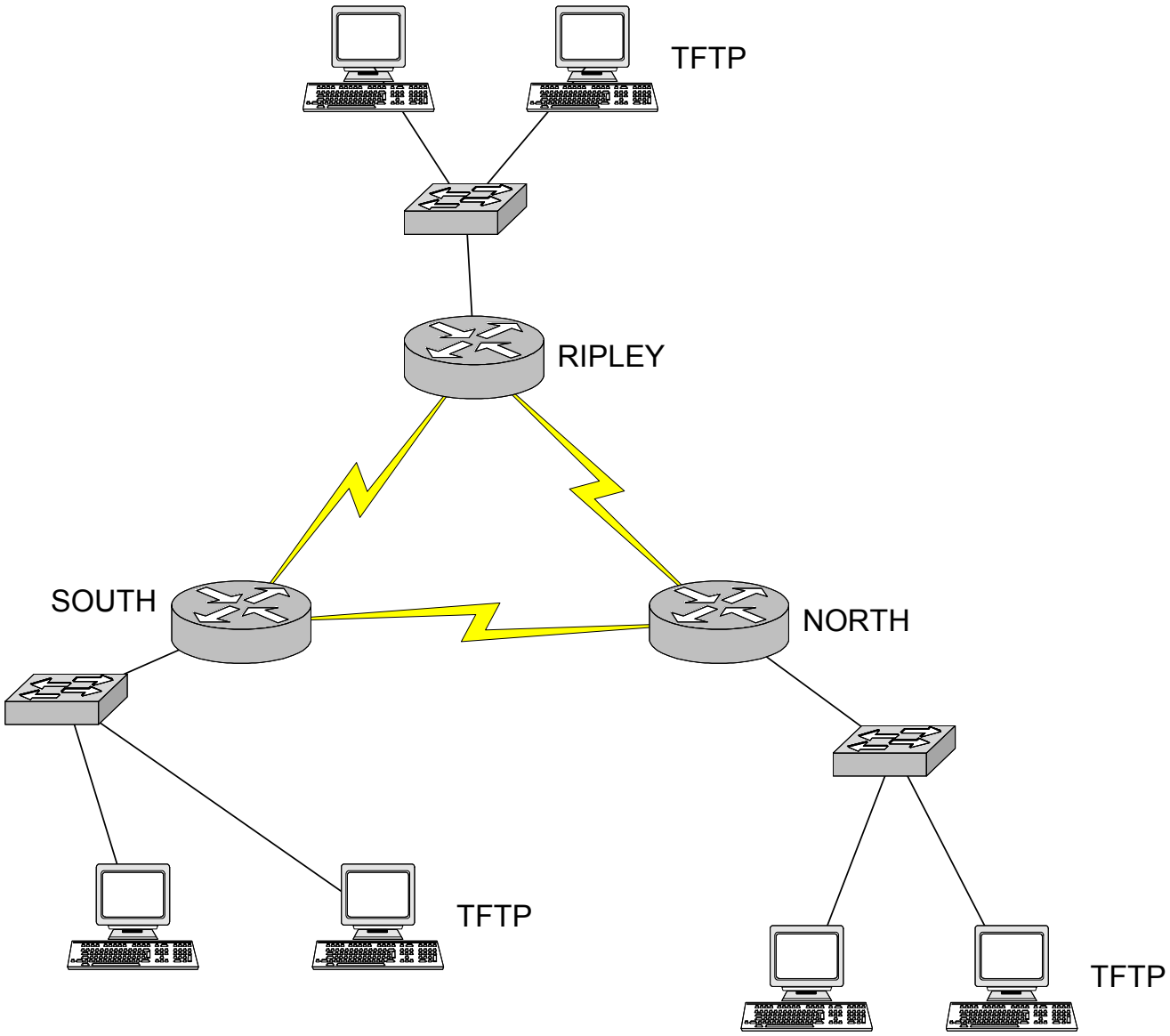
Task Overview

This exercise requires you to design a VLSM IP addressing scheme, physically connect your equipment, and configure it. The configuration will require knowledge of Static NAT, PAT, DHCP, and PPP with CHAP authentication. You will also need RIP version 2 and knowledge of basic router configuration tasks.

If a @ symbol follows a certain line of instructions, that means that particular task cannot be accomplished on Packet Tracer 4.01.

Cabling

Cable your equipment as depicted in the diagram below. For this lab you will need PCs plugged into switches; you won't be able to take a shortcut and plug into the router with a cross-over cable.



IP Addressing and the Internet

Your serial connections will use the public IP network **2.2.2.0/27**. Subnet as needed, but please note that your static NAT requirements may not allow you to use a /30 mask on your serial lines.

