**Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide**

# First Edition



ISBN-10: 1-58720-456-8
ISBN-13: 978-1-58720-456-2

**Warning and Disclaimer**



When reviewing corrections, always check the print number of your book. Corrections are made to printed books with each subsequent printing.

*First Printing: January 2015*

**Corrections for Feb 12, 2019**

| Pg | Error | Correction |
|---|---|---|
| 61 | Chapter 2, EIGRP Features, Third Paragraph, Last Sentence<br>Reads:<br>When using multicast on the segment, packets are sent to EIGRP's reserved multicast address 224.0.0.10 for IPv4 and FF00::A for IPv6. | Should read:<br>When using multicast on the segment, packets are sent to EIGRP's reserved multicast address 224.0.0.10 for IPv4 and FF02::A for IPv6. |

**Corrections for September 18, 2016**

| Pg | Error – Fourth Printing | Correction |
|---|---|---|
| 116 | Chapter 2, Table 2-2, Third and Fourth Lines of Binary Format<br>Reads:<br>0000101.00001110.00000000.00000000<br>0000101.00001110.00000000.00000000 | Should read:<br>0000101.00001100.00000000.00000000<br>0000101.00001101.00000000.00000000 |

**Corrections for August 25, 2016**

| Pg | Error – Fourth Printing | Correction |
|---|---|---|
| 286 | Chapter 4, Example 4-15 Caption<br>Reads:<br>**Example 4-15** *Redistributing EIGRP for IPv6 Routes as External Type 2 into OSPFv3* | Should read:<br>**Example 4-15** *Redistributing EIGRP for IPv6 Routes as External Type 1 into OSPFv3* |

**Corrections for December 11, 2015**

| Pg | Error – Second Printing | Correction |
|---|---|---|
| 272 | Chapter 4, First Paragraph, Last Sentence<br>Reads:<br>Likewise, to advertise the OSPF routes to EIGRP domain, the EIGRP process on R1 is configured to redistribute the OSPF routes in its routing table to its OSPF neighbors. | Should read:<br>Likewise, to advertise the OSPF routes to EIGRP domain, the EIGRP process on R1 is configured to redistribute the OSPF routes in its routing table to its EIGRP neighbors. |
| 291 | Chapter 4, Replace Second and Third Paragraphs | Replace with:<br>However, if the **redistribute** command is configured to assign a static metric of 3 hops (or lower), then R3 starts preferring the path R1-R5-R2-R4 to reach 10.2.0.0.0/24, because the hop count advertised by R1 is 3, and the hop count advertised by R4 is 6.<br><br>This results is suboptimal routing. Worse, because R3 now prefers the path to R1, it will advertise this to R4 with a hop count of 4. R4 now has the choice of the route from R3 with a hop count of 4 or the true path to the10.2.0.0/24 network with a hop count of 5. R4 will select the path to R3 and advertise this to R2. There is now a routing loop (R4, R2, R5, R1, R3, and R4). Packets destined for the 10.2.0.0/24 network that enter this loop will bounce around |

Deleted: however,

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| | | the loop and never reach the destination-network 10.2.0.0/24. |

**Corrections for September 25, 2015**

| Pg | Error – Second Printing | Correction |
|---|---|---|
| 91 | Chapter 2, First Number 3, Second Bullet<br>Reads:<br>▪ Metric = (1000 + 11,000) * 256 = 2,816,000 | Should read:<br>▪ Metric = (1000 + 10,000) * 256 = 2,816,000 |

**Corrections for August 27, 2015**

| Pg | Error – Second Printing | Correction |
|---|---|---|
| xxvii | Table I-1, Topic #1.1, Where Topic is Covered<br>Reads:<br>Chapter 1<br>Chapter 1 | Should read:<br>Chapter 5<br>Chapter 5 |
| xxviii | Table I-1, Topic #3.12, Where Topic is Covered<br>Reads:<br>Chapter 4 | Should read:<br>Chapter 5 |
| 90 | Chapter 2, The calculation of the top path follows:, No. 3, Second Bullet Point<br>Reads:<br>▪ Metric – (1000 + 11,000) * 256 = 2,816,000 | Should read:<br>▪ Metric – (1000 + 10,000) * 256 = 2,816,000 |

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| 129 | Chapter 2, Configuring and Verifying EIGRP for IPv6, Fourth Bullet Point<br>Reads:<br>▪ **BR1 – Ethernet 0/0**: FE80:200::2 | Should read:<br>▪ **BR2 – Ethernet 0/0**: FE80:200::2 |
| 131 | Chapter 2, Third Paragraph, Second Sentence<br>Reads:<br>Routers will try to determine the router ID based on the highest configured IPv4 address on a loopback interface or, if no loopback is configured, based on the highest configured IPv4 address on a physical interface. | Should read:<br>Routers will try to determine the router ID based on the highest configured IPv4 address on a loopback interface or, if no loopback is configured, based on the highest configured IPv4 address on an active physical interface. |
| 139 | Chapter 2, First Paragraph<br>Reads:<br>Basic EIGRP must be removed from interface configuration mode for IPv4 and from global configuration mode from both IPv4 and IPv6. | Should read:<br>Basic EIGRP must be removed from interface configuration mode for IPv6 and from global configuration mode from both IPv4 and IPv6. |
| 165 | Chapter 3, Example 3-5 Caption<br>Reads:<br>**Example 3-5** *Verifying OSPF Neighborships on R2 and R2* | Should read:<br>**Example 3-5** *Verifying OSPF Neighborships on R2 and R3* |
| 184 | Chapter 3, First Paragraph after 3-9, Second Sentence<br>Reads:<br>EoMPLS and Layer 2 MPLS VPN typically do not participate in Shortest Tree Protocol (STP) and bridge protocol data unit (BPDU) | Should read:<br>EoMPLS and Layer 2 MPLS VPN typically do not participate in Spanning Tree Protocol (STP) and bridge protocol data unit (BPDU) exchanges, so EoMPLS and |

