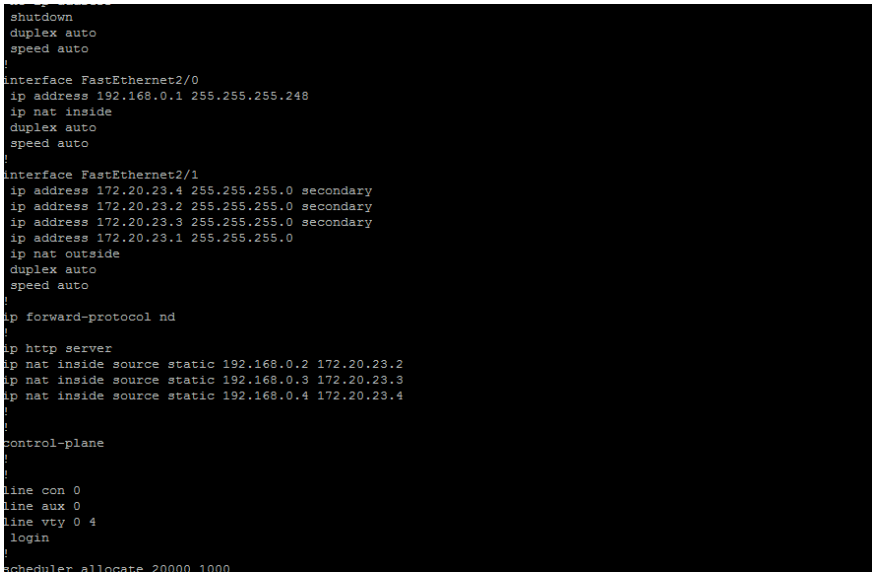
Lab 4

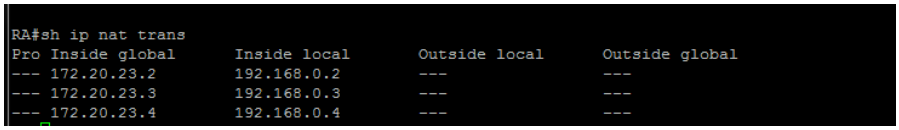
1. Part 1: NAT/PAT
    a. Initial Setup
        i. Set up connections
        ii. Set up Span port on SW2
        iii. assign ip address and default gateway to internal network pc's
    b. Static Nat
        i. on RA
            1. configure inside NAT interface
                a. int fa2/0
                b. ip nat inside
            2. configure outside NAT interface
                a. int fa2/1
                b. ip address 172.20.23.1 255.255.255.0
                c. ip nat outside
            3. assign nat ip address to internal ip addresses
                a. ip nat inside source static 192.168.0.2 172.20.23.2
                b. same for other pc's
            4. add all static nat addresses to router outside interface
                a. ip address 172.20.23.2 255.255.255.0 secondary
        ii. on RB
            1. assign static ip to interface fa2/0
        iii. Configuration
            1. RA

a.




2. Nat translations

a.




c. Dynamic NAT

i. Create NAT pool

1. ip nat pool mypool 172.20.23.2 172.20.23.4 prefix-length 24
2. access-list 1 permit 192.168.0.0 0.0.0.7
3. ip nat inside source list 1 pool mypool

ii. Configuration

1. RA

a.

```
interface FastEthernet2/0
 ip address 192.168.0.1 255.255.255.248
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet2/1
 ip address 172.20.23.4 255.255.255.0 secondary
 ip address 172.20.23.2 255.255.255.0 secondary
 ip address 172.20.23.3 255.255.255.0 secondary
 ip address 172.20.23.1 255.255.255.0
 ip nat outside
 duplex auto
 speed auto
!
ip forward-protocol nd
!
ip http server
ip nat inside source list 1 interface FastEthernet2/1 overload
!
access-list 1 permit 192.168.0.0 0.0.0.7
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
 login
```

2. NAT translations

a.

```
RA(config)#do sh ip nat trans
Pro Inside global     Inside local       Outside local      Outside global
icmp 172.20.23.2:1    192.168.0.2:1      172.20.23.5:1      172.20.23.5:1
--- 172.20.23.2       192.168.0.2        ---                ---
```

