ATM Switching Systems

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"The entire landscape of telecommunications-services, technologies and competition ... fluid and changing daily" is the context which emerged the publishing of this book. New technologies such as digital switching and fiber optics were incorporated to modernize the networking and to improve the transfer rate. As a concept, asynchronous transfer mode (ATM) is considered to be a streamlined switching and multiplexing method capable of transporting all types of information with high throughput and low delay.

ATM switches transfer cells from the input to the output of the network. The book sees ATM switches as a system performing control and management functions, relating the ATM switching and network control. The relationship between ATM switching and network control is given an in- depth analysis.

Being addressed to "readers with different backgrounds in communications networks", the book is structured in two parts (**10 chapters and several appendices and an index to subject reference**). The first part, consisting of Chapter 1 through Chapter 4, identifies the relevant technical background information on ATM.
Chapter 1 opens with a brief history of the public telephone network and packet-switched data network, and continues with the digital network integrated services. ATM is presented as the next step on the broadband network. Other elements include emerging technologies of SONET/SDH, metropolitan -area networks (MAN), and intelligent networks.

Chapter 2 covers the basic functions of the ATM layer. ATM switching systems are viewed as network elements that route, buffer, and process the information flows in the ATM layer.

The layered structure of the B-ISDN protocol reference model is the main topic of **Chapter 3**. Three different types of information flowing in ATM networks (user data, signalling information for call/connection control, and management information) are analyzed in connection with an efficient operation of the network.

Chapter 4 is an overview of traffic control and resource management needed for the efficient operation of ATM networks. This chapter first discusses the objectives and general principles, and then the basic mechanisms of resource management, connection admission control, usage/network parameter control, and congestion control.

These chapters lay the necessary bricks for the construction of the switch model in the second part. This second part, containing Chapter 5 through **Chapter 10**, takes a top-down view of the functional blocks of the ATM switch model.

Chapter 5 applies the background information of the first chapters to the development of a functional switch model. This chapter presents five major functional blocks in the model: input modules, output modules, cell switch fabric, connection admission control, and system management. It represents a guide to the remaining chapters, which are devoted to the details in each functional block.

Chapter 6 deals with the input module, especially important because of its role of entry point of traffic to an ATM switching system. The basic function of the input module is extraction of ATM cells from the physical layer signal (presumed to be SONET), and processing of the cells to be ready for routing through the fabric. The chapter concludes with the necessary cell processing. The input module may contain some functions distributed from the connection admission control (CAC) and system management (SM) functional blocks.

Chapter 7 investigates the output module , which is a counterpart of the input module in the sense that it handles the departure of traffic from the switching system. The output module may contain some distributed connection admission control and system management functions.

Chapter 8 defines the cell switch fabric, which performs the essential buffering and routing functions in the switch. General design principles are illustrated through four prototypical approaches. Other functions of the cell switch fabric include concentration, duplication, cell scheduling, selective cell discarding, and congestion monitoring. In addition, the cell switch fabric needs buffer management, which consists of space/time priorities to allow sensitivity to traffic with different cell delay and cell loss requirements.

Chapter 9 examines the functional block for connection admission control. This handles the exchange and processing of signalling messages among users and other switches following high-level signalling protocols. In response to new connection requests, connection admission control has the responsibility for the decision on call acceptance and the required amount of resources.

The functional block for system management is the subject of **Chapter 10**. This is generally responsible for managing the internal operation of the switching system and for supporting the network-wide management activities, which means the co-operation of all other functional blocks in the ATM switch.

This publication makes a smooth confrontation with the impact of signalling, operation and maintenance, network management and traffic control on the switching design and performance.

The book is an at hand technical guide for every specialist involved in high -speed communications internetworking.

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