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| | exchanges, so EoMPLS and Layer 2 MPLS VPNs are transparent to the customer routers. | Layer 2 MPLS VPNs are transparent to the customer routers. |
| 247 | Chapter 3, First Paragraph, Second Sentence<br>Reads:<br>Within the OSPF process configuration mode, the OSPF process ID is defined (using the **router-id** *ospf-process-ID* command), the passive interfaces are set, and per-process OSPF behavior can be tuned. | Should read:<br>Within the OSPF process configuration mode, the OSPF router ID is defined (using the **router-id** *ospf-process-ID* command), the passive interfaces are set, and per-process OSPF behavior can be tuned. |
| 550 | Chapter 8, First Sentence after First Note<br>Reads:<br>The uRPF feature is enabled on a per-interface basis using the **ip verify unicast source reachable-via {rx \| any} [allow-default] [allow-self-ping]** [*list*] global configuration command. | Should read:<br>The uRPF feature is enabled on a per-interface basis using the **ip verify unicast source reachable-via {rx \| any} [allow-default] [allow-self-ping]** [*list*] interface configuration command. |
| 552 | Chapter 8, Second Bullet, Second Sentence<br>Reads:<br>An NTP client is enabled with the **ntp server** {*ntp-master-hostname* \| *ntp-master-ip-address* command}. | Should read:<br>An NTP client is enabled with the **ntp server** {*ntp-master-hostname* \| *ntp-master-ip-address}* command. |
| 559 | Chapter 8, Note<br>Reads:<br>Note SNMP uses UDP, port number 162, to retrieve and send management information. | Should read:<br>Note SNMP uses UDP, port 161; UDP port 162 is also used, for sending traps. |

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| 606 | Chapter 8, Question 8 , Question<br>Reads:<br>Based on the configuration, which statement is true about the **archive** command? | Should read:<br><br>Based on the configuration, which statements are true? |
| 612 | Appendix A, Chapter 8, Answer 8<br>Reads:<br>**8.** B | Should read:<br><br>**8.** B, D, E |

**Corrections for April 24, 2015**

| Pg | Error – First Printing | Correction |
|---|---|---|
| 377 | Chapter 6, Regional Internet Registries, Fourth Bullet<br>Reads:<br>▪ **Latin American and Caribbean IP Address Regional Registry (LACNIC):** Responsible for allocation in Latin America and portions of the Caribbean | Should read:<br><br>▪ **Latin American and Caribbean Internet Addresses Registry (LACNIC):** Responsible for allocation in Latin America and portions of the Caribbean |
| 520 | Chapter 7, First Bullet, Second sub-bullet under Summary<br>Reads:<br>▪ BGP's classification as a path vector protocol and its use of TCP protocol 179 | Should read:<br><br>▪ BGP's classification as a path vector protocol and its use of TCP port 179 |

**Corrections for April 10, 2015**

| Pg | Error – First Printing | Correction |
|---|---|---|
| xxviii | Frontmatter, Line 3.12, Third Column - Where Topic Is Covered<br>Reads:<br>Chapter 4 | Should read:<br>Chapter 5 |
| 34 | Chapter 1, Fourth Bullet<br>Add sentence | Add:<br>GRE is IP protocol 47. |
| 38 | Chapter 1, Second Paragraph, Fourth Sentence<br>Reads:<br>When the spoke router starts up, it automatically initiates the IPsec tunnel with the hub route. | Should read:<br>When the spoke router starts up, it automatically initiates the IPsec tunnel with the hub router. |
| 46 | Chapter 1, Last Example between the Last Two Paragraphs<br>Reads:<br>Router(config-if)# **ip summary-address** rip 102.0.0 255.255.0.0 | Should read:<br>Router(config-if)# **ip summary-address** rip 10.2.0.0 255.255.0.0 |
| 49 | Chapter 1, First Paragraph, Third Sentence<br>Reads:<br>AS RIPng process name has local significance, and as both interfaces will be included in the same routing process, RIPng configuration will be operations, even though two processes with different names has been defined. | Should read:<br>As RIPng process name has local significance, and as both interfaces will be included in the same routing process, RIPng configuration will be operations, even though two processes with different names has been defined. |

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| 50 | Chapter 1, Example 1-10, Second Line<br>Reads:<br>R1 (config-router)# **ipv6 rip CCNP_RIP 2001:db8:A01::/52** | Should read:<br><br>R1 (config-if)# **ipv6 rip CCNP_RIP 2001:db8:A01::/52** |
| 67 | Chapter 2, Fifth Bullet<br>Reads:<br>▪ **SRTT** column shows the amount of time, in milliseconds, required for the router to send an EIGP packet to its neighbor and receive an acknowledgement for the packet. | Should read:<br><br>**SRTT** column shows the amount of time, in milliseconds, required for the router to send an EIGRP packet to its neighbor and receive an acknowledgement for the packet. |
| 86<br>Thru<br>87 | Chapter 2, Last Paragraph, Second Sentence<br>Reads:<br>The last remaining route that satisfied the feasible condition is from the topology and routing table. | Should read:<br><br>The last remaining route that satisfied the feasible condition is gone from the topology and routing table. |
| 87 | Chapter 2, First Paragraph, Second to Last Sentence<br>Reads:<br>HQ responds to the query with the reply packet, which confirms that it has not alternative path to reach the lost network. | Should read:<br><br>HQ responds to the query with the reply packet, which confirms that it has a path to reach the lost network. |
| 90 | Chapter 2, Third Paragraph, Second Sentence<br>Reads:<br>EIGPR named mode configuration is discussed later in this chapter. | Should read:<br><br>EIGRP named mode configuration is discussed later in this chapter. |

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| 137 | Chapter 2, Figure 2-21, Router BR2 link between WAN<br>Reads:<br>Eth0/1 | Should read:<br><br>Eth0/0 |
| 148 | Chapter 2, Add Third Paragraph to First Bullet | Paragraph to add:<br>Example 2-95 is showing address family configuration mode, not address family interface configuration mode. |
| 148 | Chapter 2, Second Bullet,<br>Reads:<br>▪ Example 2-95 shows the commands on BR1 available in address family interface configuration mode: You should use address family interface configuration mode for all those commands that you have previously configured directly under interfaces. Most common options are setting summarization with the **summary-address** command or marking interfaces as passive using **passive-interface** command. You can also modify default hello and hold-time timers. | Should read:<br><br>Example 2-95 shows the commands on BR1 available in **address family configuration** mode.<br>▪ **Address family interface configuration mode:** You should use address family interface configuration mode for all those commands that you have previously configured directly under interfaces. Most common options are setting summarization with the **summary-address** command or marking interfaces as passive using **passive-interface** command. You can also modify default hello and hold-time timers. |
| 151 | Chapter 2, Example 2-98<br>Insert line between fifth and sixth line | Insert as follows:<br><br>!<br>________________________________________<br>Router eigrp LAB |

