[PORTFOLIO TASK 1 2 3]

Network System Architecture

250 CT

250 CT Portfolio Exercise 1

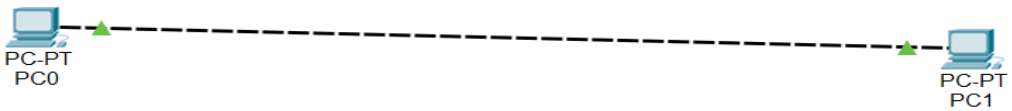
Academic year 2019/2020

Read me 1st

This activity is part of the coursework portfolio for this module. This activity **needs to be signed off** by a member of staff teaching in this module. You must do portfolio exercises in the order provided. Ensure each activity is completed prior to attempting the next one. Ideally students should work in **groups of two**.

1. Basic connectivity

As part of this activity students are required to connect the computers together and/or with networking devices.



PC To PC Connection

1.1 Connect a PC to a console port of a router

For this exercise you need to establish a link between the serial port of a PC and a console port of a router in the equipment cabinet. To achieve this you will need to use the **serial (RS232) to RJ45 adapter** on the back of the PC, and deploy a **roll-over** (also known as console) cable to connect from the patch panel in the cabinet to the **console port** of the router. Cables in the labs are colour coded – blue for straight-through, red for crossover and black for console cables. Ensure the number of the computer match the number used in the wiring cabinet patch panel.

Now use "**MobaXterm**" - should be able to find a short-cut on the desktop - to communicate with the router. To achieve this you need to:

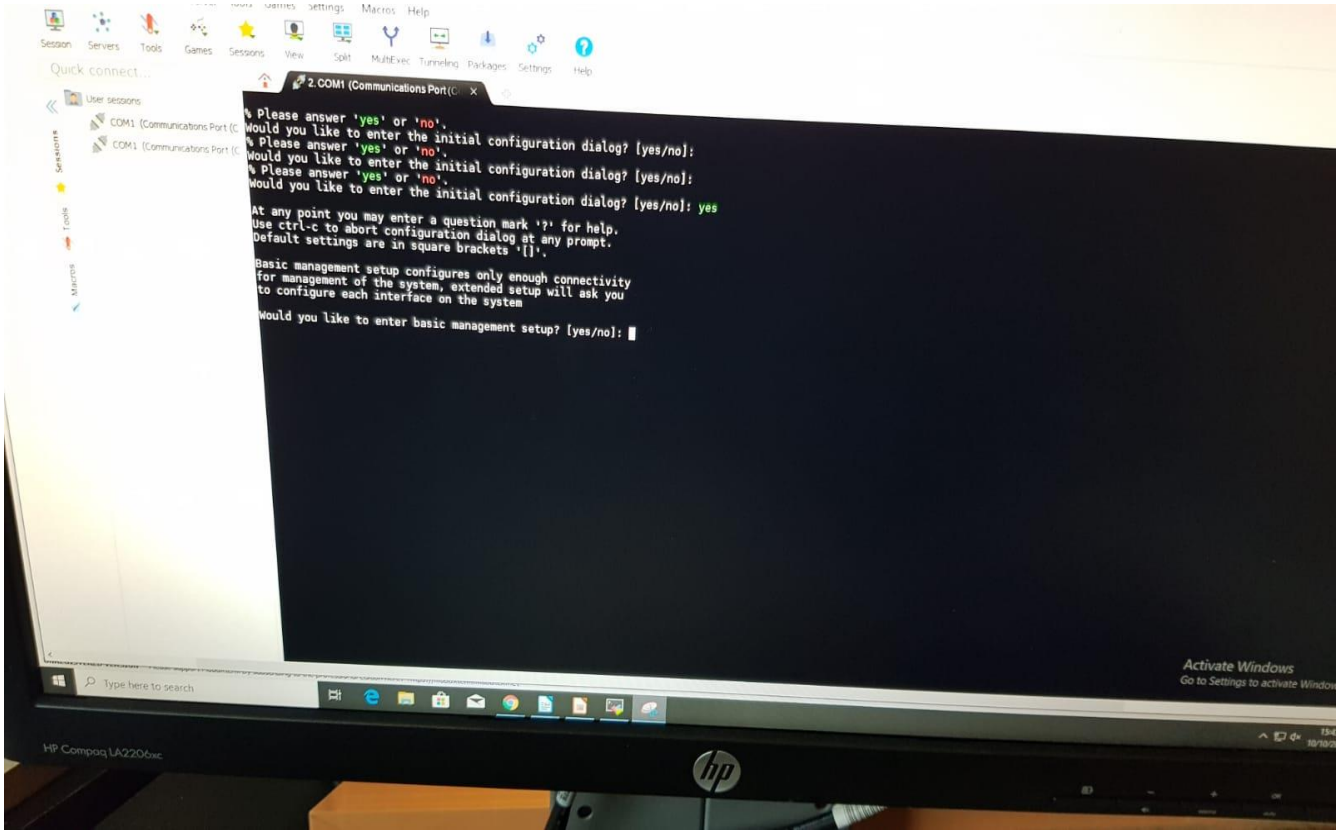
- open **MobaXterm**
- click '**Sessions**' and then click **'New session'**
- click '**Serial**'
- select 'COM1 (Communications Port (COM1))' for '**Serial port'**
- select '9600' for '**Speed (bps)'**
- **Advanced Serial settings** should be as follows