3. NAT Statistics

a.

```
RA(config)#do sh ip nat statistics
Total active translations: 3 (0 static, 3 dynamic; 1 extended)
Outside interfaces:
  FastEthernet2/1
Inside interfaces:
  FastEthernet2/0
Hits: 3693  Misses: 15
CEF Translated packets: 3692, CEF Punted packets: 0
Expired translations: 14
Dynamic mappings:
-- Inside Source
[Id: 1] access-list 1 pool mypool refcount 3
 pool mypool: netmask 255.255.255.0
        start 172.20.23.2 end 172.20.23.4
        type generic, total addresses 3, allocated 2 (66%), misses 0
Appl doors: 0
Normal doors: 0
Queued Packets: 0
```

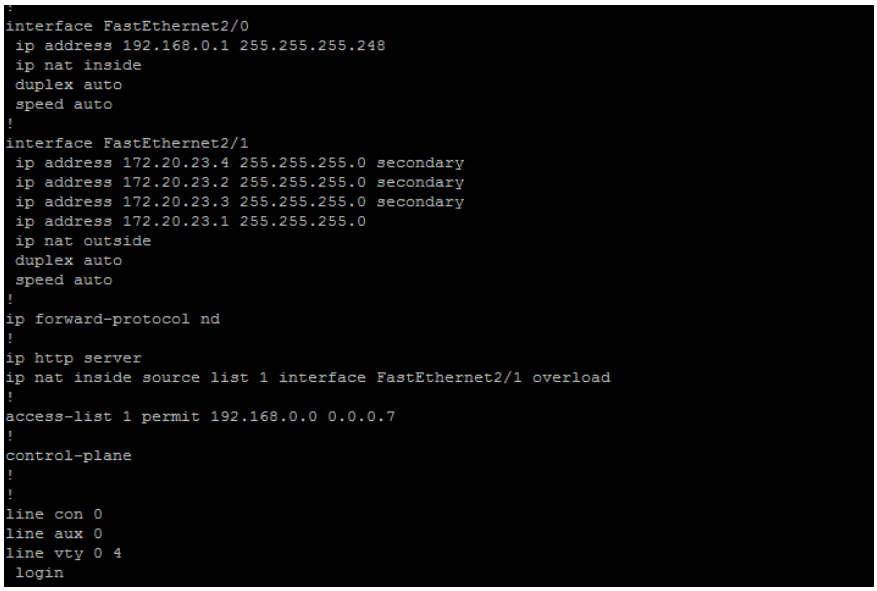
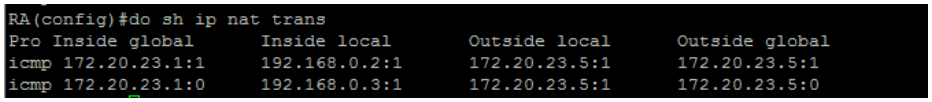
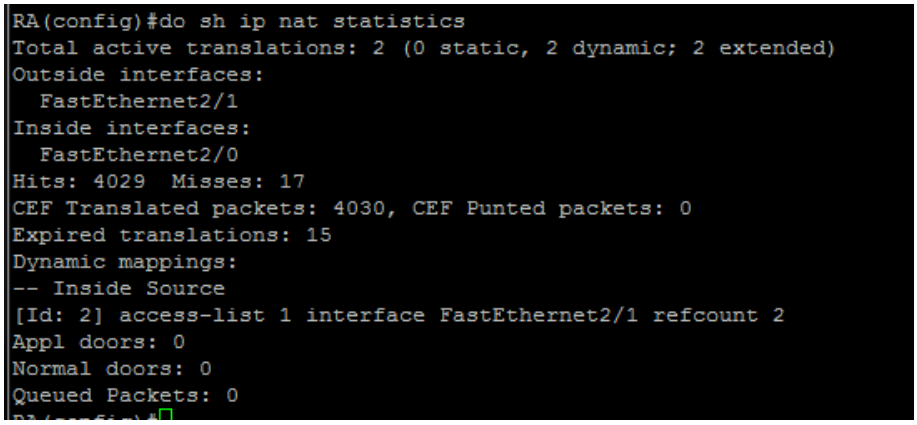
d. Use PAT

