

GoCertify Advanced Cisco® CCIE™ Lab Scenario # 1



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This scenario was taken directly from our industry leading **Lab Preparation Workbook for the Cisco CCIE Routing & Switching Laboratory Exam** and has been designed around our on-line rack (*which can be rented – please see our Website for on-line rack rental information*). This scenario will cover the following topics:

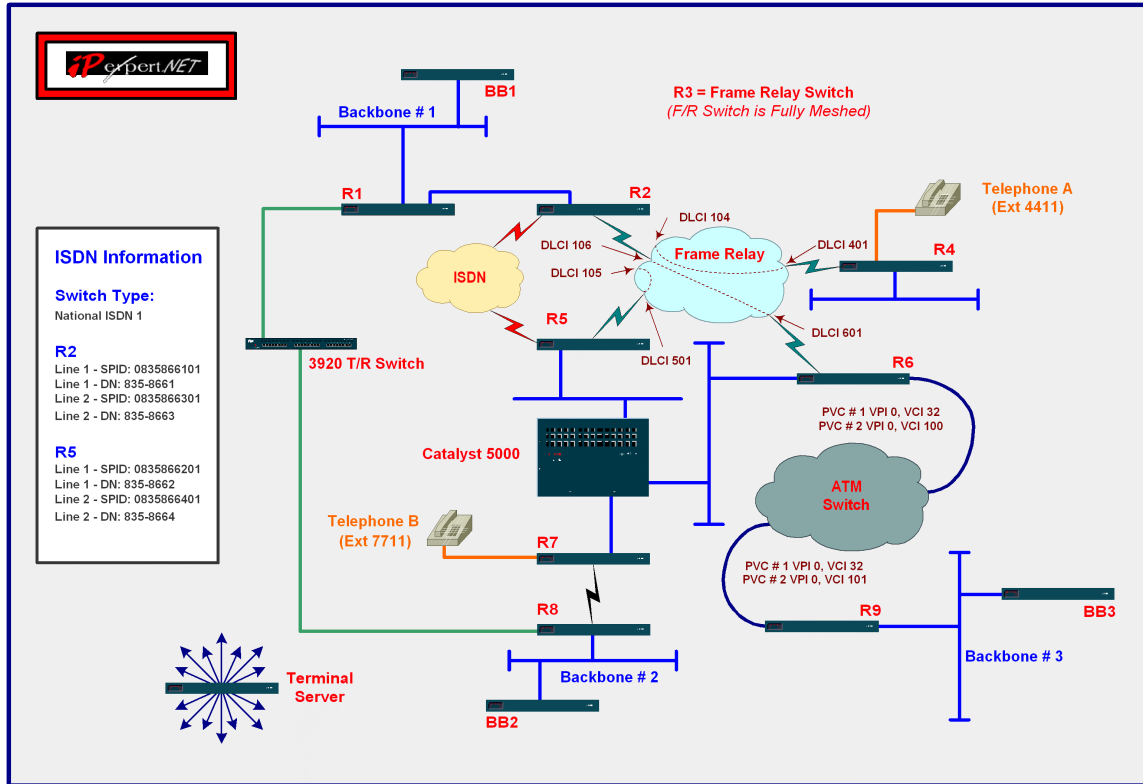
- Reverse Telnet (general rack setup)
- Frame Relay (physical & sub-interfaces)
- Catalyst Port / VLAN Assignment
- TCP/IP Addressing (FLSM and VLSM)
- Intermediate System-to-Intermediate System (IS-IS)
- IS-IS Timer / Algorithm Adjustments
- IS-IS Authentication
- Routing Information Protocol (RIP) (v1 & v2)
- RIP Protocol Timer Adjustment
- RIP Authentication
- Open Shortest Past First (OSPF)
- OSPF Timers
- OSPF Virtual Link
- OSPF Demand Circuit
- OSPF Authentication
- Enhanced Interior Gateway Routing Protocol (EIGRP)
- EIGRP Protocol Timer Adjustments
- EIGRP MD5 Authentication
- Complex Classful and Classless Redistribution
- Routing Protocol (Updates) Filtering
- Integrated Services Digital Network (ISDN)
- Backup Interface
- Data-link Switching (DLSW)
- Advanced Hot Standby Routing Protocol (HSRP)
- Dynamic Host Configuration Protocol (DHCP)
- DNS (Domain Name Server) Support
- Network Address Translation (NAT)
- Quality Of Service (QOS)
- Internetwork Packet Exchange (IPX)
- IPX RIP
- IPX EIGRP
- IPX Tunneling
- IPX Filtering
- System Logging
- Simple Network Management Protocol (SNMP)
- Network Time Protocol (NTP)
- Time Based Access-Lists
- Multicast
- Layer 2 Filtering

Lab 20-1

Physically connect and configure your network as diagramed in 20-1-A. You will use this topology diagram throughout this lab.

