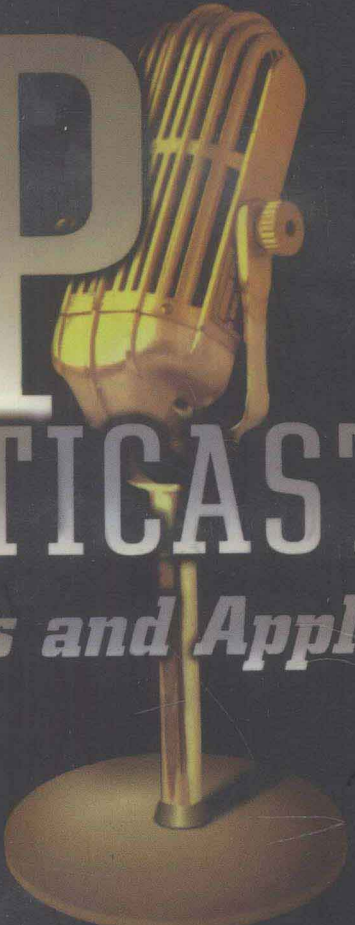




IP MULTICASTING

Concepts and Applications

M. GONCALVES & K. NILES

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CONCEPTS AND APPLICATIONS

江苏工业学院图书馆

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Preface

Introduction

Today, the Internet and corporate intranets are being used to communicate the same information to large numbers of people. IP multicasting, a technology for efficiently sending and receiving information from a group of hosts, rather than through the more traditional one-on-one interactions, creates a single stream of data to which users subscribe. This allows a few server streams to serve much larger numbers of users. Multicast reduces bandwidth demands by carrying only one instance of the data to multiple destinations.

IP multicasting is based on Class D IP addresses, where a single address points to multiple users or group members. IP multicasting floods a file to the network, to each router, which passes it on to the computers that subscribe to the information. The traditional broadcast model sends separate copies of the same data to each user.

IP multicast relies on the existence of an underlying multicast delivery system to forward data from a sender to all the intended receivers. Until all the routers on the Internet are multicast-enabled, multicast through the Internet will be limited to tunneling, services offered by multicast-enabled islands, and some Internet service providers. In the meantime, however, it is possible to deploy IP multicast using a private virtual network based on a network architecture or network service that is multicast-enabled.

The next big advance in IP multicasting technology will probably come in the area of reliable delivery of data. IP multicast protocol does not include any acknowledgment mechanism to determine whether the data sent to recipients have arrived correctly. Much research is underway to address this issue and the IETF has recently formed a working group to sort out the maze of proposed protocols and tools and come up with recommendations.

IP multicast is eminently useful for deploying information from applications based on push technologies where bandwidth consumption is a problem. For example, the IP multicast protocol uses only the bandwidth required to update a single desktop in order to update several hundred desktops requesting the same data.

Multicast technology is being heavily used for experimentation into audio/video conferencing over IP. Some commercial applications are coming into their own. Big organizations such as Toys 'R Us, Ford Motor Company, General Motors, The Ohio Company, and the American Stock Exchange are already using multicasting technology to solve software and information distribution problems. Some satellite delivery companies also are using IP multicast over their delivery systems.

For a full-blown implementation of IP multicast to work, both the hardware and software in the data path need to support IP multicast. The good news is that IP multicast is already supported in the newest equipment from networking vendors such as Cisco, and a few ISPs such as MCI and Uninet are beginning to deploy IP multicast services.

Who Should Read This Book

This book is an introduction to IP multicast concepts and features and is intended for users with varying degrees of experience with the IP multicast technologies, decisionmakers wrestling with the problems of corporate communication, system administrators and operators managing their own workstations, and programmers. Finally, this book is intended for communications specialists, field system engineers, and the general audience who wants or needs to know about IP multicasting.

This book can be used by those who design or develop applications that run on the network or work in technical support. It can be used to gain a basic understanding of IP multicasting and as a source for information about IP multicasting. Information about ISPs, suppliers and vendors, current and future IP multicasting applications, implementations, and supporting software is here.

For an engineer interested in evaluating or implementing IP multicast for an organization, product or service, this book will facilitate understanding of how to deploy IP multicast over these network infrastructures.

Organization

The book is organized into 24 chapters and appendices, which are broadly separated into four parts:

PART I TCP/IP and IP Multicasting Fundamentals

This part comprises Chapters 1 through 10 and is about the technology around IP multicasting. We provide a brief history of the Internet and introduce the different types of network infrastructures upon which IP multicast can run. This part also includes fundamentals about IP multicasting, describes how it works, introduces multicast routing concepts, algorithms, and protocols, presents interoperability, tunneling, and implementation issues, and touches on the challenges facing IP multicasting.

PART II The Mbone and Other Multicast Networks

Part two consists of Chapters 11 through 15 and is about preparing for and multicasting on different network infrastructures. We discuss Asynchronous Transfer Mode technology and the Mbone, we briefly look at the higher-level protocols used with IP multicast, we investigate writing IP multicast applications, and introduce some standard IP multicast application programming interfaces.

PART III IP Multicasting Applications

This consists of Chapters 16 through 21 and is about IP multicast applications, equipment, and suppliers. We look at some of the major players, IP multicasting application software for servers and clients, and IP multicasting content providers, management and middleware software products, and IP multicasting network service providers. Lastly we describe available IP multicasting network equipment and software development kits.

PART IV IP Multicasting Resource Center

Chapters 22-24 are about techniques used for developing IP multicast-enabled applications and how to deploy IP multicast in a diverse network platform. They also cover the main IP multicast switch equipment, including both companies and their products.

Appendixes provide a comprehensive list of IP Multicast acronyms, a bibliography, and an extensive glossary.

Typographic Conventions

Code and data structures examples included in the book are expressed in Courier fonts.

A Note on Trademarks and Standards

Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.

We have made reference to many RFCs. This is a very fast-moving area and we have attempted to be as accurate as possible. Part of this book probably became out of date as we wrote it, and other parts may have changed as the book was being published. The standards and the code and applications themselves are, as always, the best source of information.

A great many RFCs were used in the preparation of this document and we gratefully acknowledge all the authors. The bibliography at the end of this book lists the RFCs and their respective authors. The following copyright notice applies to all RFCs:

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