  Bits per-second: **9600**
  Data-bits: **8**
  Parity: **no parity**
  Stop bits: **1**

Flow control: **no flow control**

- then click OK

If the connection was successfully a command prompt or a login request should appear on the screen. **Show this to your instructor** (in order to get signed of) and then exit without saving changes.



1.2 Simple point to point network between two PCs

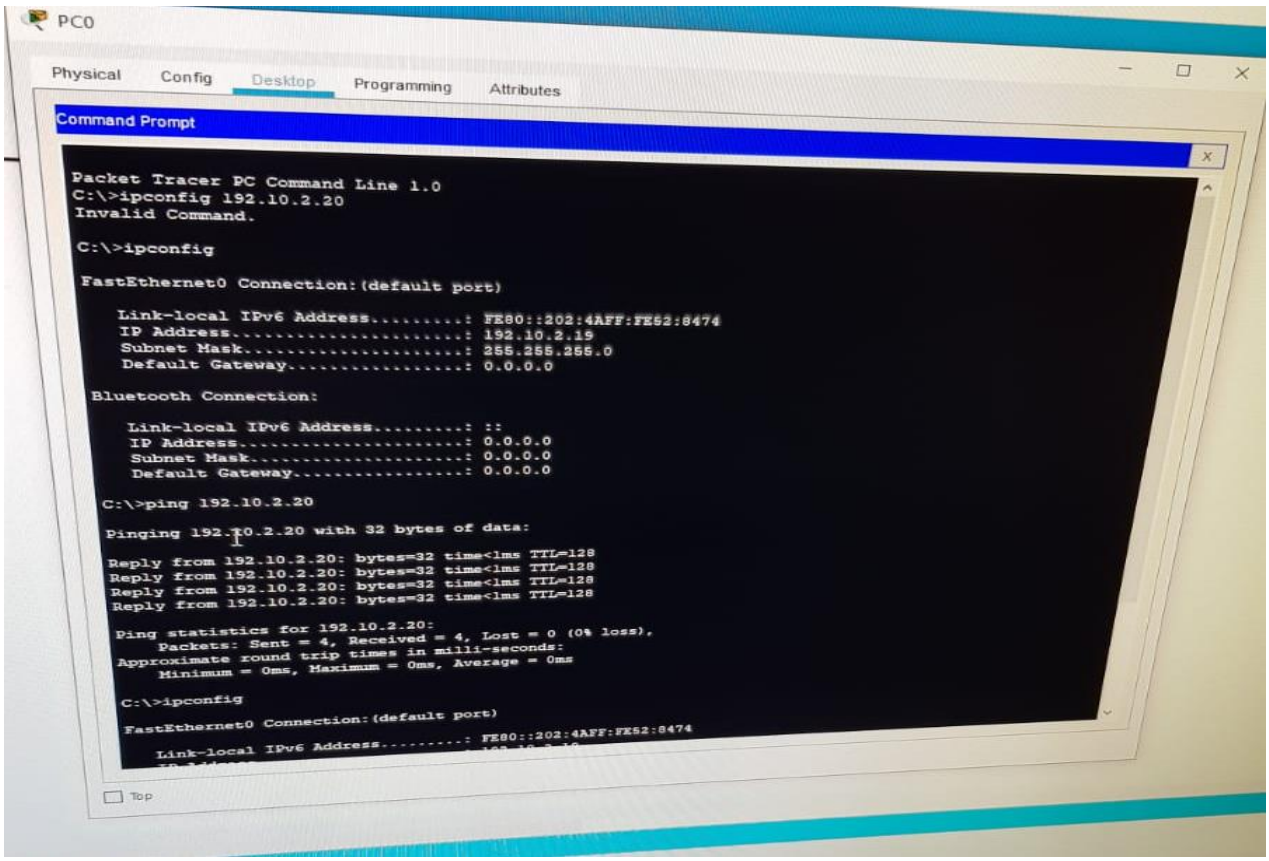
Set up a simple point to point network by direct connection using a crossover cable (red cable in this lab) to connect **the Ethernet adaptors** of the two PCs together. Configure the PCs using the following addresses, where **X is the number of the PC**:

IP address for PC 1: 192.10.2.X
IP address for PC 2: 192.10.2.X
Subnet mask: 255.255.255.0

*(**note:** the number of the PC is written on a sticker on the top of the computer tower case –also if crossover cables are not long enough you can connect the computers together through the patch panel)*

To complete this task you need to **demonstrate to the instructor** that:

1. The PCs are configured properly by typing "**ipconfig**" in the command prompt (start → run → cmd)
2. The PCs can communicate with each other by "pinging" PC1 from PC2 and vice versa using the "**ping <ip address of other PC>"** command in the command prompt.

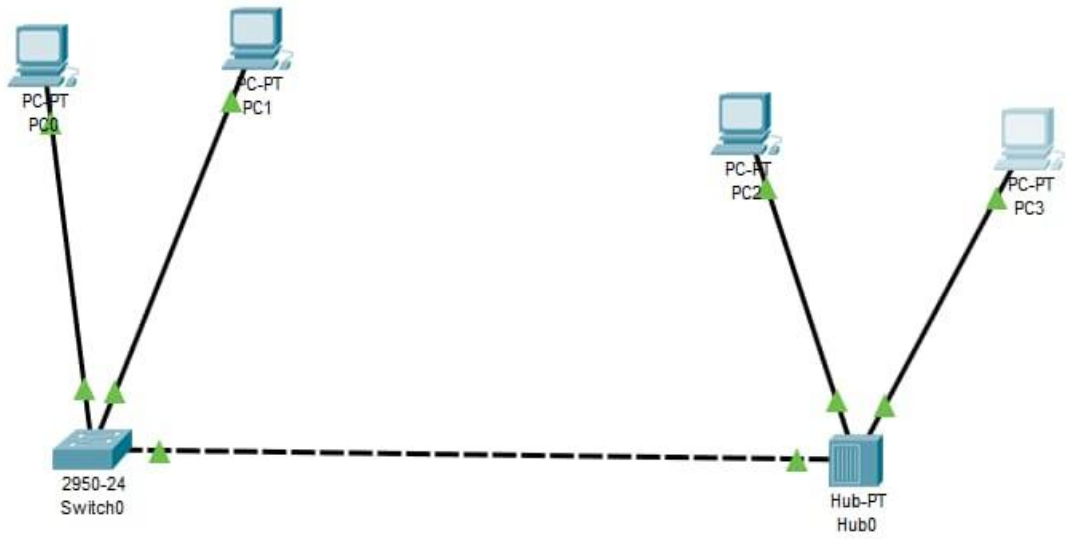


1.3 Simple network using a hub/switch

Set up a simple network using a hub/switch via the Cisco Packet Tracer,

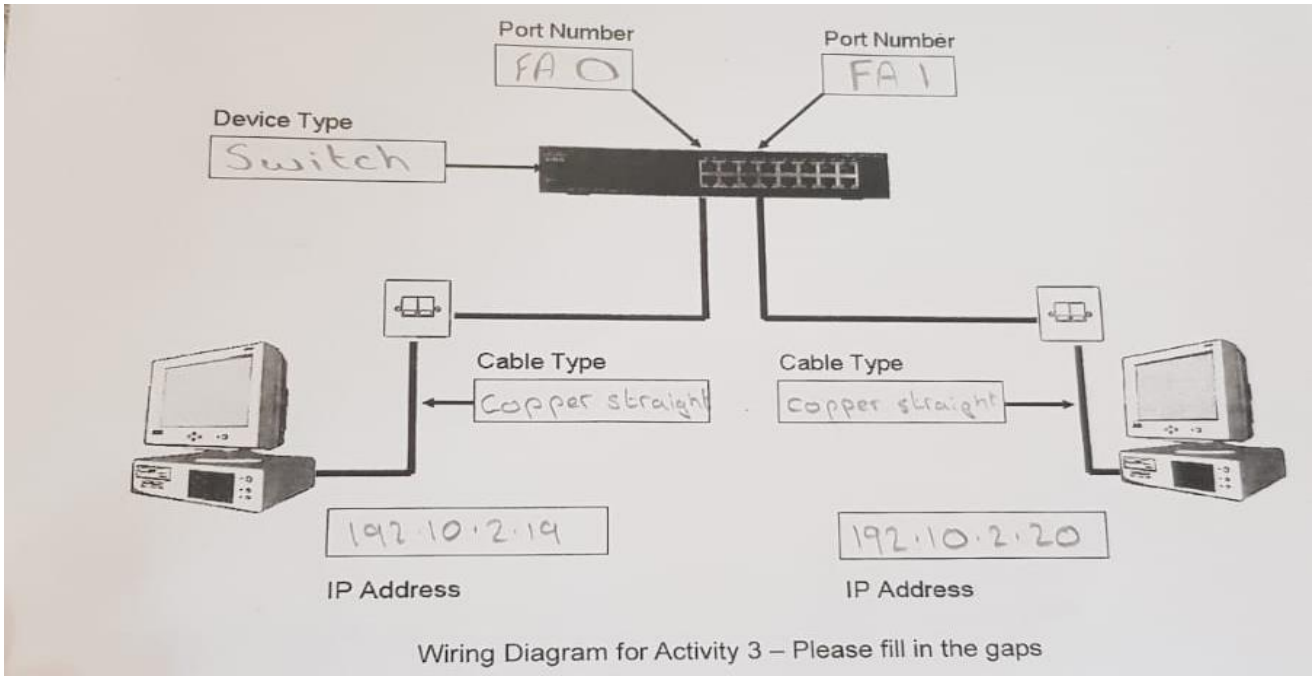
Please demonstrate to the instructor that your network works as you did in the previous exercise (use the same IP addresses as in 1.2), and further provide the evidences of your work as shown below:

- Please provide the screenshot of your system on the Cisco Packet Tracer.



- Please fill in the diagram provided.

Note: Please fill in the missing information in the following diagram – this will be marked and needs to be submitted alongside the reset of the portfolio exercises.



Wiring Diagram for Activity 3 – Please fill in the gaps

250 CT Portfolio Exercise 1
Submission Instructions

Group Members

Ideally these tasks should be completed in groups of two. Groups of three are allowed but not recommended. Please indicate the group members for this portfolio exercise.

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Instructor signatures

After completing each task, demonstrate to the instructor that the task was completed successfully in order to be signed off. Signatures indicate that the student/group successfully **completed** and **demonstrated** the activities at a satisfactory level, and as such, they contribute towards the marks allocated for these activities.

Portfolio Submission

You are required to **fill in the portfolio exercise sheets**. Those are **to be submitted later** (all portfolio exercises to be submitted together) as indicated by the module guide/schedule. The completion level and correctness of the submitted portfolio exercise sheets contributes towards you mark.

250 CT Portfolio Exercise 2

Academic year 2019/2020

Read me 1st

This activity is part of the coursework portfolio for this module. This activity **needs to be signed off** by a member of staff teaching in this module. You must do portfolio exercises in the order provided. Ensure each activity is completed prior to attempting the next one. Ideally students should work in **groups of two**.

1. Addressing Scheme

As a network administrator you are required to design the addressing scheme for the network shown in diagram 1. Subnet thegiven address (**192.168.10.0/24**) using **normal** (as opposed to variable) subnet masking and assign a subnet to each part of the network. Finally decide which IP address will be allocated to each port of each device.

