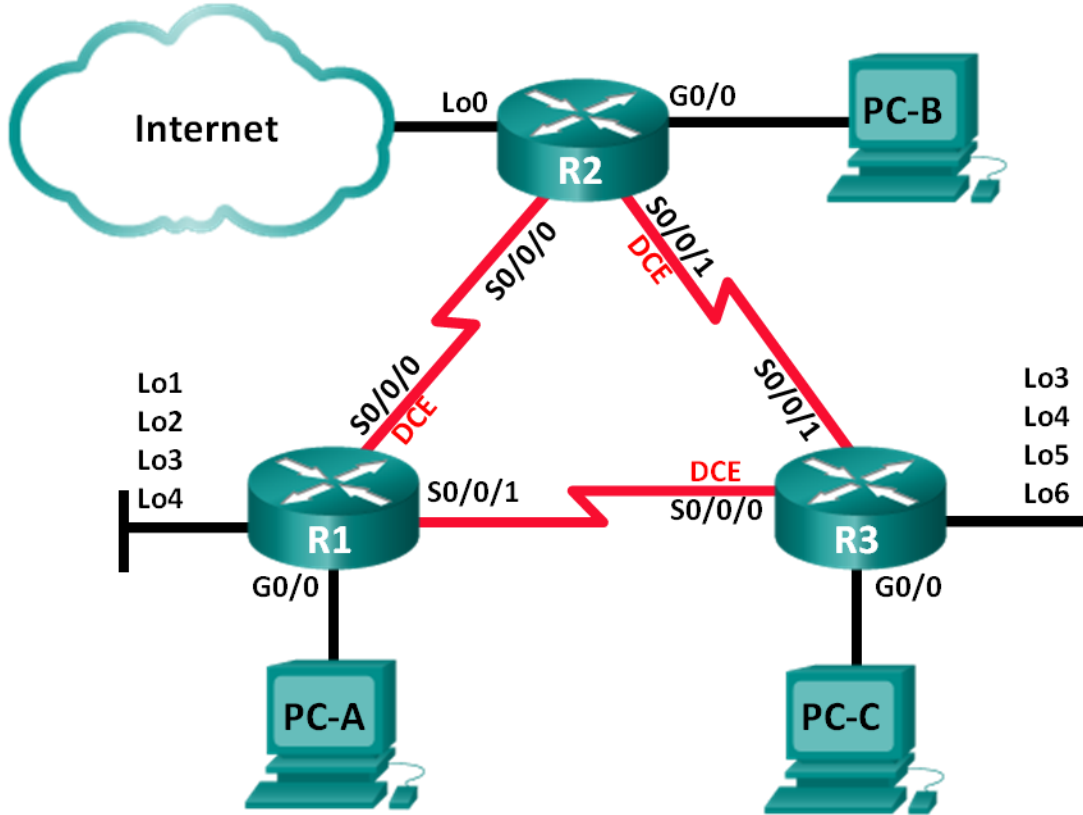


Lab – Troubleshooting Advanced EIGRP

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.1.1	255.255.255.0	N/A
	Lo1	172.16.11.1	255.255.255.0	N/A
	Lo2	172.16.12.1	255.255.255.0	N/A
	Lo3	172.16.13.1	255.255.255.0	N/A
	Lo4	172.16.14.1	255.255.255.0	N/A
	S0/0/0 (DCE)	192.168.12.1	255.255.255.252	N/A
	S0/0/1	192.168.13.1	255.255.255.252	N/A
R2	G0/0	192.168.2.1	255.255.255.0	N/A
	Lo0	209.165.200.225	255.255.255.252	N/A
	S0/0/0	192.168.12.2	255.255.255.252	N/A
	S0/0/1 (DCE)	192.168.23.1	255.255.255.252	N/A
R3	G0/0	192.168.3.1	255.255.255.0	N/A
	Lo3	172.16.33.1	255.255.255.0	N/A
	Lo4	172.16.34.1	255.255.255.0	N/A
	Lo5	172.16.35.1	255.255.255.0	N/A
	Lo6	172.16.36.1	255.255.255.0	N/A
	S0/0/0 (DCE)	192.168.13.2	255.255.255.252	N/A
	S0/0/1	192.168.23.2	255.255.255.252	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-B	NIC	192.168.2.3	255.255.255.0	192.168.2.1
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1

Objectives

Part 1: Build the Network and Load Device Configurations

Part 2: Troubleshoot EIGRP

Background / Scenario

The Enhanced Interior Gateway Routing Protocol (EIGRP) has advanced features to allow changes related to summarization, default route propagation, bandwidth utilization, metrics, and security.

