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Disclaimer

The following publication, ***CCIE Routing & Switching Lab Workbook Volume III***, is designed to assist candidates in the preparation for Cisco Systems' CCIE Routing & Switching Lab exam. While every effort has been made to ensure that all material is as complete and accurate as possible, the enclosed material is presented on an "as is" basis. Neither the authors nor Internetwork Expert, Inc. assume any liability or responsibility to any person or entity with respect to loss or damages incurred from the information contained in this workbook.

This workbook was developed by Internetwork Expert, Inc. and is an original work of the aforementioned authors. Any similarities between material presented in this workbook and actual CCIE™ lab material is completely coincidental.

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About IEWB-RS-VOL3

Internetnetwork Expert's CCIE Routing & Switching Lab Workbook Volume III is a Tier-1 self-paced product designed to improve your speed and accuracy at configuring and verifying core CCIE Routing & Switching lab tasks. This product focuses only on layer 2 and layer 3 configurations that are necessary for the operation of the network in the actual CCIE Lab Exam.

The Lab Workbook Volume III consists of ten lab scenarios each of which are divided into various sections totaling 50 points. The goal of the Lab Workbook Volume III is to make core layer 2 and layer 3 configurations second nature, increasing your speed of configuration and eliminating the need for you to reference Cisco's documentation or the context sensitive help during the exam. To accomplish this each of the sections within a scenario are assigned both a point value as well as a target time for its configuration and verification. This format allows you to easily assess your own readiness by timing your configuration.

IEWB-RS-VOL3 Lab 1

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- If any additional IP addresses are needed use IP unnumbered
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	10	40 min
WAN Technologies	5	20 min
Interior Gateway Routing	24	1 hr 15 min
Exterior Gateway Routing	8	35 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging and Switching - (40 Minutes)

2.1. VLAN Assignments

- Configure VTP between SW1, SW2, SW3, and SW4 using the domain name CORE.
- SW1 should be the VTP server while the remaining switches should be VTP clients.
- Create the VLANs as per the table below:

VLAN Number	VLAN Name
8	VLAN_E
14	VLAN_A
28	VLAN_B
33	VLAN_BB3
57	VLAN_C
82	VLAN_BB2
356	VLAN_D

- Configure the VLAN assignments per the table below:

Switch	Interface	VLAN
SW1	Fa0/1	VLAN_A
SW1	Fa0/3	VLAN_D
SW1	Fa0/5	VLAN_D
SW2	Fa0/2	VLAN_B
SW2	Fa0/4	VLAN_A
SW2	Fa0/6	VLAN_D
SW2	Fa0/24	VLAN_BB2
SW3	Fa0/3	VLAN_BB3
SW3	Fa0/5	VLAN_C
SW3	Fa0/24	VLAN_BB3
SW4	Fa0/15	VLAN_C

3 Points
15 Minutes

2.2. EtherChannel

- Configure interfaces FastEthernet0/13 through FastEthernet0/15 on both SW1 and SW2 to be bonded as a single logical 802.1q trunk link.
- Use the default native VLAN for this connection.

2 Points
10 Minutes

2.3. Trunking

- Configure an 802.1q trunk between SW2's interface FastEthernet0/16 and SW3's interface FastEthernet0/16.
- Configure two 802.1q trunks between SW2's interface FastEthernet0/19 & FastEthernet0/21 and SW4's interface FastEthernet0/16 & FastEthernet0/18.

2 Points
5 Minutes

2.4. EtherChannel

- Create two logical layer 3 connections between SW2 & SW3 and SW3 & SW4 using all remaining directly connected inter-switch links.
- Use PAgP to negotiate these connections.
- Use the IP addressing and PortChannel numbering from the diagram.

3 Points
10 Minutes

3. WAN Technologies – (20 Minutes)

3.1. Hub and Spoke

- Configure a Frame Relay hub-and-spoke network between R2, R4, and R5 with R5 as the hub.
- Use only physical interfaces for this configuration.
- Use only the DLCIs specified in the diagram.
- Do not use Frame Relay Inverse-ARP.
- Ensure that all routers can ping each other on this segment.

2 Points
10 Minutes

3.2. Point-to-Point

- Configure a Frame Relay connection between R6 and BB1 using DLCI 100.
- Use a subinterface numbered .1 on R6 for this connection.
- Do not use or disable Frame Relay Inverse-ARP

1 Point
5 Minutes

3.3. PPP Authentication

- Configure the Serial connection between R4 and R5 using PPP encapsulation.
- Configure PPP CHAP authentication over the Serial connection between R4 and R5.
- Both routers should use their hostname along with the password CCIE for authentication.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 15 Minutes)

4.1. OSPF over NBMA

- Configure OSPF area 0 over the Frame Relay circuit between R2, R4, and R5.
- Use the default OSPF network type for this link.
- Ensure that R5 is always elected the Designated Router for this segment.

3 Points
10 Minutes

4.2. OSPF

- Configure OSPF area 2 on VLAN_D between R3, R5, and R6.
- Configure OSPF area 4 on VLAN_B between R2 and SW2.
- Configure OSPF area 4 on the two EtherChannel links between SW2 & SW3 and SW3 & SW4.

2 Points
10 Minutes

4.3. OSPF Stub Area

- Configure OSPF area 3 between R5 and SW1.
- This area should be configured as an OSPF stub area.

2 Points
5 Minutes

4.4. OSPF

- Advertise the Loopback0 networks of R4 into OSPF area 0.
- Advertise the Loopback0 networks of R3 and R6 into OSPF area 2.
- Advertise the Loopback0 networks of R5 and SW1 into OSPF area 3.
- Advertise the Loopback0 networks of R2, SW2, SW3, and SW4 into OSPF area 4.
- All of these networks should appear with a subnet mask of /24 in all routing tables.

3 Points
10 Minutes

4.5. RIP

- Configure RIPv2 on R1, R4, R5, and SW1.
- Enable RIP between R1 and R4.
- Enable RIP on the Serial connection between R4 and R5.
- Enable RIP on VLAN_BB2 of SW2.
- Authenticate RIP updates coming from and being sent to BB2 using key 1 with the MD5 password CISCO.

3 Points
10 Minutes

4.6. RIP

- Advertise R1's Loopback0 interface into RIP.
- Do not use the **network** command to accomplish this task.
- R1's Loopback0 network should appear with a metric of 10 in R4's routing table.

3 Points
5 Minutes

4.7. Redistribution

- Redistribute the VLAN_BB3 network into OSPF on R3.
- Redistribute the Frame Relay link network into OSPF on R6.
- These prefixes should be seen with a cumulative metric throughout the OSPF domain.

3 Points
10 Minutes

4.8. Advanced Redistribution

- Mutually redistribute between OSPF and RIPv2 on R4, R5, and SW2.
- Routers in the OSPF domain should see the RIP routes learned from R4 with a metric of 400 and the RIP routes learned from R5 with a metric of 500.

3 Points
10 Minutes

4.9. Advanced Redistribution

- Ensure that reachability to R1's Loopback0 interface is maintained.

2 Points
5 Minutes

5. Exterior Gateway Routing – (35 Minutes)

Note that reachability to BGP networks is only required for BGP enabled routers

5.1. BGP Peering

- Configure BGP AS 100 on R3 and R6.
- Configure BGP AS 200 on R2, R4, and R5.
- Configure BGP AS 300 on R1.
- Configure BGP AS 400 on SW2.
- Configure BGP peerings between R3 & R6, R3 & BB3, and R6 & BB1.
- Configure BGP peerings between R2 & R5, R2 & SW2, R3 & R5, R4 & R5, and R5 & R6.
- R5 should be a route reflector for R2 and R4.
- The peering between R4 and R5 should stay up if R4 loses its connection to the Frame Relay network.
- Configure a BGP peering between R1 and R4.
- Advertise VLAN_E into BGP on SW2.

3 Points
15 Minutes

5.2. BGP Authentication

- Secure this peering session between R1 and R4 using the encrypted string of 1511021F0725.

1 Point
5 Minutes

5.3. BGP Aggregation

- Configure AS 100 to advertise only the summary 140.X.0.0/16 to AS 54 via BGP.
- AS 100 should not advertise this network to AS 200.
- Ensure that all BGP enabled devices can reach the prefixes learned from AS 54.

