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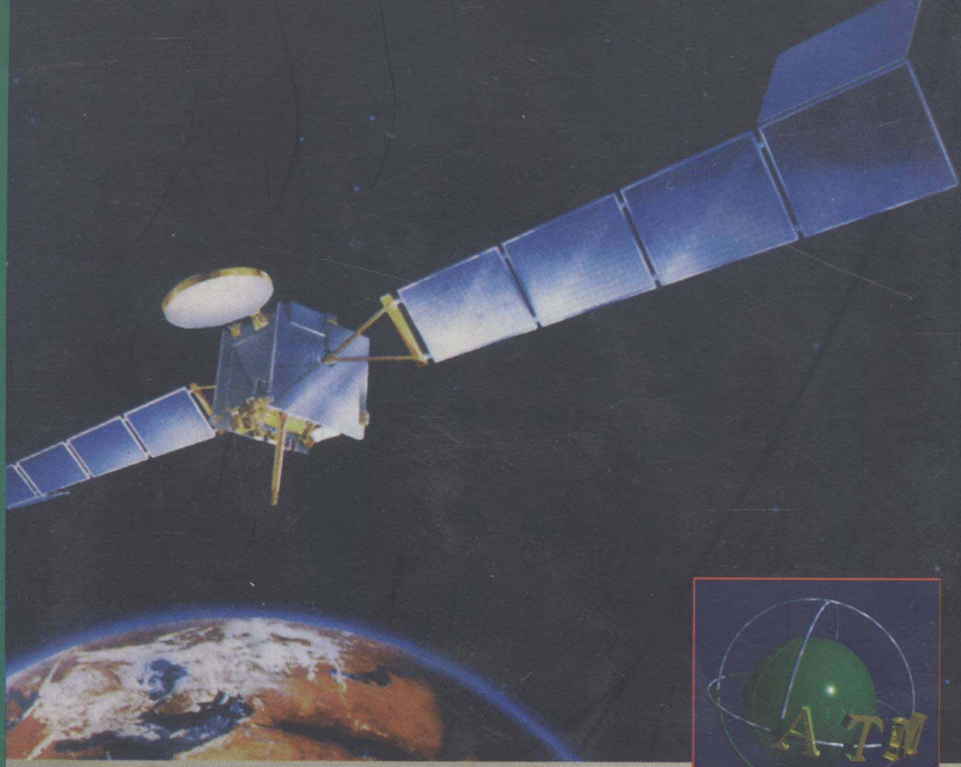

[美] UYLESS BLACK

ATM:Internetworking with ATM

ATM网互通技术

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INTERNETWORING WITH ATM

ATM 网互通技术

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出版前言

90年代中期掀起了信息高速公路的浪潮。宽带综合业务数字网络(B-ISDN)代表着国家信息基础设施的最高网络层次，将在下一世纪发挥非常重要的作用。ATM是B-ISDN的核心技术，已经得到了迅速地发展。广大科技人员和大专院校的师生为了掌握该领域最新发展的知识，迫切需要一套全面、系统地介绍ATM与B-ISDN详细技术的文献，为此我们精选了一些最新英文版图书，组成一套《ATM与B-ISDN技术丛书》，影印奉献给广大读者。

本套丛书既系统全面，又分工明确，各有侧重。在内容安排上包括ATM与B-ISDN技术基础、宽带网信令、宽带网性能分析、ATM网的规划与管理、ATM网与其它网的互通以及ATM网络的应用等技术。希望这套丛书对从事ATM和B-ISDN研究的广大科技人员和大专院校师生有所帮助。

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During the writing of this book, I happened to attend my 40th high school class reunion, and re-renewed some fine friendships.

This book is dedicated to the Lovington, New Mexico High School class of 1957. This dedication is also to acknowledge those class members of '57 that I have known since my childhood, and who went through "all the grades" with me. I enjoyed seeing you again at the reunion.

This book has one other dedication. It is to our English teacher, Frances Campbell.

