

Contents

Generic Requirements Notice of Disclaimer	iii
Contents	v
List of Figures	ix
List of Tables	xi
Preface	xiii
To Submit Comments	xiv
1. Introduction	1-1
1.1 Purpose and Scope	1-1
1.2 The Need for a Residential Gateway Function	1-2
1.3 Gateway Functionality	1-2
1.4 Gateway Architecture	1-3
1.4.1 Centralized Gateway	1-3
1.4.2 Distributed Gateways	1-4
1.4.3 Hybrid Gateways	1-4
1.5 Organization	1-4
1.6 Requirements Terminology	1-5
1.7 Requirement Labeling Conventions	1-6
1.7.1 Numbering of Requirement and Related Objects	1-6
1.7.2 Requirement, Conditional Requirement, and Objective Object Identification	1-6
1.8 Reason for Reissue	1-7
2. Operation and Application	2-1
2.1 Primary Residential Gateway Function	2-1
2.1.1 POTS Gateway Function	2-1
2.2 Protocol Stacks for the Access Network and the CPN	2-3
2.2.1 Potential Home Network Technologies	2-3
2.2.1.1 Ethernet	2-3
2.2.1.2 IEEE 1394	2-4
2.2.2 Two Access Technologies	2-5
2.2.2.1 Hybrid Fiber Coax (HFC)	2-5
2.2.2.2 ISDN BRI	2-7
2.2.3 Mediation Between The Selected Home Network And Access Technologies	2-7
2.2.3.1 Interface of HFC With Ethernet	2-7
2.2.3.2 Interface of HFC with IEEE 1394	2-8
2.2.3.3 Interface of ISDN BRI with Ethernet	2-9
2.2.3.4 Interface of ISDN BRI with IEEE 1394	2-10
2.3 Secondary Residential Gateway Functions	2-10
2.4 Subsidiary Residential Gateway Functions	2-11
2.4.1 Service Provisioning And Security	2-11
2.4.2 Directory Services Support	2-11
2.4.3 Emergency Power	2-12
2.5 Gateway Performance	2-13

- 2.5.1 Transport Performance 2-13
 - 2.5.1.1 Video Delay 2-13
 - 2.5.1.2 Jitter and Wander 2-14
 - 2.5.1.3 Error Performance 2-14
- 2.5.2 Baseband Video Transport Performance 2-14
 - 2.5.2.1 Impairments in Digital Video 2-15
 - 2.5.2.2 Video Compression Artifacts 2-15
- 3. Features, Functions, and Performance Requirements 3-1
 - 3.1 Network Compatibility 3-1
 - 3.2 Residential Gateway Functionality 3-2
 - 3.2.1 Input/Output Connections 3-3
 - 3.2.2 RS-232 Interactive Devices 3-3
 - 3.3 Provider Network Security 3-3
 - 3.3.1 Voice Services Security Requirements 3-3
 - 3.3.2 Video and Data Network Security Requirements 3-4
 - 3.3.2.1 Video and Data Services Security 3-4
 - 3.3.2.2 Network Security 3-4
 - 3.3.2.3 Video Pay-Channel Security 3-5
 - 3.3.2.4 Video Pay-per-View/Use Security Requirements 3-5
 - 3.4 Home Network Security 3-6
 - 3.5 Residential Gateway Security Requirements 3-6
 - 3.6 Residential Gateway Services and Capacity 3-7
 - 3.6.1 Single-Dwelling Residential Gateway 3-7
 - 3.6.2 Multi-Dwelling Residential Gateway 3-7
- 4. Network Performance and Loop Testing 4-1
 - 4.1 Signal Quality 4-1
 - 4.1.1 Video Bit Stream Error Detection And Correction 4-1
 - 4.1.2 Copy Protection 4-1
 - 4.2 Transmission Performance 4-1
 - 4.2.1 Round Trip Transport Delay 4-2
 - 4.2.2 Error Performance 4-2
 - 4.2.3 Jitter Performance 4-3
 - 4.2.4 Wander 4-4
 - 4.2.5 Transmitter Performance 4-4
 - 4.2.5.1 Signal Power Level 4-4
 - 4.2.5.2 Return Loss 4-4
 - 4.2.6 Receive Performance 4-4
 - 4.2.6.1 Signal Power Level 4-4
 - 4.2.6.2 Return Loss 4-5
 - 4.2.6.3 Noise Margin 4-5
 - 4.2.7 Passband Transmission on Coax 4-5
 - 4.2.7.1 QAM Receiver 4-5
 - 4.2.7.2 MPEG-2 Transport Stream 4-5
 - 4.2.7.3 Upstream QPSK Modulation 4-6
 - 4.2.8 Coaxial Cable Impedance 4-6
 - 4.2.9 Media Interface Connector 4-6