2 Points
10 Minutes

5.4. BGP Path Manipulation

- Configure local-preference on R6 so that all traffic going to destinations learned from AS 54 that have an even number in the first octet are sent out the Frame Relay connection.
- Traffic for all other destinations learned from AS 54 should use VLAN_BB3.

2 Points
5 Minutes

IEWB-RS-VOL3 Lab 2

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	9	40 min
WAN Technologies	11	45 min
Interior Gateway Routing	23	1 hr 30 min
Exterior Gateway Routing	9	1 hr 0 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (40 Minutes)

2.1. Trunking

- Configure interface Fa0/16 on SW1 and interface Fa0/13 on SW3 as ISL trunks.
- Configure interfaces Fa0/19 and Fa0/20 on both SW3 and SW4 as 802.1Q trunks.
- Configure interface Fa0/17 on SW4 and interface Fa0/20 on SW2 as ISL trunks.

2 Points
10 Minutes

2.2. EtherChannel

- Configure the trunk links between SW3 and SW4 as one logical link using EtherChannel.
- This link should be negotiated via PAgP.

2 Points
5 Minutes

2.3. Layer 3 Interfaces

- Configure interface Fa0/21 on SW1 as a native layer 3 routed interface with the IP address 161.X.67.7/24.
- Configure interfaces Fa0/15 on SW1 and SW2 as native layer 3 routed interfaces with the IP addresses 161.X.78.7/24 and 161.X.78.8/24 respectively.
- Configure VLAN interfaces 9 and 59 on SW3 per the diagram.
- Configure the VLAN interface 58 on SW2 per the diagram.

2 Points
5 Minutes

2.4. VLAN Assignments

- Configure VTP on SW1, SW2, SW3, and SW4 with the domain name INTERNETWORKEXPERT and authenticate it with the password CCIE.
- SW3 should be in charge of creating VLANs; no other switches should be able to modify VLANs that SW3 has created.
- Configure the VLAN assignments per the diagram.

3 Points
20 Minutes

3. WAN Technologies – (45 Minutes)

3.1. Point-to-Point

- Configure a Frame Relay connection between R1 and R2 using main serial interfaces.
- Configure static **frame-relay map** statements to obtain connectivity on this segment.
- Do not allow R1 or R2 to send Frame Relay Inverse-ARP requests out any other DLCIs assigned to these interfaces.

2 Points
10 Minutes

3.2. Point-to-Point

- Configure two separate Frame Relay connections between R3 & R4 and R4 & R5 using the subnets 161.X.34.0/24 and 161.X.45.0/24 respectively.
- R3 and R5 should use their main interfaces while R4 should use two point-to-point subinterfaces as per the diagram.
- Do not use Frame Relay Inverse-ARP on R3 or R5.

3 Points
15 Minutes

3.3. Point-to-Point

- Configure the Frame Relay connection between R6 and BB1 using a multipoint subinterface numbered 101 along with DLCI 101.
- Use Inverse-ARP for layer 3 to layer 2 mapping between R6 and BB1 over DLCI 101.
- Do not disable Inverse-ARP but do not allow R6 to map unused DLCI's using Inverse-ARP.

3 Points
10 Minutes

3.4. PPP

- Configure PPP on the Serial connection between R4 and R5.

**1 Point
5 Minutes**

3.5. PPP Authentication

- Configure PPP PAP authentication over the Serial connection between R4 and R5.
- Both routers should send their hostname along with the password CCIE for authentication.

**2 Points
5 Minutes**

4. Interior Gateway Routing – (1 Hour 30 Minutes)

4.1. RIPv2

- Configure RIP version 2 on R1 and R2.
- Enable RIP across the Frame Relay connection between R1 and R2.
- Advertise VLAN 10 into RIP on R1.
- Use the **passive-interface default** command on both R1 and R2.

**2 Points
10 Minutes**

4.2. RIPv2 Redistribution

- Using redistribution, advertise the Loopback0 networks of R1 and R2 into RIP.
- Ensure that only these Loopback interface networks are redistributed into RIP by using a route-map.

**2 Points
5 Minutes**

4.3. OSPF

- Configure OSPF area 0 on the Frame Relay link between R3 and R4.
- Do not change the default OSPF network type of non-broadcast.

**2 Points
5 Minutes**

4.4. OSPF

- Configure OSPF area 0 on the Frame Relay link between R4 and R5.
- Use the OSPF network type point-to-point for this link.
- Configure OSPF area 5 on VLANs 9 and 59 of R5 and SW3.

**2 Points
10 Minutes**

4.5. OSPF

- Advertise the Loopback0 networks of R3, R4, R5, and SW3 into OSPF
- These networks should not be associated with any particular OSPF area.

**2 Points
10 Minutes**

4.6. OSPF

- Configure OSPF area 51 between R2, R3, and BB2.
- Configure R3 to advertise the summaries 150.X.0.0/16 and 161.X.0.0/16 to BB2 via OSPF.

**2 Points
10 Minutes**

4.7. OSPF Redistribution

- Advertise VLAN 43 into OSPF on R4.
- Do not use the **network** statement under the OSPF process to accomplish this.

2 Points
5 Minutes

4.8. EIGRP

- Configure EIGRP AS 10 on R4, R5, R6, SW1, and SW2.
- Enable EIGRP on the Ethernet links between R5 & SW2, R6 & SW1, and SW1 & SW2.
- Enable EIGRP on the Frame Relay link between R6 and BB1.
- Enable EIGRP on the Serial link between R4 and R5

3 Points
10 Minutes

4.9. EIGRP Redistribution

- Redistribute the Loopback0 networks of R6, SW1, and SW2 into EIGRP.

1 Point
5 Minutes

4.10. IGP Redistribution

- Perform mutual redistribution between RIP and OSPF on R2.
- Perform mutual redistribution between OSPF and EIGRP on R4 and R5.

3 Points
10 Minutes

4.11. Redistribution Loop Prevention

- Ensure that the Loopback0 networks from R6, SW1, and SW2 are not redistributed back into EIGRP from OSPF on R4 or R5.
- Accomplish this task by setting the administrative distance of these networks to 200 in OSPF on R4 and R5.

2 Points
10 Minutes

5. Exterior Gateway Routing – (60 Minutes)

5.1. BGP Peerings

- Configure BGP AS 200 on R2 and R3.
- Configure BGP Sub-AS 65001 on R6, SW1, & SW2, and Sub-AS 65002 on R4, R5, and SW3. These routers should all belong to a confederation of AS 100.
- Configure BGP peerings between R2 & R3, R3 & BB2, R3 & R4, R4 & BB3, R4 & R5, R4 & SW3, R5 & SW2, R5 & SW3, SW2 & SW1, SW2 & R6, R6 & SW1, and R6 & BB1.
- The peering between R4 and R5 should stay up if the Frame Relay circuit between them is down.
- The peering between R3 and BB2 should be authenticated with the password CISCO.

3 Points
30 Minutes

5.2. BGP AS-Path Prepending

- Advertise VLAN 10 to BB3 and BB1 on R4 and R6 respectively via BGP.
- Configure AS-Path prepending so that traffic to VLAN 10 comes in the Frame Relay link between R6 and BB1.
- The Ethernet link between R4 and BB3 should still be able to be used for AS 54 to get to VLAN 10 if the Frame Relay link is down.
- R4 should not advertise VLAN 10 back to R3 via BGP.

3 Points
15 Minutes

5.3. BGP Summarization

- Configure R4 to advertise a summary of the 161.X.0.0 network into BGP.
- This advertisement should be as specific as possible while encompassing all of the 161.X.0.0 subnets used in the network.

3 Points
15 Minutes

IEWB-RS-VOL3 Lab 3

Lab Overview:

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- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

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Section	Point Value	Target Time
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Bridging and Switching	6	45 min
WAN Technologies	12	40 min
Interior Gateway Routing	27	1 hr 45 min
Exterior Gateway Routing	5	30 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (45 Minutes)

2.1. VLAN Assignments

- Configure VTP on SW1, SW2, SW3, and SW4 with the domain name IE.
- Configure VLAN assignments per the diagram.

