
Reliability and System Architecture Testing

Contents

1. PURPOSE	1-1
2. INTRODUCTION	2-1
3. PRE-TEST PLANNING	3-1
3.1 Training	3-1
3.2 Review of Architecture	3-1
3.3 Review of Findings	3-1
3.4 Site Review	3-1
3.5 Test Script Preparation	3-2
3.6 Coordination	3-2
3.7 Trial Procedure	3-3
4. SITE TESTING	4-1
4.1 Preparation of Equipment	4-1
4.2 Test Conditions	4-1
5. PARAMETERS MEASURED	5-1
6. TEST DESCRIPTION	6-1
6.1 Preliminary Reliability Tests	6-1
6.1.1 Switchover Test	6-1
6.1.2 Diagnostics Tests	6-2
6.1.3 Basic Operations - Non-Redundant Units	6-2
6.1.4 Basic Operations - Redundant Units	6-3
6.1.4.1 Two Units in a Simple Parallel Redundancy	6-3
6.1.4.2 Redundant Units in Various Configurations	6-4
A. Load-Sharing Units	6-4
B. Cross-Connect Units	6-5
6.2 Reliability Architecture Tests	6-6
6.2.1 Reliability Fault Tolerance Tests - Single Fault	6-6
6.2.1.1 Single Fault in Non-Redundant Equipment	6-7
6.2.1.2 Single Fault in a Parallel Redundant Pair	6-7
A. Fault in an Active Unit	6-7
B. Fault in a Standby Unit	6-8
6.2.1.3 Single Fault in Various Redundant Configurations	6-9
A. Load-Sharing Capability Test	6-9
B. Cross-Connect Capability Test	6-10
C. Bypass/Isolation Capability Test	6-12
6.2.1.4 Single Fault in Non-Service-Affecting Equipment	6-12

	A. Non-Service-Affecting Failure Rate	6-12
	B. I/O Device Test	6-12
	C. Disk/Tape Operability Test	6-12
6.2.2	Reliability Fault Tolerance Tests - Multiple Faults	6-13
6.2.2.1	Two Faults in a Parallel Redundant Pair	6-13
6.2.2.2	Two Faults in Cross-Connect Equipment.....	6-14
6.2.2.3	Other Multiple Fault Conditions.....	6-16
6.2.3	Reliability Fault Tolerance Test - Memory Errors.....	6-16
6.2.4	Reliability Fault Tolerance Test - Fault During Operation, Administration and Maintenance Activity	6-16
6.3	Reliability Parameter Tests	6-17
6.3.1	Recovery Time	6-17
6.3.2	Repair Time.....	6-17
6.3.3	Temperature Profile	6-17
6.4	Operations Reliability Tests.....	6-18
6.4.1	Remote Unit Test	6-18
6.4.2	Growth Equipment Reliability Test	6-18
6.4.3	Software Overwrite (Patch) Capability Test.....	6-18
6.5	Environmental Reliability Tests.....	6-19
7.	ANALYSIS OF TEST RESULTS AND REPORTING.....	7-1
8.	GLOSSARY.....	8-1
9.	REFERENCES.....	9-1

List of Figures

Figure 1.	Non-redundant Units in Active/Out-of-Service Mode	6-3
Figure 2.	Redundant Units in Active/Standby Mode	6-4
Figure 3.	Redundant Units in Various Configurations: Load-Sharing Example	6-5
Figure 4.	Redundant Units in Various Configurations: Cross-Connect Example ...	6-6
Figure 5.	Non-Redundant Unit Faults	6-7
Figure 6.	Single Fault in the Active Unit of a Redundant Pair	6-8
Figure 7.	Single Fault in the Standby Unit of a Redundant Pair	6-9
Figure 8.	Single Fault in Load-Sharing Equipment	6-10
Figure 9.	Single Fault in Cross-Connect Equipment: Example 1	6-11
Figure 10.	Single Fault in Cross-Connect Equipment: Example 2	6-11
Figure 11.	Two Faults in a Redundant Pair	6-14
Figure 12.	Two Faults in Cross-Connect Equipment	6-15

List of Tables

Table 1.	Notation for Figures.....	6-1
Table 2.	Four Basic Configurations.....	6-3