8 (EU-60)		992.5_M: Mask 9 (EU-64)	
m	US	DS	US	DS	US	DS
0	2699.94	25652.81	2811.99	25508.85	2855.96	25576.83
400	2727.95	25464.86	2783.98	25476.86	2904	25472.86
800	2755.97	24656.56	2867.92	24668.56	2847.98	24692.55
1200	2680	21824.87	2855.96	21664.92	2819.97	21672.92
1600	2520	18112.89	2683.99	18096.9	2663.95	18080.91
2000	2319.92	14040.13	2443.93	14016.14	2424	14092.1
2400	2027.92	10331.89	2139.99	10355.87	2136	10223.97
2800	1715.87	7352	1787.98	7356	1803.91	7347.97
3200	1363.83	4995.98	1455.87	4967.97	1447.91	4963.98
3600	1075.79	3115.95	1112	3123.93	1091.91	3096
4000	760	2099.89	767.92	2067.89	763.96	2063.91
4400	0	0	479.87	1191.89	523.69	1171.81
4800	0	0	0	0	0	0

## 9 Higher Layer Test Cases according TR67

### 9.1 ATM Connectivity Tests

Test configuration is not specified; any configuration suitable for ATM testing may be used.

**Table 339** illustrates the higher layer test results of Amazon reference board.

**Table 339 Higher Layer Test Results**

Test Item	Test Criteria	Test Result
Loopback at ATU-R (refer to TR-067 9.1.1)	The ATU-R is looped back, BER is less than $10^{-7}$ when using S-PRBS9, or CER is less than $3.84e^{-5}$ if using either O.191 test cells or the RFC 2544 [14] test methodology	Not Supported
Maximum number of VC's (refer to TR-067 9.1.2)	Maximum number of VC's is the same as that published in the ATU-R, or DSLAM documentation, or 16, whichever is less (for a DSLAM, the maximum number of VC's is considered to be the maximum number per port).	Support 15 VC's
Maximum VPI/VCI Range (refer to TR-067 9.1.3)	Capability to choose VPI/VCI falls within the intersection of the published ranges for the DSLAM or and the ATU-R.	Pass VP 255, VC 65535
Default VPI/VCI (refer to TR-067 9.1.4)	Cells must be passed across the circuit using the default VPI/VCI value from the CPE General Information table.	Pass
QoS Support for CBR / UBR Traffic (refer to TR-067 9.1.5)	O.191 or RFC 2544 [14] analysis shall show that only UBR traffic is discarded and that all of the CBR traffic is delivered, if UBR and CBR are implemented.	Pass
QoS Support for rtVBR / UBR Traffic (refer to TR-067 9.1.6)	O.191 or RFC 2544 [14] analysis shall show that all of the cells in the rtVBR data stream are delivered, if rtVBR and UBR are implemented. Additionally, a portion of the UBR data stream shall be delivered.	Pass
QoS Support for nrtVBR / UBR Traffic (refer to TR-067 9.1.7)	O.191 or RFC 2544 [14] analysis shall show that some UBR and some nrtVBR cells are delivered, if nrtVBR and UBR are implemented.	Pass
F5 OAM Support (refer to TR-067 9.1.8)	Confirm that a OAM response cell is received from the network.	Pass

## 9.2 Layer 3 Ethernet RFC 2684 [10] Bridged Mode

Provision the DSLAM with a fixed set of values:

- Margin up and down: 6dB
- Data Path: Fast
- FEC redundancy: Off (if configurable)
- Trellis Coding: enabled
- Bit swapping: enabled
- Payload scrambling: enabled
- Operational Mode: Autodetect (T1.413[4]/G.992.1 [1] Annex A)

### 9.2.1 Packet Throughput Test

The purpose of this test is to verify the throughput for a selected list of provisioned line rates (down/up) using IP Frame transfers of varying length.(refer to TR-067 9.2.1)

**Table 340 Throughput Test Results: Connect Rates DS: 384 kbps US: 128 kbps**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	452	150	452	150	100	100	43	40.6
128	226	75	226	75	100	100	43	40.6
256	150	50	150	50	100	100	43	40.6
512	75	25	75	25	100	100	43	40.6
1024	41	13	41	13	100	100	43	40.6
1280	32	10	32	10	100	100	43	40.6
1518	28	9	28	9	100	100	43	40.6
Test Result		Pass						

