

Contents

Dedication

Preface

1. INTRODUCTION

1.1 What Is Switching?

1.2 Evolution of Switching Technologies

1.3 Transfer Modes and Switching

13.1 Synchronous Transfer Mode

13.2 Packet Transfer Mode

13.3 Asynchronous Transfer Mode

1.4 Architectures of Switching Nodes

1.4.1 General Switch Architecture

1.4.2 Telephone Exchange

1.4.3 ATM Switches

1.4.4 IP Routers

1.4.5 Cross-connect Systems

1.4.6 Switching in Multiprocessor Systems

1.4.7 Switching in Storage Area Networks

1.5 The Contents of the Book

2. CLASSIFICATION AND TAXONOMY

2.1 Switching Elements and Switching Fabrics

2.2 Classification of Switching Fabrics

2.3 Connection Types

2.3.1 Connection Set-up Models

2.3.2 Unicast, Multicast, and Broadcast Connections

2.3.3 Single-rate and Multirate Connections

2.4 Control Algorithms

2.5 Notation, Terminology, and Models

2.5.1 Switching Fabrics and Connections

2.5.2 Multi-slot Switching Model

2.5.3 Multirate Switching Model

2.5.4 Graph Representation

3. SINGLE-PATH AND STANDARD PATH SWITCHING FABRICS

3.1 Introduction

3.2 Crossbar Switches

3.3 Triangular Switches

3.4 Tree-type Switching Fabrics

3.5 One-stage Switching Fabrics

3.6 Banyan-type Switching Fabrics

3.6.1 Structures

3.6.2 Properties and Control

3.6.3 Graph Representation

3.7 Implementations

4. TWO-STAGE SWITCHING FABRICS

4.1 Two-sided Switching Fabrics

4.2 One-sided Switching Fabrics

- 4.2.1 Space-division Switching
 - 4.2.1.1 Switching Fabric's Architecture
 - 4.2.1.2 Path Searching Algorithms
 - 4.2.1.3 Strict-sense Nonblocking Conditions
 - 4.2.1.4 Wide-sense Nonblocking Conditions
 - 4.2.1.5 Rearrangeable Switching Fabrics
- 4.2.2 Time-division Switching
 - 4.2.2.1 Switching Fabric's Architecture
 - 4.2.2.2 Strict-sense Nonblocking Conditions
 - 4.2.2.3 Wide-sense Nonblocking Conditions
 - 4.2.2.4 Rearrangeable Switching Fabrics
- 4.2.3 Multirate Switching
 - 4.2.3.1 Switching Fabric Architecture
 - 4.2.3.2 Strict-sense Nonblocking Conditions
 - 4.2.3.3 Wide-sense Nonblocking Conditions
- 4.3 Switching Fabrics with More Than Two Stages

5. THREE-STAGE SWITCHING FABRICS

- 5.1 Space-division Switching
 - 5.1.1 Switching Fabric Architecture
 - 5.1.2 Path Searching Algorithms
 - 5.1.3 Strict-sense Nonblocking Conditions
 - 5.1.3.1 Unicast Connections
 - 5.1.3.2 Multicast Connections
 - 5.1.4 Wide-sense Nonblocking Conditions
 - 5.1.4.1 Unicast Connections
 - 5.1.4.2 Multicast Connections
 - 5.1.5 Rearrangeable Switching Fabrics
 - 5.1.5.1 Unicast Connections
 - 5.1.5.2 Multicast Connections
 - 5.1.6 Rearrangeable Algorithms
 - 5.1.6.1 Single Connections
 - 5.1.6.2 Simultaneous Connections
 - 5.1.7 Repackable Switching Fabrics
- 5.2 Time-division Switching
 - 5.2.1 Switching Fabrics Composed of Digital Switches
 - 5.2.2 Path Searching Algorithms
 - 5.2.3 Strict-sense Nonblocking Conditions
 - 5.2.4 Wide-sense Nonblocking Conditions
 - 5.2.5 Rearrangeable Switching Fabrics
 - 5.2.6 Repackable switching fabrics
- 5.3 Multirate Switching
 - 5.3.1 Multirate Switching Fabrics
 - 5.3.2 Strict-sense Nonblocking
 - 5.3.3 Wide-sense Nonblocking Conditions
 - 5.3.3.1 Unicast Connections
 - 5.3.3.2 Multicast Connections
 - 5.3.4 Rearrangeable Switching Fabrics
 - 5.3.5 Repackable Switching Fabrics

5.4 Practical Implementations of Clos Networks

6. REPLICATED BASELINE SWITCHING FABRICS

6.1 Switching Fabric Topologies

6.1.1 Vertically Replicated Baseline Switching Fabrics

6.1.2 Extended Baseline Switching Fabrics

6.3 Space-division Switching

6.3.1 Strict-sense Nonblocking Conditions

6.3.1.1 Unicast Connections

6.3.1.2 Multicast Connections

6.3.2 Wide-sense Nonblocking Conditions

6.3.3 Rearrangeable Conditions

6.3.4 Rearranging Algorithms

6.4 Multirate Switching

6.4.1 Switching Fabrics

6.4.2 Strict-sense Nonblocking

6.4.2.1 Unicast Connections

6.4.2.2 Multicast Connections

6.4.3 Wide-sense Nonblocking Conditions

References

Index