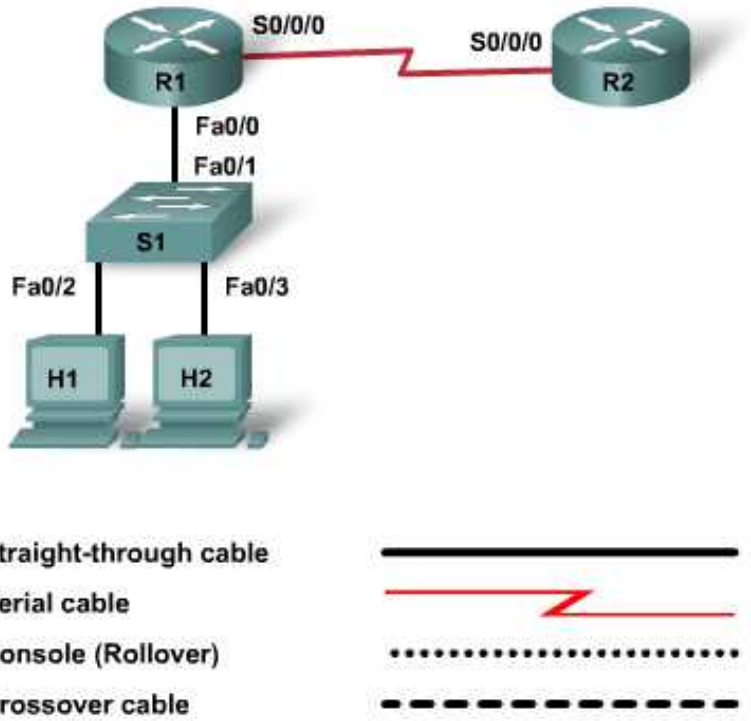
Lab 8.4.3 Configuring an ACL with NAT



Device	Host Name	FastEthernet 0/0 IP Address	Serial 0/0/0 IP Address	Serial 0/0/0 Interface Type	Default Gateway	Enable Secret Password	Enable, vty, and Console Password
Router 1	R1	192.168.1.1/24	209.165.201.1/30	DTE		class	cisco
Router 2	R2		209.165.201.2/30	DCE		class	cisco
Switch 1	S1					class	cisco
Host 1	H1	192.168.1.2/24			192.168.1.1		
Host 2	H2	192.168.1.3/24			192.168.1.1		

Objectives

- Configure NAT and PAT and verify functionality.
- Configure and apply an ACL to an interface where NAT occurs.
- Observe the effects of ACL placement when using NAT.

Background / Preparation

Cable a network similar to the one shown in the diagram. Any router that meets the interface requirements displayed on the topology diagram may be used. For example, router series 800, 1600, 1700, 1800, 2500, 2600, 2800, or any combination can be used.

The information in this lab applies to the 1841 series of routers. It also applies to other routers; however, the command syntax may vary. Depending on the router model, the interfaces may differ. For example, on some routers Serial 0 may be Serial 0/0 or Serial 0/0/0 and Ethernet 0 may be FastEthernet 0/0. The Cisco Catalyst 2960 switch comes preconfigured and only needs to be assigned basic security information before being connected to a network.

The following resources are required:

- One Cisco 2960 switch or other comparable switch
- Two 1841 or equivalent series routers, each with a serial connection and an Ethernet interface
- Two Windows-based PCs, both with a terminal emulation program, and both set up as hosts
- At least one RJ-45-to-DB-9 connector console cable to configure the routers and switch
- Three straight-through Ethernet cables
- One 2-part (DTE/DCE) serial cable

NOTE: Make sure that the routers and the switches have been erased and have no startup configurations. Instructions for erasing both switch and router are provided in the Lab Manual, located on Academy Connection in the Tools section.

NOTE: SDM Enabled Routers – If the startup-config is erased in an SDM enabled router, SDM will no longer come up by default when the router is restarted. It will be necessary to build a basic router configuration using IOS commands. The steps provided in this lab use IOS commands and do not require the use of SDM. If you wish to use SDM, refer to the instructions in the Lab Manual, located on the Academy Connection in the Tools section or contact your instructor if necessary.

Step 1: Connect the equipment

a. Connect the Serial 0/0/0 interface of Router 1 to the Serial 0/0/0 interface of Router 2 using a serial cable as shown in the diagram and addressing table.

b. Connect the Fa0/0 interface of Router 1 to the Fa0/1 port of Switch 1 using a straight-through cable.

c. Connect each PC with a console cable to perform configurations on the router and switches.

d. Connect Host 1 to the Fa0/2 port of Switch 1 using a straight-through cable.

e. Connect Host 2 to the Fa0/3 port of Switch 1 using a straight-through cable.

Step 2: Perform basic configuration on Router 1

a. Connect a PC to the console port of the router to perform configurations using a terminal emulation program.

b. Configure Router 1 with a hostname, interfaces, console, Telnet, IP addresses, and privileged passwords according to the addressing table and topology diagram. Save the configuration.