2 Points
15 Minutes

2.2. Trunking

- Configure interfaces FastEthernet0/13 through FastEthernet0/15 on SW1 as dot1q trunk links.
- Configure interfaces FastEthernet0/16 through FastEthernet0/21 on SW4 as dot1q trunk links.
- Configure interfaces FastEthernet0/19 through FastEthernet0/21 on SW3 as dot1q trunk links.
- Configure interfaces FastEthernet0/13 through FastEthernet0/15 and FastEthernet0/19 through FastEthernet0/21 on SW2 as dot1q trunk links.

2 Points
15 Minutes

2.3. EtherChannel

- Interfaces Fa0/13 – Fa0/15 on SW2 should be bound together using interface PortChannel1.
- Interfaces Fa0/16 – Fa0/18 on SW4 should be bound together using interface PortChannel2.
- Use LACP for the negotiation of these links.

2 Points
15 Minutes

3. WAN Technologies – (40 Minutes)

3.1. Point-to-Point

- Configure a Frame Relay connection between R3 and R4 using main serial interfaces.
- Use Inverse-ARP for layer 3 to layer 2 mapping.
- Do not allow R3 or R4 to send Frame Relay Inverse-ARP requests out any other DLCIs assigned to these interfaces.

2 Points
10 Minutes

3.2. Multipoint

- Using only the DLCI's specified in the diagram, configure the Frame Relay link between R1, R3, and R5.
- Configure R1, R3, and R5 so that if the DLCI's between them change to inactive or deleted status the interfaces used for this Frame Relay link are brought down.

3 Points
10 Minutes

3.3. Point-to-Point

- Configure the Frame Relay connection between R6 and BB1 using DLCI 101.
- To ensure that no layer 3 to layer 2 mapping is needed for this connection, use a point-to-point subinterface on R6.

3 Points
10 Minutes

3.4. PPP

- Configure PPP on the Serial connection between R4 and R5.
- To ensure connectivity across this Serial connection, do not disable the peer neighbor route generated by PPP.

2 Points
5 Minutes

3.5. PPP Authentication

- Configure R4 to authenticate R5 using PAP authentication.
- R5 should send the username ROUTER5 along with the password of CISCO.
- R5 should not authenticate R4.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 45 Minutes)

4.1. RIPv2

- Configure RIPv2 on R3, R4, and R5.
- Only send RIPv2 updates out the interfaces that are included in RIPv2 on the protocol diagram.
- Authenticate the RIP updates sent and received between R3 and BB2 using MD5 authentication along with the key 1 and a hash that represents the password of CISCO.

2 Points
10 Minutes

4.2. RIPv2

- Allow R4 and R5 to send/receive RIP updates between each other across the Serial connection by disabling the validation of RIP updates.

1 Point
5 Minutes

4.3. RIPv2 Metric Manipulation

- Configure an inbound offset-list on R4 so that RIP routes learned from BB3 appear in R5's routing table with a hop count of 15.

2 Points
10 Minutes

4.4. OSPF

- Configure OSPF area 135 on the Frame Relay connection between R1, R3, and R5.
- Do not change the default OSPF network type of non-broadcast.
- Ensure that R5 is the OSPF DR for this segment by configuring R1 and R3 not participate in the DR/DBR election over the Frame Relay connection.

3 Points
10 Minutes

4.5. OSPF

- Configure OSPF area 17 between R1 and SW1.
- Configure OSPF area 34 between R3 and R4.
- Without regard to network redundancy, use the minimal number of virtual links needed to support this OSPF domain.

2 Points
5 Minutes

4.6. OSPF Loopback Advertisement

- Advertise the Loopback0 network of R1 into OSPF area 0.
- Advertise the Loopback0 network of SW1 into OSPF area 17.
- These networks should appear in all other OSPF enabled routers with a /24 subnet mask.

2 Points
5 Minutes

4.7. OSPF Loopback Advertisement

- Advertise the Loopback0 network of R4 into OSPF.
- This network should appear in all other OSPF enabled routers with a /24 subnet mask.
- This network should not be associated with any particular OSPF area.

2 Points
5 Minutes

4.8. OSPF Loopback Advertisement

- Advertise the Loopback0 network of R3 into OSPF.
- This network should appear in all other OSPF enabled routers with a /24 subnet mask.
- This network should be associated with an OSPF area.
- Do not use the **ip ospf network-type point-to-point** command for this task.

2 Points
5 Minutes

4.9. OSPF Loopback Advertisement

- Advertise the Loopback0 network of R5 into OSPF.
- This network should appear in all other OSPF enabled routers with a /24 subnet mask.
- This network should not be associated with any particular OSPF area.
- Do not use the **redistribute connected** command for this task.

2 Points
10 Minutes

4.10. EIGRP

- Configure EIGRP AS 10 on R2, R5, R6, and SW3.
- Enable EIGRP on the Ethernet link between these routers.
- Advertise the VLAN 5 into EIGRP.

1 Point
5 Minutes

4.11. EIGRP

- Enable EIGRP on the Frame Relay link between R6 and BB1.
- Authenticate the EIGRP neighbor relationship between R6 and BB1 using key 1 along with the password of CISCO.

2 Points
5 Minutes

4.12. EIGRP Summarization

- Advertise the Loopback0 networks of R2, R6, and SW3 into EIGRP.
- These networks should appear with a /23 mask when advertised to other routers.

1 Point
5 Minutes

4.13. IGP Redistribution

- Perform mutual redistribution between RIP and OSPF on R3.
- Perform mutual redistribution between OSPF and EIGRP on R5.
- Perform redistribution of RIP into OSPF on R4.
- Perform redistribution of RIP into EIGRP on R5.
- Perform redistribution of OSPF into RIP on R5.

3 Points
15 Minutes

4.14. Redistribution Loop Prevention

- Do not allow the RIP routes redistributed into OSPF on R4 to be passed back into RIP on R5.
- Use route tagging to accomplish this task.

2 Points
10 Minutes

5. Exterior Gateway Routing – (30 Minutes)

5.1. BGP Peerings

- Configure BGP AS 200 on R3.
- Configure BGP AS 100 on R1, R2, and R6.
- Configure BGP peerings between R1 & R2, R1 & R3, R1 & R6, R2 & R6, R3 & BB2, and R6 & BB1.
- The peering between R3 and BB2 should be authenticated with the password CISCO.
- Do not enable BGP on R5 or SW3.
- All devices running BGP should have reachability to all BGP learned prefixes.
- Do not use tunnelling to accomplish this.

3 Points
25 Minutes

5.2. BGP Summarization

- Configure R6 to summarize the following networks into a single advertisement:
 - 112.0.0.0/8
 - 113.0.0.0/8
 - 114.0.0.0/8
 - 115.0.0.0/8
 - 116.0.0.0/8
 - 117.0.0.0/8
 - 118.0.0.0/8
 - 119.0.0.0/8

- This summary should not overlap any other networks.

2 Points
5 Minutes

IEWB-RS-VOL3 Lab 4

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	9	45 min
WAN Technologies	11	35 min
Interior Gateway Routing	27	1 hr 15 min
Exterior Gateway Routing	6	40 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (45 Minutes)

2.1. Trunking

- Configure 802.1q trunking per the table below.

Switch	Interface
SW1	Fa0/16
SW2	Fa0/16
SW2	Fa0/17
SW3	Fa0/13
SW3	Fa0/16
SW3	Fa0/17
SW3	Fa0/19
SW3	Fa0/21
SW4	Fa0/19
SW4	Fa0/21

- Use VLAN 125 as the native VLAN for all of these links.

3 Points
15 Minutes

2.2. EtherChannel

- Configure the trunk links between SW2 & SW3 and SW3 & SW4 to be bound together via PortChannel interfaces.
- Use the *active* mode of EtherChannel to accomplish this.

3 Points
10 Minutes

2.3. VTP

- Configure the VTP domain CCIE on all four switches.
- Configure VLAN assignments per the diagram.
- Filter traffic on the 802.1q trunk links so that only necessary VLAN traffic is sent over them.

3 Points
20 Minutes

3. WAN Technologies – (35 Minutes)

3.1. Hub and Spoke

- Configure a Frame Relay connection between R1, R2, and R3 using a multipoint subinterface on R3 and point-to-point subinterfaces on R1 and R2.

3 Points
10 Minutes

3.2. PPPoFR

- Configure PPPoFR on the Frame Relay link between R4 and R5.

3 Points
10 Minutes

3.3. Point-to-Point

- Using a point-to-point subinterface configure the Frame Relay connection between R6 and BB1 using DLCI 401.