Estimated Time to Complete: 10 Hours

Diagram 20-1-A (<http://www.IPexpert.NET> On-line Topology)



Infrastructure Configuration

Physically connect your rack per Diagram 20-1-A. Ensure that the appropriate cables are used.

Configure the access server to reverse telnet to all routers and the Catalyst switch when you type RX, where X= the router number in Diagram 20-1-A.

Redraw your topology map to include all routing protocol areas and IP addressing.

You will be assigning an IP addressing scheme utilizing the following information:

IP Addressing

Router 1

Ethernet 0/0 150.50.200.1 /24
 Ethernet 1/0 150.50.17.1 /24
 Token Ring 1/0 150.50.18.1 /24
 Loopback 0 200.0.0.1 /32

Router 2

Ethernet 0 150.50.17.2 /24
 Serial 0.24 150.50.24.2 /24
 Serial 0.256 150.50.100.2 /27
 BRI 0 150.50.9.2 /26
 Loopback 0 200.0.0.2 /32

Router 4

Ethernet 1/0 10.1.1.4 /24
 Serial 1/0 150.50.24.4 /24
 Loopback 0 200.0.0.4 /32

Router 5

Ethernet 0 150.50.7.5 /25
 Serial 0 150.50.100.5 /27
 BRI 0 150.50.9.5 /26
 Loopback 0 200.0.0.5 /32

Router 6
Ethernet 1/0 150.50.7.6 /25
Serial 1/0 150.50.100.6 /27
ATM 0/0 150.50.6.6 /25
Loopback 0 200.0.0.6 /32

Router 7
Ethernet 1/0 150.50.7.7 /25
Serial 1/0 150.50.5.68 /27
Loopback 0 200.0.0.7 /32

Router 8
Ethernet 0 150.50.4.8 /24
Token Ring 0 150.50.3.8 /31
Serial 0 150.50.5.69 /27
Loopback 0 200.0.0.8 /32

Router 9
Ethernet 1/0 150.50.6.209 /25
ATM 0/0 150.50.6.9 /25
Loopback 0 200.0.0.9 /32

Configure Frame-Relay between R2, R4, R5 & R6. Use the TCP/IP Addressing section to obtain your sub-interface definitions. You will use Diagram A for DLCI and PVC mappings. Only the DLCI's on the diagram should be used.

Configure your console and VTY lines so they can be reached via telnet.

Configure the link between R7 & R8. R7 is designated as the DCE end.

Routing Protocols

IS-IS

Enable the IS-IS routing process on R1 and R2.

Configure the routers R1 and R2 to signal other routers not to use it as an intermediate hop in their shortest path first (SPF) calculations.

Specify the length of time between hello packets that the Cisco IOS software sends. The value will be 15 seconds.

Specify the number of Intermediate System-to-Intermediate System (IS-IS) hello packets a neighbor must miss before the router should declare the adjacency, as down, your value is 5.

Configure the support for ISIS password authentication between router R1 and R2.

Configure interfaces Ethernet 0/0 and Token Ring 1/0 on router R1 not to generate ISIS routing updates.

Note: *Once the OSPF and RIP routing processes are configured on router R2 in the next two steps of this lab, redistribute the IS-IS routes into the OSPF and RIP routing processes. Redistribute the RIP and OSPF routes into the ISIS routing process when the routing processes are configured on router R2.*

RIP

Enable the RIP routing process on routers R2 and R4 version two of RIP will be used.

Enable the support for MD5 authentication for the exchange of RIP information.

Configure the basic RIP timers as follows:

Update: 1 Minute
Invalid: 4 Minutes
Hold-down: 4 Minutes
Flush: 5 Minutes

Add a delay to the RIP routing process that will require a 25 millisecond delay to be inserted between each RIP update packet.

Configure router R2 so that RIP information is not sent over interfaces Serial 0.256 and Ethernet 0.

The OSPF and IS-IS routes on router R2 should be redistributed into the RIP routing process.