In this lab, you will troubleshoot a network that is running EIGRP. Advanced EIGRP features have been implemented, but the network is now experiencing problems. You are tasked with finding and correcting the network issues.

Note: The routers used with CCNA hands-on labs are Cisco 1941 Integrated Services Routers (ISRs) with Cisco IOS, Release 15.2(4)M3 (universalk9 image). Other routers and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary

from what is shown in the labs. Refer to the Router Interface Summary Table at the end of this lab for the correct interface identifiers.

Note: Ensure that the routers have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Part 1: Build the Network and Load Device Configurations

Step 1: Cable the network as shown in the topology.

Step 2: Configure PC hosts.

Step 3: Load router configurations.

Load the following configurations into the appropriate router. All routers have the same passwords. The privileged EXEC password is **class**, and **cisco** is the console and vty password.

Router R1 Configuration:

```
conf t
hostname R1
enable secret class
no ip domain lookup
key chain EIGRP-KEYS
  key 1
    key-string cisco123
line con 0
  password cisco
  login
  logging synchronous
line vty 0 4
  password cisco
  login
banner motd @
  Unauthorized Access is Prohibited! @
interface lo1
  description Connection to Branch 11
  ip add 172.16.11.1 255.255.255.0
interface lo2
  description Connection to Branch 12
  ip add 172.16.12.1 255.255.255.0
interface lo3
```

Lab – Troubleshooting Advanced EIGRP

```
description Connection to Branch 13
ip add 172.16.13.1 255.255.255.0
interface lo4
description Connection to Branch 14
ip add 172.16.14.1 255.255.255.0
interface g0/0
description R1 LAN Connection
ip add 192.168.1.1 255.255.255.0
no shutdown
interface s0/0/0
description Serial Link to R2
clock rate 128000
ip add 192.168.12.1 255.255.255.252
ip authentication mode eigrp 1 md5
ip authentication key-chain eigrp 1 EIGRP-KEYS
ip hello-interval eigrp 1 30
ip hold-time eigrp 1 90
ip bandwidth-percent eigrp 1 40
no shutdown
interface s0/0/1
description Serial Link to R3
bandwidth 128
ip add 192.168.13.1 255.255.255.252
ip authentication mode eigrp 1 md5
ip authentication key-chain eigrp 1 EIGRP-KEYS
ip bandwidth-percent eigrp 1 40
no shutdown
router eigrp 1
router-id 1.1.1.1
network 192.168.1.0 0.0.0.255
network 192.168.12.0 0.0.0.3
network 192.168.13.0 0.0.0.3
network 172.16.0.0 0.0.255.255
passive-interface g0/0
auto-summary
end
```

Router R2 Configuration:

```
conf t
hostname R2
enable secret class
no ip domain lookup
key chain EIGRP-KEYS
key 1
key-string Cisco123
line con 0
```

Lab – Troubleshooting Advanced EIGRP

```
password cisco
login
logging synchronous
line vty 0 4
password cisco
login
banner motd @
  Unauthorized Access is Prohibited! @
interface g0/0
  description R2 LAN Connection
  ip add 192.168.2.1 255.255.255.0
  no shutdown
interface s0/0/0
  description Serial Link to R1
  bandwidth 128
  ip add 192.168.12.2 255.255.255.252
  ip authentication mode eigrp 1 md5
  ip authentication key-chain eigrp 1 EIGRP-KEYS
  ip bandwidth-percent eigrp 1 40
  ip hello-interval eigrp 1 30
  ip hold-time eigrp 1 90
  no shutdown
interface s0/0/1
  description Serial Link to R3
  bandwidth 128
  ip add 192.168.23.1 255.255.255.252
  ip authentication mode eigrp 1 md5
  ip bandwidth-percent eigrp 1 40
  ip hello-interval eigrp 1 30
  ip hold-time eigrp 1 90
  no shutdown
interface lo0
  ip add 209.165.200.225 255.255.255.252
  description Connection to ISP
router eigrp 1
  router-id 2.2.2.2
  network 192.168.2.0 0.0.0.255
  network 192.168.12.0 0.0.0.3
  network 192.168.23.0 0.0.0.3
  passive-interface g0/0
ip route 0.0.0.0 0.0.0.0 lo0
end
```