2 Points
5 Minutes

3.4. PPP

- Configure PPP on the Serial connection between R4 and R5.

**1 Point
5 Minutes**

3.5. PPP Authentication

- Configure R4 and R5 to authenticate each other over the Serial connection using a hash that represents the password of CISCO.

**2 Points
5 Minutes**

4. Interior Gateway Routing – (1 Hour 15 Minutes)

4.1. Bridging

- Disable IP routing on R6.
- Bridge IP between the Frame Relay and Ethernet segments on R6.

**3 Points
10 Minutes**

4.2. Bridging

- Configure the IP address of 54.X.10.6/24 on R6.
- R6 should have reachability to any address on the 54.X.10.0/24 subnet.
- Do not use Integrated Routing and Bridging (IRB) for this task.

**2 Points
5 Minutes**

4.3. RIPv2

- Configure RIPv2 on R4, R5, SW1 and SW4.
- Only send RIPv2 updates out the interfaces that are included in RIPv2 on the protocol diagram.
- Advertise R4 and SW4's Loopback0 interfaces into RIP.

2 Points
5 Minutes

4.4. Network Redundancy

- Configure the Serial connection between R4 and R5 to be in the standby state as long as the PPPoFR connection is up.

3 Points
5 Minutes

4.5. EIGRP

- Configure EIGRP AS 10 on R1, R2, and R5.
- Enable EIGRP on the Ethernet link between these routers.
- Advertise R5's Loopback0 interface into EIGRP.

2 Points
5 Minutes

4.6. OSPF

- Configure OSPF area 123 between R1, R2, and R3.
- Use the OSPF network type that was specifically designed to handle issues with routers on the same logical IP subnet not having direct communication with each other.

3 Points
5 Minutes

4.7. OSPF

- Configure OSPF area 37 between R3 and SW1.
- Configure OSPF area 0 on the Ethernet link between R3 and SW3.

2 Points
5 Minutes

4.8. OSPF

- Advertise the Loopback0 networks of R1, R2, and SW3 into OSPF.
- These networks should belong to the OSPF backbone area and should appear in all other OSPF enabled routers with a /24 subnet mask.

2 Points
5 Minutes

4.9. OSPF Loopback Advertisement

- Advertise the Loopback0 networks of R3 and SW1 into OSPF.
- These networks should appear in each others routing tables as intra-area routes.

2 Points
5 Minutes

4.10. IGP Redistribution

- Perform mutual redistribution between RIP and OSPF on SW1.
- Perform mutual redistribution between RIP and EIGRP on R5.
- Perform mutual redistribution between OSPF and EIGRP on R1 and R2.

3 Points
15 Minutes

4.11. Redistribution Loop Prevention

- Ensure that EIGRP external routes that are redistributed into OSPF on R1 and R2 do not get redistributed back into EIGRP.
- Use administrative distance to accomplish this task.

3 Points
10 Minutes

5. Exterior Gateway Routing – (40 Minutes)

Note: Only devices with BGP enabled need reachability to BGP learned prefixes

5.1. BGP Peerings

- Configure BGP AS 100 on R4 and R5.
- Configure BGP Sub-AS 1000 on R1, Sub-AS 2000 on R2, Sub-AS 3000 on R3, and Sub-AS 7000 on SW1. These routers should all belong to a confederation of AS 200.
- Configure BGP peerings between R1 & R3, R1 & R5, R2 & R3, R2 & R5, R3 & SW1, R4 & R5, R4 & BB1, and SW1 & BB2.
- The peering between R4 and R5 should remain up if the PPPoFR connection between them is down.
- The peering between R1 & R3 and R2 & R3 should be down if the Frame Relay connection is down.
- The peering between SW1 and BB2 should be authenticated with the password CISCO.

3 Points
30 Minutes

5.2. BGP Bestpath Selection

- Configure the network so that AS 100 routes through R1 to reach prefixes originated in AS 254.
- Use MED to accomplish this.

3 Points
10 Minutes

IEWB-RS-VOL3 Lab 5

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	9	45 min
WAN Technologies	9	35 min
Interior Gateway Routing	25	1 hr 30 min
Exterior Gateway Routing	7	35 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (45 Minutes)

2.1. Trunking

- Configure ISL trunking between SW1's interface Fa0/14 and SW2's interface Fa0/14.
- Configure ISL trunking between SW3's interfaces Fa0/17 - 18 and SW2's interfaces Fa0/17 - 18.
- Configure ISL trunking between SW4's interface Fa0/17 and SW2's interface Fa0/20.
- These links should be automatically negotiated via DTP.

3 Points
15 Minutes

2.2. VLAN Assignments

- VLAN Trunking Protocol has been preconfigured in the network.
- Create and configure the VLAN assignments per the diagram.

3 Points
20 Minutes

2.3. Layer 2 Tunneling

- Configure SW2 so that SW3 and SW4 see each other as CDP neighbors across the routed link that connects them.

3 Points
10 Minutes

3. WAN Technologies – (35 Minutes)

3.1. Hub and Spoke

- Configure a Frame Relay connection between R1, R2, and R5 using multipoint subinterfaces on each router.
- Do not use Inverse-ARP or more than one **frame-relay map** command on each router.

2 Points
10 Minutes

3.2. PPPoFR

- Using DLCI 301 configure a PPPoFR connection between R6 and BB1.

2 Points
10 Minutes

3.3. PPP

- Configure PPP on the Serial connection between R4 and R5 using dialer interfaces.

3 Points
10 Minutes

3.4. PPP Authentication

- BB1 will require R6 to be authenticated via PAP for the PPPoFR connection.
- R6 should send username ROUTER6 along with the password of CISCO for this authentication, but should not authenticate BB1.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 30 Minutes)

Note: The use of a GRE Tunnel on R1 is not permitted in this lab.

4.1. EIGRP

- Enable EIGRP AS 10 between R1 and R4.
- Do not send multicast EIGRP updates within VLAN 14.

**2 Points
5 Minutes**

4.2. OSPF

- Configure OSPF area 0.0.0.0 on the Ethernet segment between R1, R3, and R6.

**2 Points
5 Minutes**

4.3. OSPF

- Without enabling OSPF on R3's interface Ethernet0/0.2 or R6's interface G0/0.2, ensure that they still receive OSPF routes from each other in the event that they lose their connectivity with R1.

**2 Points
5 Minutes**

4.4. OSPF

- Configure OSPF area 125 on the Frame Relay connection between R1, R2, and R5.

**2 Points
5 Minutes**

4.5. OSPF

- Configure OSPF area 12 between SW1 and R2.
- This area should be a stub area.

2 Points
10 Minutes

4.6. OSPF

- Configure OSPF area 51 between SW1 and BB2.

2 Points
10 Minutes

4.7. OSPF Loopback Advertisements

- Advertise the Loopback0 networks of R1, R2, and R3 into OSPF area 321.
- Advertise the Loopback0 networks of R5, R6, and SW1 into OSPF area 765.

2 Points
5 Minutes

4.8. RIPv2

- Configure RIPv2 on R4, R5, SW2, SW3 and SW4.
- Advertise VLAN 48, VLAN 5, VLAN 59, VLAN 10, VLAN 109, and the Serial between R4 and R5 into RIP.
- Advertise R4, SW3, and SW4's Loopback0 networks into RIP.

1 Point
5 Minutes

4.9. Default Routing

- Configure R4 to generate a default route to SW2.
- This default route should not be sent to R5.
- Do not use a distribute-list to accomplish this task.

2 Points
5 Minutes

4.10. Route Filtering

- Configure SW2 so that it will use the default route advertised by R4 to reach the 128.X.14.0/24 network.
- Use an offset-list on SW2 to accomplish this task.

2 Points
5 Minutes

4.11. IGP Redistribution

- Perform mutual redistribution between RIP and EIGRP on R4.
- Perform mutual redistribution between RIP and OSPF on R5.
- Perform mutual redistribution between OSPF and EIGRP on R1.

3 Points
15 Minutes

4.12. Redistribution Loop Prevention

- Ensure that the RIP routes redistributed into EIGRP on R4 do not get passed back into RIP from OSPF on R5.
- Use route tagging to accomplish this task.

