

## Network Address Translation

# Review

# Questions

# The problem(s)

- ▶ IP addresses are scarce
- ▶ Renumbering networks is hard
- ▶ Private networks need to connect

# Network Address Translation

- ▶ Converts one set of IP's to another
- ▶ Supports several different methodologies
  - ▶ One to One
  - ▶ Port Mapping
  - ▶ Masquerade (PAT)

# One to One NAT

- ▶ Maps one external IP to one internal
- ▶ Used to remap networks
- ▶ Also sometime used to translate private to connect

# One to Many (Port mapping)

- ▶ Maps one external IP and Port to an inside IP and Port
- ▶ Often used to expose external services
- ▶ Very common - SOHO routers call port mapping

# Masquerade (PAT)

- ▶ Allows many internal IPs to show as one external IP
- ▶ Preserves IP space
- ▶ Very common at both residential and commercial
- ▶ Uses port rewriting to allow multiple connections



## Other NAT Types

- ▶ NAT types can be combined
- ▶ Expose port on external IP that is mapped to
- ▶ PAT can be with a pool

## Examples and Application

# Cisco implementation

- ▶ Outside and inside interface
- ▶ Local and global IPs

## Example of Local/Global

## Cisco Implentation (Contd)

- ▶ Tag inside and outside interfaces
- ▶ Create access list to match traffic (optional)
- ▶ Create NAT rules

## Example

```
interface GigabitEthernet0/0
  ip address 72.240.28.131 255.255.255.0
  ip nat outside
interface GigabitEthernet0/1
  ip address 192.168.1.1 255.255.255.0
  ip nat inside
access-list 101 permit ip 192.168.1.0 0.0.0.255 any
ip nat inside source list 101 interface GigabitEthernet0/0
```

## Example 2

```
interface FastEthernet0/0
  ip address 72.240.58.190 255.255.255.252 secondary
  ip address 72.240.53.106 255.255.255.248
  ip access-group 121 in
  ip nat outside
interface FastEthernet0/1
  ip address 192.168.1.1 255.255.255.0
  ip nat inside
access-list 100 permit ip 192.168.1.0 0.0.0.255 any
access-list 121 permit ip 12.37.9.0 0.0.0.255 host 72.240.5
access-list 121 permit ip 72.241.56.64 0.0.0.7 host 72.240
access-list 121 deny ip any host 72.240.53.107
access-list 121 permit ip any host 72.240.53.106
access-list 121 permit ip 72.240.0.0 0.0.1.255 host 72.240
access-list 121 permit ip 64.254.140.0 0.0.0.31 host 72.240
access-list 121 permit ip 64.254.34.0 0.0.0.31 host 72.240
access-list 121 permit ip 64.254.134.0 0.0.0.31 host 72.240
access-list 121 permit ip 64.254.134.0 0.0.0.255 host 72.24
```

# Nat troubleshooting

- ▶ `sh ip nat translations`
- ▶ `sh ip nat statistics`



# Demonstration

# Questions

## Monday - Firewalls