Diagram 1: The Network

1.1 Subnets: Calculate the subnets and fill in the table below. Remember that for this exercise you are only allowed to use **normal** subnetting.

No	Subnet	First host	Last host	Broadcast	Subnet mask
1	192.168.10.32	192.168.10.33	192.168.10.62	192.168.10.63	255.255.255.224
2	192.168.10.64	192.168.10.65	192.168.10.94	192.168.10.95	255.255.255.224
3	192.168.10.96	192.168.10.97	192.168.10.126	192.168.10.127	255.255.255.224
4	192.168.10.128	192.168.10.129	192.168.10.158	192.168.10.159	255.255.255.224
5	192.168.10.160	192.168.10.161	192.168.10.190	192.168.10.191	255.255.255.224
6	192.168.10.192	192.168.10.193	192.168.10.222	192.168.10.223	255.255.255.224

1.2 Device IP addresses: Decide which subnet will be allocated to each network part, and allocate IP addresses to device ports.

Device	Port	IP address	Subnet mask
Vetinari	Ethernet 0/0	192.168.10.34	255.255.255.224
Vetinari	Serial 0/2/0	192.168.10.100	255.255.255.224
Rincewind	Ethernet 0/0	192.168.10.66	255.255.255.224
Rincewind	Serial 0/2/0	192.168.10.99	255.255.255.224
Host 1	Ethernet	192.168.10.50	255.255.255.224
Host 2	Ethernet	192.168.10.67	255.255.255.224

2. Cabling

For this task you are required to wire up the devices in the way illustrated by the network diagram (diagram 1). As this is similar to what we did in the **portfolio 1 exercise**, step by step instructions

will **not** be provided. However the following few bullet points provide some additional help.

- The link between the two routers (Vetinary and Rincewind) is a **serial** cable – one side has to be the **DCE**, meaning that it will provide the clock rate. Connect the DCE side (should be labelled as such) to Rincewind.

- Routers are **specialised computers** and as such, a **crossover** cable must be used for a direct computer to router connection (such as the one between Host 2 and Rincewind).

In addition to the network connections shown in diagram 1 we also need **two extra connections** for the purpose of configuring the routers. For those two connections you are required to connect from the **serial port** of the computer (not the Ethernet port) to the **console port** of the router (from Host 1 to Vetinari, and from Host 2 to Rincewind). Detailed instructions of how to do this were given as part of the first portfolio exercise.

After finishing cabling **ask an instructor to review it** (and get signed off) before progressing to the next step.

3. Basic router commands

Assuming that the last part of the previous task was completed successfully you should be able to access the router prompt using the **HyperTermina**l application (if a password is set then this should be either “cisco” or “class”).

Cisco routers provide a number of **different modes** (states). Depending on those modes there are different things you can or can’t do. The initial mode is called the **user-Exec mode** and provides only a limited set of commands. This mode is indicated by using the character “>” as part of the prompt. For instance:

```
Router>
```

Typing “?” in the prompt should display a list of the commands available. Typing the name of a command followed by “?” displays the parameters this command expects. Copy some of the commands available along with the explanations provided in the following table.

	Command	Function
1	Connect	Open a terminal connection
2	disable	Turn off privileged commands
3	disconnect	Disconnect an existing network connection
4	enable	Turn on privileged commands
5	exit	Exit from the EXEC
6	Logout	Exit from the EXEC
7	ping	Send echo message
8	terminal	Set terminal line parameters

To do anything useful we need access to the **privilege mode** (basically akin to logging in to a computer as admin). We can do that using the enable command. Type “enable” and press enter. If a password is asked for use either “cisco” or “class”. If successful the prompt should change somehow, with the character “#” shown to indicate we are in privilege mode.

```
Router#
```