3 Points
15 Minutes

5. Exterior Gateway Routing – (35 Minutes)

5.1. BGP Peerings

- Configure BGP AS 100 on R1, R3, and R6.
- Configure BGP AS 200 on R4, R5, SW2, SW3, and SW4.
- Configure BGP peerings between R1 & R3, R1 & R4, R1 & R5, R1 & R6, R3 & R6, R3 & BB3, R4 & R5, R4 & SW2, R4 & SW3, R4 & SW4, and R6 & BB1.
- R5, SW2, SW3, and SW4 should be route-reflector clients of R4.
- The peerings from R5, SW3, and SW4 to R4 should be brought down if the Serial connection between R4 and R5 goes down.
- Advertise SW2's Loopback0 network into BGP.

3 Points
20 Minutes

5.2. BGP Path Manipulation

- Using local-preference within AS 200, ensure that R4 is used as the exit point for all BGP prefixes learned from AS 100.
- AS 100 should use R5 as the entry point for any routes advertised by AS 200.

3 Points
10 Minutes

5.3. Redistribution

- Redistribute SW2's Loopback0 network into EIGRP on R4.
- Do not redistribute any other BGP routes into EIGRP.

1 Point
5 Minutes

IEWB-RS-VOL3 Lab 6

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	7	35 min
WAN Technologies	10	40 min
Interior Gateway Routing	26	1 hr 30 min
Exterior Gateway Routing	4	25 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (35 Minutes)

2.1. Trunking and EtherChannel

- Configure interfaces FastEthernet0/13 through FastEthernet0/15 on both SW1 and SW2 as one logical dot1q trunk.
- SW2 should trunk dot1q to SW3 and SW4 on interfaces FastEthernet0/18 and FastEthernet0/19.
- Configure a dot1q trunk to R1's interface FastEthernet0/0.
- Configure a dot1q trunk to R2's interface FastEthernet0/0.
- Configure a dot1q trunk to R6's interface GigabitEthernet0/0.

2 Points
10 Minutes

2.2. VLAN Assignments

- Configure VTP on SW1, SW2, SW3, and SW4 with the domain name IE.
- Configure VLAN assignments per the diagram.

3 Points
15 Minutes

2.3. Load Balancing

- Configure SW3 and SW4 so that traffic between their VLAN 100 interfaces is load balanced on interface Fa0/19 – Fa0/21.
- Do not enable trunking between SW3 and SW4 to accomplish this.

2 Points
10 Minutes

3. WAN Technologies – (40 Minutes)

3.1. PPPoFR

- Configure a PPPoFR connection between R3, R4, and R5 using a point-to-point subinterfaces.
- Bind the DLCI's together using PPP multilink.
- Using IP addressing 145.X.0.Y/24 for each respective router's multilink interface.

3 Points
15 Minutes

3.2. Frame Relay Back-to-Back

- Using DCLI 111 configure a back-to-back Frame Relay connection between R4 and R5.
- The configuration should provide for layer 3 to layer 2 mapping automatically without the use of Frame Relay Inverse-ARP or PPPoFR.

3 Points
10 Minutes

3.3. Point-to-Point

- Configure the Frame Relay connection between R6 and BB1 using DLCI 51.
- Do not use a subinterface on R6.

2 Points
10 Minutes

3.4. PPP Authentication

- Mutually authenticate the PPPoFR session between R3 and R4 using PAP authentication and CHAP authentication between R3 and R5.
- The routers should use their respective hostnames along with the password of CISCO for this task.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 30 Minutes)

4.1. EIGRP

- Enable EIGRP AS 100 between R3 and SW1.
- Enable EIGRP AS 200 between R4 and SW1.
- Use EIGRP network statements with the wild card mask of 0.0.0.0 for this task.

2 Points
5 Minutes

4.2. EIGRP

- Advertise R3 and SW1's Loopback0 interfaces into EIGRP AS 100.
- These Loopback0 networks should appear with an administrative distance of 170 in each respective router's routing table.
- Do not use the distance command to accomplish this task.

2 Points
5 Minutes

4.3. OSPF

- Configure OSPF area 0 on the Frame Relay connection between R4 and R5.
- Configure OSPF area 245 on the Ethernet segment between R2, R4, and R5.
- Configure OSPF area 28 on the Ethernet segment between R2 and SW2.
- Do not use a virtual-link on R4 or R5 to accomplish this task.

2 Points
5 Minutes

4.4. OSPF

- Configure OSPF area 0 between SW2 & SW3 and SW3 & SW4.
- Advertise the Loopback0 interfaces of these devices into OSPF area 0.
- Do not use a virtual-link on R4 or R5 or use a tunnel on SW2 to accomplish this task.

2 Points
5 Minutes

4.5. OSPF Loopback Advertisements

- Advertise R2 and R5's Loopback0 interfaces into OSPF area 245.
- Redistribute R4's Loopback0 interface into OSPF using a route-map that specifically permits the Loopback0 interface.

2 Points
5 Minutes

4.6. RIP

- Configure RIPv2 between R1, R3, R4, R5, R6, and BB2 according to the diagram.
- Advertise the Loopback0 networks of R1 and R6 into RIP.
- Do not use the version 2 command under the routing process to accomplish this task.

2 Points
10 Minutes

4.7. RIP Authentication

- Authenticate the RIP updates between R5 and BB2 using key 1 along with the MD5 password of CISCO.

1 Point
5 Minutes

4.8. Path Manipulation

- R3 should route to R6 to reach R1's 145.X.16.1 IP address.
- Do not alter the hop count to accomplish this task.
- This configuration should be done on R1.

2 Points
5 Minutes

4.9. IGP Redistribution

- Perform mutual redistribution between RIP and EIGRP R3.
- Perform mutual redistribution between RIP, EIGRP, and OSPF on R4.
- Perform mutual redistribution between RIP and OSPF on R5.
- Perform mutual redistribution between EIGRP AS 100 and EIGRP AS 200 on SW1.

3 Points
15 Minutes

4.10. Path Manipulation

- R4 should use the external EIGRP route from SW1 to reach the 145.X.37.0/24 network.
- This configuration should be done on R3.

3 Points
10 Minutes

4.11. Redistribution Loop Prevention

- Ensure that the RIP routes redistributed into OSPF on R4 and R5 do not get passed back into RIP.
- Use administrative distance to accomplish this task.

3 Points
10 Minutes

4.12. Default Routing

- Configure R6 to generate a default route to R3 via RIP.
- R2 should default to R5 if R5 is available.
- If R5 is unavailable R2 should default to R4.
- The use of one static route on R2 is permitted for this task.

2 Points
10 Minutes

5. Exterior Gateway Routing – (25 Minutes)

5.1. BGP Peerings

- Configure BGP AS 100 on R1, R6, and SW1.
- Configure BGP AS 200 on R4, R5, and SW2.
- Configure BGP peerings between R1 & R6, R1 & SW1, R1 & BB3, R4 & SW1, R4 & SW2, and R5 & SW2.
- SW2 should forward any iBGP routes learned from R4 to R5 and vice versa.

3 Points
20 Minutes

5.2. Network Advertisement

- Configure R5 to advertise the routes learn by RIP from BB2 into BGP.
- Do not redistribute these routes into BGP.

1 Point
5 Minutes

IEWB-RS-VOL3 Lab 7

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	6	40 min
WAN Technologies	11	40 min
Interior Gateway Routing	30	1 hr 35 min
Exterior Gateway Routing	3	20 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (40 Minutes)

2.1. Trunking and EtherChannel

- Configure interfaces FastEthernet0/13 through FastEthernet0/15 on both SW1 and SW2 as one logical layer 3 link.
- All layer 2 traffic from SW1 to SW2 should be first sent to SW3, then sent to SW4, and finally on to SW2.

3 Points
20 minutes

2.2. VLAN Assignments

- Configure VTP on all switches with the domain name IE.
- Configure VLAN assignments as follows:

Switch	Interface	VLAN
SW1	Fa0/1	17
SW2	Fa0/2	27
SW1	Fa0/3	34
SW2	Fa0/4	46
SW1	Fa0/5	510
SW2	Fa0/6	46
SW3	Fa0/3	33
SW3	Fa0/24	33
SW4	Fa0/4	34
SW3	Fa0/5	55
SW2	Fa0/24	82

2 Points
15 Minutes

2.3. VLAN Filtering

- Configure SW3 so that SW2 does not receive traffic for VLAN 17 over its trunk links.
- Do not use any interface level commands to accomplish this.