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| 151 | Chapter 2, Summary, First Sentence<br>Reads:<br>In this chapter, you learned about establishing EIGPR neighbor relationships, building the EIGRP topology table, optimizing EIGRP behavior, configuring EIGRP for IPv6, and implementing name EIGRP configuration. | Should read:<br>In this chapter, you learned about establishing EIGRP neighbor relationships, building the EIGRP topology table, optimizing EIGRP behavior, configuring EIGRP for IPv6, and implementing name EIGRP configuration. |
| 153 | Chapter 2, Question 4, For all answers<br>Changes made to all four answers | Replace the following:<br>Replace AD with RD |
| 153 | Chapter 2, Question 7<br>Reads:<br>**7.** Which verification command shows you advertised distance of received EIGRP IPv6 routes? | Should read:<br>**7.** Which verification command shows you reported distance of received EIGRP IPv6 routes? |
| 171 | Chapter 3, First Bullet, Second Sentence<br>Reads:<br>Each router, rather than exchanging link-state information with every other router on the segment, sends the link-state information to the DR and BDR only, by using a dedicated IPv4 multicast address 224.0.0.6 or FF00::6 for IPv6. | Should read:<br>Each router, rather than exchanging link-state information with every other router on the segment, sends the link-state information to the DR and BDR only, by using a dedicated IPv4 multicast address 224.0.0.6 or FF02::6 for IPv6. |
| 186 | Chapter 3, Table 3-1, Last Row in First Column<br>Reads:<br>Looback | Should read:<br>Loopback |

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| 187 | Chapter 3, Example 3-24, Last Two Configurations<br>Reads:<br>Router(config-if)# **passive-interface default**<br>Router(config-if)# **no passive-interface serial 1/0** | Should read:<br>Router(config-router)# **passive-interface default**<br>Router(config-router)# **no passive-interface serial 1/0** |
| 200 | Chapter 3, Example 3-35<br>Remove shading and add shading | Remove shading from:<br>Summary Net Link States (Area 0)<br>Add shading to:<br>Summary ASB Link States (Area 0) |
| 235 | Chapter 3, Fifth Paragraph, First Sentence<br>Reads:<br>Once R3 in area 1 is configured as a stub, the stub area flag in the OSPF Hello packets will start matching between R1 and R3. | Should read:<br>Once R3 in area 2 is configured as a stub, the stub area flag in the OSPF Hello packets will start matching between R1 and R3. |
| 262 | Chapter 3, First Paragraph, Last Sentence<br>Reads:<br>Therefore, those devices will not participate in the IPv4 address family SPF calculations and will not install the IPv4 OSPFv3 routes in the IPv6 Routing Information Base (RIB). | Should read:<br>Therefore, those devices will not participate in the IPv4 address family SPF calculations and will not install the IPv4 OSPFv3 routes in the IPv4 Routing Information Base (RIB). |
| 273 | Chapter 4, Default Seed Metrics, First Bullet, First Sentence<br>Reads:<br>▪ Routes redistributed into EIGRP and RIP are assigned a metric of infinity. | Should read:<br>▪ Routes redistributed into EIGRP and RIP are assigned a metric of 0, which is interpreted as infinity or unreachable. |

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| 275 | Chapter 4, Figure 4-5, Add label to R2, (underneath R2) | Label to add:<br>172.17.0.0 |
| 277 | Chapter 4, Table 4-3, Description for *delay-metric*, first sentence<br>Reads:<br>EIGRP route delay metric, in microseconds. | Should read:<br>EIGRP route delay metric, in 10s of microseconds. |
| 277 | Chapter 4, Table 4-3, add row above **route-map** | Row to add:<br>*mtu* Smallest allowed MTU in bytes. |
| 296 | Chapter 4, Last Paragraph, First Sentence<br>Reads:<br>For example, as an alternative to using the **distribute-list out** command in Example 4-17, a **distribute-list in** could be used on the R1 and R2 routers. | Should read:<br>For example, as an alternative to using the **distribute-list out** command in Example 4-17, a **distribute-list in** could be used on the R1 router. |
| 296 | Chapter 4, Last Paragraph, Last Sentence | Delete Last Sentence:<br>R2 would require a similar configuration. |
| 300 | Chapter 4, Example 4-20, Prompt<br>Reads:<br>R3# **show ip route ospf** | Should read:<br>R1# **show ip route ospf** |
| 316 | Chapter 4, First Paragraph under Example 4-38, First Sentence<br>Reads:<br>The **distance eigrp** command changes local default values for internal and external routes that are redistributed into EIGRP domain. | Should read:<br>The **distance eigrp** command changes local default values for internal and external routes in the EIGRP domain. |

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| 317 | Chapter 4, After Example 4-40, Insert Note | Note to insert:<br><br>**Note** The **distance** *admin-distance source-address source-wildcard-mask* [*access-list*] router configuration command can be used to change the administrative distance for RIP, OSPF, EIGRP, and BGP. For EIGRP, however, this command only works for EIGRP internal routes; it does not work for EIGRP external routes. For OSPF the *source-address* parameter is the source router ID. |
| 317 | Chapter 4, First Paragraph after Example 4-40<br><br>Reads:<br><br>In the example, ACL 30 identifies the four R3 routes, and this time the **distance** command assigns an administrative distance of 95 to updates from R3's IP address that match the routes listed in ACL 30. | Should read:<br><br>In the example, ACL 30 identifies the four R3 routes, and this time the **distance** command assigns an administrative distance of 95 to updates from R3's router ID that match the routes listed in ACL 30. |
| 318 | Chapter 4, After First Paragraph, Before Manipulating Redistribution Using Route Tagging, Delete Note (note listed in errata dated 02/13/2015) | Note delete:<br><br>**Note** The **distance** *admin-distance source-address source-wildcard-mask* [*access-list*] router configuration command can be used to change the administrative distance for RIP, OSPF, EIGRP, and BGP. For EIGRP, however, this command only works for EIGRP internal routes; it does not work for EIGRP external routes. |
| 326 | Chapter 4, Question 15, Answer f<br><br>Reads:<br><br>**f.** It changes local default administrative distance EIGRP values for redistributed internal routes to 80 and redistributed | Should read:<br><br>**f.** It changes local default administrative distance EIGRP values for internal routes to 80 and external routes to 100. |