i. remove pool

ii. add overload on outside interface

1. ip nat inside source list 1 interface fa2/1 overload

iii. Configuration

1. RA
    a. 
```
interface FastEthernet2/0
 ip address 192.168.0.1 255.255.255.248
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet2/1
 ip address 172.20.23.4 255.255.255.0 secondary
 ip address 172.20.23.2 255.255.255.0 secondary
 ip address 172.20.23.3 255.255.255.0 secondary
 ip address 172.20.23.1 255.255.255.0
 ip nat outside
 duplex auto
 speed auto
!
ip forward-protocol nd
!
ip http server
ip nat inside source list 1 interface FastEthernet2/1 overload
!
access-list 1 permit 192.168.0.0 0.0.0.7
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
 login
```
2. NAT translations
    a. 
```
RA(config)#do sh ip nat trans
Pro Inside global      Inside local       Outside local      Outside global
icmp 172.20.23.1:1     192.168.0.2:1      172.20.23.5:1      172.20.23.5:1
icmp 172.20.23.1:0     192.168.0.3:1      172.20.23.5:1      172.20.23.5:0
```
3. NAT Statistics
    a. 
```
RA(config)#do sh ip nat statistics
Total active translations: 2 (0 static, 2 dynamic; 2 extended)
Outside interfaces:
  FastEthernet2/1
Inside interfaces:
  FastEthernet2/0
Hits: 4029  Misses: 17
CEF Translated packets: 4030, CEF Punted packets: 0
Expired translations: 15
Dynamic mappings:
-- Inside Source
[Id: 2] access-list 1 interface FastEthernet2/1 refcount 2
Appl doors: 0
Normal doors: 0
Queued Packets: 0
```

e. Telnet Test

    i. Enable telent

        1. On RB

            a. line vty 0 4

b. login

c. password werthman

ii. On PCs

1. open putty and select telnet
2. enter ip address and connect

iii. Findings

1. Single session Telnet from PCs

a.

```
RA(config)#do sh ip nat translations
Pro Inside global      Inside local       Outside local      Outside global
tcp 172.20.23.1:55921  192.168.0.2:55921  172.20.23.5:23     172.20.23.5:23
tcp 172.20.23.1:54779  192.168.0.3:54779  172.20.23.5:23     172.20.23.5:23
RA(config)#
```

2. Multiple sessions Telnet from PC1

a.

```
RA(config)#do sh ip nat translations
Pro Inside global      Inside local       Outside local      Outside global
tcp 172.20.23.1:55921  192.168.0.2:55921  172.20.23.5:23     172.20.23.5:23
tcp 172.20.23.1:54779  192.168.0.3:54779  172.20.23.5:23     172.20.23.5:23
RA(config)#do sh ip nat translations
Pro Inside global      Inside local       Outside local      Outside global
tcp 172.20.23.1:55921  192.168.0.2:55921  172.20.23.5:23     172.20.23.5:23
tcp 172.20.23.1:55922  192.168.0.2:55922  172.20.23.5:23     172.20.23.5:23
tcp 172.20.23.1:55923  192.168.0.2:55923  172.20.23.5:23     172.20.23.5:23
tcp 172.20.23.1:54779  192.168.0.3:54779  172.20.23.5:23     172.20.23.5:23
```

2. Part 2: Redistribution

a. Wire topology

b. assign ip addresses

c. enable routing protocols

i. To enable eigrp

1. enable eigrp [number]
2. network [network address]
3. add static neighbor

a. neighbor [ip address] [interface]

d. Redistribute static routes

i. Into rip

1. router rip

a. redistribute static metric 1

ii. Into ospf

1. router ospf [process]

a. redistribute static subnets

iii. Into eigrp

1. router eigrp [process]
2. redistribute static

e. Redistribute ospf

i. into same process

1. router ospf [process]

a. redistribute ospf [opposite process] subnets

b. default-metric 1

ii. into eigrp

1. router eigrp [process]

a. redistribute ospf [process]

b. default-metric [bandwidch] [delay] [reliability] [LOAD] [MTU]

