

Generic Requirements for Optical Time Domain Reflectometer (OTDR)-Type Equipment

Contents

Preface	Preface-1
1. Introduction.....	1-1
1.1 Document Description	1-1
1.2 Summary of Significant Changes from GR-196-CORE, Issue 1, Revision 1	1-1
1.3 Organization	1-2
1.4 Requirements Terminology.....	1-2
1.5 Requirement Labeling Conventions.....	1-3
1.5.1 Numbering of Requirement and Related Objects	1-3
1.5.2 Requirement, Conditional Requirement, and Objective Object Identification	1-4
1.6 Technical Feature/Function Testing.....	1-4
2. General Information.....	2-1
2.1 Product Definition.....	2-1
2.1.1 Principles of Operation	2-1
2.1.2 Performance	2-2
2.2 Types of OTDR-Like Test Equipment.....	2-3
2.2.1 Full-Feature OTDR.....	2-3
2.2.2 Mini-OTDR and Fiber Break Locator	2-3
2.2.3 Remote Test Unit (RTU).....	2-4
2.3 Applications and Uses.....	2-4
2.4 Operating Environment.....	2-4
2.5 Fiber Optic System Considerations.....	2-5
3. General Requirements and Objectives.....	3-1
3.1 Operation.....	3-1
3.1.1 Full-Feature OTDR	3-1
3.1.2 Mini-OTDR.....	3-5
3.1.3 Fiber Break Locators.....	3-9
3.1.4 RTU.....	3-10
3.2 Unit Powering Features.....	3-12
3.2.1 Full-Feature OTDR	3-12
3.2.2 Mini-OTDR and Fiber Break Locators	3-12
3.2.3 RTU.....	3-13
3.3 Input/Output Port Features	3-13
3.3.1 Full-Feature OTDR, Mini-OTDR, and Fiber Break Locator.....	3-13
3.3.2 RTU.....	3-14

3.4	Mechanical Design.....	3-14
3.4.1	Full-Feature OTDR.....	3-14
3.4.2	Mini-OTDR.....	3-14
3.4.3	Fiber Break Locators.....	3-15
3.4.4	RTU.....	3-15
3.5	Maintenance	3-15
3.6	Product Information	3-16
3.6.1	Documentation.....	3-16
3.6.2	Performance Specification Sheet	3-17
3.6.2.1	Full-Feature OTDR and Mini-OTDR.....	3-17
3.6.2.2	Fiber Break Locator.....	3-18
3.6.2.3	RTU	3-20
3.7	Product and Packaging Markings.....	3-21
3.7.1	Product Markings.....	3-21
3.7.2	Packaging Markings.....	3-22
3.8	Laser Protection	3-22
4.	Specific Requirements and Objectives	4-1
4.1	Operational Criteria.....	4-1
4.1.1	Spectral Characteristics.....	4-1
4.1.1.1	Full-Feature OTDR.....	4-1
4.1.1.2	Mini-OTDR	4-1
4.1.1.3	Fiber Break Locator.....	4-2
4.1.1.4	RTU	4-2
4.1.2	Measurement Range.....	4-2
4.1.2.1	Full-Feature OTDR.....	4-2
4.1.2.2	Mini-OTDR and Fiber Break Locator.....	4-3
4.1.2.3	RTU	4-4
4.1.3	Resolution	4-5
4.1.3.1	Full-Feature OTDR.....	4-5
4.1.3.2	Mini-OTDR and Fiber Break Locator	4-5
4.1.3.3	RTU	4-6
4.1.4	Accuracy	4-7
4.1.4.1	Distance Accuracy.....	4-7
4.1.4.2	Loss/Reflectance/ORL Accuracy	4-7
4.1.5	Measurement Time	4-8
4.2	Mechanical Design Criteria.....	4-8
4.2.1	Shock Tests	4-8
4.2.1.1	Shipment from Manufacturer	4-8
4.2.1.2	Local Transportation.....	4-9
4.2.1.3	During Use.....	4-9
4.2.2	Vibration Test	4-9
4.2.2.1	Full-Feature OTDR, Mini-OTDR, and Fiber Break Locator.....	4-9
4.2.2.2	RTU	4-9

4.3	Power Criteria	4-10
4.3.1	Full-Feature OTDR	4-10
4.3.2	Mini-OTDR and Fiber Break Locator	4-10
4.3.3	RTU.....	4-10
4.4	Environmental Criteria.....	4-11
4.4.1	Non-Operating Environment.....	4-11
4.4.1.1	Full-Feature OTDR, Mini-OTDR, and Fiber Break Locator	4-11
4.4.1.2	RTU	4-11
4.4.2	Operating Environment.....	4-11
4.4.2.1	Full-Feature OTDR.....	4-11
4.4.2.2	Mini-OTDR, and Fiber Break Locator	4-11
4.4.2.3	RTU	4-11
4.4.3	Dust Resistance	4-12
4.4.3.1	Full-Feature OTDR, Mini-OTDR, and Fiber Break Locator	4-12
4.4.3.2	RTU	4-12
4.5	Electromagnetic Interference	4-12
4.6	Safety Criteria	4-12
5.	Performance Verification Test Procedures	5-1
5.1	Operational Criteria.....	5-1
5.1.1	Spectral Characteristics.....	5-1
5.1.2	Measurement Range.....	5-2
5.1.3	Resolution	5-5
5.1.4	Accuracy	5-9
5.1.4.1	Distance Accuracy.....	5-9
5.1.4.2	Loss/Reflectance/ORL Accuracy	5-12
5.1.5	Measurement Time	5-14
5.2	Mechanical Design Criteria.....	5-14
5.2.1	Shock Tests	5-14
5.2.1.1	Shipment from Manufacturer	5-14
5.2.1.2	Local Transportation.....	5-15
5.2.1.3	During Use.....	5-15
5.2.2	Vibration Test	5-15
5.3	Power Criteria	5-15
5.3.1	AC Power.....	5-15
5.3.2	DC Power.....	5-15
5.4	Environmental Criteria.....	5-16
5.4.1	Non-Operating Environment.....	5-16
5.4.2	Operating Environment.....	5-17
5.4.2.1	Full-Feature OTDR.....	5-17
5.4.2.2	Mini-OTDR, and Fiber Break Locator	5-17
5.4.2.3	RTU	5-17
5.4.3	Dust Resistance	5-17