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| | external routes to 100. | | |
| 347 | Chapter 5, Table 5-1, Replace First Command and Description | Replace with:<br>**match ip address** {*access-list-number* \| *name*} [...*access-list-number* \| *name*] | Matches any packets that have a source address that is permitted by a standard or extended access control list (ACL). Multiple ACLs can be specified. Matching any one results in a match. |
| 362 | Chapter 5, First Paragraph after Example 5-30, Second and Third Sentences<br>Reads:<br>Next the SLA test operation using the **icmp-echo 10.1.1.1 source-interface Ethernet 0/0** command. This configures the router to send the ICMP echoes to destination 10.1.1.1 using the Ethernet 0/0 interface as a source. | Should read:<br>Next the SLA test operation using the **icmp-echo 10.1.3.3 source-interface Ethernet 0/0** command. This configures the router to send the ICMP echoes to destination 10.1.3.3 using the Ethernet 0/0 interface as a source. | |
| 363 | Chapter 5, Example 5-33, Last Config<br>Reads:<br>R1(config)# **ip route** 0.0.0.0 0.0.0.0 10.1.1.1 3 track 2 | Should read:<br>R1(config)# **ip route** 0.0.0.0 0.0.0.0 172.16.1.1 3 track 2 | |
| 364 | Chapter 5, Figure 5-18, Add Label to PC | Label to add:<br>Notebook | |
| 379 | Chapter 6, Note, First Sentence<br>Reads:<br>Extensions to BGP-4, known as BGP4+, have been defined to support multiple protocols, including IPv6. | Should read:<br>Extensions to BGP-4, known as MP-BGP (or BGP4+), have been defined to support multiple protocols, including IPv6. | |

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| 401 | Chapter 6, Enabling SLAAC, Second Sentence reads:<br>If a default router is selected on this interface, the optional **default** keyword causes a default route to be installed using that default router. | Should read:<br>The optional **default** keyword causes a default route to be installed using the default router sending the RAs as the default router. |
| 428 | Chapter 7, BGP Characteristics, Second Paragraph, Third Sentence<br>Reads:<br>BGP information is carried inside TCP segments using protocol 179; these segments are carried inside IP packets. | Should read:<br>BGP information is carried inside TCP segments using port 179; these segments are carried inside IP packets. |
| 501 | Chapter 7, Example 7-46, Last Line of Configuration<br>Reads:<br>ip prefix-list desired-subnets permit 0.0.0.0/0 ge8 le 24 | Should read:<br>ip prefix-list desired-subnets permit 0.0.0.0/0 ge 8 le 24 |
| 544 | Chapter 8, Step 3<br>Reads:<br>**Step 3. Enable the use of SSH protocol:** Optionally allow SSH access only from authorized hosts by specifying an ACL. | Should read:<br>**Step 3. Allow SSH from authorized hosts:** Optionally allow SSH access only from authorized hosts by specifying an ACL. |
| 556 | Chapter 8, Step 1, First Sentence<br>Reads:<br>**Step 1**. Define NTP authentication key or keys with the **ntp authentication-key** global | Should read:<br>**Step 1**. Define NTP authentication key or keys with the **ntp authentication-key** *key_number* **md5** key global configuration command. |

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| | configuration command. | |
| 556 | Chapter 8, Example 8-18, First Line<br>Reads:<br>R1(config)# **ntp authentication-key md5 NTP-pa55w0rd** | Should read:<br>R1(config)# **ntp authentication-key 1 md5 NTP-pa55w0rd** |
| 556 | Chapter 8, Example 8-19, First Line<br>Reads:<br>S1(config)# **ntp authentication-key md5 NTP-pa55w0rd** | Should read:<br>S1(config)# **ntp authentication-key 1 md5 NTP-pa55w0rd** |
| 557 | Chapter 8, Simple NTP, Third Paragraph, First Sentence<br>Reads:<br>SNTP configuration commands simply replace the **ntp** portion of NTP commands with **snmp**. | Should read:<br>SNTP configuration commands simply replace the **ntp** portion of NTP commands with **sntp**. |
| 567 | Chapter 8, Example 8-28, Caption<br>Reads:<br>**Example 8-28** *Sample SCP Configuration on R1* | Should read:<br>**Example 8-28** *Using SCP on Router to Copy a File* |
| 567 | Chapter 8, Example 8-28, First Prompt<br>Reads:<br>R1# **copy scp: flash:** | Should read:<br>R2# **copy scp: flash:** |
| 567 | Chapter 8, Example 8-28, Fourth and Fifth lines<br>Reads:<br>Source filename []? **R1backup.cfg**<br>Destination filename [R1backup.cfg]? | Should read:<br>Source filename []? **R2backup.cfg**<br>Destination filename [R2backup.cfg]? |

