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Review of Generic Requirements for Remote Radio Head Protection Used in Fiber to the Antenna (FTTA) Systems GR-3177-CORE Issue 1, December 2014

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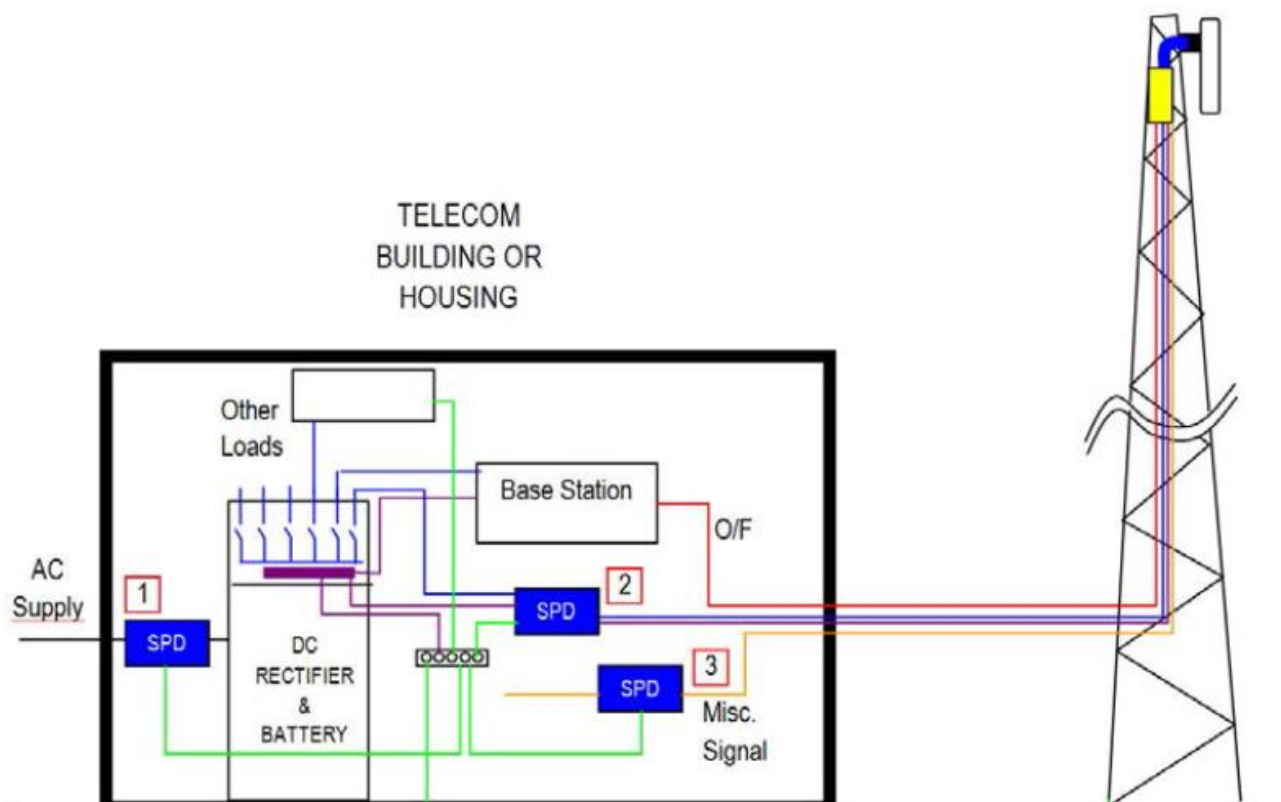
Generic Requirements Background

- **Telcordia has a long-standing history of developing “standards” for the telecommunications industry in the form of proposed Generic Requirements (GRs)**
- **GRs differ from industry standards:**
 - GRs can be directly applied to product development or product implementation
 - GRs are often more detailed than any other industry standards
 - GRs are recognized worldwide
- **In 1996, Telcordia was officially given responsibility for continuing to facilitate development of GRs for the industry**
- **We take this role very seriously and continuously strive to meet the following objectives:**
 - Ensure a high level of industry participation in GR development
 - Ensure all participants are treated equally in the GR process
 - Ensure requirements are developed in a timely and effective manner for the industry

 What Products Does GR3177 Cover

Electrical protection systems for use in wireless Fiber to the Antenna (FTTA) applications. The initial focus of GR-3177, Issue 1, is on electrical protection for outdoor tower and rooftop applications. This includes connections between local and remote base stations.