5.5	Electromagnetic Discharge	5-18
5.6	Safety Criteria	5-19
Appendix A: OTDR Outside Plant Data Format Description		A-1
A.1	Overview Criteria.....	A-1
A.2	Map Block.....	A-3
A.3	General Parameters Block.....	A-5
A.4	Supplier Parameters Block.....	A-5
A.5	Fixed Parameters Block	A-5
A.6	Key Events Block.....	A-6
A.7	Link Parameters Block.....	A-7
A.8	Data Points Block.....	A-8
A.9	Special Proprietary Blocks	A-8
A.10	Checksum Block	A-9
References		References-1
Glossary.....		Glossary-1
Acronyms.....		Acronyms-1
Index		Index-1

List of Figures

Figure 5-1.	OTDR Measurement Range Test Setup	5-2
Figure 5-2.	OTDR Measurement Range Alternative Test Setup	5-3
Figure 5-3.	Front-End Reflective Resolution Test Setup	5-5
Figure 5-4.	Front-End Non-Reflective Resolution Test Setup.....	5-6
Figure 5-5.	Network Reflective Resolution Test Setup	5-6
Figure 5-6.	Network Non-Reflective Resolution Test Setup	5-6
Figure 5-7.	Method 1 Distance Scale Factor Test Setup	5-10
Figure 5-8.	Method 2 Distance Accuracy Test Setup	5-11
Figure 5-9.	Method 2 Sample Plot of Distance Accuracy Data	5-12
Figure 5-10.	Reflectance Accuracy Test Setup	5-13
Figure 5-11.	ORL Accuracy Test Setup	5-13
Figure 5-12.	Dust Resistance Test Setup.....	5-18
Figure A-1.	Summary of Offsets Used in OTDR Data Format	A-7

List of Tables

Table 1-1.	Summary of Feature/Function Testing	1-4
Table 2-1.	Near Worst-Case Measurement Ranges for Various Types of Telephone Plant Operating at 1310 nm and 1550 nm	2-6
Table 3-1.	Performance Specification Sheet: OTDR and Mini-OTDR	3-17
Table 3-2.	Performance Specification Sheet: Fiber Break Locator	3-18
Table 3-3.	Performance Specification Sheet: RTU	3-20
Table 4-1.	OTDR Centroidal Wavelength Requirements and Objectives	4-1
Table 4-2.	Mini-OTDR Centroidal Wavelength Requirements	4-1
Table 4-3.	RTU Centroidal Wavelength Criteria	4-2
Table 4-4.	Measurement Range Requirements for OTDRs	4-3
Table 4-5.	Measurement Range Objectives for OTDRs	4-3
Table 4-6.	Measurement Range Requirements for Mini-OTDR/Fiber Break Locator 4-3	
Table 4-7.	Measurement Range Objectives for Mini-OTDR/Fiber Break Locator ...	4-4
Table 4-8.	Measurement Range Requirement Criteria for RFTS	4-4
Table 4-9.	Measurement Range Objectives Criteria for RFTS	4-4
Table 4-10.	Resolution Requirements for OTDRs	4-5
Table 4-11.	Resolution Objectives for OTDRs	4-5
Table 4-12.	Resolution Requirements for Mini-OTDRs and Fiber Break Locator	4-5
Table 4-13.	Resolution Objectives for Mini-OTDRs and Fiber Break Locator	4-6
Table 4-14.	Resolution Requirements for RFTS	4-6
Table 4-15.	Resolution Objectives for RFTS	4-6
Table 4-16.	Distance Accuracy Requirements	4-7
Table 4-17.	OTDR Loss/Reflectance Accuracy Requirements	4-7
Table 4-18.	OTDR Loss/Reflectance Accuracy Objectives	4-7
Table 5-1.	OTDR Measurement Range Test Conditions	5-3
Table 5-2.	Front-End Resolution Test Setup Fiber Length Requirements	5-7
Table 5-3.	Front-End Resolution Test Setup Fiber Length Objectives	5-7
Table 5-4.	Network Resolution Test Setup Fiber Lengths Requirements	5-7
Table 5-5.	Network Resolution Test Setup Fiber Lengths Objectives	5-7
Table A-1.	File Block Layout	A-1
Table A-2.	Character Conventions Used in Data Format	A-2
Table A-3.	Block ID Strings	A-4