About This Guide

This section discusses the objectives, audience, organization, and conventions of the **Internetwork Design Guide**.

Document Objectives

This guide presents a set of general guidelines for planning internetworks and provides specific suggestions for several key internetworking implementations. The remaining chapters in this guide are technology chapters that present detailed discussions about specific implementations of large-scale internetworks in the following environments:

- Large-scale Internetwork Protocol (IP) internetworks
 - Enhanced Interior Gateway Routing Protocol (IGRP) design
 - Open Shortest Path First (OSPF) design
- IBM System Network Architecture (SNA) internetworks
 - Source-route bridging (SRB) design
 - Synchronous Data Link Control (SDLC) and serial tunneling (STUN), SDLC Logical Link Control type 2 (SDLLC), and Qualified Logical Link Control (QLLC) design
 - Advanced Peer-to-Peer Networking (APPN) and Data Link Switching (DLSw) design
- ATM internetworks
- Packet service internetworks
 - Frame Relay design
- Dial-on-demand routing (DDR) internetworks
- ISDN internetworks

In addition to these technology chapters there are chapters on designing switched LAN internetworks, campus LANs, and internetworks for multimedia applications.

Note The term *router* is used throughout this guide to refer to internetworking devices that also offer bridging and gateway functions. Routers are sometimes called *intermediate systems*. End stations are also called *end systems*.

The objective of this guide is to help you identify and implement *practical* internetworking strategies that are flexible enough to fit a variety of situations and that can also scale up as your network requirements change. The **Internetwork Design Guide** focuses on identifying the essential technologies and appropriate implementations for specific environments. It is not the final word in internetwork design. Do not try to use this as a step-by-step handbook for designing every facet of your internetwork.

This manual, the **Internetwork Design Guide** publication, helps you identify features and capabilities of routers and switches that meet specific internetworking requirements. It is not a comprehensive encyclopedia of network design strategy. The emphasis is not on issues such as maximum cable runs or the relative merits of IEEE 10BaseT and thin Ethernet.

The central elements of this guide are the technology chapters, which consist of the following:

- Technology-specific issues
- Router-related implications of design implementation
- Implementation recommendations

The technology chapters do not cover every possible implementation, but they address a variety of environments that are commonly encountered when designing internetworks.

Note The *Internetworking Case Studies* publications are companion guides to this design guide. Case studies provide internetwork scenarios with detailed configuration examples for specific Cisco features.

Audience

This guide is intended for the network administrator who designs and implements router- or switched-based internetworks. Readers should know how to configure a Cisco router and switch and should be familiar with the protocols and media that their routers and switches are configured to support. Knowledge of basic network topology is essential.

Document Organization

This document consists of the following chapters:

- Chapter 1, "Introduction," provides an overview of the trends and challenges that network designers face today when designing internetworks.
- Chapter 2, "Internetworking Design Basics," provides introductory material that outlines the key
 issues in designing effective large-scale internetworks, contrasts switching and routing, and
 describes the three key service layers associated with internetworks: access, distribution, and
 backbone. The chapter also provides a general mapping of feature capabilities into this
 hierarchical approach to internetwork design along with a brief overview of the different types of
 internetworking devices.
- Chapter 3, "Designing Large-Scale IP Internetworks," focuses on routing protocols for large-scale IP internetworks and describes the characteristics of two routing protocols: Enhanced IGRP and Open Shortest Path First (OSPF).
- Chapter 4, "Designing SRB Internetworks," describes the issues that pertain to designing internetworks that use source-route bridging and remote source-route bridging.

- Chapter 5, "Designing SDLC, SDLLC, and QLLC Internetworks," provides information about designing internetworks that use routers in IBM front-end processor (FEP) environments.
- Chapter 6, "Designing APPN Internetworks," describes the issues that pertain to designing internetworks that use APPN.
- Chapter 7, "Designing DLSw+ Internetworks," provides information about designing internetworks that use Data Link Switching Plus (DLSw+).
- Chapter 8, "Designing ATM Internetworks," focuses on the use of Asynchronous Transfer Mode (ATM) technology and LAN Emulation (LANE) in designing WANs.
- Chapter 9, "Designing Packet Service Internetworks," focuses on Frame Relay to describe the implementation of packet-switching services in terms of hierarchical network design, topology, broadcast issues, and performance.
- Chapter 10, "Designing DDR Internetworks," describes the design of dial-on-demand routing (DDR) internetworks. DDR provides connectivity across Public Switched Telephone networks and works with access lists to determine the kinds of packets that initiate a connection.
- Chapter 11, "Designing ISDN Internetworks," describes issues that pertain to designing internetworks that use Integrated Services Digital Network (ISDN) technology. The chapter includes techniques for maximizing performance and minimizing connection costs.
- Chapter 12, "Designing Switched LAN Internetworks," focuses on the operation of LAN switches and compares them with routers. The chapter provides vital information on scalability and the use of routers and virtual LANs (VLANs) in switched LAN internetwork designs.
- Chapter 13, "Designing Internetworks for Multimedia," describes the evolution of video and audio capture and compression standards and how these standards affect the way that multimedia applications run in networks today. This chapter shows the transition of a traditional LAN design (capable of handling modest multimedia applications) to switched LAN designs capable of handling bandwidth-intensive multimedia applications.
- Appendix A, "Subnetting an IP Address Space," provides a detailed example of subnetting a Class B network.
- Appendix B, "IBM Serial Link Implementation Notes," clarifies some common misconceptions about half-duplex, full-duplex, and multipoint connections.
- Appendix C, "SNA Host Configuration for SRB Networks," describes the configuration of IBM devices, such as FEPs, VTAM-switched major nodes, and 3174 cluster controllers, and provides information about configuration values that optimize the device's connection to a router.
- Appendix D, "SNA Host Configuration for SDLC Networks," provides configuration information about FEPs and 3174 cluster controllers in routed SDLC environments.
- Appendix E, "Broadcasts in Switched LAN Internetworks," presents the results of testing the effect of broadcasts on UNIX, PC, and Macintosh hosts running IP, IPX, and AppleTalk in a flat network topology.
- Appendix F, "References and Recommended Reading," lists books, periodicals, technical publications, and standards that provide additional information that will help you design efficient internetworks.