<table>
<tr><td>567</td><td>Chapter 8, Example 8-28, Last Prompt<br>Reads:<br>R1#</td><td>Should read:<br><br>R2#</td></tr>
<tr><td>575</td><td>Chapter 8<br>Replace Example 8-34</td><td>Replace with:<br>Example 8-34 Sample EIGRP Key Chain Configuration

```
R1(config)# key chain R1-Chain
R1(config-keychain)# key 1
R1(config-keychain-key)# key-string firstkey
R1(config-keychain-key)# accept-lifetime 4:00:00 Jan 1 2015 4:00:00 Jan 31 2015
R1(config-keychain-key)# send-lifetime 4:00:00 Jan 1 2015 4:00:00 Jan 31 2015
R1(config-keychain-key)# exit
R1(config-keychain)# key 2
R1(config-keychain-key)# key-string secondkey
R1(config-keychain-key)# accept-lifetime 4:00:00 Jan 25 2015 4:00:00 Feb 28 2015
R1(config-keychain-key)# send-lifetime 4:00:00 Jan 25 2015 4:00:00 Feb 28 2015
R1(config-keychain-key)# end
R1#
```
</td></tr>
<tr><td>576</td><td>Chapter 8, Last Bullet<br>Reads:<br>▪ Classic IPv4 and IPv6 EIGRP neighbor authentication using the named EIGRP method</td><td>Should read:<br><br>▪ IPv4 and IPv6 EIGRP neighbor authentication using the named EIGRP method</td></tr>
<tr><td>588</td><td>Chapter 8, Example 8-53, Eighth Configuration<br>Reads:<br>R1(config-if)# interface s0/0/0</td><td>Should read:<br><br>R1(config)# interface s0/0/0</td></tr>
<tr><td>598</td><td>Chapter 8, Example 8-66 Caption<br>Reads:<br>Example 8-66 Sample VRF-Lite Configuration on R3</td><td>Should read:<br><br>Example 8-66 Sample VRF-Lite Configuration on Central</td></tr>
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| 610 | Appendix A, Chapter 4, Question 6, Answer<br>Reads:<br>**6.** B and F | Should read:<br><br>**6.** A and F |

**Corrections for March 19, 2015**

| Pg | Error – First Printing | Correction |
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| 25 | Chapter 1, Partial running-config for R1, Last Line<br>Reads:<br>ppp pap sent-username R2 password sameone | Should read:<br><br>ppp pap sent-username R1 password sameone |
| 262 | Chapter 3, Summary, Last Bullet Point<br>Reads:<br>▪ Use the **area** *area-id* command to define an area as stubby. | Should read:<br><br>▪ Use the **area** *area-id* stub router configuration command to define an OSPF area as stubby. |

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| 325 | Chapter 4, Question 10, Answers a thru f<br>Reads:<br>a. Sets the administrative distance to 3 for updates as identified in ACL 95 from any neighbor<br>b. Sets the administrative distance to 3 for updates as identified in ACL 95 from the neighbor with a router ID of 10.1.3.1<br>c. Sets the administrative distance to 3 for updates as identified in ACL 95 from the neighbor with the next-hop address of 10.1.3.1<br>d. Sets the administrative distance to 95 for updates as identified in ACL 3 from any neighbor<br>e. Sets the administrative distance to 95 for updates as identified in ACL 3 from the neighbor with a router ID of 10.1.3.1<br>f. Sets the administrative distance to 95 for updates as identified in ACL 3 from the neighbor with the next-hop address of 10.1.3.1 | Should read:<br>a. Sets that administrative distance to 30 for updates as identified in ACL 95 from any neighbor<br>b. Sets that administrative distance to 30 for updates as identified in ACL 95 from the neighbor with a router ID of 10.1.3.1<br>c. Sets that administrative distance to 30 for updates as identified in ACL 95 from the neighbor with the next-hop address of 10.1.3.1<br>d. Sets that administrative distance to 95 for updates as identified in ACL 30 from any neighbor<br>e. Sets that administrative distance to 95 for updates as identified in ACL 30 from the neighbor with a router ID of 10.1.3.1<br>f. Sets that administrative distance to 95 for updates as identified in ACL 30 from the neighbor with the next-hop address of 10.1.3.1 |
| 326 | Chapter 4, Question 14, Second Sentence<br>Reads:<br>Which prefix list configured on R3 would allow R1 to know about networks 172.16.10.0/24 and 172.16.11.0/24? | Should read:<br>Which prefix list configured on R3 would allow R1 to **only learn about networks** 172.16.10.0/24 **and** 172.16.11.0/24? **(R3 would not learn about network 172.16.0.0/16.)** |

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| 607 | Appendix A, Chapter 1, Answer to Question 1<br>Reads:<br>1. A converged network is one in which data, voice, and video traffic coexists on a single network. | Should read:<br><br>1. A converged network describes the state of the network in which all routers have the same view of the network topology. |
| 610 | Appendix A, Chapter 4, Answer 14<br>Reads:<br>14. A | Should read:<br><br>14. B |

**Corrections for February 23, 2015**

| Pg | Error – First Printing | Correction |
|---|---|---|
| 57 | Chapter 1, Question 14<br>Reads:<br>14. March each DMVPN component with its function.<br>a. Provides a scalable tunneling framework<br>b. Provides dynamic mutual discovery of spokes<br>c. Provides key management and transmission protection | Should read:<br><br>14. Match each DMVPN component with its function.<br>__IPsec<br>__mGRE<br>__NHRP<br>a. Provides a scalable tunneling framework<br>b. Provides dynamic mutual discovery of spokes<br>c. Provides key management and transmission protection |
| 607 | Appendix A, Chapter 1, Answer to 7<br>Reads:<br>7. When a router that is using a classful routing protocol sends an update about a subnet of a network across an | Should read:<br><br>7. When a router is performing autosummarization and it needs to send an update about a subnet of a network across an interface belonging to |

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| | interface belonging to a different network, the router assumes that the remote router will use the default subnet mask for that class of IP address. Therefore, when the router sends the update, it does not include the subnet information; the update packet contains only the major (classful) network information. | a different network, the router does not include the subnet, but rather sends the major (classful) network address instead. If the routing protocol is a classful routing protocol the (classful) subnet mask is not included and is assumed by the receiving router. If the routing protocol is a classless routing protocol, then the (classful) subnet mask is included with the update. |

