Case Study

Routing

Cisco Networking Academy Program

CCNA 2: Routers and Routing Basics v3.1

Overview and Objectives

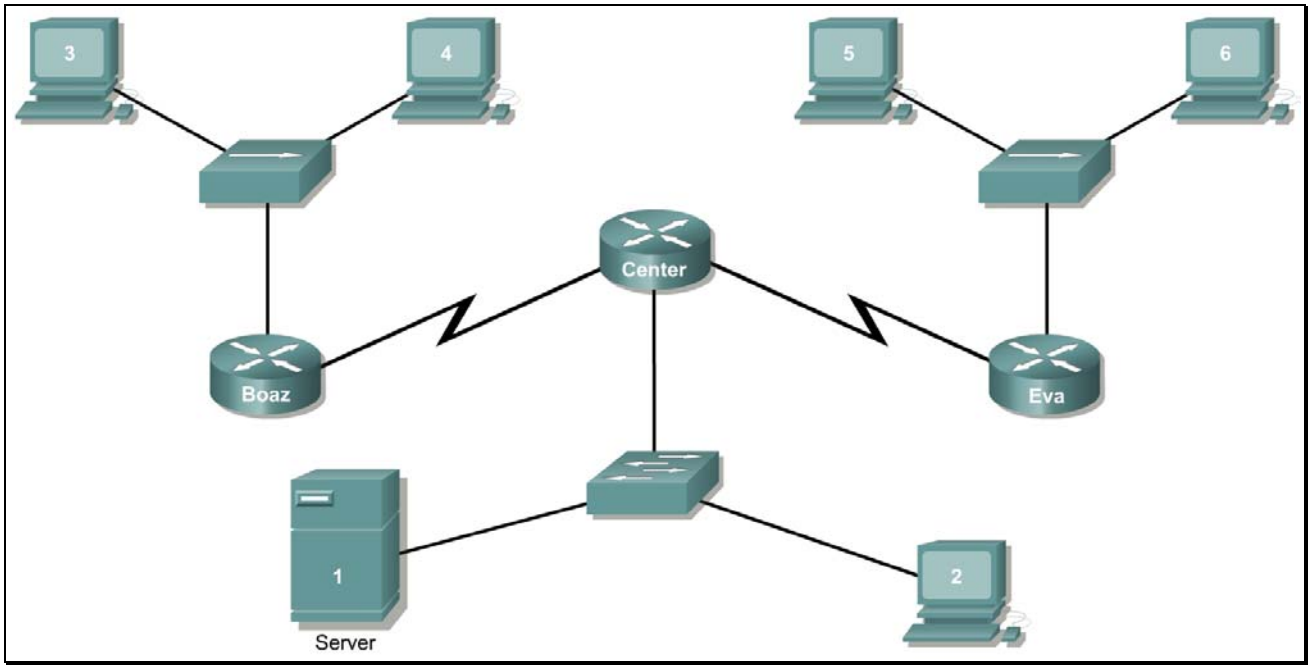
This case study allows students to complete a network design, implementation, and troubleshooting project using the skills gained in CCNA 2. Students will use the skills that have already been developed to use, make, and connect the proper cabling to the appropriate devices.

It is crucial to read and understand the scenarios to make sure that all requirements are fulfilled. Each scenario guides the student through the proper steps to ensure that the project is completed properly.

This case study requires the student to accomplish the following tasks:

- Set up the physical layout of the network using the diagram and accompanying narrative
- Correctly configure the routers with a basic router configuration
- Set up a TFTP server on one of the workstations
- Create and apply access control lists on the appropriate router(s) and interface(s)
- Troubleshoot and test all connectivity and access control lists
- Provide detailed documentation in a prescribed form, as listed in the deliverables section

Scenario and Phase 1: Project Description



A company has several people responsible for maintaining various sections of the internetwork infrastructure. Many technicians have done an excellent job with the small portion for which they are responsible.

One of the other network associates who was responsible for a larger portion of the infrastructure suddenly left the company. This left redesign and implementation on this portion of the internetwork unfinished. A technician is given the task to complete the design and implementation of the unfinished network.

After taking home the documentation to study over the weekend, it is apparent to the technician why the network associate left suddenly. The few documents that existed were poorly written. So during the weekend the technician reconstructs the diagram above from an existing diagram that was found. It represents the new internetwork design. It shows the planned routers, hubs/switches, circuits, and the servers/workstations at each site. The server at the Center site is a file server accessed only by workstations on this internetwork. The workstation at the Center site is used to manage all routers on the internetwork.

