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CISCO

BGP – Configuring BGP on Cisco Routers v4.0 Certification Training

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Course Overview

Our 5-day instructor-led Live Online course Configuring BGP on Cisco Routers version 4.0 provides students with in-depth knowledge of Border Gateway Protocol (BGP), the routing protocol that is one of the foundations of the Internet and New World technologies such as Multiprotocol Label Switching (MPLS). This curriculum covers the theory of BGP, configuration of BGP on Cisco IOS routers, detailed troubleshooting information, and hands-on exercises that provide learners with the skills that they need to configure and troubleshoot BGP networks in customer environments. Different service solutions in the curriculum cover BGP network design issues and usage rules for various BGP features, preparing learners to design and implement efficient, optimal, and trouble-free BGP networks.

To participate in the hands-on labs in this class, you need to bring a laptop computer with the following:

- Windows 7 or 8.1 or 10 is recommended. Mac OSX 10.6 or greater is supported as well.
- Intel Celeron or better processors are preferred.
- 1 GB or more of RAM

Browser Requirements: Internet Explorer 10 or greater or Mozilla Firefox. (Safari and Mozilla Firefox for Mac OSX)

- All students are required to have administrator rights to their PCs and cannot be logged in to a domain using any Group Policies that will limit their machine's capabilities.
- If you do not have administrator rights to your PC, you at least need permissions to download, install, and run Cisco Any Connect Client.
- If you are participating in a WebEx event, it is highly recommended to take this class at a location that has bandwidth speeds at a minimum of 1 Mbps bandwidth speeds.

Note: Students registering for this course will be receiving their course kit in a digital format.

Course Objectives

After completing this course the student should be able to:

- Describe how to configure, monitor, and troubleshoot basic BGP to enable interdomain routing in a network scenario with multiple domains
- Describe how to use BGP policy controls to influence the BGP route selection process in a network scenario In which you must support connections to multiple ISPs
- Describe how to use BGP attributes to influence the route selection process in a network scenario where you must support multiple connections
- Describe how to successfully connect the customer network to the Internet in a network scenario in which multiple connections must be implemented
- Describe how to configure the service provider network to behave as a transit AS in a typical implementation with multiple BGP connections to other autonomous systems
- Enable route reflection as possible solution to BGP scaling issues in a typical service provider network with multiple BGP connections to other autonomous systems
- Describe the available BGP tools and features to optimize the scalability of the BGP routing protocol in a typical BGP network

Prerequisites

The knowledge and skills that a learner must have before attending this course are as follows:

- Intermediate to advanced knowledge of Cisco IOS Software configuration
- Configuring and troubleshooting RIP, EIGRP, OSPF and IS-IS
- Skills and knowledge equivalent to those learned in:
    - Interconnecting Cisco Networking Devices v2.0, Part 1 (ICND1 v2.0) and Part 2 (ICND2 v2.0), or
    - Interconnecting Cisco Networking Devices: Accelerated Version 2.0 (CCNAX v2.0)
    - Implementing Cisco IP Routing (ROUTE v2.0)
    - Building Cisco Service Provider Next-Generation Networks Part 1 (SPNGN1) v1.2
    - Building Cisco Service Provider Next-Generation Networks Part 2 (SPNGN2) v1.2

Schedule

Currently, there are no public classes scheduled. Please contact a Phoenix TS Training Consultant to discuss hosting a private class at 301-258-8200.

Program Level

Advanced

Training Delivery Methods

Group Live

Duration

5 Days / 32 hours Training

CPE credits

26 NASBA CPE Credits

Field of Study

Information Technology

Advanced Prep

N/A

Course Registration

Candidates can choose to register for the course by via any of the below methods:

- Email: Sales@phoenixts.com
- Phone: 301-582-8200
- Website: www.phoenixts.com

Upon registration completion candidates are sent an automated course registration email that includes attachments with specific information on the class and location as well as pre-course study and test preparation material approved by the course vendor. The text of the email contains a registration confirmation as well as the location, date, time and contact person of the class.

Online enrolment closes three days before course start date.

