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Disclaimer

The following publication, ***CCIE Routing & Switching Lab Workbook Volume IV***, is designed to assist candidates in the preparation for Cisco Systems' CCIE Routing & Switching Lab exam, specifically the ***Troubleshooting*** portion of the 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.

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Workbook Overview

Troubleshooting becomes integral part of the updated CCIE R&S lab exam. The new section is a group of loosely correlated trouble tickets. Every ticket has a point value associated with it, and the candidate must obtain 80% of the total section score in order to succeed in this section. Troubleshooting scenario uses a topology separate from the configuration part of the exam and has its own L2 configuration and IP addressing. Section grading is based on the automatic script along with a human hand to confirm the script results. From this information, one may conclude that mastering troubleshooting techniques becomes vital for succeeding in the new exam.

In this new IEWB-RS VOL4 workbook we present you with ten troubleshooting scenarios, each having ten trouble tickets. This amount should be approximately equal to the number of the troubleshooting tasks you will encounter in the actual exam. The topology used for every scenario is the same that we use for all our RS products, including VOL1 (technology-focused labs), VOL2 (configuration mock lab scenarios) and VOL3 (core technologies scenarios).

However, unlike our previous workbooks, we **restrict** access to some of the devices in the lab topology. For every scenario this “restricted” set may be different and it is clearly outlined in the scenario’s baseline. Using this technique we increase the scenario complexity by allowing candidates to see only “one” side of the problem. When looking at the lab diagram, you will clearly see routers not under your control as being displayed in orange color. Also, when you log onto the “restricted” device, it will warn you using a banner message.

In addition to the above restriction, we highly encourage you not using the **show running-configuration**, **show startup-configuration** commands or any other command that shows you the textual representation of the router’s configuration. This requirement makes you focus on using the show and debugging commands, which is invaluable when troubleshooting the real-world scenarios.

Our ultimate goal is not only prepare you for passing the Troubleshooting section of the CCIE R&S lab exam, but also to teach you a structured troubleshooting approach. As opposed to simple guessing and peeking at the routers running configurations you should learn using the debugging commands and interpreting various show commands output. For every ticket, we are going to follow the same structured procedure to resolve the issue. Here is an outline of this procedure:

1. Build and Analyze the Baseline
2. Analyze the Symptoms (propose hypothesis)
3. Isolate the issue (gather more symptoms)
4. Fix the Issue (by comparing to the Baseline)

We are now going to discuss all these steps in details to give you the basic understanding of the fundamental procedure.

Structured Troubleshooting

Build and Analyze the Baseline

Since all tickets in a scenario share the same topology, you need to perform this step only once per the whole scenario. Baseline is essentially a picture of the healthy network, which serves as the starting point of any troubleshooting process. In real life, your baseline is the snapshot of your network under “normal” conditions – stable topology, interfaces under normal utilization, devices responding to management requests, users happy etc. In the lab, all you have is the diagram and possibly some additional network description. Additional information might be provided in the trouble ticket itself, but the initial starting point is the diagram.

We recommend making your own diagrams, including the following information:

- IP addressing + IGPs.
- Layer 2 topology.
- BGP diagram.
- IPv6 topology.
- Multicast and Redistribution diagram.

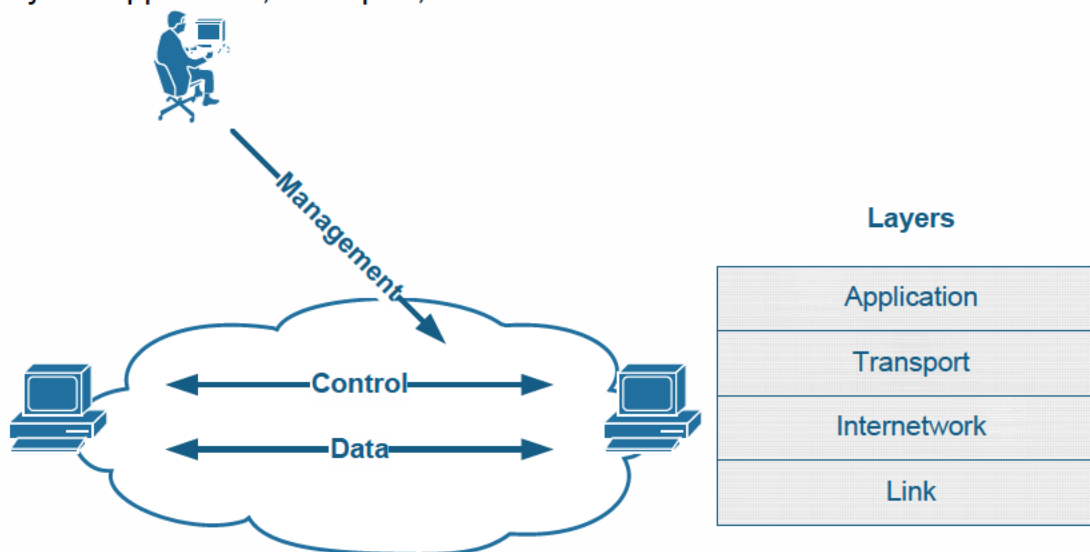
You may enhance your diagrams with any extra information provided, e.g. hints on the network pre-configuration and applications deployed, such as WWW, FTP, SMTP, VoIP and so on. This will help you analyzing symptoms later. Your goal at this stage is to get clear picture of the network and discover any potential caveats. Try to not use any IOS commands at this point, as this may consume your valuable time and add unneeded information. Overall, don't spend too much time building the baseline – the goal is to spend around 20 minutes. By the end of the baseline analysis phase, you should have clear understanding of the protocols and applications deployed in your network.

When you're finished with building the baseline, take a quick look over all tickets in sequence. See if you can make any conclusions based on the ticket information, like marking the potentially broken links or missing information flows. Sometimes this may be obvious from the ticket text and give you an extra hint which will help when dealing with other tickets.

Analyze the Symptoms

The ultimate goal of this step is coming up with the initial scope of the problem area and the initial set of hypothesis identifying the root cause. With respect to the CCIE lab, the primary source of the information is trouble ticket itself. The ticket might be formatted in a very simple manner, such as “there is an issue that prevents R1 from communicating with R2” or contain a detailed situation description, for example “at 10:00am this morning customers at Branch 1 site started complaining of poor HTTP performance. Analyzing the NOC action logs, you have noticed that someone was modifying R3’s configuration yesterday, but the change log entry is missing” and so on.

When trying to narrow the initial problem scope, it is helpful to use a reference network model, based on the classic TCP/IP protocol layers. The minimal working network consists of two communicating nodes and communication substrate connecting them. The substrate might be a direct link or a set of other nodes/routers. The network functions in three general planes: data, control and management. The first plane is responsible for forwarding data between the two endpoints, based on the programmed tables. The control plane is responsible for negotiating the data paths and establishing end-to-end connectivity. Example control plane protocols are OSPF, RIP, BGP and so on. The management plane is responsible for enforcing certain policy on the network and monitoring its performance. For example, SNMP and SSH used to carry CLI commands are both management protocols. All planes could be subdivided into four classic layers: Application, Transport, Internetwork and Link.



When analyzing the symptoms, you should select the network elements (e.g. nodes, links) that you suspect to belong to the problematic area: e.g. routers on the path between two nodes failing to communicate. At the same time, you should mark the planes and the layers that you suspect to malfunction and identify the protocol names at every layer. You need to be aware of the symptoms typical for every layer and remember that an issue at lower layer affects all other overlying layers as well (cascading effect).

Lastly, the most helpful thing to identify the initial problematic area is finding out what prior changes might have been made to the network, if this is mentioned in the ticket. Remember, every change is a potential problem!

