



# BGP Design and Implementation

Practical guidelines for designing and deploying a scalable BGP routing architecture



# BGP Design and Implementation

**Randy Zhang, CCIE No. 5659**

**Micah Bartell, CCIE No. 5069**

**Cisco Press**

Cisco Press  
800 East 96th Street, 3rd Floor  
Indianapolis, IN 46240 USA

# BGP Design and Implementation

## Table of Contents

### Table of Contents

#### Introduction

#### Part I: Understanding Advanced BGP

##### Chapter 1 Advanced BGP Introduction

- Understanding BGP Characteristics

- Comparing BGP and IGP

##### Chapter 2 Understanding BGP Building Blocks

- Comparing the Control Plane and Forwarding Plane

- BGP Processes and Memory Use

- BGP Path Attributes

- Understanding Internal BGP

- Path Decision Process

- BGP Capabilities

- BGP-IGP Routing Exchange

- Routing Information Base

- Switching Paths

- Case Study: BGP Memory Use Estimation

- Summary

##### Chapter 3 Tuning BGP Performance

- BGP Convergence Tuning

- BGP Network Performance Features

- Case Study: BGP Convergence Testing

- Summary

##### Chapter 4 Effective BGP Policy Control

# **Table of Contents**

- Policy Control Techniques
- Conditional Advertisement
- Aggregation and Deaggregation
- Local AS
- QoS Policy Propagation
- BGP Policy Accounting
- Case Study: AS Integration via the Local AS
- Summary

## **Part II: Designing BGP Enterprise Networks**

### **Chapter 5 Enterprise BGP Core Network Design**

- Using BGP in the Enterprise Core
- BGP Network Core Design Solutions
- Remote Site Aggregation
- Case Study: BGP Core Deployment
- Summary

### **Chapter 6 Internet Connectivity for Enterprise Networks**

- Determining What Information to Accept from Upstream Providers
- Multihoming
- Route Filtering
- Load Balancing
- Additional Connectivity Concerns
- Case Study: Load Balancing in a Multihoming Environment
- Summary

## **Part III: Designing BGP Service Provider Networks**

### **Chapter 7 Scalable iBGP Design and Implementation Guidelines**

- Issues of iBGP Scalability
- Route Reflection
- Confederation
- Confederation Versus Route Reflection

# **Table of Contents**

Summary

## **Chapter 8 Route Reflection and Confederation Migration Strategies**

General Migration Strategies

Case Study 1: iBGP Full Mesh to Route Reflection Migration

Case Study 2: iBGP Full Mesh to Confederation Migration

Case Study 3: Route Reflection to Confederation Migration

Case Study 4: Confederation to Route Reflection Migration

Summary

## **Chapter 9 Service Provider Architecture**

General ISP Network Architecture

Transit and Peering Overview

BGP Community Design

BGP Security Features

Case Study: Distributed Denial-of-Service Attack Mitigation

Summary

## **Part IV: Implementing BGP Multiprotocol Extensions**

### **Chapter 10 Multiprotocol BGP and MPLS VPN**

BGP Multiprotocol Extension for MPLS VPN

Understanding MPLS Fundamentals

Building MPLS VPN Architectures

VPNs Across AS Borders

Deployment Considerations

Case Study: Inter-AS VPN Using Multihop eBGP Between RRs and IPv4 Labels

Summary

### **Chapter 11 Multiprotocol BGP and Interdomain Multicast**

Multicast Fundamentals

Interdomain Multicast

Case Study: Service Provider Multicast Deployment

Summary

# **Table of Contents**

## Chapter 12 Multiprotocol BGP Support for IPv6

IPv6 Enhancements

IPv6 Addressing

MP-BGP Extensions for IPv6 NLRI

Configuring MP-BGP for IPv6

Case Study: Deploying a Dual-Stack IPv4 and IPv6 Environment

Summary

## Part V: Appendixes

Appendix A: Multiprotocol BGP Extensions for CLNS Support

Appendix B: Matrix of BGP Features and Cisco IOS Software Releases

Appendix C: Additional Sources of Information

Appendix D: Acronym Glossary

A

B

C

D

E

F

G

I

L

M

N

O

P

Q

R

S

# Table of Contents

T  
U  
V

Index