Router R3 Configuration:

```
conf t
hostname R3
```

Lab – Troubleshooting Advanced EIGRP

```
enable secret class
no ip domain lookup
key chain EIGRP-KEYS
  key 1
    key-string Cisco123
line con 0
  password cisco
  login
  logging synchronous
line vty 0 4
  password cisco
  login
banner motd @
  Unauthorized Access is Prohibited! @
interface lo3
  description Connection to Branch 33
  ip add 172.16.33.1 255.255.255.0
interface lo4
  description Connection to Branch 34
  ip add 172.16.34.1 255.255.255.0
interface lo5
  description Connection to Branch 35
  ip add 172.16.35.1 255.255.255.0
interface lo6
  description Connection to Branch 36
  ip add 172.16.36.1 255.255.255.0
interface g0/0
  description R3 LAN Connection
  ip add 192.168.3.1 255.255.255.0
  no shutdown
interface s0/0/0
  description Serial Link to R1
  ip add 192.168.13.2 255.255.255.252
  ip authentication mode eigrp 1 md5
  ip authentication key-chain eigrp 1 EIGRP-KEYS
  ip hello-interval eigrp 1 30
  ip hold-time eigrp 1 90
  clock rate 128000
  bandwidth 128
  no shutdown
interface s0/0/1
  description Serial Link to R2
  bandwidth 128
  ip add 192.168.23.2 255.255.255.252
  ip authentication mode eigrp 1 md5
```

```
ip authentication key-chain eigrp 1 eigrp-keys
! ip bandwidth-percent eigrp 1 40
ip hello-interval eigrp 1 30
ip hold-time eigrp 1 90
no shutdown
router eigrp 1
router-id 3.3.3.3
network 192.168.3.0 0.0.0.255
network 192.168.13.0 0.0.0.3
network 192.168.23.0 0.0.0.3
network 172.16.0.0 0.0.255.255
passive-interface g0/0
auto-summary
end
```

Step 4: Verify end-to-end connectivity.

Note: It may be necessary to disable the PC firewall to ping between PCs.

Step 5: Save the configuration on all routers.

Part 2: Troubleshoot EIGRP

In Part 2, verify that all routers have established neighbor adjacencies, and that all network routes are available.

Additional EIGRP Requirements:

- All serial interface clock rates should be set at 128 Kb/s and a matching bandwidth setting should be available to allow EIGRP cost metrics to be calculated correctly.
- Manual route summarization of the branch networks, simulated by using Loopback interfaces on R1 and R3, should be utilized. The automatic summarization feature of EIGRP should not be used.
- EIGRP should redistribute the static default route to the Internet. This is simulated by using Loopback interface 0 on R2.
- EIGRP should be configured to use no more than **40** percent of the available bandwidth on the serial interfaces.
- EIGRP Hello/Hold timer intervals should be set to **30/90** on all serial interfaces.
- All serial interfaces should be configured with MD5 authentication, using key chain **EIGRP-KEYS**, with a key-string of **Cisco123**.

List the commands used during your EIGRP troubleshooting process:

Lab – Troubleshooting Advanced EIGRP

List the changes made to resolve the EIGRP issues. If no problems were found on the device, then respond with “no problems were found”.

R1 Router:

R2 Router:

R3 Router:

Reflection

1. How can the **auto-summary** command create routing issues in EIGRP?
2. What advantages are provided by manually summarizing the branch routes (loopback interfaces on R1 and R3) in this network?
3. Why would you want to change the EIGRP Hello and Hold time intervals on an interface?

Router Interface Summary Table

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.