Isolate the issue

The goal of this phase is finding the device(s) and the specific configuration area that might be causing the issue(s). This is the core of the troubleshooting process. You start verifying your initial hypothesis, by trying to narrow the problematic area as small as possible. To start with the process, you need to select from these three approaches:

Top-down approach

Test application layers across the path that you suspect to be causing the issues. Usually this approach works well when the issue is lying in application misconfiguration (e.g. improper IMAP4 settings). This is very helpful in real-life scenarios; however, from the lab perspective this approach is not very useful as most issues will probably be related to the network configuration.

Bottom-up approach

You start by testing physical layer issues of every node in the problematic area. If you don't find any issues, you proceed to the next layer (i.e. networking) and see if there are any deviations from the baseline there. This is the most universal approach, as it starts with the fundamental layer and moves up. However, executing bottom-up search might be routine and time consuming, and thus inappropriate for a small issue.

Divide-and-Conquer approach

This method attempts to reduce the amount of work required by bottom-up search by making a “guess” – picking up the network layer that you suspect to be malfunctioning and testing the devices in the problematic area at this layer. It is common to start with the Internetwork layer and test end-to-end connectivity using the `ping` and `tracert` commands. If this layer is healthy, then any underlying layer should be healthy as well, and you may continue searching in the “up” direction. Otherwise, using the above mentioned commands you may further isolate the problematic area and find the specific devices that might be causing the issue.

It is important to remember that during the issue isolating phase you will learn more information and may have to change your initial hypothesis, based on the results. Effectively, the Analyze and Isolate phases are deeply interconnected and depend on each other.

Fix the Issue

At the end of the previous stage you should be dealing with the “hot” area of the problem – devices/links that are malfunctioning or improperly configured. Of course, you should have facts on hands to prove that your hypothesis/guess was valid. Your next step is developing a plan to resolve the problem. Resist the urge of simply going ahead and changing the running configuration – you may effectively introduce more issues than there originally was. Save the original configuration, and type in your “fixup” in the notepad. Implement the “fixup” step by step – don’t apply changes to multiple devices at the same time. After every change, run verifications to see if the issue has been eliminated or not.

When you’re done, compare the results to the baseline you have built at the first step. If everything seems to match and the symptoms outlined in the ticket no longer persist you may consider the ticket to be resolved. If not, you should re-analyze the initial symptoms and the additional information gathered during the previous steps. The last step could be named as “Verification” step.

Solutions Structure

Solution documents for Labs 1-5 are formatted in structured manner to show you the flow of the actual troubleshooting process. You will find the sections corresponding to the in-depth analysis of the scenario baseline, diagram drawing and detailed step-by-step troubleshooting for every ticket presented in the scenario. Here is an outline for the solution document structure:

Build and Analyze the Baseline

- Layer 2 Diagram.
- BGP Diagram.
- Multicast and Redistribution.
 - Redistribution Loops Analysis.
 - Multicast Propagation Analysis.
- IPv6 Diagram
- Read over the Lab

Solutions

- Ticket 1
 - Analyze the Symptoms
 - Isolate the Issue
 - Fix the issue
 - Verify
- ...
- Ticket 10
 - Analyze the Symptoms
 - Isolate the Issue
 - Fix the issue.
 - Verify

As you can see, the document follows the exact same path for the troubleshooting process that we outlined before. Every solution is about 50-60 pages long and provides enough details for every ticket, so that you'll have plenty of material to learn from.

IEWB-RS VOL4 Lab 1

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for the Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all the issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the unfiltered `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- 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.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be 100% fixed in compliance with the requirements to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible solutions, choose the one that best meets the requirements and requires minimal changes. As per the CCIE R&S lab exam requirements, you are required to finish this lab in **two** hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order. Tackle the tickets in the order you prefer taking into consideration that time is a critical factor!

GOOD LUCK!

Baseline

All network devices are configured as per the provided diagram. The diagram reflects the proper network configuration, including IP addresses, IGP protocol settings and BGP AS numbers and serves as your primary source of information. This section provides the required information for the troubleshooting process. All the statements made below reflect the true network state; however some information may not be utilized in the troubleshooting process.

Devices under your Control

For this lab, access to and configuration of the following devices ONLY is allowed: R1, R4, R5, R6, SW1 and SW2. Backbone devices (BB1, BB2, and BB3) are not to be configured apart from the initial configurations, and are colored in **ORANGE**.

Bridging and Switching

- All switches use the VTP domain name of CCIE.
- SW1 is the VTP server, SW3 & SW4 are VTP clients and SW2 is in VTP transparent mode.
- L3 etherchannels and point-to-point links are configured between the switches as per the diagram.
- The trunk links connecting the switches are:
 - SW1 Fa0/14 to SW2 Fa0/14
 - SW2 Fa0/17 to SW3 Fa0/17
 - SW3 Fa0/19 to SW4 Fa0/19
- SW1 is the STP root bridge for all VLANs (PVST+).
- The Frame-Relay sub-interfaces of R2 and R3 are configured as point-to-point.

IGP

- Mutual redistribution is configured between RIP and EIGRP on R6.
- Mutual redistribution is configured between OSPF and EIGRP on R3 and SW2.
- The Serial link between R4 and R5 is a slow ISDN link and should be used only when the frame-relay link between R4 and R5 fails.
- No additional redistribution is to be configured anywhere in the network.

IPV6

- IPv6 is configured on the different links connecting R1, R2, and R3 as follows:
 - Network 2001:164:X:12::/64 between R1 and R2.
 - Network 2001:164:X:23::/64 between R2 and R3.
 - The PPP link between R1 and R3 uses the network 2001:164:X:13::/64.
- RIPng is used as the routing protocol between R1, R2 and R3.
- R1 prefers to reach R3's Loopback100 subnet via R2.
- R2 uses point-to-point Frame-Relay sub-interfaces.

BGP

- BGP peering sessions are configured as per the following table :

Device 1	Device 2
R4	BB3
R4	R3
R3	R1
R3	R2
R1	SW2
R1	R2
R2	R6
R6	BB2

- The peering session between R6 and BB2 is authenticated using the password of "CISCO".
- AS 300 users cannot use AS 200 as a transit to any other AS.
- AS 54 and AS 254 receive only a single summary route representing the whole 164.X.0.0 major subnet.

Multicast

- IP multicast routing is enabled on R2, R3, R4 and SW1.
- PIM is enabled on the following networks:
 - Frame Relay segments between R2 & R3 and R3 & R4.
 - Ethernet link between R4 and SW1.
 - VLANs 26, 3, and 7 of R2, R3, and SW1 respectively.
- R3 is the RP for the following multicast groups:
 - 225.10.0.0 - 225.10.255.255
 - 225.26.0.0 - 255.26.255.255
 - 225.42.0.0 - 255.42.255.255
 - 225.58.0.0 - 255.58.255.255
- R4 is the RP for the following multicast groups:
 - 226.37.0.0 - 226.37.255.255
 - 226.45.0.0 - 226.45.255.255
 - 227.37.0.0 - 227.37.255.255
 - 227.45.0.0 - 227.45.255.255
- RP is configured statically throughout the network.

QoS

- A Cisco Unified Call Manager server is deployed on VLAN5. Users on VLAN 7 register their SIP phones with the server.
- The Frame-Relay links of R4 and R5 are provisioned at 256Kbps. FRTS is configured on all the routers to accommodate this limitation.
- VoIP traffic is given priority treatment over the WAN links following the best practice recommendations for slow speed links.

Trouble Tickets

Ticket 1: VoIP Quality

- You have received complaints from users on VLAN7 using their Cisco IP Phones.
- The problem symptoms are voice quality degradation when calling the users on VLAN 5 subnet.
- QOS has been configured as per corporate policy regulations.
- All the frame-relay links appear to be uncongested.
- The problem seems to be really ambiguous, as users have complained that the voice quality is degraded only in one direction (From VLAN 7 to the HQ).
- Based on the above information provide a solution to this problem.

