Network Maintenance: Access and Testing - Generic Test Architecture

CONTENTS

Telcordia GR-818-Documentation Information

Preface . . . . Preface- 1

1. Introduction 1-1
   1.1 Document History 1-1
   1.2 Changes in This Document 1-1
   1.3 Document History 1-2
   1.4 Requirements Terminology 1-2
   1.5 Graphical Conventions for Figures in FR-476 1-3

2. Overview of the Generic Test Architecture 2-1
   2.1 Architecture Configurations 2-2
   2.2 DLC Test Architectures 2-4
   2.3 Interface Technology 2-8
   2.4 Terminology Used in FR-476 2-8

3. DLC Test Architecture Configurations 3-1
   3.1 TSCl/RTUl Generic Test Access Interface 3-1
   3.2 TSC2/RTU2 Generic Test Access Interface 3-3
   3.3 Architecture Overview 3-8

4. Test System Controller/Remote Test Unit (TSC/RTU) 4-1
   4.1 OS-to-TSC Interface 4-3
   4.2 TSC/RTU-to-TAU Interfaces 4-3
      4.2.1 MTAU Interface 4-3
      4.2.2 DTAU Interface 4-5
      4.2.3 No Test Trunk (NTT) Interface 4-7
         4.2.3.1 Requirements for a Dedicated NTT 4-7
         4.2.3.2 Requirements for a Non-Dedicated NTT . . . 4-8
   4.3 Craftsperson Interface for Local Operations 4-9
   4.4 TSC/RTU Common Functions 4-9
      4.4.1 Addressing 4-9
      4.4.2 Camp-On 4-10
      4.4.3 Automated Testing 4-11
      4.4.4 Test Ports 4-11
      4.4.5 Monitor/Talk Line 4-11
      4.4.6 Administration and Maintenance 4-12
         4.4.6.1 Autonomous Reporting of Failures 4-12

4.4.6.2 Demand Out-of-Service Diagnostics 4-12
4.4.6.3 Background Diagnostics 4-13
4.4.6.4 Release of AU Circuit Accesses and Associated Test Resources 4-13
4.4.6.5 Status of the TSC/RTU and Associated NEs 4-13
4.4.6.6 Test Access Path Maintenance 4-14
4.4.6.7 Sectionalization of TSC/RTU 4-15
4.4.6.8 Initialization 4-15
4.4.7 System Maintenance Strategies 4-15
4.4.7.1 Automatic Maintenance Strategies 4-15
4.4.7.2 Demand Diagnostics 4-19
4.4.8 Traffic Analysis 4-19
4.4.9 Quality and Reliability 4-20
4.5 Digital Loop Carrier TSC/RTU 4-20

5. Metallic Test Access Unit 5-1
5.1 TSC/RTU-to-MTAU Interface 5-1
5.1.1 Control line 5-1
5.1.2 Failure and Status 5-1
5.1.3 Metallic Test Access Link 5-2
5.1.4 MTAU Functional Wiring Arrangement with NTT . . . 5-4
5.2 Test Access Configurations 5-5
5.2.1 Circuit Access Points 5-8
5.3 Metallic Test Access Functions 5-9
5.3.1 Loop-Around Function 5-9
5.3.2 Monitor Mode Function 5-10
5.3.3 Split Mode Function 5-10
5.3.4 Release Function 5-11
5.3.5 Terminate and Leave Function (Optional) 5-13
5.4 Report Initialization Function 5-13
5.5 MTAU Performance and Maintenance 5-15
5.5.1 System Administrator Control 5-15
5.5.2 Autonomous Reporting of Failure 5-15
5.5.3 Demand Out-of-Service Diagnostics 5-15
5.5.4 Error Logs 5-16
5.5.5 MTAU General Quality and Reliability Requirements 5-16
5.5.6 System Availability 5-16

6. Digital Test Access Unit 6-1
6.1 DS0/DS1 Physical and Functional Integration 6-2
6.2 TSC/RTU to DTAU Interface 6-3
6.2.1 Control Link 6-3
6.2.2 Digital Test Access Link 6-3
6.3 Per-Channel Test Access Functions 6-6
6.3.1 Monitor Access Function 6-6