**Corrections for February 13, 2015**

| Pg | Error – First Printing | Correction |
|---|---|---|
| 41 | Chapter 1, Section Incorrectly Listed<br>Reads:<br>**IPv4 Fragmentation and PMTUD** | Should read:<br><br>**IPv6 Fragmentation and PMTUD** |
| 50 | Chapter 1, Example 1-10, Second Command<br>Reads:<br>R1 (config-router)# ipv6 rip CCNP_RIP 2001:db8:A01::/52 | Should read:<br><br>R1 (config-router)# ipv6 rip CCNP_RIP summary-address 2001:db8:A01::/52 |
| 65 | Chapter 2, Example 2-1, Fifth Config<br>Reads:<br>BR1 (config-router)# **network 172.16.1.0** | Should read:<br><br>BR1 (config-router)# **network 172.16.0.0** |
| 71 | Chapter 2, Example 2-13, After Each<br>Hello-interval is 5, Hold-time is 15<br>Insert | Insert:<br><br><…output omitted…> |
| 72 | Chapter 2, Example 2-14, First HQ config<br>Reads: | Should read: |

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| | HQ(config)# **interface Serial 2/0** | HQ(config)# **interface Serial 1/0** |
| 77 | Chapter 2, Figure 2-6, Address for Router BR on Right<br>Reads:<br>192.168.0.0/24 | Should read:<br>192.168.1.0/24 |
| 78 | Chapter 2, Example 2-14, Last Prompt<br>Reads:<br>Branch# **no debug all** | Should read:<br>BR# **no debug all** |
| 80 | Chapter 2, Fourth Paragraph<br>Reads:<br>To complete the configuration on BR, the two remaining interfaces Ethernet 0/1 and 0/2 are configured to be a part of the EICRP process, as shown in Example 2-20. | Should read:<br>To complete the configuration on BR, the two remaining interfaces Ethernet 0/1 and Serial 0/2 are configured to be a part of the EICRP process, as shown in Example 2-20. |
| 90 | Chapter 2, Figure 2-7, Link from R7 to R4<br>Reads:<br>100 Mbps<br>Delay 10 ms | Should Read:<br>100 Mbps<br>Delay 20 ms |
| 91 | Chapter 2, Change Section title<br>Reads:<br>**EIGRP Metric Calculation Example** | Should read:<br>**Feasibility Condition** |
| 97 | Chapter 2, Second Paragraph<br>Reads:<br>Using the topology in Figure 2-14, notice that there are three routers: HQ, BR1A, and BR1B. All routers are already preconfigured with EIGRP. BR1B | Should read:<br>Using the topology in Figure 2-14, notice that there are three routers: HQ, BR1A, and BR1B. All routers are already preconfigured with EIGRP. BR1A announces the summary network 192.168.16.0/23 |

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| | announces to HQ summary network 192.168.16.0/23, which summarizes prefixes 192.168.16.0/24 and 192.168.17.0/24. BR1B, in contrast, announces its loopback with prefix 192.168.18.0/24 as an external EIGRP route. | (which summarizes prefixes 192.168.16.0/24 and 192.168.17.0/24) to HQ. BR1A redistributes its static route to 192.168.18.0/24 into EIGRP (so it is an external EIGRP route). BR1A is running EIGRP on all of its directly connected networks. |
| 110 | Chapter 2, Figure 2-18, Add external network above the Internet Cloud on the left next to the HQ router | External Network to add:<br><br>209.165.202.129 |
| 116 | Chapter 2, Table 2-2, Prefix Column, Last Entry<br>Reads:<br>10.8.0.0/16 | Should read:<br><br>10.8.0.0/13 |
| 123 | Chapter 2, Load Balancing with EIGRP section, Paragraph 2, Last Sentence<br>Reads:<br>Up to six equally good routes can be kept in the routing table. | Should read:<br><br>The maximum number of equally good routes that can be kept in the routing table is IOS version-dependent; testing results typically found 32 as the maximum. |
| 126 | Chapter 2, First Bullet Point<br>Reads:<br>▪ The route must be loop free. This condition is satisfied when the advertised distance is less than the total distance, or when the route is a feasible successor. | Should read:<br><br>▪ The route must be loop free. This condition is satisfied when the route is a feasible successor, such that its reported distance is less than the feasible distance of the successor route. |
| 134 | Chapter 2, Sentence Above Table 2-3<br>Reads:<br>In Table 2-3, the first 62 bits are common | Should read:<br><br>In Table 2-3, the first 62 bits are common among all |

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| | among all three subnets. Therefore, the best summary route is 2001:DB8:0:0::/62. | four subnets. Therefore, the best summary route is 2001:DB8:0:0::/62. |
| 134 | Chapter 2, Table 2-3<br>Reads:<br>Perfix Binary Format<br>2001:DB8:0:0::64 **2001:DB8:0:00000000000000**00<br>2001:DB8:0:1::64 **2001:DB8:0:00000000000000**01<br>2001:DB8:0:2::64 **2001:DB8:0:00000000000000**10<br>Summary route<br>2001:DB8:0:0::62 **2001:DB8:0:00000000000000**00 | Should read:<br>Perfix Binary Format<br>2001:DB8:0:0::/64 **2001:DB8:0:00000000000000**00::/64<br>2001:DB8:0:1::/64 **2001:DB8:0:00000000000000**01::/64<br>2001:DB8:0:2::/64 **2001:DB8:0:00000000000000**10::/64<br>2001:DB8:0:3::/64 **2001:DB8:0:00000000000000**11::/64<br>Summary route<br>2001:DB8:0:0::/62 **2001:DB8:0:00000000000000**00::/62 |
| 145 | Chapter 2, Example 2-90, First Command<br>Reads:<br>BR2# **show running configuration \| section router eigrp** | Should read:<br>BR2# **show running config \| section router eigrp** |
| 159 | Chapter 3, First Bullet Point title<br>Reads:<br>▪ **Backbone area, transit area or area 0:** | Should read:<br>▪ **Backbone area, or area 0:** |
| 160 | Chapter 3, Last Bullet Point<br>Reads:<br>▪ **Type 3: Link-State Request (LS) packet:** When the data base synchronization process is over, the router might still have a list of LSAs that are missing in its database. The router will send an LSR packet to inform OSPF neighbors to send the most recent version of the missing LSAs. | Should read:<br>▪ **Type 3: Link-State Request (LS) packet:** The LSR packet is used within the database synchronization process. A router sends an LSR to request that its OSPF neighbors send the most recent version of LSAs that are missing in its database. |