3 Points

Ticket 2: Load-Balancing

- SW2, SW3 and SW4 are configured such that traffic from SW2 destined to VLAN 9 is load balanced across the links connecting (SW2 to SW3) and (SW2 to SW4).
- However, recently you have found that only the path via SW4 is being utilized.
- Using the devices under your control only, return the network to baseline and ensure load balancing is achieved.

3 Points

Ticket 3: BGP Peering

- After the security administrator of AS 300 has changed some “security settings” you notice that the BGP adjacency between R1 and R3 fails. This is the message you keep seeing on your router’s console:

```
%BGP-3-NOTIFICATION: sent to neighbor 164.1.13.3 4/0 (hold time
expired) 0 bytes
```

- You have limited access to the remote router. So far, the only valuable piece of information you were able to get is:

```
Rack1R3#show ip bgp neighbors 164.1.13.1
BGP neighbor is 164.1.13.1, remote AS 300, external link
  BGP version 4, remote router ID 0.0.0.0
  BGP state = OpenSent
  Last read 00:01:34, last write 00:01:34, hold time is 180,
  keepalive interval is 60 seconds
  Message statistics:
    InQ depth is 0
    OutQ depth is 0

                Sent          Rcvd
Opens:           26            1
Notifications:  23            0
Updates:         0            0
Keepalives:     157          156
Route Refresh:  0            0
Total:          206          157
  Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast
  BGP table version 1, neighbor version 0/0
  Output queue size : 0
  Index 2, Offset 0, Mask 0x4
  2 update-group member
  Outbound path policy configured
  Outgoing update AS path filter list is 1

                Sent          Rcvd
Prefix activity: ----          ----
  Prefixes Current:      0            0
  Prefixes Total:        0            0
  Implicit Withdraw:     0            0
  Explicit Withdraw:     0            0
  Used as bestpath:      n/a          0
  Used as multipath:     n/a          0

                Outbound      Inbound
Local Policy Denied Prefixes:  -----
  Total:                   0            0
  Number of NLRIs in the update sent: max 0, min 0

Connections established 1; dropped 1
Last reset 01:25:07, due to BGP Notification sent, hold time
expired
```

```

External BGP neighbor may be up to 1 hop away.
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
Connection is ECN Disabled, Minimum incoming TTL 254, Outgoing
TTL 255

```

```

Local host: 164.1.13.3, Local port: 44156
Foreign host: 164.1.13.1, Foreign port: 179

```

```

Enqueued packets for retransmit: 1, input: 0  mis-ordered: 0 (0
bytes)

```

```

Event Timers (current time is 0xECDA36):

```

Timer	Starts	Wakeups	Next
Retrans	7	5	0xECFCDC
TimeWait	0	0	0x0
AckHold	0	0	0x0
SendWnd	0	0	0x0
KeepAlive	0	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0

```

iss: 263956977  snduna: 263956978  sndnxt: 263957023
sndwnd: 16384
irs: 1374337120  rcvnxt: 1374337121  rcvwnd: 16384
delrcvwnd: 0

```

```

SRTT: 37 ms, RTTO: 1837 ms, RTV: 1800 ms, KRTT: 58784 ms
minRTT: 20 ms, maxRTT: 300 ms, ACK hold: 200 ms
Flags: active open, nagle
IP Precedence value : 6

```

```

Datagrams (max data segment is 1460 bytes):

```

```

Rcvd: 1 (out of order: 0), with data: 0, total data bytes: 0
Sent: 3 (retransmit: 5, fastretransmit: 0, partialack: 0, Second
Congestion: 0), with data: 1, total data bytes: 45

```

- You cannot reach the other administrator via the phone, so it's up to you to use the given information to fix your side of the connection.

4 Points

Ticket 4: Connectivity Issue

- VLAN 41 users cannot reach any resource on VLAN 5 – all the IP Phones are in the unregistered state.
- VLAN 41 users are only able to reach the local resources.
- Using the baseline description as your reference, provide a comprehensive solution to the problem.

3 Points

Ticket 5: Old Backup

- R6's power supply has failed accidentally, and no recent backup of the configuration exists.
- To minimize downtime, you loaded the old backup file taken a couple of weeks ago and tried to get the network back to the original working state.
- Your main goal is make all the routers in the EIGRP domain reach all the RIP routes announced by BB1 and verify that BGP is working properly.

3 Points**Ticket 6: BGP Prefixes**

- The network administrator of AS 254 complained that AS 54 prefixes are unreachable.
- The administrator claims that AS 200 is not advertising these prefixes to AS 254.
- The problem seems to be related to your network configuration, so it's up to you to solve it.

3 Points**Ticket 7: Security Improvement**

- The security administrator enabled "some security feature" on SW3 for the users of VLAN 55, and this lead to users being unable to browse the internet.
- You asked the users of VLAN 55 to run the `ipconfig /all` command and noticed that all rebooted machines are getting an ip address in the range 169.254.0.0/16. Users are supposed to get an ip address through DHCP.
- The DHCP server configured on R5 seems to be working properly.
- The security admin is out for lunch, and you only have a few minutes to resolve the problem.

3 Points

Ticket 8: BGP Peering

- After some IP configuration changes on VLAN 18 you found that BGP peering sessions between R1 and SW2 is no longer active.
- The latest configuration changes don't give a hint about the cause of the broken BGP peering.
- Restore BGP peering between R1 and SW2. Configuration changes to R1 and SW2 ONLY are allowed.

3 Points**Ticket 9: IPv6**

- IPv6 users behind R1 can no longer reach the Loopback100 address of R3.
- A primary and a backup path are supposed to exist.
- No alarms signaling the problem are present.
- Resolve the problem by accessing the routers under your control.

3 Points**Ticket 10: Multicast**

Note: Prior to starting with this ticket make sure you resolved Tickets 4 and 5

- Users on VLAN 41 complain that video feeds from VLAN 26 are no longer received.
- The channel being used maps to the multicast address 226.37.1.1.
- Solve the ticket, and verify that multicast streams can be sent from R6 to SW1 successfully.
- Testing can be done using ICMP.

2 Points

IEWB-RS VOL4 Lab 2

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP address, IGP protocol settings and BGP AS numbers and serves as your primary source of the information. This section provides the scenario-specific configuration information that you may need during troubleshooting process. Notice that not all of the information may be useful during the troubleshooting process; however, all statement made below reflect the correct network configuration.

Devices under your Control

For this lab, you may only access and modify the configuration all devices with except to SW1, SW3 and SW4. Backbone devices BB1, BB2 and BB3 are out of your control per the initial topology configuration. If you refer to the diagram provided, the devices colored in **ORANGE** are out of your control.

Bridging and Switching

- All switches are in transparent VTP mode and use VTP domain name of CCIE.
- The following is the list of the trunk links interconnecting the switches:
 - SW1's interfaces Fa0/13, Fa0/14, and Fa0/15 and SW2's interfaces Fa0/13, Fa0/14, and Fa0/15.
 - SW1's interfaces Fa0/19, Fa0/20, and Fa0/21 and SW4's interfaces Fa0/13, Fa0/14, and Fa0/15.
 - SW2's interfaces Fa0/16, Fa0/17, and Fa0/18 and SW3's interfaces Fa0/16, Fa0/17, and Fa0/18.
 - SW3's interfaces Fa0/19, Fa0/20, and Fa0/21 and SW4's interfaces Fa0/19, Fa0/20, and Fa0/21.
- SW1 is the STP root bridge for all VLANs. Classic STP (PVST+) is in use.
- The Frame-Relay sub-interfaces of R2 and R3 are configured as point-to-point.