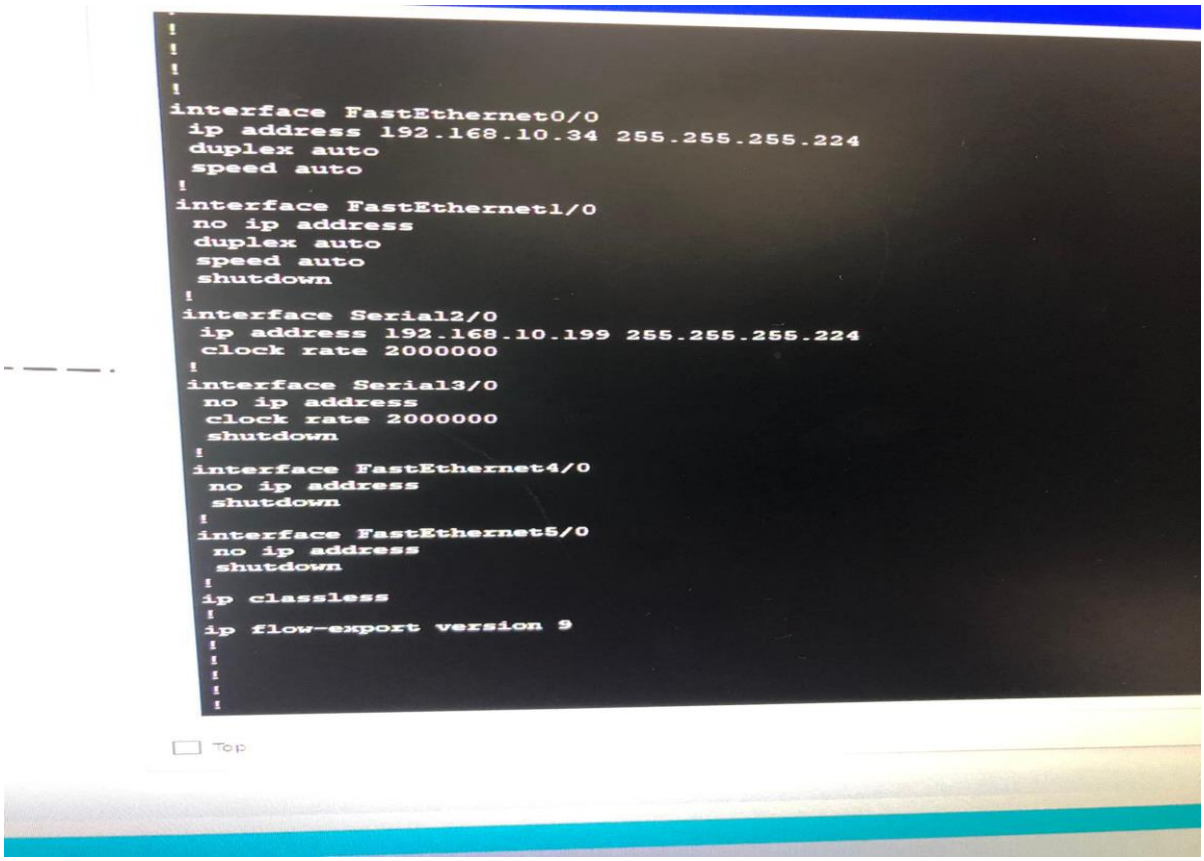
Type “?” to see the commands available to you now (the list should be longer). Copy some of those and their explanations to the table provided.

	Command	Function
1	Auto	Exec level Automation
2	Clear	Reset functions
3	Clock	Manage the system clock
4	Configure	Enter configuration mode
5	Connect	Open a terminal connection
6	Copy	Copy from one file to another
7	Debug	Debugging functions (see also ‘undebug’)
8	Delete	Delete a file