After returning to work Monday morning, the technician presents the new diagram to the Network Infrastructure Team Leader that assigned the project. After discussion, it is determined that new documentation must be developed for the project. The Team Leader, the instructor, must approve the documentation at each phase of the process. Use the following information to implement the network.

Network address _____

Required number of subnets _____

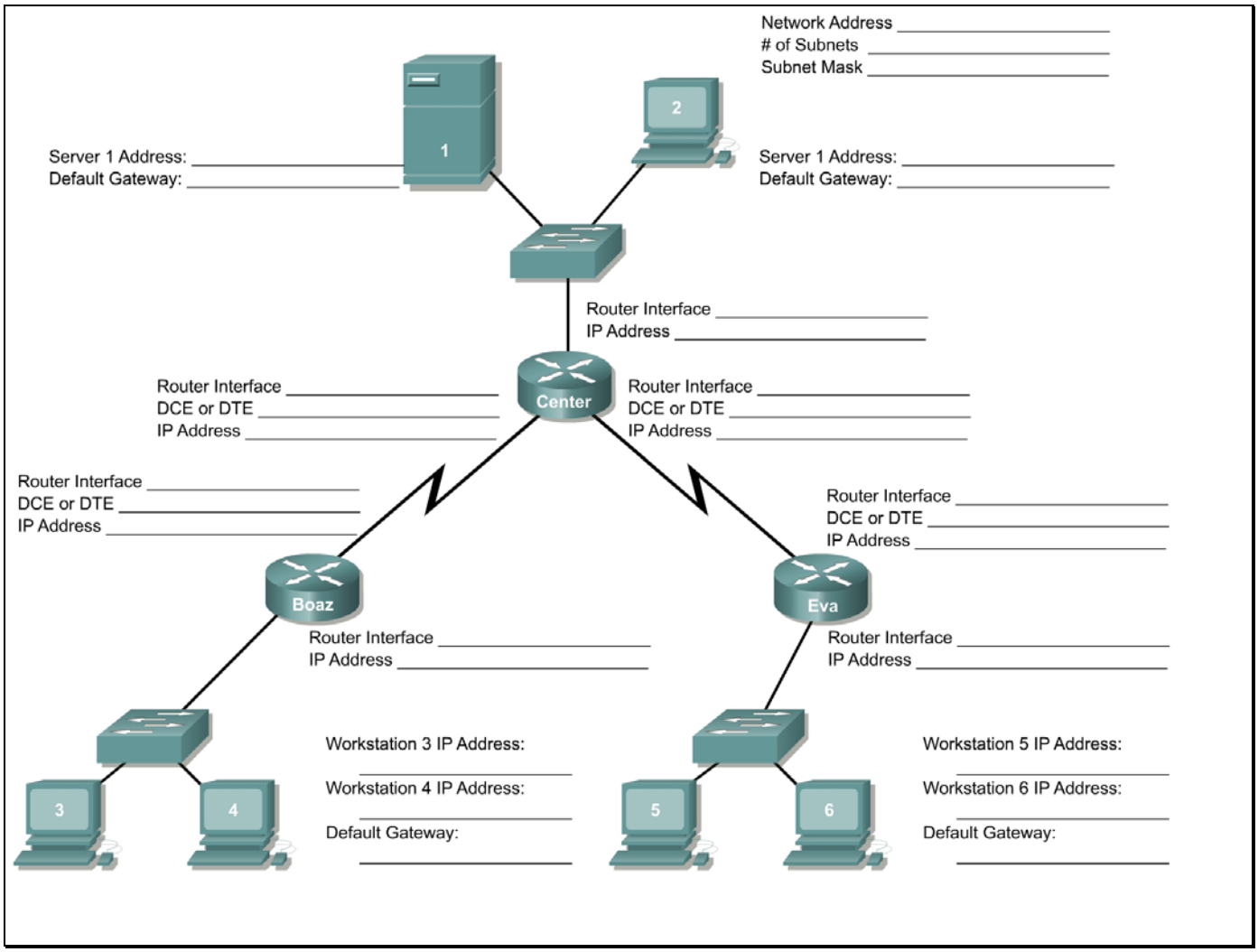
Routing protocol _____

Phase 2: IP Addressing

Now that the basic plan is in place, the team leader assigns the technician to develop a prototype for the new internetwork. Use the network address assigned along with the subnetting requirements, to subnet the network. From the IP addressing scheme, assign IP addresses to the appropriate interfaces on all routers and computers in the internetwork. Use the diagram below as a guide. Obtain approval of this phase of development from the team leader before proceeding to Phase 3.

Instructor approval _____Date _____

Network Diagram - IP Addressing



Phase 3: Basic Router and Workstation Configuration

After the team leader inspects the prototype cabling, the technician is assigned to create a basic configuration on the router and workstations.