What Products Does GR3177 Cover





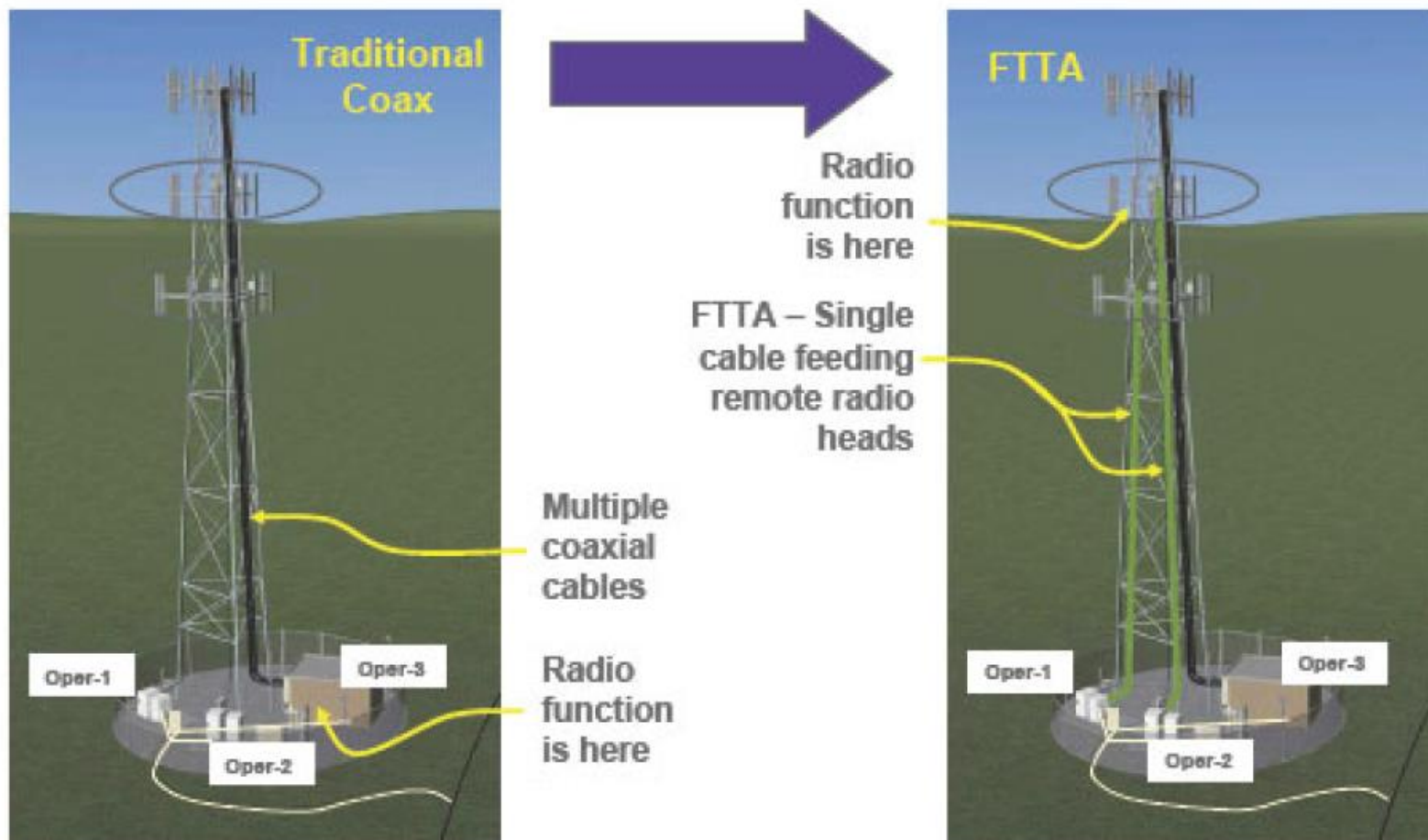
GR3177 Development Participants

GR-3177-CORE, Issue 1, was developed jointly by Telcordia, Telecommunications Service Providers (TSPs), and equipment manufacturers.

