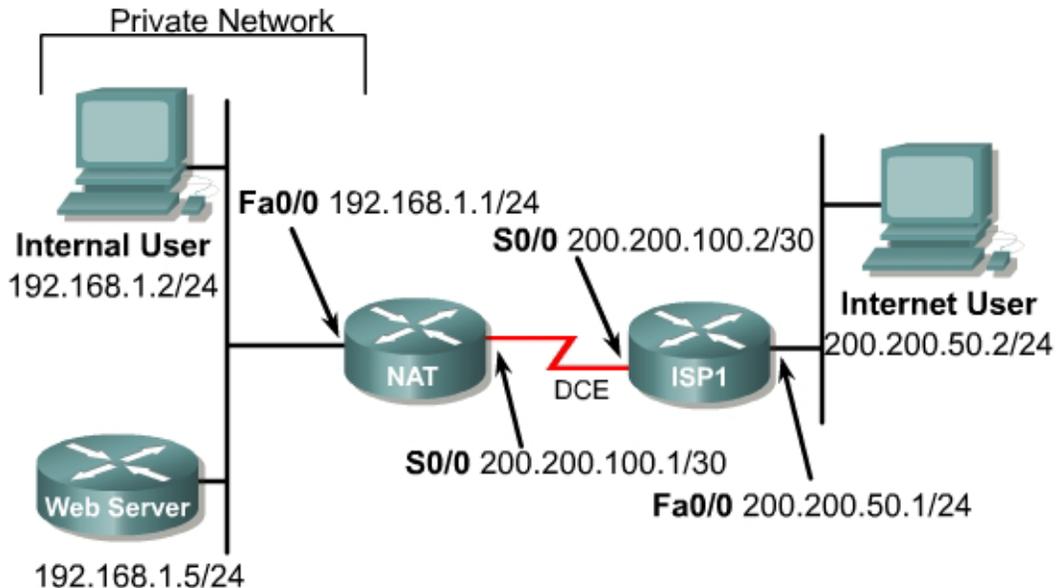


## Lab 2.10.4b Network Address Translation – Port Address Translation and Port Forwarding



### Objective

In this lab, Port Address Translation (PAT) and port forwarding are configured.

### Scenario

The International Travel Agency is planning to launch an informational Web site on a local Web server for the general public. However, the one Class C address that has been allocated will not be sufficient for the users and devices the company has on this network. Therefore, a network is configured that will allow all internal company users access to the Internet and all Internet users access to the company's informational Web server through static NAT and PAT. Internal user addresses must be translated to one legal global address and all Internet Users must access the informational Web server through the one legal global address as well.

### Step 1

Build and configure the network according to the diagram. If you are using the configuration files from the previous lab, remove the NAT pool (public) and the static and dynamic NAT configurations. Use a Cisco router as WebServer if another Web server is not available.

Use `ping` to test connectivity between the NAT and ISP1 routers, between the Internal User and the NAT router, and between the Internet User and ISP1.

Also check that WebServer server is accessible by connecting to it from the Internal User workstation with a browser using the WebServer IP address, 192.168.1.5.

### Step 2

Since no routing protocol will be enabled, configure a default route to the Internet from the NAT router.

```
NAT(config)#ip route 0.0.0.0 0.0.0.0 200.200.100.2
```

### Step 3

Create a standard Access Control List that would enable all Internal Users access to the Internet.

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

### Step 4

Because a single inside global address, 200.200.100.1, will be used to represent multiple inside local addresses, 192.168.1.x, simultaneously, apply the access list and configure NAT overload on the serial 0/0 interface of the NAT router. In general, NAT can be used to overload a pool of public addresses, when a single external address is overloaded. This is referred to as port address translation (PAT).

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

This configuration allows Internal Users to access the Internet, but blocks external users from accessing internal hosts.

### Step 5

Now specify the inside and outside NAT interfaces.

```
NAT(config)#interface fastethernet 0/0
NAT(config-if)#ip nat inside

NAT(config-if)#interface serial 0/0
NAT(config-if)#ip nat outside
```