2. into rip

a. redistribute ospf [process]

b. default-metric 1

f. Redistribute eigrp

i. into ospf

1. router ospf [process]

a. redistribute eigrp [process] subnets

b. default-metric 1

g. redistribute rip

i. into ospf

1. router ospf [process]

a. redistribute rip subnets

h. for all redistribute connect subnets

i. double check id of routers

j.

```
R3(config)#do sh ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

D EX 192.168.12.0/24 [170/2682112] via 192.168.16.2, 00:05:17, Serial1/3
D    192.168.13.0/24 [90/2681856] via 192.168.16.2, 00:28:13, Serial1/3
D    192.168.15.0/24 [90/2172416] via 192.168.16.2, 00:28:13, Serial1/3
S    192.168.4.0/24 [1/0] via 192.168.5.2
C    192.168.5.0/24 is directly connected, Serial1/0
S    192.168.6.0/24 [1/0] via 192.168.5.2
D EX 192.168.7.0/24 [170/2682112] via 192.168.16.2, 00:05:17, Serial1/3
     192.168.0.0/32 is subnetted, 1 subnets
O       192.168.0.1 [110/2] via 192.168.1.1, 00:29:04, FastEthernet2/0
C    192.168.16.0/24 is directly connected, Serial1/3
C    192.168.1.0/24 is directly connected, FastEthernet2/0
C    192.168.2.0/24 is directly connected, FastEthernet2/1
O    192.168.3.0/24 [110/2] via 192.168.2.2, 00:29:04, FastEthernet2/1
```

k.

```
R4(config)#do sh ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
D EX    192.168.12.0/24 [170/2170112] via 192.168.13.1, 00:06:26, Serial1/1
O E2    192.168.12.1/32 [110/1] via 192.168.10.1, 00:42:28, Serial1/2
C    192.168.13.0/24 is directly connected, Serial1/1
C    192.168.15.0/24 is directly connected, FastEthernet2/0
O E2 192.168.8.0/24 [110/1] via 192.168.10.1, 00:41:05, Serial1/2
O E2 192.168.9.0/24 [110/1] via 192.168.10.1, 00:41:05, Serial1/2
C    192.168.10.0/24 is directly connected, Serial1/2
O E2 192.168.11.0/24 [110/1] via 192.168.10.1, 00:42:29, Serial1/2
D EX 192.168.4.0/24 [170/2170112] via 192.168.13.1, 00:06:27, Serial1/1
D EX 192.168.5.0/24 [170/2170112] via 192.168.13.1, 00:06:27, Serial1/1
D EX 192.168.7.0/24 [170/2170112] via 192.168.13.1, 00:06:27, Serial1/1
C    192.168.16.0/24 is directly connected, Serial1/0
```

3. Access List

a.
```
access-list 100 deny   icmp host 192.168.3.2 host 192.168.9.1
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
 login
!
scheduler allocate 20000 1000
!
end

R6(config)#
```

b.
```
!
access-list 150 deny   tcp host 192.168.3.2 host 192.168.6.1 eq telnet
!
control-plane
!
!
```

c.
```
access-list 150 deny   ip host 192.168.15.1 host 221.22.2.22
!
```

d.
```
!
access-list 150 deny   tcp any eq telnet any
!
!
```

4. Report Questions
    a. PAT
        i. Commands listed in first part of lab
        ii. If three computers trying to access the network at the same time they will be able to but they would be given different ports for along with their IP addresses to distinguish them.
    b. NAT
        i. Again, the pc would be given different ports to use telnet on if there were multiple sessions. If 1:1 was set up, each telnet would get it's own ip address.
    c. Admin Distance

i. It would've been a nightmare if I had used admin distance on all the routing protocols. I didn't know what to do with the metrics; I didn't know what they meant. You had to assign default metrics to each routing protocol when redistributing.

d. Access List
    i. access-list deny tcp any eq 80 any
    ii. access-list deny ftp any any
    iii. access-list allow ssh 100.100.100.0 255.255.255.0 eq 20 any
    iv. deny icmp requests inward