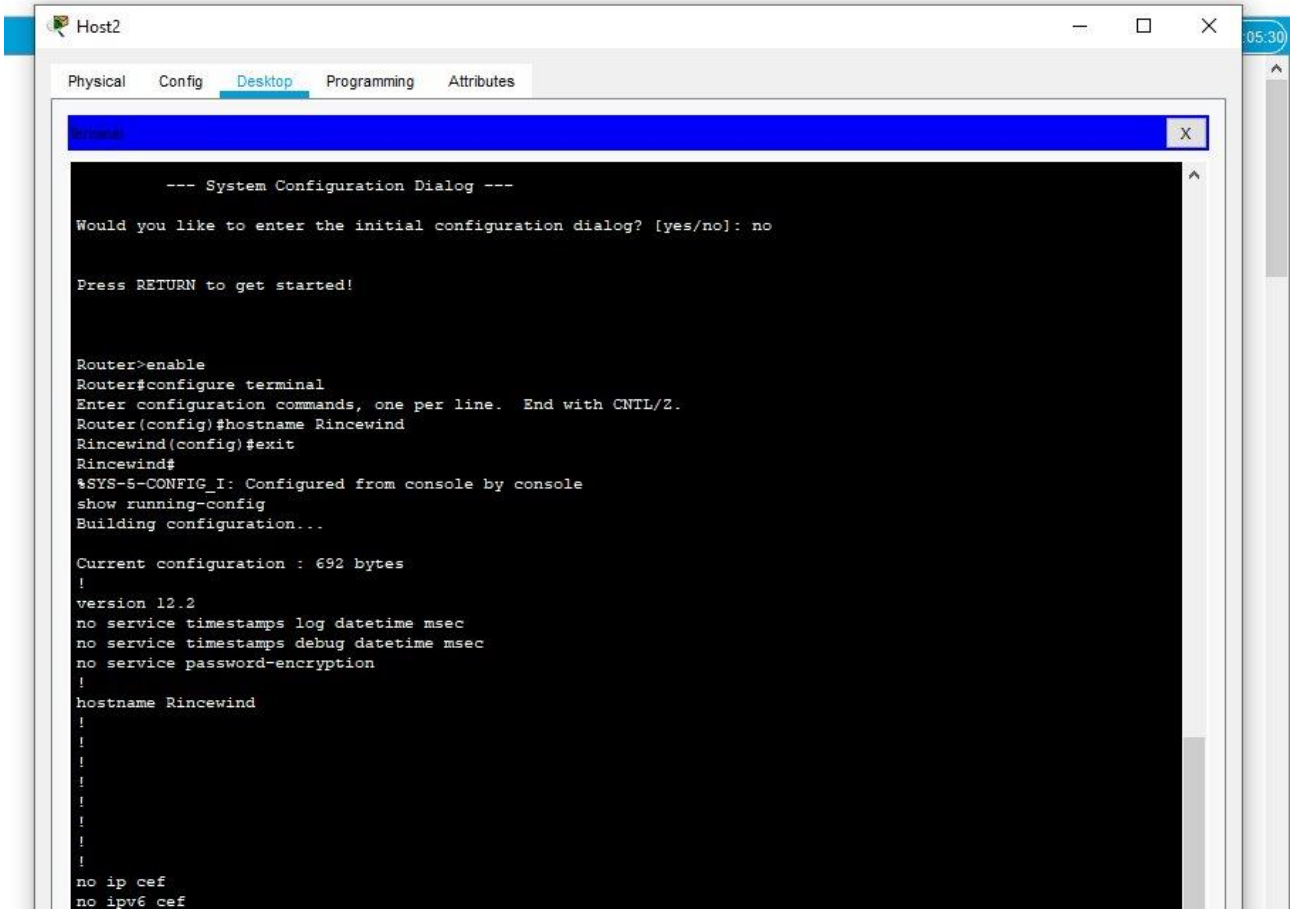
The configuration of the router is stored in the startup-config file. When booting the router it is copied to memory. Typing “show running-config” in the privilege mode displays the current configuration the router has loaded in its memory (note that since it might have been changed since the router last booted, the running-config is not necessarily the same as the startup-config). Try this command and inspect the configuration (pressing space to go to the next page). What sort of useful information can be found there?

Answers:
We can see information about the host name. We can see the current configuration in bytes. Information about login, debugging and password encryption is also displayed.
When using this command, we find the different IP address for the various ports for instance, in the fastEthernet0/0 we can see the IP address, duplex auto and speed auto. For the serial interfaces, we can also see the clock rates.

The result is seen below:



Before we start configuring routers it is a good idea to delete the previous configuration. Type “erase startup-config” to delete the configuration file from the secondary storage. Then restart the router using the “reload” command. After reboot the router might ask you if you want to enter the initial configuration dialog. Answer **NO** to this question.



Some tips: Writing enough characters for the command to be uniquely identified is enough – “sh run” will work just as well as “show running-config”. Pressing the tab character while typing a command will try to guess what you are trying to type and complete the command for you. The up and down arrow keys allow you to access commands previously typed – so no need to type the same command again and again.