The participating companies in the development of GR-3177 are:

- AT&T
- CenturyLink
- Dehn
- Erico
- Phoenix Contact
- Raycap
- Telcordia
- Tii Industries
- Verizon

Fiber to the Antenna (FTTA) Solutions Transition to Fiber-Fed Remote Radio Heads





GR3177 Requirements

- **2 General Information**
- 2.1 General Description
- 2.2 Protection from Lightning Damage
 - 2.2.1 Direct Strike Lightning Protection
- 2.3 Operating Environment
- 2.4 Test Conditions/Temperatures
 - 2.4.1 Installation Tests
 - 2.4.2 Operating Tests
- 2.5 Laboratory Conditions
- 2.6 Thermal Soak
- 2.7 Calibration
- 2.8 Force and Weight Tolerances
- 2.9 Damage Definition
- 2.10 Safety Precautions
- 2.11 Closure Requirements



GR3177 Requirements

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- **3 Detailed Requirements**
- 3.1 Documentation
 - 3.1.1 Practices
 - 3.1.2 Audio-Visual Training Package
- 3.2 Markings, Packaging, and Shipping
 - 3.2.1 Identification
 - 3.2.2 Shipping Container and Packaging Arrangement
 - 3.2.3 Package Label
 - 3.2.4 Consumable Materials
- 3.3 Product Samples
- 3.4 Product Changes
- 3.5 Quality
- 3.6 Safety and Reliability Considerations
 - 3.6.1 Restriction of Hazardous Substances (RoHS) Compliance
 - 3.6.2 Listing



GR3177 Requirements

- **External Interfaces**
- 4.1 General Features
 - 4.1.1 Deployment Configurations
 - 4.1.2 Mounting Hardware
 - 4.1.3 Components
 - 4.1.4 Installation Size and Weight
 - 4.1.5 Maintenance
 - 4.1.6 Tools
 - 4.1.7 Security
- 4.2 Cable Management — Integrated FTTH Electrical Protector Closure
 - 4.2.1 Termination Compartment
 - 4.2.2 Cable Compatibility
 - 4.2.3 Fiber Splice Capacity and Organization
 - 4.2.4 Fiber Protection
- 4.3 Cable Management - Stubbed FTTH Electrical Protector Systems
 - 4.3.1 Fiber Stub Cable
 - 4.3.2 Power Stub Cable
 - 4.3.3 Service Wire Stub Cable



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- **External Interfaces**
- 4.4 Power Interface
 - 4.4.1 DC Power Interface Connection
- 4.5 Electromagnetic Compatibility (EMC)
 - 4.5.1 Electrical Safety
 - 4.5.2 Bonding and Grounding
- 4.6 RRH DC Feed Surge Protection
 - 4.6.1 RRH DC Feed Surge Protection
 - 4.6.2 RRH DC Feed Surge Protection Circuit Breaker or Fuse
- 4.7 RRH Miscellaneous Surge Protection
- 4.8 Base Station AC Supply Surge Protection
- 4.9 Alarms



GR3177 Requirements

- **5 Global Product Requirements**
- 5.5 Wall-Mounted Equipment
- 5.6 Electrical Criteria
 - 5.6.1 Bond Clamp Retention
 - 5.6.2 AC Fault Test
- 5.7 Mechanical Criteria
 - 5.7.1 Cable Clamping
 - 5.7.2 Sheath Retention
 - 5.7.3 Cable Flexing
 - 5.7.4 Cable Torsion
 - 5.7.5 Vertical Drop
 - 5.7.6 Compression
 - 5.7.7 Impact
 - 5.7.8 Central Member (CM) Protrusion
- 5.8 Environmental Criteria
 - 5.8.1 Accelerated Thermal Aging
 - 5.8.2 Field Assembly
 - 5.8.3 Temperature and Humidity



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- **5 Global Product Requirements**
- 5.8.4 Freeze/Thaw
- 5.8.5 Weathertightness
 - 5.8.5.1 Weathertightness - Dust
 - 5.8.5.2 Weathertightness - Water Resistance
 - 5.8.5.2.1 Wind-Driven Rain Test Procedure
 - 5.8.5.2.2 Water-Spray Test Procedure
- 5.8.6 Corrosion Resistance
- 5.8.7 Chemical Resistance
 - 5.8.7.1 Material Degradation
 - 5.8.7.2 Chemical Immersion
- 5.8.8 Insect Resistance
- 5.8.9 Ultraviolet Resistance
- 5.8.10 Fungus Resistance
- 5.8.11 Rodent Resistance
- 5.8.12 Fire Resistance (Brush Fire)
- 5.8.13 Power Cross Ignition
- 5.9 Shock and Vibration
 - 5.9.1 Installation Shock
 - 5.9.2 Environmentally Induced Vibration
 - 5.9.3 Earthquake Resistance