OSPF

The OSPF routing protocol will be configured between routers R2, R5, R6, R7 and R8. To configure OSPF, perform the task in the following section:

The OSPF area 0 will consist of the following:

- All interfaces on router R2.
- All interfaces on router R5 except for the Ethernet interface.
- Serial interface of router R6.

The OSPF area 1 will consist of the following:

- All Ethernet interfaces of routers R5, R6, the Serial interface of R8, and all interfaces on R7.

The OSPF area 2 will consist of the following:

- All LAN interfaces and the Loopback interface on R8.

Enable the support for area 0 simple authentication. Authentication should be enabled between all OSPF connected interfaces.

Set the hello time period between R7 and R8 to 15 seconds.

Set the number of seconds that a device's hello packets must not have been seen before its neighbors declare the OSPF router down. Between routers R7 and R8 set the time period to one minute.

The ATM interface on router R6 should not pass OSPF routing information.

OSPF routes on router R6 should be redistributed into the EIGRP routing process.

EIGRP routes on router R6 should be redistributed into the OSPF routing process.

RIP routes on router R2 should be redistributed into the OSPF routing process.

ISIS routes on router R2 should be redistributed into the OSPF routing process.

EIGRP

Enable the EIGRP routing process on routers R6 and R9.

Enable the support for MD5 authentication for the exchange of EIGRP information.

Define the hello-interval to be 1 minute.

Define the hold-time to be 2 minutes.

The EIGRP routing process should be allowed to use more than 40% of the bandwidth between the two routers.

Redistribute the EIGRP routes into the OSPF routing process on router R6.

Redistribute the OSPF routes into the EIGRP routing process on router R6.

Note: At this point in the lab all routers should be able to ping all subnets defined in the network topology diagram.

IPX

Configure the support for IPX on routers R8 and R9. Perform the following steps to complete the task:

Convert the IP addresses of the LAN and Loop-back interfaces from decimal to hexadecimal to create the IPX network addresses.

Disable the support IPX RIP as a routing protocol on both routers.

Enable IPX EIGRP as the routing protocol for IPX routes.

Create a tunnel interface between routers R8 and R9 to encapsulate the traffic between the two routers across the IP core.

HSRP

Enable HSRP support on the Ethernet interfaces of router R5 and R6.

Configure the time between hello packets and the hold time before other routers declare the active router to be down on routers R5 and R6. The hello setting should be 7 and the hold down setting a value of 17.

Adjust the priority values for routers R5 and R6. R6 should be configured for a value of 10 above the default and R5 could be configured for a value of 15 above the default. Enable the HSRP router with the highest priority to immediately become the active router.

Specify a clear-text HSRP authentication string with a value of ipexpert between routers R5 and R6.

Specify the virtual MAC address for the HSRP group. Use the following MAC address: 0000.0c07.aaaa

Define a name (ipexpert_r5) for the HSRP process for router R5.

Define a name (ipexpert_r6) for the HSRP process for router R6.

Specify another interface (Serial 0) on router R5 for the HSRP process to monitor in order to alter the HSRP priority.

Network Management (NTP, HTTP, SNMP and Logging)

Make router R4 a master NTP server for all network devices. All other devices will be required to authenticate as a valid client to receive time services. All devices should be set for central time zone.

Enable the support for logging on all devices with the following configuration:

Logging level: Debugging
Logging server: 150.50.6.225
Enable debug timestamps and include the date, time, and milliseconds relative to the local time zone

Enable the support for SNMP with the following configuration:

Read-only community string: ipexpert
Read-write community string: trepxepi
Provide the support for SNMP system shutdowns
Trap Server: 150.50.6.225

Generate traps that are supported under the RFC for SNMP

Only allow SNMP host 150.50.6.225 to access SNMP information from the devices

Enable HTTP services, only allow host 150.50.6.225 to access the service on each router.

NAT

Configure NAT on router R8 so that all outbound traffic on interface S0 from the clients on subnet 150.50.4.0/24 and only the first 31 clients of subnet 150.50.3/0/24 are translated to the IP address of interface S0. Configure the following IP NAT translation parameters:

Udp-timeout: 8 Hours
DNS-timeout: 8 Hours
TCP-timeout: 8 Hours
Finrst-timeout: 8 Hours

ISDN

Configure the BRI interfaces on routers R2 and R5 to be used as a backup WAN link for sub-interface S0.256 on router R2. Use the SPID and DN information provided in the network topology diagram to configure the link between the routers. Use the following parameters to complete the configuration of the backup interface:

Configure the interface BRI0 to backup interface Serial0.256 on router R2.