**1 Point
5 minutes**

3. WAN Technologies – (40 Minutes)

3.1. PPPoFR

- Configure a PPPoFR connection between R2 and R4 using only the physical interfaces.

**2 Points
10 Minutes**

3.2. Point-to-Point

- Configure the Frame Relay connection between R1 and R5 using the DLCI's provided in the diagram.
- Use a point-to-point subinterface on R1 and a multipoint subinterface on R5.

**3 Points
10 Minutes**

3.3. Bridging

- Using a BVI, configure the Frame Relay connection between R6 and BB1 using DLCI 401.

**2 Points
10 Minutes**

3.4. PPP

- Configure PPP on the Serial connection between R4 and R5
- Use IP unnumbered for this connection.

2 Points
5 Minutes

3.5. PPP Authentication

- Authenticate the PPPoFR session between R2 and R4 using CHAP.
- The routers should send their hostnames with a null password for this authentication.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 35 Minutes)

4.1. EIGRP

- Enable EIGRP AS 10 on R2, R3, R4, and R6.
- Advertise the interfaces in EIGRP according to the protocol diagram.
- Redistribute the Loopback0 interfaces of R3 and R6 into EIGRP.

2 Points
5 Minutes

4.2. RIP

- Enable RIPv2 on R3.
- Advertise VLAN 33 into RIP.

2 Points
5 Minutes

4.3. RIP Summarization

- BB3 should only receive a summarized route for the 144.X.0.0/16 and 150.X.0.0/16 networks.
- Do not use the **ip summary-address rip** command for this task.

2 Points
5 Minutes

4.4. OSPF

- Configure OSPF area 0 between R1 & R5 and R5 & SW4.
- Configure OSPF area 1 between R1, R2, SW1, and SW2.
- Advertise R1, R2, SW1, SW2, and SW4's Loopback0 networks in OSPF area 1.
- Configure OSPF area 51 between SW2 and BB2.

2 Points
5 Minutes

4.5. OSPF

- Do not use a virtual link or tunnel directly between R1 and SW2.

2 Points
5 Minutes

4.6. OSPF Loopback Advertisement

- Configure OSPF on R4's Loopback0 interface.
- The Loopback0 interface should appear in R5's routing table with a subnet mask of /24.
- Do not use redistribution or the **ip ospf network point-to-point** command for this task.

2 Points
5 Minutes

4.7. OSPF Loopback Advertisement

- Advertise R5's Loopback0 interface into OSPF.
- Do not use the **network** command under the routing process for this task.

2 Points
5 Minutes

4.8. OSPF

- Ensure that R4 and R5 become OSPF neighbors across the IP unnumbered link.

2 Points
5 Minutes

4.9. NAT

- Configure NAT on R5 so that its Ethernet0/1 interface is considered as the inside interface.
- Other devices do not need reachability to R5's interface Ethernet0/1 but R5 should be able to successfully ping any IP address in the network when sourcing the ping off its Ethernet0/1 interface.
- Do not apply the **ip nat outside** command to more than one interface to accomplish this task and do not advertise interface Ethernet0/1 via any routing protocol.

3 Points
10 Minutes

4.10. IGP Redistribution

- Perform redistribution of RIP into EIGRP on R3.
- Without redistributing EIGRP into RIP ensure that BB3 can reach any of the IP addresses within the network.

3 Points
10 Minutes

4.11. IGP Redistribution

- Perform mutual redistribution between OSPF and EIGRP on R2 and R4.
- These routes should be redistributed in such a way that the cost does not change as the routes are advertised throughout the OSPF domain.

2 Points
10 Minutes

4.12. Path Manipulation

- OSPF enabled routers should prefer to route to R4 to reach the external routes redistributed from EIGRP over routing to R2.
- This configuration should not be done on R2 or R4.

2 Points
10 Minutes

4.13. Redistribution Loop Prevention

- Ensure that the RIP routes redistributed into EIGRP on R3 do not get passed back into EIGRP from OSPF on R2 or R4.

3 Points
10 Minutes

4.14. Default Routing

- Configure R1 to generate a default route into OSPF.

1 Point
5 Minutes

5. Exterior Gateway Routing – (20 Minutes)

5.1. BGP Peerings

- Configure BGP according to the protocol diagram on R1, R2, R5, and SW2.
- Do not enable BGP on SW1 or SW4 but ensure that they can reach all BGP routes by using the default route advertised via OSPF by R1.
- Configure BGP according to the protocol diagram on R3, R4, and R6.
- Do not enable iBGP peering between R3 and R6.
- eBGP peering should be done between R2 & R4, R4 & R5, R3 & BB3, and R6 & BB1.

3 Points
20 Minutes

IEWB-RS-VOL3 Lab 8

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	8	40 min
WAN Technologies	14	45 min
Interior Gateway Routing	23	1 hr 10 min
Exterior Gateway Routing	7	30 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (40 Minutes)

2.1. Trunking

- Configure ISL trunk links on the first connected interfaces between SW1 & SW4 and SW2 & SW3.
- Configure 802.1q trunk links on the second connected interfaces between SW2 & SW4 and the first connected interfaces between SW3 & SW4.
- Shut down unused connected interfaces between the switches.

2 Points
10 Minutes

2.2. VLAN Assignments

- Configure VTP on the switches using the domain name IECWB.
- Configure the VLAN assignments as follows:

Device	Interface	VLAN
R1	Fa0/0	100
R2	Fa0/0	28
R3	E0/1	34
R4	E0/0	46
R4	E0/1	34
R5	E0/0	53
R5	E0/1	58
R6	G0/0	46
SW3	Fa0/21	53
SW4	Fa0/20	53

- BB2 should be in VLAN 100.
- BB3 should be in VLAN 53.

2 Points
10 Minutes

2.3. Spanning-Tree Protocol

- Configure SW4 as the spanning-tree root for all configured VLANs.
- Layer 2 traffic from SW2 to SW4 should first be sent to SW3.

2 Points
10 Minutes

2.4. VTP

- Configure VTP pruning so that SW4 does not send VLAN 7 traffic to SW2 and SW3.
- SW4 should still send broadcast traffic in VLAN 58 to SW1.

2 Points
10 Minutes

3. WAN Technologies – (45 Minutes)

3.1. Point-to-Point

- Configure a Frame Relay connection between R1 and R5 using the DLCI's provided in the diagram.
- Configure this connection so that the routers do not rely on manual or dynamic layer 3 to layer 2 mapping.

2 Points
10 Minutes

3.2. Point-to-Point

- Configure the Frame Relay connection between R2 and R5 using the DLCI's provided in the diagram.
- Configure this connection so that the routers use manual layer 3 to layer 2 mapping.

2 Points
10 Minutes

3.3. Point-to-Point

- Configure the Frame Relay connection between R4 and R5 using the DLCI's provided in the diagram.
- Configure this connection so that the routers use dynamic layer 3 to layer 2 mapping (Inverse-ARP).

2 Points
10 Minutes

3.4. Point-to-Point

- Configure the Frame Relay connection between R6 and BB1 using the DLCI provided in the diagram.
- Use Inverse-ARP for layer 3 to layer 2 mapping but do not Inverse-ARP on any DLCI other than 101.

2 Points
5 Minutes

3.5. PPP and Bridging

- Configure PPP on the Serial connection between R4 and R5
- Ensure that the configuration does not rely on IPCP but uses BCP.

```
Rack1R4#show int serial0/1 | in (Encap|Open)
  Encapsulation PPP, LCP Open
  Open: CDPCP, BCP, loopback not set
Rack1R4#
```

3 Points
5 Minutes

3.6. Bridging

- Configure the Serial connection between R1 Serial0/1 and R2 Serial0/1 according to the diagram.
- Bridging will need to be configured on R3 to accommodate this configuration.

3 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 10 Minutes)

4.1. RIPv2

- Enable RIPv2 on R4, R5, R6, SW3, and SW4.
- Advertise the connection between R4 and R5, VLAN 46, and VLAN 53 into RIP.
- Advertise the Loopback0 networks of SW3 and SW4 into RIP.
- Do not run RIP on the Frame Relay link between R4 and R5.

**2 Points
5 Minutes**

4.2. EIGRP

- Enable EIGRP on R3, R4, and SW1.
- Advertise the Ethernet segment between R3 and SW1 into EIGRP.
- Advertise the Ethernet segment between R3 and R4 into EIGRP.