IGP

- Mutual redistribution is configured between RIP and OSPF on R3 and R4.
- IPv6 is configured on the Frame-Relay link between R1 and R2 using the network 2001:141:X:12::/64
- IPv6 is configured on R2, R5 and SW2 using the IPv6 prefix 2001:141:X:25::/64.
- RIPng is used as IPv6 routing protocol between R1, R2 and R3.
- OSPFv3 Area 0 is configured on the Frame-Relay link while OSPFv3 Area 1 is configured on the Ethernet segment.
- New Loopback interfaces with the IP addresses 2001:150:X:Y::Y/64 have been created on R5 and SW2 and advertised into OSPFv3 Area 1.

BGP

- BGP peering sessions are configured according to the following table:

Device 1	Device 2
R6	BB1
R6	R2
R1	BB2
R1	R2
R2	R5
R5	SW2
R5	R4

- R1 and BB2 peering session is authenticated used the password value of "CISCO".

Multicast

- IP Multicast routing configured on R1, R2, R3, R4, R5, SW1 and SW2.
- PIM sparse mode enabled on the following interfaces:

Device	Interface
R1	Fa0/0
R1	S0/0.1
R2	Fa0/0
R2	S0/0
R3	Fa0/0
R3	Fa0/1
R3	S1/0.1
R4	Fa0/0
R4	Fa0/1
R4	S0/0
R5	Fa0/0
R5	Fa0/1
R5	S0/0
SW1	Fa0/3
SW1	VL7
SW2	VL258

- Auto-RP is used to disseminate Group-to-RP mapping information through the network.
 - R2 is the RP for the multicast groups 225.0.0.0 through 225.255.255.255.
 - R5 is the RP for the multicast groups 239.0.0.0 through 239.255.255.255.
- SW2 is the Auto-RP Mapping Agent

Trouble Tickets

 **Note**

Prior to loading the initial configurations, make sure you switched SW2 to dual IPv4/IPv6 mode using the command `sdm prefer dual-ipv4-and-ipv6 routing` and reloading the switch

Ticket 1: WWW Connectivity

- The user on a host on VLAN255 (simulated by SW3) has been reported that he is unable to reach the Web server on VLAN37
- The user told you that he was able to reach the same host until today. He suspects that the recent software updates on the Web server are to blame.
- Assuming you cannot make any changes to the user's PC isolate and fix this issue.

3 Points

Ticket 2: Suboptimal Routing

- Your NMS reports high link utilization for the Frame-Relay connection between R4 and R5.
- However, per the normal configuration the fast link connecting R4 and R5 should be used.
- Find the problem and ensure optimal routing while introducing minimal changes to the network.

3 Points

Ticket 3: Connectivity Issue

- Users on VLAN 12 report that they cannot reach any of VLAN43 resources.
- You suspect that the latest security policy changes in AS 400 are to blame.
- Fix this issue and make sure you can ping and telnet from VLAN12 to VLAN43

3 Points

Ticket 4: RIPv2

- After a recent change in the routing policy users behind BB1 started complaining they cannot reach VLAN7 and VLAN77 subnets.
- Figure out what the issue is and fix the problem.

3 Points**Ticket 5: Traceroute**

- The admin in charge of the networks behind R3 reported that he cannot reach R5 via the `traceroute` command.
- He suspects you implemented some sort of filtering blocking the `traceroute` command from working properly.
- Find what might be causing such behavior and fix the problem.

3 Points**Ticket 6: NAT**

- There is a server on VLAN45 that has been just moved in. Apparently, the server admin did not configure the default gateway properly.
- A user with the IP address of BB3 needs to access the server immediately, and you cannot find the server admin to fix the configuration problem.
- You tasked a subordinate of yours to configure NAT in R4 so that BB3 should see the server as 204.12.X.100 and the server should communicate to the BB3 using the IP 141.X.145.254.
- However, the configuration made by your subordinate is not working for some reason.
- Using your knowledge of Cisco NAT make sure the configuration works.

3 Points

Ticket 7: BGP

Note: This ticket requires you to resolve Ticket 3 prior to starting.

- Recently, the administrator of AS 254 told you that they cannot reach AS 400 networks anymore.
- As the admin of AS400 you have been given access to AS300 and AS200 BGP routers to investigate this issue. .
- With minimal configuration changes, provide a solution to this problem.

2 Points

Ticket 8: DHCP

- A new host has been deployed on VLAN45 configured to obtain an IP address via DHCP.
- The address to be allocated should be 141.X.145.100.
- R5 is pre-configured as DHCP relay inserting information option with the subscriber-id value of "VLAN45".
- The DHCP server is located in R3 and you asked your subordinate to configure it for DHCP address allocation based on Option 82.
- However, when you came back from lunch you found that the host still cannot auto-configure the IP address.
- Fix the issue and make sure the allocation based on Option 82 works.

4 Points

Ticket 9: IPv6

- R1 is not being able to reach the Loopback100 subnet of R5 but it can reach the Loopback100 subnet of SW2.
- Modifying only the IPv6 relevant configuration, resolve this issue.
- Apply minimal configuration changes to accomplish this task.

3 Points

Ticket 10: Multicast

Note: This ticket requires you to resolve Tickets 2 and 3 prior to starting.

- Multicast listeners on VLAN37 cannot receive feeds sourced in VLAN12 and VLAN43.
- The group used to source the multicast feed is 239.X.X.X where X is your rack number.
- Resolve this issue without using any static multicast routes and make sure the feed flows through the network.

3 Points

IEWB-RS VOL4 Lab 3

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP address, IGP protocol settings and BGP AS numbers and serves as your primary source of the information. This section provides the scenario-specific configuration information that you may need during troubleshooting process. Notice that not all of the information may be useful during the troubleshooting process; however, all statement made below reflect the correct network configuration.

Devices under your Control

For this lab, you may only access and modify the configuration of all “core” devices in the network. Backbone devices BB1, BB2 and BB3 are out of your control per the initial topology configuration. If you refer to the diagram provided, the devices colored in **ORANGE** are out of your control.

Bridging and Switching

- The following is the list of the trunk links interconnecting the switches:
 - SW1 interface Fa0/16 and SW3 interface Fa0/13.
 - SW1 interface Fa0/19 and SW4 interface Fa0/13.
- Additionally, here is the outline of the trunk links configuration between SW1 and SW2:

```
#show etherchannel 13 port-channel
      Port-channels in the group:
      -----

Port-channel: Po13
-----

Age of the Port-channel   = 00d:00h:02m:38s
Logical slot/port        = 2/13           Number of ports = 3
GC                       = 0x00000000    HotStandBy port = null
Port state                = Port-channel Ag-Inuse
Protocol                  = -

Ports in the Port-channel:

Index  Load  Port      EC state      No of bits
-----+-----+-----+-----+-----
  0     00   Fa0/13    On/FEC        0
  0     00   Fa0/14    On/FEC        0
  0     00   Fa0/15    On/FEC        0

Time since last port bundled:    00d:00h:01m:34s    Fa0/15
```

```
#show interfaces po13 trunk
```

```
Port      Mode      Encapsulation  Status      Native vlan
Po13      on        802.1q         trunking    1

Port      Vlans allowed on trunk
Po13      1-6,8-4094

Port      Vlans allowed and active in management domain
Po13      1,3-6,42,55,57,263

Port      Vlans in spanning tree forwarding state and not pruned
Po13      1,3-6,42,55,57,263
```

- The Frame-Relay sub-interfaces of R5 are configured as point-to-point.

IGP

- IGP protocols are configured per the diagram supplied with the scenario.