4.3	Audio Signal Delay	4-6
4.4	Video Signal Quality	4-6
4.5	Audio Signal Quality	4-7
4.6	Residential Gateway Testing Requirements	4-8
4.6.1	Service Provider Network Signal Quality Testing	4-8
4.6.2	Residential Gateway Self Testing	4-8
4.6.3	Residential Gateway Test Interface	4-9
5.	Broadband Protection and Unit Powering	5-1
5.1	Electrical Protection at Customer Premises	5-1
5.2	Electrical Protection for Twisted-Pair Cables	5-1
5.3	Protection for Coaxial Cables	5-1
5.4	Resistibility	5-2
5.4.1	Twisted-Pair Interface	5-2
5.4.2	Coaxial-Cable Interface	5-2
5.4.2.1	First-Level Lightning and Power Fault Tests	5-2
5.4.2.2	Second-Level Lightning and Power Fault Tests	5-3
5.5	Power Requirements	5-5
5.5.1	Residential Gateway Powering	5-5
6.	Environmental Compatibility	6-1
6.1	Temperature Cycling with Humidity	6-1
6.2	Salt Spray (Fog) Exposure	6-1
6.3	Environmental Pollutants	6-1
6.4	Vibration	6-2
6.5	Chemical Resistance	6-2
6.6	UV Degradation	6-2
6.7	Ozone Degradation	6-3
6.8	Drop Test	6-3
6.9	Impact Test	6-3
6.10	Rain Test	6-3
6.11	Fungus Resistance	6-4
6.12	Electromagnetic Compatibility	6-4
6.12.1	Regulatory	6-4
6.12.2	Additional Susceptibility Constraints	6-4
Appendix A:	Example Applications	A-1
A.1	Video on Demand	A-1
A.2	Home-Shopping	A-1
A.3	Program Broadcasting	A-2
A.4	Near Video on Demand Broadcasting	A-3
A.5	Delayed Broadcast	A-3
A.6	Games	A-4
A.7	Work-at-Home	A-5
A.8	Video Telephony	A-5
A.9	Home Banking	A-5
A.10	Video Conferencing	A-5
A.11	Internet Access	A-6
A.12	Virtual CD-ROM	A-6

References	References-1
Reference Note	References-3
To Contact Telcordia Customer Service	References-3
To Order Documents From Outside Telcordia	References-3
To Order Documents Within Telcordia	References-3

List of Figures

Figure 1-1	The Centralized Gateway	1-8
Figure 1-2	Distributed Gateway	1-9
Figure 1-3	Hybrid Gateway	1-10
Figure 2-1	POTS Distributed on Coax	2-16
Figure 2-2	RF Spectrum Allocation	2-17
Figure 2-3	HFC - Ethernet Gateway	2-18
Figure 2-4	HFC - IEEE 1394 Gateway	2-19
Figure 2-5	Gateway Power Architecture	2-20

List of Tables

Table 4-1	Analog Video Requirements at RG Interface	4-7
Table 4-2	Audio Performance Requirements at the RG Interface	4-8
Table 5-2	First-Level AC Power Fault Test	5-3
Table 5-1	First-Level Lightning Surge Test	5-3
Table 5-3	Second-Level Lightning Surge Test	5-4
Table 5-4	Second-Level AC Power Fault Test	5-4