**Table 341 Throughput Test Results: Connect Rates DS: 1536 kbps US: 384 kbps**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	1811	452	1811	452	100	100	35.5	32
128	905	226	905	226	100	100	35.5	32
256	603	150	603	150	100	100	35.5	32
512	301	75	301	75	100	100	35.5	32
1024	164	41	164	41	100	100	35.5	32
1280	129	32	129	32	100	100	35.5	32
1518	113	28	113	28	100	100	35.5	32
Test Result		Pass						



**Table 342 Throughput Test Results: Connect Rates DS: 8000 kbps US: 800 kbps**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	9434	943	9434	943	100	100	18	14.5
128	4717	471	4717	471	100	100	18	14.5
256	3144	314	3144	314	100	100	18	14.5
512	1572	157	1572	157	100	100	18	14.5
1024	857	85	857	85	100	100	18	14.5
1280	673	67	673	67	100	100	18	14.5
1518	589	59	589	59	100	100	18	14.5
<b>Test Result</b>		Pass						

## 9.2.2 Packet Latency Tests

The purpose of this test is to measure the round trip time of the given transmission chain.(refer to TR-067 9.2.2)

**Table 343 Latency Test Results with Multiple Frame Sizes**

Packet Size	Round Trip Times in ms		
	Min.	Ave.	Max.
64	15	15	16
128	15	15	16
256	31	31	32
512	47	51	63
1024	94	98	110
1280	125	125	125
1518	156	156	157
<b>Test Result</b>	Pass		

**Table 344 Latency Test Results with Multiple Train Rates**

Packet Size	Round Trip Times in ms		
	Min.	Ave.	Max.
384/128 kbps	125	125	125
1536/384 kbps	32	35	47
MAX DN/MAX UP (8000Kbps/800Kbps)	15	15	16
<b>Test Result</b>	Pass		

## 9.2.3 RFC 2516 [11] PPPoE End-to-End Connectivity Test

PPPoE (Point-to-Point Protocol over Ethernet) is a protocol used by many ADSL Internet Service Providers.(refer to TR-067 9.3)

Table 345 PPPoE

Test Item	Test Criteria	Test Result
PPPoE (refer to TR-067 9.3)	<ul style="list-style-type: none"><li>• Transmitted packets are received.</li><li>• The PPPoE session has been torn down correctly.</li></ul>	Pass

## 9.2.4 RFC 2364 [12] PPPoA End-to-End Connectivity Test

PPPoA (Point-to-Point Protocol Over ATM) using the PPP dial-up protocol with ATM as the transport.(refer to TR-067 9.4)

**Table 346 PPPoA**

Test Item	Test Criteria	Test Result
PPPoA (refer to TR-067 9.4)	<ul style="list-style-type: none"> <li>Transmitted packets are received</li> <li>The PPPoA session has been torn down correctly</li> </ul>	Pass

## 9.2.5 RFC 2684 [10] End-to-End Connectivity Test

### 9.2.5.1 Verify IP Bridged

Refer to TR-067 9.5

**Table 347 Verify IP Bridged RFC 2684 [10]**

Test Item	Test Criteria	Test Result
Verify IP Bridge (refer to TR-067 9.5.1)	Transmitted packets are received	Pass

## 9.2.6 Usability Test

Refer to TR-067 9.6.

**Table 348** illustrates the Usability test result of Amazon reference board.

**Table 348 Usability Test Summary**

Test Item	Test Criteria	Test Result
PC Re-boot	No more than two reboots are required	Pass
Power Cycle Test	Modem re-powers. Link re-covers and modem passes data	Pass
Link Cycle Test	Link re-covers and modem passes data	Pass
Verify 10/100 Ethernet Auto-negotiation (802.3u)	No Errors shall be detected on either side of the link to pass each test. The CPE must match the pass/fail requirements for each test as listed in the <b>Table 349</b> on the following page.	Pass

**Table 349 10/100 Ethernet Auto-negotiation Expected Results Table**

Link Partner Advertisement capabilities	DUT Link Status after Auto-Neg completes	Expect Pass/Fail	Pass/Fail
10 FDX/HDX	10 FDX	Pass	Pass
10 FDX	10 FDX	Pass	Pass
10 HDX	10 HDX	Pass	Pass
100 FDX/HDX	100 FDX	Pass	Pass
100 FDX	100 FDX	Pass	Pass
100 HDX	100 HDX	Pass	Pass
10 / 100 FDX/HDX	100 FDX	Pass	Pass
10 / 100 FDX	100 FDX	Pass	Pass
10 / 100 HDX	100 HDX	Pass	Pass
NA 10 HDX	10 HDX	Pass	Pass
NA 10 FDX	10 HDX	Fail	Fail
NA 100 FDX	100 HDX	Fail	Fail
NA 100 HDX	100 HDX	Pass	Pass

