Lab - Troubleshooting NAT Configurations

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
Gateway	G0/1	192.168.1.1	255.255.255.0	N/A
	S0/0/1	209.165.200.225	255.255.255.252	N/A
ISP	S0/0/0 (DCE)	209.165.200.226	255.255.255.252	N/A
	Lo0	198.133.219.1	255.255.255.255	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-B	NIC	192.168.1.4	255.255.255.0	192.168.1.1

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Troubleshoot Static NAT

Part 3: Troubleshoot Dynamic NAT

Background / Scenario

In this lab, the Gateway router was configured by an inexperienced network administrator at your company. Several errors in the configuration have resulted in NAT issues. Your boss has asked you to troubleshoot and correct the NAT errors and document your work. Ensure that the network supports the following:

- PC-A acts as a web server with a static NAT and will be reachable from the outside using the 209.165.200.254 address.
- PC-B acts as a host computer and dynamically receives an IP address from the created pool of addresses called NAT_POOL, which uses the 209.165.200.240/29 range.

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). The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other routers, switches 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: Make sure that the routers and switch have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 2 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 2 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 and serial cables as shown in the topology

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure the routers with basic settings. Additional NAT-related configurations are provided. The NAT configurations for the Gateway router contains errors that you will identify and correct as you proceed through the lab.

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

Step 2: Configure PC hosts.

Step 3: Initialize and reload the switch and routers.

Step 4: Configure basic settings for each router.

a. Disable DNS lookup.

b. Configure device name as shown in the topology.

c. Configure IP addresses as listed in the Address Table.

d. Set the clock rate to **128000** for DCE serial interfaces.

e. Assign **cisco** as the console and vty password.

f. Assign **class** as the encrypted privileged EXEC mode password.

g. Configure **logging synchronous** to prevent console messages from interrupting the command entry.

Step 5: Configure static routing.

a. Create a static route from the ISP router to the Gateway router-assigned public network address range 209.165.200.224/27.

```
ISP(config)# ip route 209.165.200.224 255.255.255.224 s0/0/0
```

b. Create a default route from the Gateway router to the ISP router.

```
Gateway(config)# ip route 0.0.0.0 0.0.0.0 s0/0/1
```

Step 6: Load router configurations.

The configurations for the routers are provided for you. There are errors with the configuration for the Gateway router. Identify and correct the configurations errors.

Gateway Router Configuration

```
interface g0/1
 ip nat outside
 no shutdown
interface s0/0/0
 ip nat outside
interface s0/0/1
 no shutdown
ip nat inside source static 192.168.2.3 209.165.200.254
ip nat pool NAT_POOL 209.165.200.241 209.165.200.246 netmask 255.255.255.248
ip nat inside source list NAT_ACL pool NATPOOL
ip access-list standard NAT_ACL
 permit 192.168.10.0 0.0.0.255
banner motd $AUTHORIZED ACCESS ONLY$
end
```

Step 7: Save the running configuration to the startup configuration.

Part 2: Troubleshoot Static NAT

In Part 2, you will examine the static NAT for PC-A to determine if it is configured correctly. You will troubleshoot the scenario until the correct static NAT is verified.

a. To troubleshoot issues with NAT, use the **debug ip nat** command. Turn on NAT debugging to see translations in real-time across the Gateway router.

```
Gateway# debug ip nat
```

b. From PC-A, ping Lo0 on the ISP router. Do any NAT debug translations appear on the Gateway router?

c. On the Gateway router, enter the command that allows you to see all current NAT translations on the Gateway router. Write the command in the space below.

Why are you seeing a NAT translation in the table, but none occurred when PC-A pinged the ISP loopback interface? What is needed to correct the issue?

d. Record any commands that are necessary to correct the static NAT configuration error.

e. From PC-A, ping Lo0 on the ISP router. Do any NAT debug translations appear on the Gateway router?

f. On the Gateway router, enter the command that allows you to observe the total number of current NATs. Write the command in the space below.

Is the static NAT occurring successfully? Why?

g. On the Gateway router, enter the command that allows you to view the current configuration of the router. Write the command in the space below.

h. Are there any problems with the current configuration that prevent the static NAT from occurring?

i. Record any commands that are necessary to correct the static NAT configuration errors.

j. From PC-A, ping Lo0 on the ISP router. Do any NAT debug translations appear on the Gateway router?

k. Use the **show ip nat translations verbose** command to verify static NAT functionality.

Note: The timeout value for ICMP is very short. If you do not see all the translations in the output, redo the ping.

Is the static NAT translation occurring successfully?

If static NAT is not occurring, repeat the steps above to troubleshoot the configuration.

Part 3: Troubleshoot Dynamic NAT

a. From PC-B, ping Lo0 on the ISP router. Do any NAT debug translations appear on the Gateway router?

b. On the Gateway router, enter the command that allows you to view the current configuration of the router. Are there any problems with the current configuration that prevent dynamic NAT from occurring?

c. Record any commands that are necessary to correct the dynamic NAT configuration errors.

d. From PC-B, ping Lo0 on the ISP router. Do any NAT debug translations appear on the Gateway router?

e. Use the **show ip nat statistics** to view NAT usage.

Is the NAT occurring successfully?

What percentage of dynamic addresses has been allocated?

f. Turn off all debugging using the **undebug all** command.

Reflection

1. What is the benefit of a static NAT?

2. What issues would arise if 10 host computers in this network were attempting simultaneous Internet communication?

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.