BGP

- Using the Layer 3 connectivity diagram as your reference, recover the BGP peering sessions mesh.
- Do not break the requirements of the lab scenario when performing this operation.
- R1 and BB2 peering session is authenticated used the password value of "CISCO".

Trouble Tickets

Ticket 1: RIPv2

- Fix the issue preventing R6 from learning RIPv2 prefixes from BB1.
- Do not change the IP addressing on R6 to resolve this problem.

2 Points

Ticket 2: BGP Peering

- The BGP session between R6 and R2 is not coming up for some reason.
- Do not apply any changes to SW4 to resolve this problem.

3 Points

Ticket 3: Backup Link

- Users on VLAN42 report terrible performance when connecting the servers on VLAN5.
- You suspect that the problem is that packets are taking suboptimal path across the backup Serial link between the two sites.
- Restore optimal performance and ensure the primary path over Frame-Relay cloud is being used.

3 Points

 **Note**

You need to resolve Ticket 4 prior to continuing with any other ticket that follows.

Ticket 4: Network Optimization

This ticket requires Tickets 1 and 2 resolved prior to starting.

- After a recent merge process, some networks have been joined together.
- In order to provide end-to-end connectivity, mutual redistribution has been configured between RIP and OSPF on R1, R2, R3, R4 and SW1.
- However, the straight-forward configuration approach resulted in network instabilities and sub-optimal routing.
- Fix the network configuration to ensure optimal routing, which means using high-speed links (Ethernet and Frame-Relay) for primary data paths.
- The routers behind R5 should receive a single default route to reach the rest of the network.
- R4 may still use the Serial link to reach the networks behind R5.

4 Points

Ticket 5: Server Farm

- Two new servers have been recently connected to SW1 port 0/18 and SW2 port 0/19 respectively.
- For the lab purpose, the servers are emulated by L3 ports in SW3 and SW4 respectively.
- The following is the configuration policy for the server block:
 - The new servers are assigned to the subnet 192.10.X.0/24
 - To ensure security, the servers should not be able to communicate *directly*.
 - The servers should be able to reach and communicate via R4.
- However, the configuration appears to be incomplete, as servers cannot reach to each other.
- Ensure the inter-server connectivity via R4 and verify it by using IP addresses assigned to the switchports of SW3 and SW4.

3 Points

Ticket 6: BGP

- AS254 and AS54 cannot exchange routes across AS 100, AS 200 and AS 300.
- Applying changes to BGP configurations only, restore the end-to-end connectivity.
- Do not apply any changes to AS 300 routers to accomplish this.
- The ticket will be resolved when AS 54 and AS 254 could see each other's routes.

3 Points**Ticket 7: L2VPN**

- You have tasked a junior system administrator to configure an L2VPN tunnel between VLAN64 and VLAN46 interfaces of R6 and R4.
- Some time after this, he reported that the configuration has been done, but there are some issues preventing it from working properly.
- Find and resolve the issues preventing the Layer 2 VPN tunnel from coming up.

3 Points**Ticket 8: NTP**

- You have recently re-loaded the configuration for R3 and R4 using the backup copies and soon after that discovered the logging timestamps went wrong.
- You know that NTP has been used for time synchronization on R3 and R4.
- R5 was supposed to be the NTP master for R3 and R4.
- You may assume that R5 is configured correctly and fix the issues in R3 and R4.

3 Points

Ticket 9: Fragmentation

- The Frame-Relay connection between R1 and R2 has been recently replaced with L2 VPN. Soon after this, users on VLAN263 started complaining that they cannot download files from the servers on VLAN42.
- They still could use `telnet` and `ssh` to access the servers though.
- Suspecting that this may be caused by Path MTU discovery failures, you configured a workaround by clearing DF bit on all TCP packets received by R2 on its VLAN263 interface.
- However, this does not seem to help and the problem persists. Find the solution to this problem that works for all types of network traffic.

3 Points**Ticket 10: Internet Access**

- After the recent security policy changes users on VLAN5 started complaining they cannot reach YouTube videos anymore.
- Asking a few questions you found that users cannot access any other WWW sites as well.
- After a short investigation you found that the uplink used to reach the YouTube website is via BB1.
- Talking to the users you found that only HTTP is being affected, FTP downloads work well.
- Applying minimal changes to the network configuration resolve this problem and restore WWW connectivity.

3 Points

IEWB-RS VOL4 Lab 4

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP address, IGP protocol settings and BGP AS numbers and serves as your primary source of the information. This section provides the scenario-specific configuration information that you may need during troubleshooting process. Notice that not all of the information may be useful during the troubleshooting process; however, all statement made below reflect the correct network configuration.

Devices under your Control

For this lab, you may access and modify the configuration of all “core” devices in the network with except to SW3. Backbone devices BB1, BB2 and BB3 are out of your control per the initial topology configuration. If you refer to the diagram provided, the devices colored in **ORANGE** are out of your control.

Bridging and Switching

- The following trunk links are pre-configured between the switches.
- EtherChannel link between SW1’s interfaces Fa0/13 and Fa0/14 and SW2’s interfaces Fa0/13 and Fa0/14.
- EtherChannel link between SW1’s interfaces Fa0/16 and Fa0/17 and SW3’s interfaces Fa0/13 and Fa0/14. Use port channel number 13.
- EtherChannel link between SW1’s interfaces Fa0/19 and Fa0/20 and SW4’s interfaces Fa0/13 and Fa0/14.
- All switches are in VTP transparent mode and all trunks use 802.1Q encapsulation.

IGP

- IGP protocols are configured per the diagram supplied with the scenario.
- Mutual redistribution is configured in R1, R3 and R4 between the respective routing protocols.

BGP

- Use the diagram as you reference on the BGP AS numbers.
- BGP peering sessions are configured according to the following table:

Device 1	Device 2
R4	BB3
R4	R5
R4	R3
R3	R2
R3	SW2
R3	R1
R2	SW1
R1	R6
R1	BB2
SW1	SW4
SW2	SW3
SW3	SW4

- SW3 and SW4 advertise their Loopback0 interfaces into BGP.
- The peering session between R4 and R5 should remain up in case of the Frame-Relay link failure.

IPv6

- Discover IPv6 topology for this scenario using the respective show commands only.

Trouble Tickets

Ticket 1: RIPv2

- Users on VLAN3 complain that they cannot get to the networks behind BB1.
- Find out what might be causing this problem and resolve it.
- In the end, you should be able to trace the route down to the networks behind BB1.

3 Points

Ticket 2: IP Connectivity

- R5 cannot ping R4's Loopback0 interface IP address when sourcing packets off of its own Loopback0 interface.
- Resolve this problem and make sure you can ping when either of the connections between R4 and R5 is down.

3 Points

Ticket 3: OSPF

- You have recently tasked your subordinate with optimizing your network routing and security.
- Soon after this, VLAN27 users reported to you that cannot reach to the servers running on VLAN3.
- While not sure what your associate has done, you need to go ahead and recover the network to its baseline.

3 Points

Ticket 4: IPv6

This ticket requires Tickets 1 and 2 resolved prior to starting.

- Restore connectivity between IPv6 Ethernet segments connected to R2 and R1 respectively.
- You are only allowed to change one router's configuration to accomplish this task.

4 Points

Ticket 5: OSPF

This ticket requires Ticket 3 resolved prior to starting.

- Soon after you fixed the problem preventing communications between R2 and SW1, users on VLAN3 and VLAN2005 reported that they cannot reach any servers on VLAN7 anymore.
- Fix the issue applying minimal changes to router configurations.

3 Points

Ticket 6: BGP

This ticket requires Ticket 2 resolved prior to starting.

- Users on VLAN 2005 cannot reach the server on network 112.0.0.0.
- Restore the connectivity so that you can **tracert** off of the mentioned interface to this subnet.