Although you will only need two subnets for the lab, for the sake of practicing, you must variably subnet the network **172.20.0.0/24** to accommodate the following host counts:

Harpers Ferry: 56 hosts
Beckley: 48 hosts
Charleston: 26 hosts
Huntington: 20
Ripley: 10
Parkersburg North: 13
Parkersburg South: 5

Basic Global Configurations

On each router, configure the following:

1. Host name
2. Banner message of the day @
3. Enable secret password (use *cisco*)

Line Configurations

- This lab requires lines to be authenticated with username and password. Create a username/password entry for your lines. Make the user name *remote* and the password *cisco*

On Your Telnet Lines and Console Lines

1. Force incoming connections to authenticate against the local username/password entry you just created in global configuration. *Hint: the command to do this is a variation of the login command.*@
2. Set your exec-timeout to 40 minutes to ensure idle connections are killed.@
3. Type logging synchronous to keep your commands from being split by system messages.@

Basic Interface Configurations

Configure the following basic parameters on your interfaces:

1. IP address
2. Description
3. Clockrate (where applicable)
4. PPP encapsulation (where applicable)

*Note: At this point you should be able to double-check your cabling by using the **show cdp neighbors** command. Connected switches will not appear in the readout when you perform this command on Packet Tracer.*

Basic Routing Configuration

1. Enable RIP version 2
2. Advertise all directly connected networks. Eventually you won't be advertising your LANs, since you don't want private networks being sent in the updates, but go ahead and advertise them for now so you can test connectivity and functionality.
3. Ensure you're not sending RIP broadcasts onto your LAN. Since there's no equipment capable of using the updates, there's no sense in wasting bandwidth on the LAN. *Hint: make RIP passive in regards to your Ethernet interface.*

DHCP

1. Enable DHCP on each router to provide IP addresses and default gateways for your LAN.
2. One PC will serve as a TFTP server and will have its IP information statically assigned. The other PC will receive its IP addressing via DHCP. Be sure to set the appropriate PCs to use DHCP!
3. Ensure the addresses used for static assignments are excluded from the DHCP pool.

Connectivity Test

At this point, every PC should be able to ping every other PC and router interface on the network. Test connectivity to ensure there are no hardware or configuration errors up to this point.

CHAP Authentication

1. Enable CHAP Authentication on all serial interfaces. The midterm skills will only require the basic method taught in the curriculum.
2. For the purposes of this lab, you do not need to set up CHAP to use customized usernames and passwords, but you can set it up that way if you want. @
3. Once you've enabled CHAP authentication, retest to ensure you still have proper connectivity. A **show ip interface brief** command on each router will verify your serial lines are "up and up," but you can also use **ping** and **trace**.

NAT

1. Use a static NAT mapping to bind one of your public IP addresses to the private IP address you assigned to the PC you designated as a TFTP server.
2. Configure PAT to translate all other private hosts to an IP address assigned to one of your serial interfaces.
3. Stop advertising your private LAN subnets with RIP v2.

NAT Testing

1. Wait at least thirty seconds after removing your LAN routes from RIP v2. On each router, at privileged exec mode, type **clear ip route *** to clear cached entries in your routing tables. Then type **show ip route** to view your tables and ensure no private LANs are being advertised by any router.
2. Test the static NAT mapping by pinging the TFTP servers on each LAN. Alternately, you can actually run the TFTP server software on the PCs and use TFTP to back up your configuration files on the remote servers. The ping alone will not verify proper configuration. You must also check your NAT translation tables to ensure the proper translation has taken place.
3. Test the dynamic NAT translations by pinging between the other PCs on the LAN. Then check the NAT translation tables.

Conclusion

This concludes the lab exercise. Please ensure your router configurations are erased and all cables are stored properly.

Answer Key

Subnetting:

Serial Lines
Given: 2.2.2.0 – 2.2.2.31/27 (32 total addresses)
Needed: three subnets for serial lines, allowing for a couple extra addresses to be used with static NAT translations.

Solution:
2.2.2.0 – 2.2.2.7/29
2.2.2.8 – 2.2.2.15/29
2.2.2.16 – 2.2.2.23/29
2.2.2.24 – 2.2.2.31/29

Private LANs:
Given: 172.20.0.0 – 172.20.0.255/24 (256 total addresses)
Needed:
Harpers Ferry: 56 hosts
Beckley: 26 hosts
Charleston: 48 hosts
Huntington: 20
Ripley: 10
Parkersburg North: 13
Parkersburg South: 5

Solution:
172.20.0.0 – 172.20.0.63/26 (62 useable)
172.20.0.64 – 172.20.0.127/26 (62 useable)
172.20.0.128 – 172.20.0.159/27 (30 useable)