On the first day of class, candidates are provided with instructions to register with the exam provider before the exam date.

Complaint Resolution Policy

To view our complete Complaint Resolution Policy policy please click here: Complaint Resolution Policy

Refunds and Cancellations

To view our complete Refund and Cancellation policy please click here: Refund and Cancellation Policy

Who Should Attend

The primary audience for this course is as follows:

- This course is intended primarily for network administrators, network engineers, network managers and systems engineers who would like to implement BGP.

The secondary audience for this course is as follows:

- This course is intended for network designers and project managers. The course is also recommended to all individuals preparing for BGP exam.

Duration

5 Days

Price

$3,795

Course Outline

Module 1: BGP Overview

Lesson 1: Introducing BGP

- Interdomain Routing
- Why External Routing Protocols?
- BGP Characteristics
- BGP Development Considerations
- Single-Homed Customers
- Multihomed Customers

- Transit Autonomous Systems
- BGP Limitations
- Summary

Lesson 2: Understanding BGP Path Attributes

- BGP Path Attributes
- Well-Known BGP Attributes
- Optional BGP Attributes
- AS-Path Attribute
- Next-Hop Attribute
- Summary

Lesson 3: Establishing BGP Sessions

- BGP Neighbor Discovery
- Establishing a BGP Session
- BGP Keepalives
- MD5 Authentication
- Summary

Lesson 4: Processing BGP Routes

- Receiving Routing Updates
- Building BGP Table
- BGP Route Selection Criteria
- BGP Route Propagation
- Building IP Routing Table
- Advertising Local Networks
- Automatic Summarization
- Summary

Lesson 5: Configuring Basic BGP

- BGP Routing Process
- Configuring External Neighbors
- Discovery 1: Configure Basic BGP
- Announcing Networks in BGP
- Redistributing Routes into BGP
- Discovery 2: Announcing Networks in BGP
- BGP Conditional Route Injection
- BGP Support for TTL Security Check
- Discovery 3: Implement BGP TTL Security Check
- Multihomed Customer Problem
- Summary

Lesson 6: Monitoring and Troubleshooting BGP

- Monitoring Overall BGP Routing
- Monitoring BGP Neighbors
- Monitoring BGP Table
- Debugging BGP
- BGP Session Startup Problems
- BGP Neighbor Not Reachable

- BGP Neighbor Not Configured
- BGP AS Number Mismatch
- Summary

Lesson 7: Module Summary

- References

Lesson 8: Module Self-Check

Module 2: BGP Transit Autonomous Systems

Lesson 1: Working with Transit AS

- Transit AS Tasks
- External Route Propagation
- Internal Route Propagation
- Packet Forwarding in AS
- Core Router IBGP Requirements in Transit AS
- Discovery 4: BGP Route Propagation
- Summary

Lesson 2: Interacting with IBGP and EBGP in Transit AS

- AS-Path Processing in IBGP
- Multipath Load Sharing in BGP
- BGP Split Horizon
- IBGP Full Mesh
- IBGP Neighbors
- IBGP Next-Hop Processing
- Discovery 5: IBGP Full Mesh
- Transit Network Using Edge Routers as Next Hops Example
- Differences Between EBGP and IBGP Sessions
- Scalability Limitations of IBGP-Based Transit Backbones
- Summary

Lesson 3: Forwarding Packets in Transit AS

- Packet Forwarding in Transit AS
- Recursive Lookup in Cisco IOS Software
- Routing Protocols in Transit AS
- BGP and IGP Interaction
- Discovery 6: BGP Administrative Distance
- Problems with BGP and IGP Interaction
- Summary

Lesson 4: Monitoring and Troubleshooting IBGP in Transit AS

- Monitoring IBGP
- Common IBGP Problems
- Troubleshooting IBGP Session Startup Issues
- Troubleshooting IBGP Route Selection Issues
- Troubleshooting IBGP Synchronization Issues
- Summary