3 Points

Ticket 7: MPLS VPN

This ticket requires Ticket 6 resolved prior to starting.

- Interfaces Loopback100 in R4 and R5 belong to the same MPLS VPN.
- However, tests show that end-to end connectivity between these subnets cannot be obtained.
- Fix the issue and make sure you can ping between the two subnets inside the respective VPN.

3 Points

Ticket 8: BGP Peering

- Your Network Monitoring System reports that there is a problem in BGP session formation between SW3 and SW4.
- Everything was working correctly until recent changes in the switches configuration.
- Restore the connectivity and make sure the BGP peering session is up and working.

2 Points

Ticket 9: EIGRP

- Users on VLAN8 are complaining on connectivity problems,
- A quick check revealed that SW2 is not learning EIGRP prefixes from R3.
- Resolve this issue and recover connectivity to the networks behind R3.
- Do not change any configuration on R3 to accomplish this.

3 Points

Ticket 10: Netflow

- R6 has been configured for reporting the bandwidth usage on its WAN connection.
- However, the network manager has complained that he is not receiving any information about the HTTP downloads for users in VLAN 6.
- Fix this issue, knowing that the NMS IP address is 192.10.X.100 and its listening on the port 9996 for NetFlow v9 packets.
- Do not send any extra information aside requested by the manager.

3 Points

IEWB-RS VOL4 Lab 5

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP address, IGP protocol settings and BGP AS numbers and serves as your primary source of the information. This section provides the scenario-specific configuration information that you may need during troubleshooting process. Notice that not all of the information may be useful during the troubleshooting process; however, all statement made below reflect the correct network configuration.

Devices under your Control

For this lab, you may access and modify the configuration of all “core” devices in the network. Backbone devices BB1, BB2 and BB3 are out of your control per the initial topology configuration. If you refer to the diagram provided, the devices colored in **ORANGE** are out of your control.

Bridging and Switching

- Discover Layer 2 topology using show commands.
- A layer 2 tunnel connects R4 and SW2 transparently across L2 switches cloud.

IGP

- IGP protocols are configured per the diagram supplied with the scenario.

BGP

- Use the diagram as you reference on the BGP AS numbers.
- Discover BGP peering sessions using show commands.

IPv6

- R1 and R5 are the relevant devices configured for IPv6. Discover the addressing using the relevant show commands..

Multicast

- Stub multicast routing configured between R5 and R1, with R5 being connected to the receivers.

MPLS VPN

- R4 and R5 form SP core network and SW3/SW4 play the role of CE devices for “VPN_B” customer.
- R6 and R4 support VRF-Lite functionality for “VPN_A” customer and use GRE tunnel to connect separated sites.

Trouble Tickets

Ticket 1: OSPF

- Isolate and eliminate the issue preventing R5 from learning the OSPF prefixes originated as SW2.

3 Points

Ticket 2: OSPF

- R5 cannot reach the OSPF prefixes originated as SW1 across the optimal path going across the Frame-Relay link to R2.
- Fix this issue and make sure the path across the OSPF area 0 is used.

3 Points

Ticket 3: BGP

- Customers of AS 254 cannot reach any of AS 54 prefixes.
- Find the issue causing this behavior and fix it.
- You are only allowed to modify AS 200 configuration to accomplish this.

3 Points

Ticket 4: IPv6

- IPv6 hosts connected to R5's VLAN5 interface cannot obtain the default router's IPv6 address.
- Fix the issues preventing proper hosts auto-configuration.

3 Points

Ticket 5: MPLS VPN

- Customers connected to R4 VLAN 4 cannot reach the prefixes behind BB1.
- Resolve this issue and restore communications.

3 Points

Ticket 6: MPLS VPN

- CE routers emulated by SW3 and SW4 cannot use the primary path across the MPLS VPN core between R4 and R5.
- Fix the issue and ensure the backdoor link between SW3 and SW4 is used as backup only.

3 Points**Ticket 7: Multicast**

- Multicast listeners on VLAN5 cannot receive any feeds from the multicast sources behind R1.
- Recover the multicast traffic flow and make sure feeds sources off R3 Loopback0 can reach VLAN5 users.
- You are allowed one static multicast route to accomplish this.

3 Points**Ticket 8: QoS**

- VoIP calls made across the Frame-Relay cloud between R3 and R4 experience serious quality degradation.
- Fix the issues that may affect voice calls quality.
- The physical interface rate for the Frame-Relay connections is 768Kbps and equals the provisioned CIR.

3 Points**Ticket 9: Secure Access**

- Your network administrators complain they cannot login to R6 using SSH2.
- Fix the problem that might be causing this and test your solution by initiating a SSH2 session from R5.
- Use the name/password of "cisco" for verification.

3 Points

Ticket 10: Security

- Users on VLAN7 complained they cannot get access to a WWW server on VLAN32.
- Short investigation revealed that the users are supposed to open a hole in dynamic access list configured in R2 VLAN27 interface by logging with the same credentials individually.
- For some reason, the configuration is not working anymore and you task it to recover functionality.
- The server's IP address is 191.X.32.100 and the users authenticate using the name dynacl and the password value of cisco.

3 Points

IEWB-RS VOL4 Lab 6

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP addressing. You will find the necessary additional baseline information in the trouble-tickets.

Trouble Tickets

Ticket 1: EIGRP

- Configure your network so that R3 prefers reaching VLAN 73 prefix over the fast path across SW3 and SW4 as opposed to using any other slower route.

3 Points

Ticket 2: Connectivity

- There is a problem preventing R4 from reaching any subnets behind R1.
- Fix this issue using the minimum amount of configuration changes.

3 Points

Ticket 3: BGP

- Fix the issue preventing the customers of AS 100 from accessing any networks in AS 54.
- Your solution should result in successful AS 54 prefixes propagation through AS 100.

3 Points

Ticket 4: IPv6

- R3, R4, R5 and R6 are connected using an IPv6 multipoint tunnel.
- However, none of the routers can ping IPv6 address.
- The tunnels should be sourced off of the Loopback 0 interfaces.
- Fix the problem applying minimum amount of changes.

3 Points**Ticket 5: Multicast**

- Multicast routing is enabled in R1, R3, SW2 and R6.
- Receivers on VLAN6 cannot listen to the multicast audio feeds sourced off VLAN3.
- Apply the necessary changes to resolve this problem.

3 Points**Ticket 6: Core Dumps**

- Last week, R6 crashed a few times for no reason, and you want to investigate more details.
- A subordinate of yours have configured R6 to save crash dumps to a server with the IP address 148.X.3.100 using FTP.
- However, upon the next crash you found that the crash dump was not saved.
- Resolve this issue using minimum configuration changes and assuming the destination server is correctly configured for FTP access using the name R6CORE and the password of CISCO.

3 Points

Ticket 7: Time Synchronization

- Syslog messages from R5 show incorrect time stamps.
- This happened after the recent security policy updates made to R5.
- Without compromising the security, fix the time synchronization problem.

3 Points**Ticket 8: NAT**

- R3 has been configured to balance HTTP and HTTPS requests going to the virtual IP address 148.X.3.100 between a pool of servers with the IP addresses 148.X.3.110-148.X.3.112.
- However, users accessing the server from the outside can't reach the server on any of the ports.
- Fix the issues that break the load-balancing functionality.

3 Points**Ticket 9: Server Access**

- Users on VLAN7 complain about problems accessing the Internet WWW servers behind BB3.
- One of the users told you he cannot open web pages or ping any of the IP addresses.
- Fix the issues causing this problem and restore connectivity.