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| 161 | Chapter 3, First Bullet Pont<br><br>Reads<br><br>▪ **Type 4: Link-State Updated (LSU) packet:** There are several types of LSUs, known as LSAs. LSU packets are used for the flooding of LSAa and sending LSA responses to LSR packets. It is sent only to the directly connected neighbors who have previously requested LSAs in the form of LSR packet. In case of flooding, neighbor routers are responsible for re-encapsulation of received LSA information in new LSU packets. | Should read:<br><br>▪ **Type 4: Link-State Updated (LSU) packet:** LSU packets contain several types of LSAs. LSU packets are used for the flooding of LSAs and sending LSA responses to LSR packets. Responses are sent only to the directly connected neighbors who have previously requested LSAs in LSR packets. In case of flooding, neighbor routers are responsible for re-encapsulation of received LSA information in new LSU packets. |
| 169 | Chapter 3, Second Paragraph, Sentence<br><br>Reads:<br><br>On broadcast links, OSPF neighbors first determine the designated router (DR) and backup designated router (BDR) roles, which optimize the exchange of information in broadcast segments. | Should read:<br><br>On multi-access links, OSPF neighbors first determine the designated router (DR) and backup designated router (BDR) roles, which optimize the exchange of information in broadcast segments. |
| 170 | Chapter 3, Section Titled:<br><br>Optimizing OSPF Adjacency Behavior, Replace First Three Paragraphs, (First paragraph before Figure 3-5 and Two Paragraphs After Figure 3-5) | Replacement Paragraphs:<br><br>Multiaccess networks, either broadcast (such as Ethernet) or nonbroadcast (such as Frame Relay), represent interesting issues for OSPF. All routers sharing the common segment will be part of the same IP subnet. When forming adjacency on multiaccess network, if every router tried to establish full OSPF adjacency with all other routers on the segment, this may not represent an issue for the smaller multiaccess broadcast networks, but it could be an |

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| | | issue for the nonbroadcast multiaccess (NBMA) networks, where in most cases you do not have full-mesh private virtual circuit (PVC) topology. In these NBMA networks neighbors would not be able to synchronize their OSPF databases directly among themselves. A logical solution in this case is to have a central point of OSPF adjacency responsible for the database synchronization and advertisement of the segment to the other routers, as shown in Figure 3-5.<br><br>As the number of routers on the segment grows, the number of OSPF adjacencies increases exponentially. If every router had to synchronize its OSPF database with every other router, this would be inefficient. For example, if every router on the segment advertised all its routing information to all other routers on the segment, in a full-mesh of OSPF adjacencies the OSPF routers would receive a large amount of redundant link-state information. Again, the solution for this problem is to establish a central point with which every other router forms adjacency and which advertises segment as a whole to the rest of the network.<br><br>Thus, the routers on the multiaccess segment elect a designated router (DR) and backup designated router (BDR), which centralizes communications for all routers connected to the segment. The DR and BDR improve network functioning in the following ways: |
| 175 | Chapter 3, Section Titled: OSPF Behavior in NBMA Hub-and-Spoke Topology, Fourth Sentence<br><br>Reads:<br><br>OSPF treats NBMA environments like any | Should read:<br><br>By default, OSPF treats NBMA environments like any other broadcast media environment, such as Ethernet; however, NBMA clouds are usually built as |

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| | other broadcast media environment, such as Ethernet; however, NBMA clouds are usually built as hub-and-spoke topologies using private virtual circuits (PVCs) or switched virtual circuits (SVCs). | hub-and-spoke topologies using private virtual circuits (PVCs) or switched virtual circuits (SVCs). |
| 176 | Chapter 3, Paragraph Above Example 3-15<br>Reads:<br>Example 3-15 shows setting the OSPF priority on R4's and R5's Ethernet 0/0 interfaces to 0 using **ip ospf priority** interface command. Setting the OSPF interface priority to 0 prevents the router from being a candidate for the DR/BDR role. | Should read:<br><br>In our example network the effect of a priority changed is tested using Ethernet interfaces. Example 3-15 shows setting the OSPF priority on R4's and R5's Ethernet 0/0 interfaces to 0 using **ip ospf priority** interface command. Setting the OSPF interface priority to 0 prevents the router from being a candidate for the DR/BDR role. |
| 178 | Chapter 3, Example 3-18, Last Prompt<br>Reads:<br>R1# no debug ip ospf adj | Should read:<br><br>R3# no debug ip ospf adj |
| 185 | Chapter 3, Fourth Bullet, Last Sentence<br>Reads:<br>The primary router will poll the secondary for information. | Should read:<br><br>The master (primary) router will poll the slave (secondary) for information. |
| 202 | Chapter 3, Figure 3-16, Area 1 and Area 2<br>Reads:<br>Area 1<br>Area 2 | Should read:<br><br>Area 10<br>Area 20 |
| 205 | Chapter 3, First Set of Bullet Points, Fourth Bullet Point, Second Sentence<br>Reads: | Should read:<br><br>After this process, R1 is in the 2-way state with R2. |

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| | After this process, R1 is in the 2-way state. | |
| 205 | Chapter 3, Third Paragraph<br><br>Add Sentence | Sentence to Add:<br><br>A router will ignore a received LSA if it has the same sequence number as the router already has for that LSA. |
| 214 | Chapter 3, Last Paragraph, Second Sentence<br><br>Reads:<br><br>ABRA2 in type 2 LSA reports the lowest cost to reach network B as 6, while ABR1 reports the cost of 21. | Should read:<br><br>ABRA2 in type 3 LSA reports the lowest cost to reach network B as 6, while ABR1 reports the cost of 21. |
| 236 | Chapter 3, Figure 3-34, label Second and Third Routers | Should read:<br><br>Second Router – ABR<br><br>Third Router – ASBR1 |
| 259 | Chapter 3, First Paragraph, Third Sentence After Example 3-86<br><br>Reads:<br><br>Area acts as a totally stubby area for IPv6. | Should read:<br><br>Area 2 acts as a totally stubby area for IPv6. |
| 260 | Chapter 3, First Full Paragraph, Second Sentence<br><br>Reads:<br><br>To perform such summarization for IPv6, you would use the **summary-prefix** command in the address family router configuration mode. | Should read:<br><br>To perform such summarization for IPv6, you would use the **summary-prefix** command in the IPv6 address family router configuration mode. |
| 275 | Chapter 4, Paragraph Above Figure 4-6<br><br>Add Sentence | Sentence to Add:<br><br>For OSPFv2 and OSPFv3, R1 and R3 are in area 0 and R3 and R4 are in area 2. R3 is the ABR. |