Any errors in grammar or paragraph composition in this book should be directed straight to Ms. Campbell, which is in order with the culture of the 1990s of blaming someone else for our shortfailings.

No, Ms. Campbell, I was kidding. Any semblance in this book to a logical and well-constructed composition, I owe largely to you (and your diagramming exercises).

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The effective internetworking of computers, switches, routers, and bridges requires a great deal of cooperative interaction between these machines. In a sense, they must have some type of social structure in order for the networks that they create to be able to transport information. Since they may be in different geographical areas, perhaps far-apart from each other, a process called path discovery is executed between them in order to build an efficient route between the machines. Furthermore, the route, once learned, must be retained, and if necessary, updated to reflect changing conditions in the system.

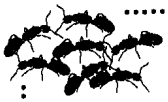
In conducting research for the books in this series, and as part of my interest in nature, I have noticed the similarities of computer networks' behavior to that of creatures in the natural world. For this book, I have chosen the common ant as an analogy to computer networking.

Like computer networks, the ant's "social" behavior in building and maintaining their networks of colonies and nests is quite complex, one of the most elaborate in the insect world. But the scientists who study ants are not certain how the ants decide how to build (or abandon) some of these networks. Indeed, the communications between ants occurs through a perplexing combination of smell, taste, touch, and antennae movement.

One of the most fascinating aspects of computer networking is route discovery, and I have wondered how the ant performs this feat—how they know where their home base is, after wondering about in their foraging labors. Generally, the ant finds its way, largely by environmental clues. But on occasion, it operates like a first-generation route discovery protocol; not very efficient. For example, some ants use a process called light-compass orientation, and take their clues from the sun's angle to them. Try placing a box on top of an ant that is walking about. If the box is left over the ant for say an hour, and then removed, the ant will strike out in a different direction from its original course, by an angle equal to the number of degrees the sun moved during the ant's confinement. Well, not too impressive. Maybe something like looping packets through a network again-and-again.

One of the most remarkable attributes of ants is their prodigious strength. Some can lift a stone some 60 times their own weight. That impressive fact led me to use them for the cover of this book, symbolized by their carting-around Frame Relay, ATM, and other networks.

The ant is quite efficient; it does not waste much time hauling non-productive things to its colony. So, even though virtual networks are part of the subject matter of this book, I chose not to show this term on the cover. After all, no self-respecting ant would waste its time transporting something that doesn't exist.



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Preface

This book is one in a collection of books titled Advanced Communications Technologies. It is also a companion to two Asynchronous Transfer Mode (ATM) books in this series, volumes I and II, titled *ATM: Foundation for Broadband Networks,* and *ATM: Signaling in Broadband Networks,* respectively.

This volume deals with a major issue in the industry: integrating the ATM technology into existing systems. The approach taken is called internetworking (or interworking): connecting ATM networks to existing systems. In so far as possible, the internetworking operations makes the presence of ATM transparent to the existing systems.

If ATM is to be successful, prominent technologies must be supported by ATM, or integrated into the ATM technology. Several of these technologies are discussed in this book. They are: (a) Frame Relay, (b) Ethernet and Token Ring local area networks, and (c) Internet Protocol (IP)-based internets and intranets.

Many issues surrounding the subject of ATM internetworking must be resolved, such as migration plans, deployment schedules, and acquisition decisions. Moreover, the tradeoffs of ATM vs. Fast Ethernet, and ATM vs. IPv6 (IP, version 6) are far from settled. In many network situations, these technologies provide attractive alternatives to ATM.

However, the majority of the technical issues pertaining to the internetworking of ATM to Frame Relay, Ethernet, Token Ring, and IP have been resolved, due to the work of the ATM Forum, the Frame Relay

Forum, several Internet Task Forces, and some of the formal standards bodies. It is this subject that this book addresses.

I hope you find this information useful, and this book a welcome addition to your library. I can be reached at:

102732.3535@compuserve.com.

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