Configure the backup interface to be activated after five seconds after the loss of interface Serial0.256.

Configure the backup interface to be deactivated thirty seconds after the serial interface returns to normal operation.

Use CHAP for authentication when the link is established.

IP Multicast

The Rendezvous Point (RP) in this lab will be located on the backbone segment of router R1 with an IP address of 150.50.200.1/24. Enable routers R2 and R4 to utilize the RP service on the backbone segment of router R1. Use the following parameters to complete the configuration:

Enable multicast routing support on router R1. Enable both dense and sparse mode PIM on both Ethernet interfaces.

Enable multicast routing support on router R2. Enable both dense and sparse mode PIM on both the Ethernet interface and serial interfaces required to provide communications for routers R4. Configure the PIM RP address as 150.50.200.1.

Enable multicast routing support on router R4. Enable both dense and sparse mode PIM on both the Ethernet interface and serial interfaces required to provide communications to routers R1. Configure the PIM RP address as 150.50.200.1.

DHCP

Enable Dynamic Host Configuration Protocol (DHCP) server support on router R4. Use the following parameters to complete the configuration:

Enable the Cisco IOS DHCP server feature on your router.

Disable DHCP address conflict logging.

Create a name for the DHCP server address pool: engineering

Specify the subnet network number and mask of the DHCP address pool (10.1.1.0/24).

Specify the Domain Name for the clients: ipexpert

Specify the IP address of a DNS server that is available to a DHCP clients: 150.50.200.100

Specify the IP addresses that the DHCP server should not assign to DHCP clients. (10.1.1.1/24- 10.1.1.10/24)

Specify the IP address of the default router for a DHCP clients: 100.1.1.4

Specify the duration of the lease: 5 Days

Quality of Service

Enable the type of QOS on router R7 that will allow for 6 queues to service end user request by cycling through them in round-robin fashion, sending the portion of allocated bandwidth for each queue before moving to the next queue.

The QOS feature should be applied to interface S1/0. The queues should be configured as follows:

Queue: 1	Protocol: IP	Packet Count: 100
Queue: 2	Protocol: DLSW	Packet Count: 90
Queue: 3	Protocol: Bridge	Packet Count: 80
Queue: 4	Protocol: ARP	Packet Count: 70
Queue: 5	Protocol: CDP	Packet Count: 60
Queue: 6	Protocol: Default	Packet Count: 50

Enable the type of QOS on router R4 that will assign each packet in one of four queues--High, Medium, Normal, or Low- based on an assigned priority. The QOS feature should be applied to interface S1/0. The queues should be configured as follows:

Queue 1 Level: High
Queue 2 Level: Medium
Queue 3 Level: Normal
Queue 4 Level: Low

Protocol: IP
Protocol: ARP
Protocol: CDP
Protocol: CompressedTCP

Number of Packets: 100
Number of Packets: 75
Number of Packets: 50
Number of Packets: 25

Access-List

Restrict inbound web traffic on the interface E1/0 on router R4 to only the hours of 8:00 am to 6:00 pm, Monday thru Friday. Allow all other IP traffic to pass.

Restrict inbound telnet traffic on interface E0 on router R8 from 9:00 am to 1:00 pm only on Monday, Wednesday, and Friday.

DLSW

Configure DLSW services between Token Ring segments over the WAN.

Configure the support for DLSW between the Token Ring segments on routers R1 and R8. Use the IP address of the loop-back interfaces for the DLSW peer-id with a ring-group value of 4000.

Configure router R1 to block users from accessing a SAP with a value of 12.

Adjust the following DLSW NetBios timers to 50,000 seconds on routers R1 and R8:

NetBIOS -cache-timeout
NetBIOS -explorer-timeout
NetBIOS -retry-interval

Adjust the value of the LLC2 idle timer on Token Ring segments on routers R1 and R8 to a value of: 60,000

This concludes the [GoCertify.COM](http://www.GoCertify.COM) Advanced Lab Scenario # 1. To review your work, please see our supplied router configurations and the “show” commands.

This lab was written by IPexpert, Inc. For more great lab scenarios check out

[IPexpert.NET's Lab Preparation Workbook for the Cisco CCIE Routing & Switching Laboratory Exam.](http://www.IPexpert.NET)

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