172.20.0.160 – 172.20.0.191/27 (30 useable)
172.20.0.192 – 172.20.0.207/28 (14 useable)
172.20.0.208 – 172.20.0.223/28 (14 useable)
172.20.0.224 – 172.20.0.231/29 (8 useable)

```
!router configurations
!answer key for CIT 206 midterm skills practice lab
!written by Tom Thomas
!2.19.07

!#######Start Configuration for South router#########
enable
config t

hostname South
enable secret cisco

username North password 0 cisco !! used for PPP CHAP
username Ripley password 0 cisco !! used for PPP CHAP
username remote password 0 cisco !! used for console and telnet lines

interface FastEthernet0/0
        description SOUTH LAN
        ip address 172.20.0.225 255.255.255.248
        ip nat inside
        no shut

interface Serial0/0
        description WAN to RIPLEY
        ip address 2.2.2.18 255.255.255.248
        encapsulation ppp
        ppp authentication chap
        ip nat outside
        clock rate 56000
        no shut

interface Serial0/1
        description WAN to NORTH
        ip address 2.2.2.1 255.255.255.248
        encapsulation ppp
        ppp authentication chap
        ip nat outside
        clock rate 56000
        no shut
```

```
router rip
        version 2
        passive-interface FastEthernet0/0
        network 2.0.0.0

ip nat inside source list 1 interface Serial0/0 overload
ip nat inside source static 172.20.0.226 2.2.2.6

access-list 1 permit 172.20.0.224 0.0.0.7 ! used with PAT

ip dhcp excluded-address 172.20.0.225
ip dhcp excluded-address 172.20.0.226

ip dhcp pool Ripley
        network 172.20.0.224 255.255.255.248
         default-router 172.20.0.225

line con 0
        login local
        exec-timeout 40
        logging synchronous

line vty 0 4
        login local
        exec-timeout 40
        logging synchronous

end
write memory

!#######Start Configuration for North router#########
enable
config t

hostname North

enable secret cisco

username Ripley password 0 cisco !used for PPP CHAP
username South password 0 cisco  !used for PPP CHAP
username remote password 0 cisco ! used for vty and console

interface FastEthernet0/0
        description NORTH LAN
        ip address 172.20.0.209 255.255.255.240
        ip nat inside
```

```
        no shut

interface Serial0/0
        description WAN to RIPLEY
        ip address 2.2.2.9 255.255.255.248
        clock rate 56000
        encapsulation ppp
        ppp authentication chap
        ip nat outside
        no shut

interface Serial0/1
        description WAN to SOUTH
        clockrate 56000
        ip address 2.2.2.2 255.255.255.248
        encapsulation ppp
        ppp authentication chap
        ip nat outside
        no shut

router rip
        version 2
        passive-interface FastEthernet0/0
        network 2.0.0.0

ip nat inside source list 1 interface Serial0/0 overload
ip nat inside source static 172.20.0.210 2.2.2.4
ip classless

access-list 1 permit 172.20.0.208 0.0.0.15 ! used with PAT

ip dhcp excluded-address 172.20.0.209
ip dhcp excluded-address 172.20.0.210

ip dhcp pool Ripley
        network 172.20.0.208 255.255.255.240
        default-router 172.20.0.209

line con 0
        login local
        exec-timeout 40
        logging synchronous

line vty 0 4
        login local
        exec-timeout 40
```

```
        logging synchronous

end
write memory

!#######Start Configuration for Ripley router#########
enable
config t

hostname Ripley

enable secret cisco

username North password 0 cisco ! used for PPP CHAP
username South password 0 cisco ! used for PPP CHAP
username remote password 0 cisco ! used for vty and console

interface FastEthernet0/0
        description RIPLEY LAN
        ip address 172.20.0.193 255.255.255.240
        ip nat inside
        no shut

interface Serial0/0
        description WAN to South
        ip address 2.2.2.17 255.255.255.248
        clock rate 56000
        encapsulation ppp
        ppp authentication chap
        ip nat outside
        no shut

interface Serial0/1
        description WAN to North
        ip address 2.2.2.10 255.255.255.248
        encapsulation ppp
        ppp authentication chap
        clock rate 56000
        ip nat outside
        no shut

router rip
        version 2
        passive-interface FastEthernet0/0
        network 2.0.0.0
```

```
ip nat inside source list 1 interface Serial0/0 overload
ip nat inside source static 172.20.0.194 2.2.2.20

access-list 1 permit 172.20.0.192 0.0.0.15 !used with PAT

ip dhcp excluded-address 172.20.0.193
ip dhcp excluded-address 172.20.0.194

ip dhcp pool Ripley
        network 172.20.0.192 255.255.255.240
        default-router 172.20.0.193
line con 0
        login local
        exec-timeout 40
        logging synchronous

line vty 0 4
        login local
        exec-timeout 40
        logging synchronous

end
write memory
```