## 10 Higher Layer Test Cases according TR100

### 10.1 Layer-3 Ethernet RFC 2684 [10] Bridged Mode

Provision the DSLAM with a fixed set of values:

- Margin up and down: 6dB
- Data Path: Fast
- FEC redundancy: Off (if configurable)
- Trellis Coding: enabled
- Bit swapping: enabled
- Payload scrambling: enabled
- Operational Mode: Autodetect (T1.413[4]/G.992.1 [1] Annex A)

#### 10.1.1 Packet Throughput Test

The purpose of this test is to verify the throughput for a selected list of provisioned line rates (down/up) using IP Frame transfers of varying length.(refer to TR-100 8.1.1). Pass criteria is 85%.

**Table 350 Throughput Test Results: Connect Rates DS: 12000 kbit/s US: 800 kbit/s**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	14150	943	14150	943	100	100	26.9	24.5
128	7075	471	7075	471	100	100	26.9	24.5
256	4716	314	4716	314	100	100	26.9	24.5
512	2358	157	2358	157	100	100	26.9	24.5
1024	1286	85	1286	85	100	100	26.9	24.5
1280	1010	67	1010	67	100	100	26.9	24.5
1518	884	58	884	58	100	100	26.9	24.5
<b>Test Result</b>		Pass						

**Table 351 Throughput Test Results: Connect Rates DS: 18000 kbit/s US: 800 kbit/s**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	21226	943	21226	943	100	100	26.9	24.5
128	10613	471	10613	471	100	100	26.9	24.5
256	7075	314	7075	314	100	100	26.9	24.5
512	3537	157	3537	157	100	100	26.9	24.5
1024	1929	85	1929	85	100	100	26.9	24.5
1280	1516	67	1516	67	100	100	26.9	24.5
1518	1326	58	1326	58	100	100	26.9	24.5
<b>Test Result</b>		Pass						

**Table 352 Throughput Test Results: Connect Rates DS: 24000 kbit/s US: 800 kbit/s**

Analyzer Recorded FPS			Max FPS		% of Max		Margin	
Frame Size	DS	US	DS	US	DS	US	DS	US
64	27970	943	28301	943	98	100	7	25.4
128	14150	471	14150	471	100	100	7	25.4
256	9433	314	9433	314	100	100	7	25.4
512	4716	157	4716	157	100	100	7	25.4
1024	2572	85	2572	85	100	100	7	25.4
1280	2021	67	2021	67	100	100	7	25.4
1518	1768	58	1768	58	100	100	7	25.4
<b>Test Result</b>		Pass						

## 10.2 RFC 2516 [12] PPPoE Throughput Test

**Table 353** describe the test procedure for the PPPoE packet throughput test

**Table 353 PPPoE Packet Throughput Test**

Test Item	Test Criteria	Test Result
PPPoE Packet Throughput	In both Downstream and Upstream directions, the ratio shall equal or exceed 0.84	Pass (DS: 87%, US: 87.3%)

## 10.3 RFC 2364 [13] PPPoA End-to-End Connectivity Test

**Table 354** describe the test procedure for the PPPoA end-to-end connectivity test

**Table 354 PPPoA**

Test Item	Test Criteria	Test Result
PPPoA Connectivity	[1] Transmitted packets are received [2] The PPPoA session has been torn down correctly	Pass

## 10.4 RFC 2684 [11] IP Bridged End-to-End Connectivity Test

**Table 355** describe the test procedure for the IP Bridged connectivity test

**Table 355 Verify IP Bridged RFC 2684 [11]**

Test Item	Test Criteria	Test Result
Verify IP Bridged	Transmitted packets are received.	Pass

## 10.5 Power Cycle Test

**Table 348** describe the test procedure for the power cycle test

**Table 356 Power Cycle Test**

Test Item	Test Criteria	Test Result
Power Cycle Test	Modem re-powers. Link re-covers and modem passes data	Pass

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**References**

- [1] TR-067: DSL Forum Technical Report TR-067, ADSL Interoperability Test Plan, May 2004
- [2] 1TR112 U-R2 V6.1: T-COM, U-R2 Interface of ADSL Systems, May 2005
- [3] 1TR112 U-R2 V7.0: T-COM, U-R2 Interface of ADSL Systems, Sept 2005
- [4] TR-100: DSL Forum Technical Report TR-100, ADSL Interoperability Test Plan, Feb 2007



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