**2 Points
5 Minutes**

4.3. EIGRP

- Advertise R3 and SW1's Loopback0 interface into EIGRP.
- These networks should appear with an administrative distance of 170 on R4.
- Do not redistribute the Loopback0 interfaces into EIGRP to accomplish this task.

**2 Points
5 Minutes**

4.4. EIGRP

- Configure EIGRP on R6.
- Advertise R6's Loopback0 interface into EIGRP without using a network statement.
- Enable EIGRP on the Frame Relay connection between R6 and BB1.
- Authenticate this EIGRP neighbor relationship using key 1 along with the password of CISCO.

3 Points
10 Minutes

4.5. OSPF

- Configure OSPF area 125 between R1, R2, and R5.
- Configure OSPF area 0 between R2 and SW2.
- Configure OSPF area 0 across the Frame Relay connection between R4 and R5.

2 Points
5 Minutes

4.6. OSPF

- Configure OSPF area 58 between R5 and SW2.
- Do not use a virtual link or tunnel on any OSPF enabled routers.

3 Points
10 Minutes

4.7. OSPF Loopback Advertisement

- Configure OSPF on R1, R4, R5, and SW2's Loopback0 interface.
- R4 should have one single route to reach R1, R2, and R5's Loopback0 networks through R5.

2 Points
5 Minutes

4.8. OSPF Loopback Advertisement

- Advertise R2's Loopback0 interface into OSPF.
- R1 should see this network as an intra-area route.
- SW2 should see this network as an external-type 2 route.

**2 Points
5 Minutes**

4.9. IGP Redistribution

- Perform mutual redistribution between RIP and OSPF on R5.
- Perform mutual redistribution between EIGRP and RIP on R6.
- Perform mutual redistribution between OSPF and EIGRP on R4.

**3 Points
10 Minutes**

4.10. IGP Redistribution

- Ensure that routers in the EIGRP domain have reachability to the 137.X.54.0/24 and the 137.X.46.0/24 networks.
- Do not redistribute RIP into EIGRP on R4 to accomplish this task.

**2 Points
10 Minutes**

5. Exterior Gateway Routing – (30 Minutes)

Note: SW3 and SW4 do not need reachability to BGP learned prefixes

5.1. BGP Peerings

- Configure BGP according to the protocol diagram on all devices.
- eBGP peering should be done between R1 & BB2, R1 & R2, R1 & R5, R2 & SW2, R3 & R4, and R5 & SW2.
- iBGP peering should be done between R2 & R5, R4 & R5, R4 & R6, and R3 & SW1.
- The peering between R1 and BB2 should be authenticated with the password CISCO.

**3 Points
20 Minutes**

5.2. BGP

- Configure SW2 to advertise the VLAN 8 network via BGP.
- This network when received by R2 should appear as below:

```
Rack1R2#show ip bgp
BGP table version is 2, local router ID is 137.1.28.2
Status codes: s suppressed, d damped, h history, * valid, > best, i
- internal, r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network        Next Hop        Metric LocPrf Weight Path
* i137.1.8.0/24  137.1.58.8      0      100      0 300 i
*>                137.1.28.8      0              0 65008 300 i
Rack1R2#
```

- Do not use AS-path prepending for this task.

**2 Points
5 Minutes**

5.3. Private AS

- Configure SW1 to advertise the VLAN 7 network via BGP.
- This network should appear to the backbone routers to have originated by AS 100.

2 Points
5 Minutes

IEWB-RS-VOL3 Lab 9

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	4	25 min
WAN Technologies	7	30 min
Interior Gateway Routing	31	1 hr 35 min
Exterior Gateway Routing	8	30 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (25 Minutes)

Note: VTP is preconfigured with SW1 in server mode, SW3 in transparent mode, and SW2 and SW4 in client mode

2.1. Trunking

- Configure interfaces Fa0/13 – 15 on SW1 and SW2 as one logical 802.1q trunk using EtherChannel.
- Configure interfaces Fa0/16 – 18 on SW2 and SW3 as one logical ISL trunk using EtherChannel.
- Configure interfaces Fa0/19 – 21 on SW3 and SW4 as one logical 802.1q trunk using EtherChannel.
- Do not use dynamic trunking or EtherChannel negotiation.

2 Points
10 Minutes

2.2. VLAN Assignments

- Configure VLAN assignments as follows:

Device	Interface	VLAN
R1	Fa0/0	136
R2	Fa0/0	2
R3	E0/1	136
R4	E0/0	54
R4	E0/1	48
R5	E0/0	54
R5	E0/1	57
R6	G0/0	136

2 Points
15 Minutes

3. WAN Technologies – (30 Minutes)

3.1. Partial Mesh

- Configure a Frame Relay connection between R1, R2, R4, and R5 using the DLCI's provided in the diagram.
- Use only the physical interfaces on R1 and R5.
- Use multipoint subinterfaces on R2 and R4.
- Use only one Frame Relay map statement on R2 and R4.

3 Points
10 Minutes

3.2. Point-to-Point

- Configure the Frame Relay connection between R6 and BB1 using the DLCI provided in the diagram.

2 Points
10 Minutes

3.3. PPP

- Configure PPP on the Serial connection between R4 and R5

1 Point
5 Minutes

3.4. Authentication

- Configure CHAP authentication on R4 and R5.
- Use username ROUTER4 on R4 and ROUTER5 on R5 along with the password of CISCO.

1 Point
5 Minutes

4. Interior Gateway Routing – (1 Hour 35 Minutes)

4.1. Default Routing

- Configure SW3 so that it sends traffic for all destinations to SW1.
- Do not use static routing for this task.

**1 Point
5 Minutes**

4.2. RIPv2

- Enable RIPv2 on R4, R5, and SW2.
- Advertise VLAN 8, 48, & 54 and SW2's Loopback0 into RIP.
- The administrative distance of RIP should be half of the default administrative distance on R4 and R5.

**3 Points
5 Minutes**

4.3. RIPv2

- Configure R4 to generate a default route to SW2.
- This default should not be sent to R5.
- Do not use a distribute-list to accomplish this task.

**2 Points
5 Minutes**

4.4. RIPv2

- The RIP updates sent between R4 and R5 across VLAN 54 should be sent with a destination IP address of 156.X.54.255.
- Do not use the **neighbor** command to accomplish this task.

**2 Points
5 Minutes**

4.5. OSPF

- Configure OSPF area 1245 between R1, R2, R4, and R5.

3 Points
10 Minutes

4.6. OSPF Attributes

- Configure OSPF area 0 on the PPP connection between R4 and R5.
- Set the OSPF hello interval on the PPP connection to 2400 seconds.

2 Points
5 Minutes

4.7. OSPF

- Configure OSPF area 51 between R2, SW4, and BB2.
- Summarize the 156.X.0.0 network out towards SW4 and BB2.
- Use the most efficient summarization possible with the minimal amount of address overlap for your internal network.

2 Points
5 Minutes

4.8. OSPF

- Configure OSPF area 57 between R5 and SW1.
- Configure OSPF area 0 on VLAN 5 and 7.
- OSPF area 57 should be a stub area.
- Do not use a GRE tunnel for this task.

3 Points
10 Minutes

4.9. OSPF Loopback Advertisement

- Advertise R1, R2, R4, R5, and SW1's Loopback0 interface into OSPF area 0.

**3 Points
10 Minutes**

4.10. OSPF Path Manipulation

- R4 and R5 should route across the Frame Relay connection as opposed to the PPP connection to reach each other's Loopback0 networks.

**2 Points
5 Minutes**

4.11. IGP Redistribution

- Perform mutual redistribution between RIP and OSPF on R4 and R5.

**3 Points
10 Minutes**

4.12. Loop Prevention

- Prevent route looping between RIP and OSPF on R4 and R5.
- Do not use administrative distance to accomplish this task.

**3 Points
10 Minutes**

4.13. Default Routing

- Configure R1 to generate a default route into OSPF.
- This default should not be redistributed into RIP.

**1 Point
5 Minutes**

4.14. Default Routing and HSRP

- Using a static route, configure a default on R1 pointing to 156.X.136.254.
- As long as R6's DLCI 101 is active, R6 should be the HSRP primary router answering for this IP address.
- If R6's DLCI 101 becomes inactive or deleted R3 should become the active router.

