
Generic Reliability Requirements for Digital Cross-Connect Systems

Contents

Preface	Preface-1
1. Introduction	1-1
1.1 Purpose and Scope	1-1
1.2 Related Bellcore Documents	1-1
1.3 Changes from TA-NWT-1339	1-2
1.4 Structure and Use of This Document	1-2
1.5 Requirements Terminology	1-3
1.6 Requirement Labeling Conventions	1-4
1.6.1 Numbering of Requirement and Related Objects	1-4
1.6.2 Requirement, Conditional Requirement, and Objective Object Identification	1-4
2. Digital Cross-Connect Systems	2-1
2.1 Classification of DCSs	2-2
2.2 Functional Description	2-2
2.2.1 Digital Interface	2-2
2.2.2 Cross-Connect Matrix	2-3
2.2.3 Synchronization	2-3
2.2.4 Control System	2-3
2.3 DCS Evolution	2-4
3. Hardware Reliability Criteria	3-1
3.1 Hardware Downtime Requirements	3-1
3.1.1 Downtime Per Individual Port	3-1
3.1.1.1 Downtime Per DS1 Port	3-2
3.1.1.2 Downtime Per DS3/STS-1 Port	3-2
3.1.1.3 Downtime Per OC-3, OC-12, and STS-3 Ports	3-3
3.1.2 Total System Downtime	3-3
3.1.3 Downtime for Control and Reconfiguration	3-4
3.1.4 Downtime for Alarm Visibility	3-4
3.1.5 Summary of Hardware Downtime Criteria	3-5
3.2 Method of Estimating Hardware Downtime	3-6
3.2.1 Component Reliability Prediction	3-6
3.2.2 Equipment Service Restoral Time	3-7
3.2.3 Consideration of OA&M Activities	3-7
3.2.4 System Reliability Modeling	3-8
3.2.4.1 Failure Mode States	3-8

3.2.4.2	Downtime States	3-9
3.2.5	Reliability Testing	3-9
3.3	Hardware Design Criteria.....	3-10
3.3.1	Single Failure Modes	3-10
3.3.2	Silent Failure Modes	3-11
3.3.3	Other Design Criteria	3-11
3.3.3.1	Power Distribution.....	3-11
3.3.3.2	Single Backplane	3-12
3.3.3.3	Physical Design Criteria	3-12
3.3.3.4	Environmental Criteria	3-13
4.	Operations and Maintenance Design Criteria	4-1
4.1	Trouble Detection and Notification.....	4-1
4.2	Repair and Restore	4-2
4.3	Routine Maintenance.....	4-2
4.4	Data Integrity.....	4-3
4.5	Emergency Control	4-3
4.6	System Defensiveness	4-4
5.	Field Reliability Performance Criteria	5-1
5.1	Definitions	5-1
5.2	Total System Service Outage	5-2
5.3	Partial System Service Outage	5-2
5.4	Network Element Management Outage	5-2
5.5	Service Restoral Time	5-3
5.6	Software Reliability.....	5-3
5.6.1	Release Applications Measurements.....	5-3
5.6.2	Problem Reports.....	5-4
5.6.3	Product Change Notices	5-4
5.6.4	Software Faults.....	5-5
5.6.5	Fix Response Time.....	5-5
5.7	Average Circuit Pack Return Rate	5-6
5.8	Summary of In-Service Performance Criteria.....	5-6
6.	Growth and Upgrade Criteria.....	6-1
6.1	Port Availability	6-1
6.2	Total System Availability.....	6-1
6.3	Control System Availability.....	6-2
References	References-1
Glossary	Glossary-1

List of Figures

Figure 2-1.DCS Functional Block Diagram	2-1
---	-----

List of Tables

Table 3-1. Hardware Downtime Criteria for DCSs	3-5
Table 5-1. Field Reliability Performance Criteria for DCSs	5-6