6.3.2 Split Access Function 6-10
6.3.3 Release Access Function 6-15
6.3.4 Terminate and Leave Access Function (Optional) 6-15
6.3.5 Loopback Function 6-17
6.3.6 Change-Pair Function 6-18
6.3.7 Keep-Alive Signals 6-18
6.3.8 Signaling 6-18
6.3.9 Digital Data Access (Optional) 6-19
6.3.10 DS1 Access 6-20
6.3.11 Sub-64-kb/s Access for Low Bit Rate Voice 6-20
6.3.12 Digital Cross-Connect Access (Optional) 6-20
6.3.12.1 Test Access State 6-22
6.3.12.2 TSC/RTU Requirements for DFAD 6-28
6.4 Transmission. 6-30
6.4.1 Facility Interface 6-31
6.4.2 Equipment and Facility Alarms 6-32
6.4.3 Alarm Interfaces 6-32
6.4.4 Yellow Alarms 6-32
6.4.5 Denial of Test Access - Facility Failure 6-33
6.4.6 Compatibility with Clear Channel Capability 6-33
6.5 DTAU Performance and Maintenance 6-34
6.5.1 Transmission Delay 6-34
6.5.2 Jitter Tolerance 6-34
6.5.3 Error Performance 6-34
6.5.4 Signaling Distortion 6-34
6.5.5 Framing 6-34
6.5.6 Blocking Considerations 6-36
6.5.7 Size Guidelines 6-36
6.5.8 DTAU Maintenance, Quality, and Safety 6-36
6.5.9 Reliability and Availability 6-37
6.6 DS3 DTAU Functions 6-38
6.6.1 Interface 6-38
6.6.2 Circuit Access 6-39
6.6.3 Terminate and Leave 6-39

7. Generic RFIS Architectures 7-1
7.1 Architecture for Verification of Optical Splice Integrity 7-3

References References-1

Glossary Glossary-1

LIST OF FIGURES

Figure 1-1. Conventions for FR-476 1-3
Figure 2-1. A Generic Test Architecture 2-3
Figure 2-2. Example ofa Generic Test Architecture Using the DCN . . . 2-4
Figure 2-3. Generic Test Architecture - IDLC System 2-6
Figure 2-4. Generic Test Architecture - UDLC System 2-7
Figure 3-1. Generic Test Access Interface - TSC1/RTU1 (IDLC) 3-2
Figure 3-2. Generic Test Access Interface - TSC1/RTUl (UDLC) 3-3
Figure 3-3. Generic Test Access Interface - TSC2/RTU2 (IDLC) 3-4
Figure 3-4. Generic Test Access Interface - TSC2/RTU2 (UDLC) 3-5
Figure 3-5. Generic Test Access Interface - Co-Located TSC2/RTU2 Scenario (IDLC) 3-7
Figure 3-6. Generic Test Access Interface - Co-Located TSC2/RTU2 Scenario (UDLC) 3-8
Figure 3-7. IDLC Generic Test Architecture - Configuration 1 3-9
Figure 3-8. IDLC Generic Test Architecture - Configuration 2 3-10
Figure 3-9. UDLC Generic Test Architecture - Configuration 1 3-11
Figure 3-10. UDLC Generic Test Architecture - Configuration 2 3-12
Figure 4-1. Dedicated NTT Interface 4-8
Figure 4-2. NTT Interface with MTAU 4-9
Figure 5-1. Relation of MTAU TAP Pairs to Circuit Pairs 5-3
Figure 5-2. MTAU Access Point on NTT 5-5
Figure 5-3. MTAU Test Access Configuration Modes 5-12
Figure 5-4. MTAU Terminate and Leave Circuit States 5-14
Figure 6-1. Digital Test Access Unit 6-1
Figure 6-2. DTAU with Type 1 Test Access Link 6-4
Figure 6-3. DTAU with Type 2 Test Access Link 6-5
Figure 6-4. DTAU Circuit Access Configurations 6-7
Figure 6-5. In-Service Monitor Access 6-8
Figure 6-6. DFAD Test Access Configurations 6-9
Figure 6-7. Far Direction Overlap Segment Access 6-11

Figure 6-8. Near Direction Overlap Segment Access 6-12

Figure 6-9. Near Direction Straight-Away or Looped POT 6-13

Figure 6-10. Far Direction Straight-Away or Looped POT 6-14

Figure 6-11. DTAU T&L Access Configurations 6-16

Figure 6-12. Looped-A and Looped-Z Direction Examples 6-17

Figure 6-13. Test Access Configurations for Two-Way Mapped Circuit . . . 6-23

Figure 6-14. Test Access Configurations for One-Way Mapped Circuit . . . 6-24

Figure 6-15. Test Access Configurations for Separate One-Way Mapped circuit 6-25

Figure 6-16. Test Access Configurations for Unmapped Circuit 6-26

Figure 6-17. Test Access State Diagram ofa Test Circuit 6-29

Figure 6-18. DS3 DTAU Modes 6-40

Figure 7-1. RFTS Architecture Supporting Generic Test and Test Access Interfaces 7-2

Figure 7-2. Combined RFTS Architecture Supporting the Generic Test Interface 7-3

Figure 7-3. Cascaded Arrangement for Verification of Construction Splice Integrity 0.7-4

Figure 7-4. Multi-port Arrangement for Verification of Construction Splice Integrity 7-5

LIST OF TABLES

Table 5-1. Example of Number of TAPs and Test Ports for SS Circuits . . . 5-4
Table 5-2. Configuration Codes 5-6
Table 5-3. TAP Pair Assignments 5-7
Table 6-1. Test Access Mode Restriction with Respect to Mapping Configuration 6-29
Table 6-2. Channel-Timeslot Assignment 6-35