1 Point
5 Minutes

5. Exterior Gateway Routing – (30 Minutes)

Note: SW4 does not need reachability to BGP learned prefixes

5.1. BGP Peerings

- Configure BGP according to the protocol diagram on R1, R3, and R6.
- eBGP peering should be done between AS 100 & AS 54, and AS 100 & AS 200.
- iBGP peering should be done within AS 100.

3 Points
20 Minutes

5.2. BGP Network Advertisement

- Configure R1 to advertise the 156.X.0.0/24 network via BGP.
- Advertise the routes learned by OSPF on R1 via BGP.
- Configure R3 to advertise the 204.12.X.0/24 network and R6 to advertise the 54.1.X.0/24 network via BGP.

2 Points
5 Minutes

5.3. Next-hop Processing

- Configure the network so that R1 will forward traffic learned via AS 100 to the active HSRP router within VLAN 136.

3 Points
5 Minutes

IEWB-RS-VOL3 Lab 10

Lab Overview:

The following scenario is a practice lab exam designed to help you develop your speed and accuracy at configuring Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing and Switching Lab exam. The goal of this scenario is to configure and verify complete layer 2 and layer 3 reachability as quickly as possible while minimizing the usage of Cisco's documentation or the context sensitive help. Ensure to track your time as you progress through each section and compare your results with the specified target time.

Lab Instructions:

Prior to starting, ensure that the initial configuration scripts for this lab have been applied. For a current copy of these scripts, see the Internetwork Expert members site at <http://members.internetworkexpert.com>.

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an address refers to your rack number, while any reference to Y in an address refers to your router number.

Upon completion, all devices should have full IP reachability to all networks in the routing domain, including any networks generated by the backbone routers unless explicitly specified.

Lab Do's and Don'ts:

- Do not change or add any IP addresses from the initial configuration unless otherwise specified
- Do not change any interface encapsulations unless otherwise specified
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified
- Do not use any static routes, default routes, default networks, or policy routing unless otherwise specified
- Save your configurations often

Point Values & Target Times:

The point values and target times for each section are as follows:

Section	Point Value	Target Time
Troubleshooting	2	10 min
Bridging and Switching	7	50 min
WAN Technologies	10	40 min
Interior Gateway Routing	29	1 hr 20 min
Exterior Gateway Routing	5	25 min

GOOD LUCK!

1. Troubleshooting - (10 Minutes)

1.1. Faults

- There are 2 faults with the initial configurations that need to be resolved.
- Each fault is worth 1 point
- All information (IP addressing, interface numbering, etc) in the diagrams is correct.

2. Bridging & Switching - (50 Minutes)

2.1. Trunking

- Configure interfaces Fa0/14 – 17 on SW1 as 802.1q trunk links.
- Configure SW2 and SW3 to bind the remote ends of these links at 802.1q trunk links with EtherChannel using PAgP.

2 Points
15 Minutes

2.2. VLAN Assignments

- Configure the VTP domain ONE on SW1, TWO on SW2, THREE on SW3, and FOUR on SW4.
- Configure the VLAN assignments per the diagram.
- Do not create VLAN 48 on SW1 or SW3.

3 Points
15 Minutes

2.3. 802.1q Tunneling

- Configure interfaces Fa0/13 and Fa0/21 on SW2 and SW4 as access ports in VLAN 48.
- Using VLAN 1000 configure 802.1q tunneling on SW1 and SW3 to transport VLAN 48 between SW2 and SW4.

2 Points
20 Minutes

3. WAN Technologies – (40 Minutes)

3.1. Hub and Spoke

- Configure a hub and spoke Frame Relay connection between R1, R2, and R3.
- R1 and R2 should be the spokes and R3 should be the hub.
- Use a multipoint subinterface on R3.
- Use only the DLCI's provided in the diagram.

2 Points
10 Minutes

3.2. Point-to-Point

- Using a subinterface, configure the Frame Relay connection between R6 and BB1 using the DLCI provided in the diagram.
- Layer 3 to layer 2 mapping should be performed by inverse-ARP.
- Do not use the **no frame-relay inverse-arp** or **no frame-relay inverse-arp ip <DLCI>** commands for this task.

2 Points
10 Minutes

3.3. Point-to-Point

- Configure the Frame Relay connection between R3 and R5 using the information provided in the diagram.

2 Points
10 Minutes

3.4. PPP Authentication

- Authenticate the Frame Relay connection between R3 and R5 using CHAP authentication.
- Each router should use their respective hostnames along with a hash that represents the password of CISCO.

2 Points
5 Minutes

3.5. PPP

- Use PPP encapsulation on the Serial link between R4 and R5.
- Use IP unnumbered off of each router's respective Loopback0 interfaces.
- Do not allow PPP to install any unnecessary host routes (/32) in their routing tables.

2 Points
5 Minutes

4. Interior Gateway Routing – (1 Hour 20 Minutes)

4.1. RIPv2

- Enable RIPv2 on the Frame Relay connection between R1, R2, & R3 and between R6 & BB1.
- Enable RIPv2 between R2 and BB2.
- Authenticate the RIP updates between R2 and BB2 using key 1 along with the MD5 password of CISCO.
- Advertise R2's Loopback0 interface into RIP.

3 Points
5 Minutes

4.2. RIPv2

- Ensure that R1 and R2 can receive each other's RIP updates.
- Do not disable split-horizon or use a tunnel for this task.

3 Points
5 Minutes

4.3. RIPv2

- Configure R3 to advertise a default route into RIP.
- This default should only be sent when R3's Ethernet0/0 and Ethernet0/1 interfaces are down.
- If needed a static route is permitted on R3 for this task.

2 Points
5 Minutes

4.4. OSPF

- Configure OSPF area 35 across the Frame Relay connection between R3 and R5.

2 Points
5 Minutes

4.5. OSPF

- Configure OSPF area 367 between R3 & R6 and R3 & SW1.
- Do not use a DR or DBR within VLAN 37.

2 Points
5 Minutes

4.6. OSPF

- Configure OSPF on the PPP connection between R4 and R5.

3 Points
10 Minutes

4.7. OSPF Loopback Advertisement

- Advertise R3, R4, R5, R6, and SW1's Loopback0 interface into OSPF area 0.

3 Points
10 Minutes

4.8. EIGRP

- Configure EIGRP AS 10 on R1, R4, and SW2.
- Advertise VLAN 8, VLAN 148, and the Ethernet segment between R4 & SW2.
- Advertise R1, R4, and SW2's Loopback0 interfaces into EIGRP without using the network statement.

3 Points
10 Minutes

4.9. EIGRP

- Configure the network so that R1 uses the 100Mbps connection between itself and SW2 over the 10Mbps connection between itself and R4 to reach the 157.X.48.0/24 network.

2 Points
5 Minutes

4.10. IGP Redistribution

- Perform mutual redistribution between EIGRP and RIP on R1.
- Perform mutual redistribution between RIP and OSPF on R3 and R6.
- Perform mutual redistribution between EIGRP and OSPF on R4.

3 Points
10 Minutes

4.11. Loop Prevention

- Do not allow the RIP routes redistributed into EIGRP on R1 and then into OSPF on R4, to be redistributed back into RIP on R3.
- Use a dynamic method to prevent this looping that will allow for future routes to be automatically stopped from looping.

3 Points
10 Minutes

5. Exterior Gateway Routing – (25 Minutes)

5.1. BGP Peerings

- Configure BGP AS 65148 on R1, R4, and SW2.
- Configure BGP AS 200 on R2.
- Configure BGP AS 100 on R3, R5, R6, and SW1.
- eBGP peering should be done between R1 & R2, R1 & R3, R4 & R5, R5 & BB3, and R6 & BB1.
- iBGP peering should be done between all routers within a given AS.
- R1 should not peer with R4 and SW2 if the Ethernet segment (157.X.48.0/24) between R4 and SW2 is down.

3 Points
20 Minutes

5.2. BGP Network Advertisement

- Configure SW1 to advertise VLAN 7 into BGP without the use of a network statement.
- Configure SW2 to advertise VLAN 8 into BGP using a network statement.
- Configure R5 to advertise VLAN 5 and 53 into BGP.
- Only devices on these segments are required to have reachability to BB3.

2 Points
5 Minutes