Lesson 5: Module Summary
- References

Lesson 6: Module Self-Check

Module 3: Route Selection Using Policy Controls

Lesson 1: Using Multihomed BGP Networks
- Business Requirements for Multihomed BGP Networks
- Technical Requirements for Multihomed BGP Networks
- BGP Route Selection Without BGP Policies
- Multihomed Customer Routing Policies
- Influencing BGP Route Selection
- Transit Traffic Issue
- Routing Update Reliability Issue
- Return Traffic Issue
- Summary

Lesson 2: Employing AS Path Filters
- AS Path Filtering Scenarios
- AS Path Regular Expressions
- String Matching
- Applying AS Path Filters
- Configuring BGP AS Path Filters
- Discovery 7: Configure Non-Transit Autonomous System
- Monitoring AS Path Filters
- Summary

Lesson 3: Filtering with Prefix Lists
- Requirements for Prefix-Based Filters
- Prefix Lists vs. IP Access Lists
- Configuring Prefix Lists
- BGP Filters Implementation
- Implementing Prefix Lists in the BGP Process
- Discovery 8: Filtering Customer Prefixes
- Modifying Prefix Lists
- Monitoring Prefix Lists
- Summary

Lesson 4: Using Outbound Route Filtering
- Outbound Route Filtering
- Inbound vs. Outbound Filtering Example
- BGP Prefix-Based Outbound Route Filtering
- Outbound Route Filter Message
- Configuring Outbound Route Filtering
- Using Outbound Route Filtering
- Discovery 9: Prefix-Based Outbound Route Filtering
- Summary

Lesson 5: Applying Route Maps as BGP Filters
- Route Map Overview
- BGP Route-Map Policy List Support
- BGP Route Map Continue
- Prefix List Use in Route Maps
- BGP Filters
- Using Route Maps as BGP Filters
- Discovery 10: Configure Route Maps as BGP Filters
- Summary

Lesson 6: Implementing Changes in BGP Policy
- Traditional Filtering Limitations
- BGP Soft Reset Enhancement
- Route Refresh
- Configuring Route Refresh
- Monitoring Route Refresh
- Summary

Lesson 7: Module Summary
- References

Lesson 8: Module Self-Check

Module 4: Route Selection Using Attributes

Lesson 1: Influencing BGP Route Selection with Weights
- BGP Route Selection Criteria
- Influencing BGP Route Selection
- Configuring Per-Neighbor Weights
- Discovery 11: Configure Per-Neighbor Weights
- Changing Weights with Route Maps
- BGP Route Selection and Filtering Tools Summary
- Summary

Lesson 2: Setting BGP Local Preference
- Consistent Route Selection Within the AS
- BGP Local Preference
- Configuring Default Local Preference
- Monitoring Local Preference
- Discovery 12: Configure and Monitor Local Preference
- Configuring Local Preference with Route Maps
- Discovery 13: Configure Local Preference Using Route Maps
- Summary

Lesson 3: Using AS Path Prepending
- Return Path Selection in a Multihomed AS
- AS Path Prepending
- AS Path Prepending Design Considerations
- Discovery 14: Configure AS Path Prepending

- BGP Hide Local-Autonomous System
- Summary

Lesson 4: Understanding BGP Multi-Exit Discriminators

- Selecting the Proper Return Path
- MED Propagation in a BGP Network
- Changing MED
- Discovery 15: Configure MED
- Troubleshooting the MED
- Advanced MED Configuration
- Summary

Lesson 5: Addressing BGP Communities

- Selecting the Proper Return Path
- BGP Communities Overview
- Using Communities
- Configuring BGP Communities
- Discovery 16: Configure Local Preference Using the Communities
- BGP Named Community Lists
- BGP Cost Community
- BGP Link Bandwidth Feature
- BGP Support for Sequenced Entries in Extended Community Lists
- Summary

Lesson 6: Module Summary

Lesson 7: Module Self-Check

Module 5: Customer-to-Provider Connectivity with BGP

Lesson 1: Understanding Customer-to-Provider Connectivity Requirements

- Customer-to-Provider Connectivity Types
- Customer Redundant Connectivity
- Customer-to-Provider Routing Schemes
- Customer Routing Schemes
- Customer Addressing Requirements
- Customer AS Number Allocation
- Summary