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- **5 Global Product Requirements**
- 5.10 Package Quality
- 5.11 Transportation Shock (Rail)
- 5.12 Bullet Resistance
- 5.13 SPD Protector Testing
 - 5.13.1 Testing of SPD Samples
 - 5.13.2 Clamping Voltage
 - 5.13.3 Surge Current Rating
 - 5.13.3.1 Maximum Single Withstand Surge Current
 - 5.13.3.2 Multiple Withstand Surge Current Rating
 - 5.13.4 Maximum Continuous Operating Voltage
- 5.14 Conditional Requirements
 - 5.14.1 Building Fire Resistance



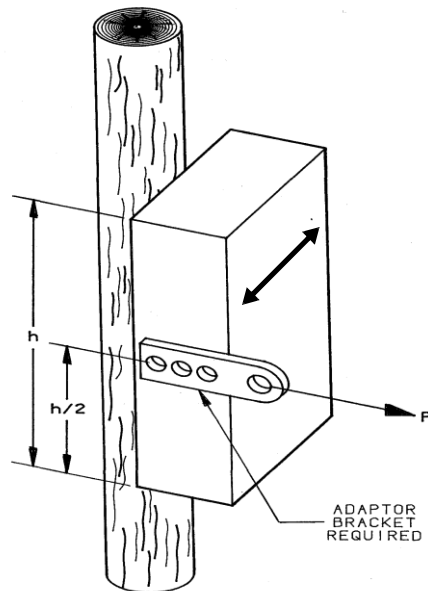
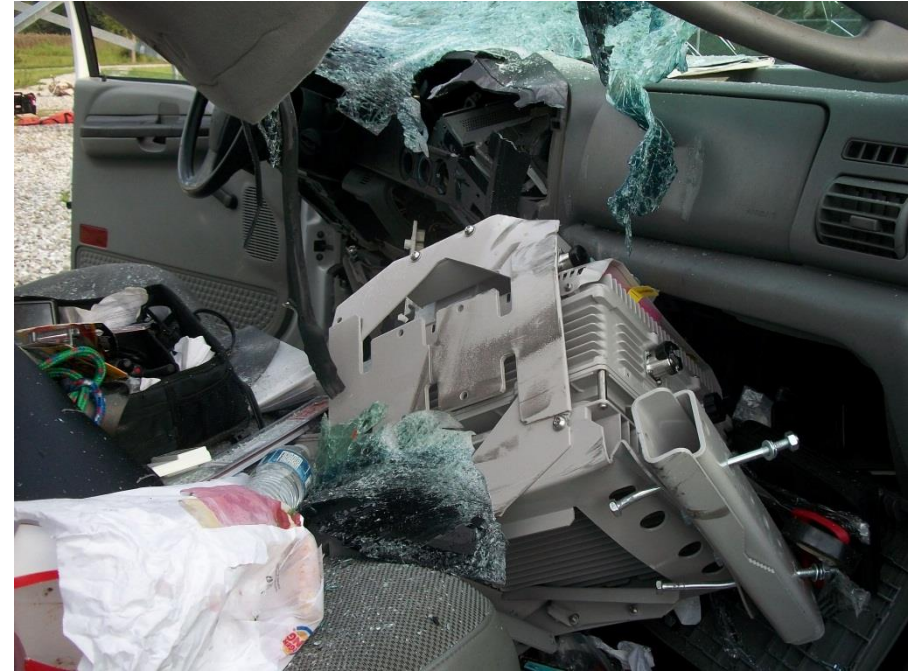
GR3177 Requirements

- **Appendix A: Informative Appendix**
 - A.1 The ABCs of Fiber
 - A.2 Fiber to the Antenna (FTTA) Solutions
 - A.3 Fiber to the Antenna Solutions
- **Appendix B: Optical Measurements**
 - B.1 Apparatus
 - B.2 Transmission Measurement Facility
- **Appendix C: Modes of Protection**
- **Appendix D: Determination of the Protection Measures Against Lightning**
 - D.1 Determination of the Protection Measures (LPL)
 - D.2 SPD Current Requirements
- **Appendix E: Dust Observational Standard**
- **Appendix F: References**



Safety – Pole Mounting

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Surge Testing