3 Points

Ticket 10: Convergence

- Your users complain that every time someone from the network staff reboots R5 it takes considerable time to restore access to the servers on VLAN5.
- At the same time, they tell they recover access to the Internet (the connection uses another FastEthernet interface) relatively fast.
- Intrigued by this behavior you started figuring out what might be causing such asymmetry.

3 Points

IEWB-RS VOL4 Lab 7

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

Lab Instructions:

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Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP addressing. You will find the necessary additional baseline information in the trouble-tickets.

Trouble Tickets

Ticket 1: EIGRP

- After a recent configuration change, your NMS started to report loss of EIGRP adjacency between R4 and R5.
- The problem only relates to the Frame-Relay link and does not affect the backup Serial connection.
- Find and resolve the issue using the minimum amount of configuration changes.

3 Points

Ticket 2: Performance Degradation

This ticket requires Ticket 1 to be resolved prior to starting.

- Users on VLAN23 complain about slow speed when accessing to the network resources on VLAN73.
- After a short investigation you found that this relates to the suboptimal path taken across the Frame-Relay cloud.
- Find and resolve the issue causing sub-optimal routing.

3 Points

Ticket 3: Multicast

- You have a test multicast deployment with receivers on R4 and sources behind SW1.
- The only multicast group currently used for testing is 227.69.53.7.
- Apparently, the multicast flows from behind BB3 cannot make it through to the users on VLAN46.
- Find the issue that might be causing this behavior while ensuring the minimum amount of multicast feeds allowed.

3 Points**Ticket 4: DDoS Protection**

- Recently R5 was configured to protect the servers on VLAN5 from TCP SYN flooding attacks.
- However, it appears the solution has completely broken access to the servers on VLAN5 from the Internet.
- Find and eliminate the issue while ensuring DoS attack protection.

3 Points**Ticket 5: NAC**

- R5 has been configured for Network Admission Control for the hosts residing on VLAN5.
- However, no host is being able to access any external network.
- Find the misconfiguration issue causing this problem and eliminate it.

3 Points**Ticket 6: OSPF**

- After recent configuration changes, the OSPF adjacency across the Serial link between R1 and R3 is not coming up.
- Fix the issue that might be causing this problem, using the minimum amount of commands to accomplish your goal.

3 Points

Ticket 7: Firewall

- R4 has been configured for IOS Firewall Feature set to restrict access for the users on VLAN4.
- Specifically these users should be able to use FTP only to get to R5's Loopback0 subnet.
- At the same time, the users are allowed to access WWW servers anywhere.
- However, it appears the users cannot connect to R5 using FTP or access any web-servers behind R6.
- Find the misconfigurations and restore connectivity.

3 Points**Ticket 8: Logging**

- One of your subordinate engineers complains that he is having problems doing some firewall debugging in R4.
- Apparently all his debugging commands show little or now debugging output, even though there are events supposed to trigger the debug conditions.
- Find and resolve the issue that might be causing this behavior.

3 Points**Ticket 9: QoS**

- R1's Frame-Relay interface has been configured for QoS to allow for priority handling of VoIP traffic.
- At the same time, the important HTTP flows have been guaranteed some remaining bandwidth on the PVC connecting to R5.
- Soon after this you started getting user complains about them being unable to use telnet or FTP applications during some day hours.
- After a small investigation you found that these moments coincide with heavy Frame-Relay link congestions.
- Using minimum amount of commands resolve this issue.

3 Points

Ticket 10: BGP

- Your customers connecting to VLAN46 network have reported you that they cannot get to the networks originated by an ISP behind BB1.
- Find the issues that might be causing this behavior and restore connectivity.

3 Points

IEWB-RS VOL4 Lab 8

Lab Overview:

The following scenario is a practice lab exam designed to test your skills at troubleshooting Cisco networking devices. Specifically, this scenario is designed to assist you in your preparation for Cisco Systems' CCIE Routing & Switching Lab exam Troubleshooting Section. However, remember that in addition to being designed as a simulation of the actual CCIE lab exam, this practice lab should be used as a learning tool. Instead of rushing through the lab in order to resolve all issues, take the time to apply the structured troubleshooting methodology and improve your strategy.

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.INE.com>

Refer to the attached diagrams for interface and protocol assignments. Any reference to X in an IP address refers to your rack number, while any reference to Y in an IP address refers to your router number. When not explicitly mentioned, a router's IP address on the segment is based off the router number, Y. For example, R1 will have the IP address of 150.X.100.1 on the subnet 150.X.100.0/24, and SW3 will have the IP address 150.X.100.9 on the same subnet.

Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
- Do not use the `show running-config` or `show startup-config` commands or their equivalents when performing troubleshooting.
- Do not change or add any IP addresses from the initial configuration unless required for troubleshooting.
- Do not change any interface encapsulations unless required for troubleshooting.
- Do not change the console, AUX, and VTY passwords or access methods unless otherwise specified.
- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP addressing. You will find the necessary additional baseline information in the trouble-tickets.

Trouble Tickets

Ticket 1: Switching

- SW4 recently has some customers added using VLAN7.
- The users started complaining that cannot reach any resources in VLAN7 connected to SW1.
- Isolate and remove the issues preventing end-to-end communications using the minimum amount of configuration changes.

3 Points

Ticket 2: Switching

- A recent Frame-Relay link failure on R1 has brought to your attention that the newly configured backup link between R1 and R2 is not working.
- You have noticed that R1 connects to R2 using R3 as the frame-relay switch.
- Using this information, find and eliminate the issues causing this problem.

3 Points

Ticket 3: PPP

- Recent SNMP monitoring alarms show that R4 and R5 lost the IGP adjacency over the Serial link running PPP.
- Restore the backup connectivity between R4 and R5 using the minimal configuration changes.

3 Points

Ticket 4: Connectivity

- Users in AS54 complain that they cannot access the corporate VPN server located on VLAN 88.
- Figure out what the problem could be and resolve it using the minimum amount of commands possible.

3 Points**Ticket 5: BGP**

- After a new BGP policy has been implemented by AS 200 the network administrator of AS 300 called you and informed they can no longer reach AS 100 prefixes.
- You contacted AS 200's administrator and found that his intention was to aggregate AS 100's routing information sent to AS 54 and AS 300.
- Since AS 200's administrator is your friend he let you access the aggregating router to see what went wrong.
- Without changing the aggregated prefix, fix the issue preventing AS 300 from accessing AS 100.

3 Points**Ticket 6: IPv6**

- Your colleague deployed a test implementation of basic IPv6 networking on R1, R2 and R3.
- Intrigued you decided to see how it works but soon found that you cannot reach the network behind R1 and R2 from R3.
- Find out what could be the issue causing this and fix it to surprise your colleague.

3 Points

Ticket 7: EEM

- R5 is supposed to report its running configuration to a mail server at the IP address 149.X.0.100 every 5 minutes.
- However, this is not working for some reason. Your task is to find out the root cause of the problem and fix it.
- Assume the mail server is functional, even though it is fictitious in this configuration.

3 Points**Ticket 8: QoS**

- You asked your subordinate to configure Int-Serv support on the PVC between R4 and R5 to accommodate request from the VoIP team.
- Soon after this the VoIP folks complained they're not getting the desired quality of service for VoIP calls reserving bandwidth using RSVP.
- They mentioned that RSVP signaling, however, makes it end to end from VLAN5 to VLAN 4.

3 Points**Ticket 9: HSRP**

- Per the network documentation, R1 is supposed to be the primary physical gateway of the redundant pair forming the virtual gateway on VLAN127.
- However, one of the users sent you a `tracert` output demonstrating that the primary gateway is R2, not R1.
- At the same time, your NMS does not display any errors related to R1.
- Find and resolve the problem preventing R1 from being a primary forwarder.