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| 278 | Chapter 4, Second Bullet Point<br>Reads:<br>▪ Delay in tens of microseconds = 100. Route delay in tens of microseconds. It can be 0 or any positive integer that is a multiple of 39.1 nanoseconds. | Should read:<br>▪ Delay in tens of microseconds = 100. Route delay in tens of microseconds. It can be 0 or any positive integer. |
| 279 | Chapter 4, Example 4-4, Second line<br>Reads:<br>R1 (config-router)# **redistribute ospf 20 metric 1500 100 255 1 1500** | Should read:<br>R1 (config-rtr)# **redistribute ospf 20 metric 1500 100 255 1 1500** |
| 291 | Chapter 4, Fourth Paragraph, Fourth Sentence<br>Reads:<br>There is now a routing loop (R4, R2, R1, R3, and R4). | Should read:<br>There is now a routing loop (R4, R3, R1, R2, and R4). |
| 315 | Chapter 4, Paragraph Under Example 4-37, First Sentence<br>Reads:<br>The highlighted route 10.1.4.0/24 describes the loopback interface on R4. | Should read:<br>The highlighted route 10.1.4.0/24 describes one of the loopback interfaces on R4. |
| ~~318~~ | ~~Chapter 4, After First Paragraph, Before Manipulating Redistribution Using Route Tagging, Insert Note~~ | ~~Note to insert:~~<br>~~**Note** The **distance** *admin-distance source-address source-wildcard-mask* [*access-list*] router configuration command can be used to change the administrative distance for RIP, OSPF, EIGRP, and BGP. For EIGRP, however, this command only works for EIGRP internal routes; it does not work for EIGRP external routes.~~ |

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| 353 | Chapter 5, Example 5-26 PC prompts<br>Read:<br>PC> **ping 192.168.100.1**<br>PC> | Prompts Should read:<br><br>Notebook> **ping 192.168.100.1**<br>Notebook> |
| 409 | Chapter 6, Example 6-23, Command Line<br>Reads:<br>PC>exit | Should read:<br><br>PC>**exit** |
| 452 | Chapter 7, Last Paragraph<br>Reads:<br>The *status codes* are shown at the beginning of each line of output, and the *origin codes* are shown at the end of each line. A row with an asterisk (*) in the first column means that the next-hop address (in the fifth column) is valid. (For BGP the next-hop address is not always on a router that is directly connected to this router, as explored later in this example.) Some of the other options for the first column are as follows: | Should read:<br><br>The *status codes* are shown at the beginning of each line of output, and the *origin codes* are shown at the end of each line. A row with an asterisk (*) in the first column means that the table entry is valid. Some of the other options for the first column are as follows: |
| 453 | Chapter 7, Fourth Paragraph<br>Reads:<br>Some, but not all, of the BGP attributes that are associated with the route are displayed. The fifth column lists all the next-hop addresses for each route. If this column contains 0.0.0.0, this router originated the route. | Should read:<br><br>Some, but not all, of the BGP attributes that are associated with the route are displayed. The fifth column lists all the next-hop addresses for each route. If this column contains 0.0.0.0, this router originated the route. (For BGP the next-hop address is not always on a router that is directly connected to this router, as explored later in this example.) |

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| 461 | Chapter 7, Insert Note before Last Paragraph | Note to insert:<br>**Note** If the **neighbor** *ip-address* **next-hop-self** command is also used with this neighbor, then the address of the specified loopback interface will also be the next-hop address for routes sent to this neighbor. |
| 576 | Chapter 8, Insert Note after Table 8-3 | Note to insert:<br>**Note** EIGRP SHA does not support key chains. |
| 581 | Chapter 8, Insert Note after First Paragraph, Before Example 8-43 | Note to insert:<br>**Note** The **debug eigrp packet terse** command is useful when troubleshooting EIGRP authentication issues. |
| 582 | Chapter 8, Example 8-45, 11th Command<br>Reads:<br>R1(config-router-af-interface)# **authentication mode hmac-sha-256 secret-2** | Replace with:<br>R1(config-router-af-interface)# **authentication mode md5** |
| 582 | Chapter 8, First Paragraph after Example 8-45<br>Reads:<br>Notice how in the named EIGRP method the interface authentication specifics are configured under the EIGRP process. Also Notice how named EIGRP supports SHA256. | Should read:<br>Notice how in the named EIGRP method the interface authentication specifics are configured under the EIGRP process. |
| 583 | Chapter 8, Example 8-46, 11th Command<br>Reads:<br>R2(config-router-af-interface)# **authentication mode hmac-sha-256 secret-2** | Should read:<br>R2(config-router-af-interface)# **authentication mode md5** |

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| 583 | Chapter 8, Add Second Paragraph After Example 8-46 | Paragraph to Add:<br>Named EIGRP also supports the newer, more secure SHA256 authentication. This method simplifies the authentication configuration since it does not require key chains. To configure SHA256, use the **authentication mode hmac-sha-256** *encryption-type password* address family interface configuration mode command. |
| 595 | Chapter 8, Example 8-63, First Command<br>Reads:<br>R1# show bgp summary | Should read:<br><br>R1# show ip bgp summary |
| 617 | Appendix B, Decimal and Binary Changes,<br>Removing last row and readjusting flow of Decimals and Binary Codes | Adding at the end of Third Set after Decimal 251 and Binary 11111011<br>Decimal Binary<br>252 11111100<br>253 11111101<br>254 11111110<br>255 11111111 |

**Corrections for January 28, 2015**

| Pg | Error – First Printing | Correction |
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| 19 | Chapter 1, Figure 1-11, Router on the right<br>Reads:<br>A | Should read:<br><br>B |

This errata sheet is intended to provide updated technical information. Spelling and grammar misprints are updated during the reprint process, but are not listed on this errata sheet.

**Updated 09/18/2016**