Use the diagram and planning sheets to create a basic configuration for the router. The checklist below will help keep track of the configuration process.

	Boaz	Center	Eva
Hostname			
Console Password			
Secret Password			
VTY Password			
Serial 0/0 IP address			
Serial 0/1 IP address			
***Serial 0/0 Clock Rate**			
***Serial 0/1 Clock Rate**			
Fa 0/0 IP address			
Fa 0/1 IP address			
Enable the interfaces			
Add Routing Protocol			
Add Network Statements			

Note *: As needed

Table continued on next page

	Boaz	Center	Eva
*** Host Table - contains all routers and servers**			
Message of the Day			
Serial 0/0 description			
Serial 0/1 description			
Fa 0/0 description			
Fa 0/1 description			

Instructor approval _____Date _____

Phase 4: Access Control Lists

While testing the network, the team leader discovers that security has not been planned for the network. If the network configuration were installed as designed, any network user would be able to access all network devices and workstations.

The team leader asks the technician to add access control lists (ACLs) to the routers. The team leader has some suggestions for developing the security. Before the ACLs are added, backup the current router configuration. Also, make sure there is complete connectivity throughout the network before any of the ACLs are applied.

The following conditions must be taken into consideration when creating the ACLs:

- Workstation 2 and File Server 1 are on the management network. Any device on the management network can access any other device on the entire network.
- Workstations on Eva and Boaz LANs are not permitted outside of their subnet except to access File Server 1.
- Each router can telnet to the other routers and access any device on the network.

The team lead asks the technician to write down a short summary of the purpose of each ACL, the interfaces upon which they will be applied, and the direction of the traffic. Then list the exact commands that will be used to create and apply the ACLs to the router interfaces.

Before the ACLs are configured on the routers, review each of the following test conditions and make sure that the ACLs will perform as expected:

Telnet from Boaz to Eva	SUCCESSFUL
Telnet from Workstation 4 to Eva	BLOCKED
TELNET from Workstation 5 to Boaz	BLOCKED
TELNET from Workstation 2 to Boaz	SUCCESSFUL
TELNET from Workstation 2 to Eva	SUCCESSFUL
Ping from Workstation 5 to File Server 1	SUCCESSFUL
Ping from Workstation 3 to File Server 1	SUCCESSFUL
Ping from Workstation 3 to Workstation 4	SUCCESSFUL
Ping from Workstation 5 to Workstation 6	SUCCESSFUL
Ping from Workstation 3 to Workstation 5	BLOCKED
Ping from Workstation 2 to Workstation 5	SUCCESSFUL
Ping from Workstation 2 to Workstation 3	SUCCESSFUL
Ping from Router Eva to Workstation 3	SUCCESSFUL
Ping from Router Boaz to Workstation 5	SUCCESSFUL

Phase 5: Documenting the Network

In order to support the network properly, documentation is required. Create documentation that is logically organized to make troubleshooting simpler.

Configuration Management Documentation

	Boaz	Center	Eva
`show cdp neighbors`			
`show ip route`			
`show ip protocol`			
`show ip interface brief`			
`show version`			
`show hosts`			
`show startup config`			

Security Management Documentation

	Boaz	Center	Eva
`show ip interface`			
`show ip access lists`			

Instructor approval _____Date _____

Case Study Deliverables

The key lesson of this case study is the importance of thorough and clear documentation. There should be two types of documentation completed.

General Documentation:

- A complete narrative of the project should be typed using word processing software. Since the scenarios break up the entire task into pieces, take care to address each scenario task so that any layperson could understand that particular task.
- Microsoft Excel or another spreadsheet program could be used to simply list the equipment and serial numbers.
- Cisco Network Designer (CND), Microsoft Visio, or any paint program could be used to draw the network.
- Provide documentation that specifies how the security was tested. A plan for monitoring the network should also be included.

Technical Documentation:

The technical documentation should include details of the network topology. Use CND, Visio, or any paint program to draw the network.

Use the tables in the working copy of the case study as a reference, and enter all table information into a spreadsheet program such as Microsoft Excel. The spreadsheet should include the following details:

- IP addressing of all interfaces
- DCE/DTE information
- Router passwords
- Interface descriptions
- IP addressing and gateway assignments for all PCs

The actual access control lists, or router commands sequence, should be included in this documentation using a word processing program. Be sure to include the router interface the list is applied to and the direction.

Document the use of a routing protocol.

Router output from the following commands should be captured and placed into this documentation:

- **`show cdp neighbors`**
- **`show ip route`**
- **`show ip protocol`**
- **`show ip interface`**
- **`show version`**
- **`show hosts`**

- **show startup-config**
- **show ip access-list**