3 Points

Ticket 10: HTTP

- Some time ago, you asked your subordinate to set up R6 so that it allows downloading its IOS image via HTTP.
- A flash card error in R4 requires you to reinstall the software image. You are trying to pull the image from R6 but the transfer fails.
- The time is pressing and you need to fix this issue as soon as possible.

3 Points

IEWB-RS VOL4 Lab 9

Lab Overview:

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Lab Instructions:

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Use the name `cisco` along with the password of `cisco` to access the console line of any device used in the topology.

Lab Do's and Don'ts:

- Do not access the routers that are marked as restricted for your access.
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- Do not use static route, default routes, default networks, or policy routing unless otherwise specified.
- Save your configurations often.

Grading:

This practice lab consists of 10 trouble tickets totaling 30 points. A score of 24 points is required to achieve a passing grade. A trouble ticket must be fixed 100% with the requirements given in order to be awarded the points for that ticket. No partial credit is awarded. If a ticket has multiple possible resolutions, choose the solution that best meets the requirements and requires minimal changes. Per the CCIE R&S lab exam requirements, you are required to finish this lab in two hours.

The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP addressing. You will find the necessary additional baseline information in the trouble-tickets.

Trouble Tickets

Ticket 1: Switching

- After a recent switch reconfiguration you found that you lost reachability between R1 and BB2.
- At the same time, you have NMS reports telling you that BGP session between R3 and R4 went down.
- Figure out the problem and resolve it using minimum amount of configuration commands.

3 Points

Ticket 2: EIGRP

- Find and resolve the problem preventing EIGRP adjacency formation between R2 and R3.

3 Points

Ticket 3: Routing

- Users on VLAN58 are supposed to reach the networks behind BB1 by routing across R4.
- However, in reality the path taken follows through R3, which is suboptimal and results in poor performance.
- Find and resolve the problem causing this behavior.

3 Points

Ticket 4: IPv6

This ticket requires Ticket 2 to be resolved prior to starting.

- After a fresh IPv6 deployment users connected to R5 and R2 started complaining they can't reach to each other.
- Resolve the issue and restore communications between the IPv6 networks.

3 Points**Ticket 5: Serial Link**

- After a recent configuration changes, customers in AS 300 can no longer reach prefixes from AS 254.
- Use the minimum amount of configuration commands possible to resolve this issue.

3 Points**Ticket 6: SNMP**

- One of your subordinates configured R5 for SNMP management..
- However, you have soon discovered that neither of NMSs (142.X.5.100 and 142.X.58.100) receives any SNMP traps.
- Furthermore, the NMSs cannot perform a remote router reload and cannot correlate interface information after router reboot and interface indexes change.
- Per the policy, the SNMPv2 community values used for router management and trap origination are CISCORW and CISCOTRAP.
- Fix the problems using the minimum amount of configuration commands.

3 Points

Ticket 7: System Management

- SW2 should be reporting the MAC addresses added or removed on its interfaces connected to R2 and R6 to the NMS at 142.X.5.100.
- For some reason this is not happening and your goal is to fix this problem.

3 Points**Ticket 8: Broadcast Forwarding**

This ticket requires tickets 1 and 5 to be resolved prior to starting.

- The applications deployed on VLAN46 and VLAN 12 use broadcast UDP packets on port 5000 to exchange information.
- A solution has been implemented to forward the broadcast packets in the form of multicasts across R4, R3 and R1.
- However, the broadcast packets do not seem to make it through.
- Fix the issue preventing the broadcast packets exchange.

3 Points**Ticket 9: EIGRP**

This ticket requires tickets 1 and 2 to be resolved prior to starting.

- Even though you fixed the EIGRP adjacency problem between R2 and R3, SW1 still cannot reach any of the destinations behind R3.
- Fix this problem and make sure you can reach any internal subnet from SW1.

3 Points

Ticket 10: Netflow

- R6 has been configured to report traffic information on the flows going to AS 54.
- However, due to the large amount of needless information on DNS requests, the router has been configured to report information only on TCP flows.
- Soon after this you went through the reports and found that some information on HTTP transfers is missing.
- In addition, there is no information being sent about the maximum and minimum packet sizes in each flow.
- Configure R6 to fix the abovementioned problems.

3 Points

IEWB-RS VOL4 Lab 10

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The tickets generally have no dependencies, unless explicitly stated in the ticket outline, so you may work through them in any order you like. It's up to you to select the tickets that you feel most easy to deal with and manage your time accordingly.

GOOD LUCK!

Baseline

All network devices are configured according to the diagram provided with this scenario. The diagram reflects the proper network configuration, including IP addressing. You will find the necessary additional baseline information in the trouble-tickets.

Trouble Tickets

Ticket 1: Backup

- The Serial link between R4 and R5 should be used as backup.
- However, it appears the faster primary path is not being used.
- Find the issue and restore the default behavior.

3 Points

Ticket 2: OSPF

- Due to recent issues on the Frame-Relay PVC connecting R1 to R5 your IT management decided to use this circuit as a backup path for traffic from VLAN 11 to VLAN5.
- Implement a workaround that steers traffic from VLAN11 to VLAN5 across R3 and R2.
- Make sure your solution to the problem preserves the PVC between R1 and R5 as a backup path.

3 Points

Ticket 3: BGP

- After deploying BGP route-reflectors in your autonomous system you realized there is something wrong.
- There are consistent routing loops appearing when you try reaching to AS 54 destinations. A sample traceroute output looks like this:

```
Rack1SW3#traceroute 28.119.16.1
```

```
Type escape sequence to abort.
```

```
Tracing the route to 28.119.16.1
```

```
 1 139.1.11.1 1004 msec 0 msec 4 msec
 2 150.1.2.2 36 msec 32 msec 36 msec
 3 139.1.25.5 64 msec 60 msec 64 msec
 4 139.1.25.2 56 msec 56 msec 52 msec
 5 139.1.25.5 84 msec 80 msec 84 msec
 6 139.1.25.2 76 msec 76 msec 72 msec
 7 139.1.25.5 104 msec 104 msec 100 msec
 8 139.1.25.2 96 msec 96 msec 96 msec
 9 139.1.25.5 136 msec 120 msec 124 msec
10 139.1.25.2 116 msec
```

- Modifying BGP configuration only, resolve this issue.

3 Points

Ticket 4: IPv6

- Find and resolve the issue preventing R4 and R5 from having connectivity to the rest of IPv6 routing domain.
- Specifically no router behind R3 can ping R4's or R5's Loopback subnets.
- Resolve the issue and restore communications between the IPv6 networks.

3 Points

Ticket 5: DHCP

- Eliminate the issue preventing hosts on VLAN367 from proper auto-configuration via DHCP.

3 Points**Ticket 6: QoS**

- Recently, customers connected to VLAN5 subnet started complaining on poor VoIP calls quality.
- After some investigation you found that their complaints relate to the calls placed to the users on VLAN2.
- Find out what might be affecting VoIP quality and fix the problem.

3 Points**Ticket 7: OSPF**

- Users behind SW4 report loss of connectivity with the corporate resources found on VLAN11.
- Isolate and fix this issue using the minimum amount of commands possible.

3 Points**Ticket 8: Reachability**

- Restore connectivity between the servers on VLAN 6 and the customers behind BB2.

3 Points

Ticket 9: Network Reachability

- Resolve the issue preventing users on VLAN 7 from communicating with the datacenter located on VLAN 2.

3 Points**Ticket 10: QoS**

- The multicast video feeds using RTSP protocol and sourced from VLAN 367 to VLAN 5 experience significant quality degradation per the end users reports.
- Your colleague assured you that he has applied necessary bandwidth reservation of 256Kbps on the congested link between R2 and R3.
- Find out what might be causing such problem and eliminate it.

3 Points