Enter the command `ping 200.200.50.2` from the Internal User workstation. Then, on the NAT router, enter the commands `show ip nat translations`, `show ip nat statistics`, and `show ip nat translations verbose`. Sample output follows.

```
NAT#show ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
icmp 200.200.100.1:516 192.168.1.5:516   200.200.50.2:516   200.200.50.2:516
icmp 200.200.100.1:517 192.168.1.5:517   200.200.50.2:517   200.200.50.2:517
icmp 200.200.100.1:518 192.168.1.5:518   200.200.50.2:518   200.200.50.2:518
icmp 200.200.100.1:519 192.168.1.5:519   200.200.50.2:519   200.200.50.2:519
icmp 200.200.100.1:520 192.168.1.5:520   200.200.50.2:520   200.200.50.2:520

NAT#show ip nat statistics
Total active translations: 5 (0 static, 5 dynamic; 5 extended)
Outside interfaces:
  Serial0/0
Inside interfaces:
  FastEthernet0/0
Hits: 25 Misses: 30
Expired translations: 20
Dynamic mappings:
-- Inside Source
[Id: 1] access-list 1 interface Serial0/0 refcount 5

NAT#show ip nat translations verbose
Pro Inside global      Inside local      Outside local      Outside global
icmp 200.200.100.1:516 192.168.1.5:516   200.200.50.2:516   200.200.50.2:516
      create 00:00:15, use 00:00:15, left 00:00:44, Map-Id(In): 1,
      flags:
extended, use_count: 0
icmp 200.200.100.1:517 192.168.1.5:517   200.200.50.2:517   200.200.50.2:517
      create 00:00:15, use 00:00:15, left 00:00:44, Map-Id(In): 1,
```

```

      flags:
    extended, use_count: 0
icmp 200.200.100.1:518 192.168.1.5:518 200.200.50.2:518 200.200.50.2:518
  create 00:00:15, use 00:00:15, left 00:00:44, Map-Id(In): 1,
  flags:
    extended, use_count: 0
icmp 200.200.100.1:519 192.168.1.5:519 200.200.50.2:519 200.200.50.2:519
  create 00:00:15, use 00:00:15, left 00:00:44, Map-Id(In): 1,
  flags:
    extended, use_count: 0
icmp 200.200.100.1:520 192.168.1.5:520 200.200.50.2:520 200.200.50.2:520
  create 00:00:15, use 00:00:15, left 00:00:44, Map-Id(In): 1,
  flags:
    extended, use_count: 0

```

## Step 6

Internet users need access to the informational Web server through 200.200.100.1 through port 80. Configure PAT so that Internet users are directed to the informational Web server, 192.168.1.5, when they connect to the IP address 200.200.100.1 through a web browser.

```

NAT(config)#ip nat inside source static tcp 192.168.1.5 80 200.200.100.1 80
extendable

```

The **extendable** keyword at the end of this static NAT command causes the router to reuse the global address of an active translation and save enough information to distinguish it from another translation entry. This command has the effect of translating external attempts to connect to port 80/IP address 200.200.100.1 to internal attempts to connect to port 80/IP address 192.168.1.5. The process of performing NAT translations based on the value of the incoming port number of an IP packet is called *port forwarding*.

## Step 7

Successful configuration of port forwarding is indicated by being able to reach the informational Web server from the Internet User workstation with a Web browser using the inside global address of 200.200.100.1.

After successful connection to the web server with a browser from the Internet User workstation, issue the same three **show** commands from Step 5 on the NAT router to view the translations. Sample outputs are shown below.

```

NAT#show ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4806 200.200.50.2:4806
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4809 200.200.50.2:4809
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4814 200.200.50.2:4814
tcp 200.200.100.1:80   192.168.1.5:80   ---                ---

NAT#show ip nat statistics
Total active translations: 4 (1 static, 3 dynamic; 4 extended)
Outside interfaces:
  Serial0/0
Inside interfaces:
  FastEthernet0/0
Hits: 243 Misses: 30
Expired translations: 34
Dynamic mappings:
-- Inside Source
[Id: 1] access-list 1 interface Serial0/0 refcount 0

NAT#show ip nat translations verbose
Pro Inside global      Inside local      Outside local      Outside global
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4806 200.200.50.2:4806
  create 00:01:00, use 00:00:59, left 00:00:00,
  flags:
extended, timing-out, use_count: 0
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4809 200.200.50.2:4809
  create 00:00:59, use 00:00:59, left 00:00:00,
  flags:
extended, timing-out, use_count: 0
tcp 200.200.100.1:80   192.168.1.5:80   200.200.50.2:4814 200.200.50.2:4814
  create 00:00:41, use 00:00:40, left 00:00:19,

```

```
      flags:
extended, timing-out, use_count: 0
tcp 200.200.100.1:80 192.168.1.5:80 --- ---
      create 00:11:23, use 00:00:41,
      flags:
static, extended, extendable, use_count: 3
```

PAT and port address translation have now been successfully configured.