Lesson 2: Implementing Customer Connectivity Using Static Routing

- When to Use Static Routing?
- Characteristics of Static Routing
- Designing Static Route Propagation in a Service Provider Network
- BGP Backup with Static Routes
- Floating Static Routes with BGP
- Load Sharing with Static Routes
- Summary

Lesson 3: Connecting a Customer to a Single Service Provider

- BGP Configuration on Customer Routers

- Conditional BGP Advertising in Customer Networks
- BGP Configuration on Service Provider Routers
- Removing a Private AS Numbers
- BGP Support for Dual AS Configuration for Network AS Migrations
- Backup Solutions with BGP
- Load Sharing
- Load Sharing with BGP Multipath
- Load Sharing with EBGP Multihop
- Summary

Lesson 4: Connecting a Multihomed Customer to Multiple Service Providers

- BGP Configuration for Multihomed Customers
- Multihomed Customer Address Space Selection
- Multihomed Customer AS Number Selection
- AS Number Translation
- Primary and Backup Link Selection
- BGP Incoming Link Selection
- Load Sharing with Multiple Providers
- Summary

Lesson 5: Module Summary

- References

Lesson 6: Module Self-Check

Module 6: Scaling Service Provider Networks

Lesson 1: Scaling IGP and BGP in Service Provider Networks

- Common Service Provider Network
- Route Propagation in Service Provider Networks
- Scaling Service Provider Routing Protocols
- Scaling Service Provider Addressing
- Summary

Lesson 2: Introducing and Designing Route Reflectors

- IBGP Scalability Issues in a Transit AS
- Route Reflector Split-Horizon Rules
- Redundant Route Reflectors
- Route Reflector Clusters
- Additional Route Reflector Loop-Prevention Mechanisms
- Network Design with Route Reflectors
- Potential Network Issues
- Hierarchical Route Reflectors
- Summary

Lesson 3: Configuring and Monitoring Route Reflectors

- Route Reflector Backbone Migration

- Configuring Route Reflectors
- Discovery 17: Configure Route Reflector
- Summary

Lesson 4: Module Summary

Lesson 5: Module Self-Check

Module 7: Optimizing BGP Scalability

Lesson 1: Improving BGP Convergence
- BGP Convergence
- BGP Processes
- CPU Effects of BGP Processes
- Improving BGP Convergence
- PMTU Discovery
- Increasing Input Queue Depth
- BGP Prefix Independent Convergence
- Bidirectional Forwarding Detection for BGP
- BGP Nonstop Forwarding Awareness
- BGP Scan Time
- BGP Advertisement Interval
- BGP Keepalive and Hold-Down Timers
- Summary

Lesson 2: Limiting the Number of Prefixes Received from a BGP Neighbor
- BGP Route Limiting
- Configuring the BGP Route Limiting
- Discovery 18: Configure BGP Route Limiting
- Summary

Lesson 3: Implementing BGP Peer Groups
- BGP Peer Groups Overview
- BGP Peer Groups as a Performance Tool
- BGP Peer Group Limitations
- Configuring BGP Peer Groups
- Discovery 19: Configure BGP Peer Groups
- BGP Peer Group Configuration Examples
- BGP Dynamic Update Peer Groups Feature
- BGP Peer Templates Overview
- BGP Peer Templates Inheritance
- BGP Peer Templates Configuration
- Summary

Lesson 4: Using BGP Route Dampening
- BGP Route Dampening
- BGP Route Dampening Operation
- Configuring BGP Route Dampening
- Discovery 20: Configure BGP Route Dampening

Lab Outline

Challenge 1: Configure a Basic BGP Network

- Configuring a Basic BGP Network

Challenge 2: Configure a BGP Transit AS

- Configure a Transit AS

Challenge 3: Configure BGP Using BGP Filtering

- Configuring BGP Using BGP Filtering Techniques

Challenge 4: Configure BGP Route Selection Using BGP Attributes

- Configuring BGP Route Selection Using BGP Attributes

Challenge 5: Configure BGP Route Reflectors

- Configuring Route Reflectors

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