Step 3: Perform basic configuration on Router 2

Perform basic configuration on Router 1 as the gateway router with a hostname, interfaces, console, Telnet, and privileged passwords according to the addressing table and topology diagram. Save the configuration.

Step 4: Perform basic configuration on Switch 1

Configure Switch 1 with a hostname and console, telnet and privileged passwords according to the table and topology diagram.

Step 5: Configure the hosts with IP address, subnet mask, and default gateway

a. Configure each host with the proper IP address, subnet mask, and default gateway.

b. Each workstation should be able to ping the attached router. If the ping was not successful, troubleshoot as necessary. Check and verify that the workstation has been assigned a specific IP address and default gateway.

Step 6: Configure static and default routes on the routers

a. Configure a static route on router R2 to reach the private network on R1. Use the next hop interface on R1 as the path.

```
R2(config)#ip route 192.168.1.0 255.255.255.0 209.165.201.1
```

b. Configure a default route on router R1 to forward any unknown destination traffic to the next hop interface on R2.

```
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.2
```

Step 7: Verify that the network is functioning

a. From the attached hosts, ping the FastEthernet interface of the default gateway router.

Was the ping from Host 1 successful? _____

Was the ping from Host 2 successful? _____

If the answer is no for either question, troubleshoot the router and host configurations to find the error. Ping again until they are both successful.

b. From each host, ping the Serial 0/0/0 interface of R2.

Each ping should be successful. If it is not, troubleshoot the static and default route configurations to find the error. Ping again until they are both successful.

Step 8: Configure NAT and PAT on R1

a. Define an access list that matches the inside private IP addresses.

```
R1(config)#access-list 1 permit 192.168.1.0 0.0.0.255
```

b. Define the PAT translation from inside the list to outside.

```
R1(config)#ip nat inside source list 1 interface s0/0/0 overload
```

c. Specify the interfaces.

```
R1(config)#interface fastethernet 0/0
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#interface serial 0/0/0
R1(config-if)#ip nat outside
```

Where will the private IP address of a host be translated? _____

_____

Step 9: Test and verify the configuration

a. Ping PC2 from PC1.

Was it successful? _____

b. Ping the serial interface on R2 from PC1 and PC2.

Was it successful? _____

c. Verify that NAT translations are taking place by using the command **show ip nat translations** (a sample output is shown).

```
Pro  Inside global    Inside local   Outside local     Outside global
icmp 209.165.201.1:2  192.168.1.2:2  209.165.201.2:2   209.165.201.2:2
icmp 209.165.201.1:3  192.168.1.2:3  209.165.201.2:3   209.165.201.2:3
icmp 209.165.201.1:4  192.168.1.2:4  209.165.201.2:4   209.165.201.2:4
icmp 209.165.201.1:5  192.168.1.2:5  209.165.201.2:5   209.165.201.2:5
icmp 209.165.201.1:10 192.168.1.3:10 209.165.201.2:10  209.165.201.2:10
icmp 209.165.201.1:7  192.168.1.3:7  209.165.201.2:7   209.165.201.2:7
icmp 209.165.201.1:8  192.168.1.3:8  209.165.201.2:8   209.165.201.2:8
icmp 209.165.201.1:9  192.168.1.3:9  209.165.201.2:9   209.165.201.2:9
```

How does the output indicate that PAT is being used?

_____

Step 10: Configure and apply an ACL designed to filter traffic from one host

a. Prevent PC1 from reaching R2, while allowing other traffic to flow freely.

```
R1(config)#access-list 10 deny 192.168.1.2
R1(config)#access-list 10 permit any
```

b. Apply the ACL to the serial interface of R1.

```
R1(config)#interface s0/0/0
R1(config-if)#ip access-group 10 out
```

Step 11: Test the effects of the ACL on network traffic

a. Ping from PC1 to PC2, and from PC1 to its default gateway.

Were the pings successful? _____

b. Ping from PC1 to the serial interface of R2.

Was the ping successful? _____

c. Ping from PC2 to the serial interface of R2.

Was the ping successful? _____

Is the ACL producing the desired results? _____

What would you expect to see if you viewed the NAT translation table?

_____

Step 12: Move the ACL and retest

a. Remove the ACL from the serial interface of R1.

```
R1(config)#interface s0/0/0
R1(config-if)#no ip access-group 10 out
```

b. Place the ACL on the FastEthernet interface instead.

```
R1(config)#interface fastethernet 0/0
R1(config-if)#ip access-group 10 in
```

c. Retest the ACL using the pings from Step 11.

Describe the results this time.

_____

Is the ACL producing the desired results? _____

Step 13: Reflection

a. What is the role of the serial interface IP of R1 in NAT and PAT? (Refer back to the output shown in Step 9.)

_____

_____

b. List, in the order in which they occurred, the changes that happened to the PC1 IP address when the ACL was placed on the R1 serial interface.

_____

_____

_____

c. Why did moving the ACL to the FastEthernet interface produce the desired results?

_____

_____