4. Basic router configuration

Before you start this part make sure that the router **has no previous configuration set**. This can be achieved by erasing the startup-config and reloading the device (last part of the previous task). For this part you are required to configure the two routing devices (Vetinari and Rincewind). In order to configure routers you need to be in the router **global configuration mode** – the prompt will look like this:

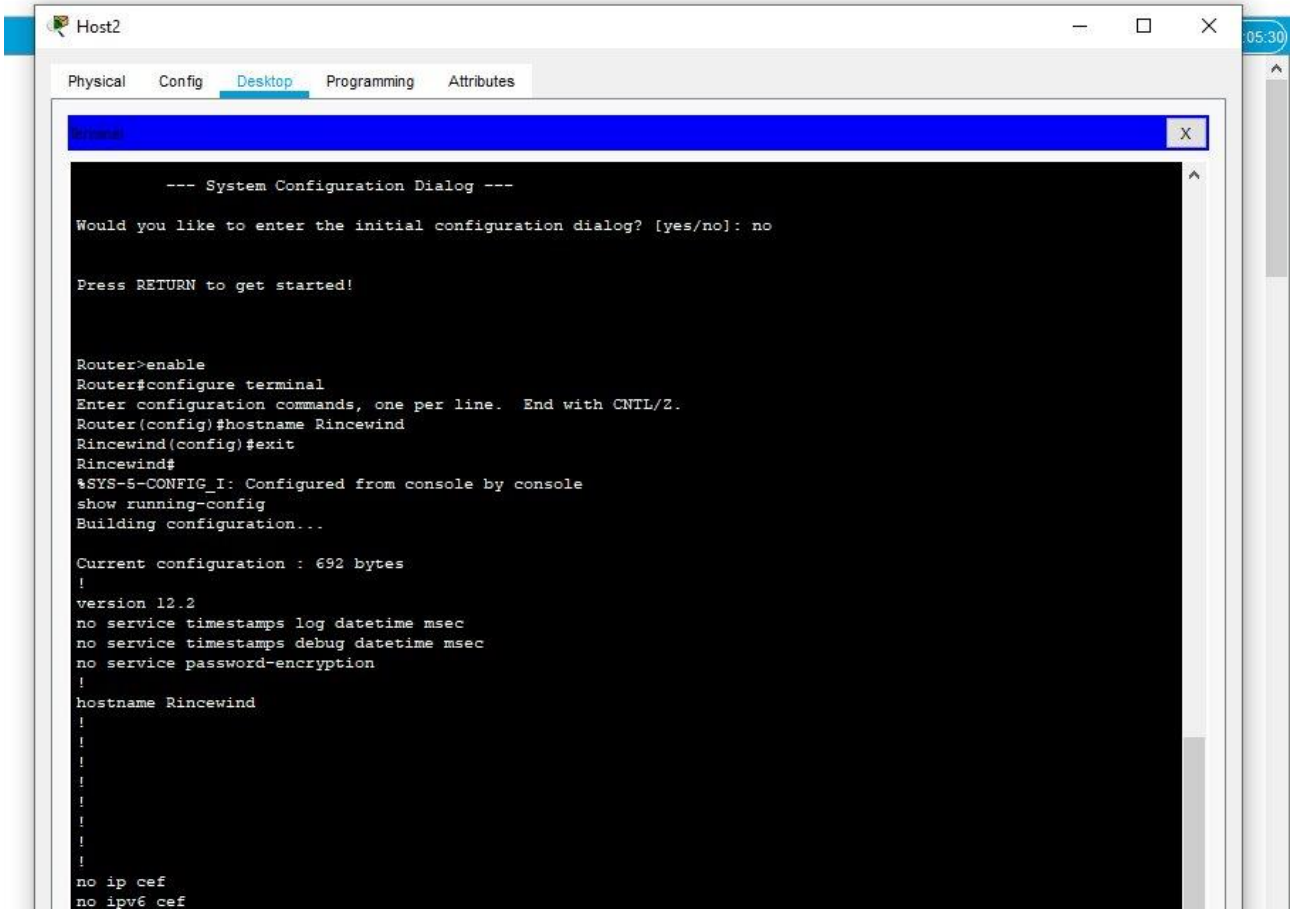
Router(config)#

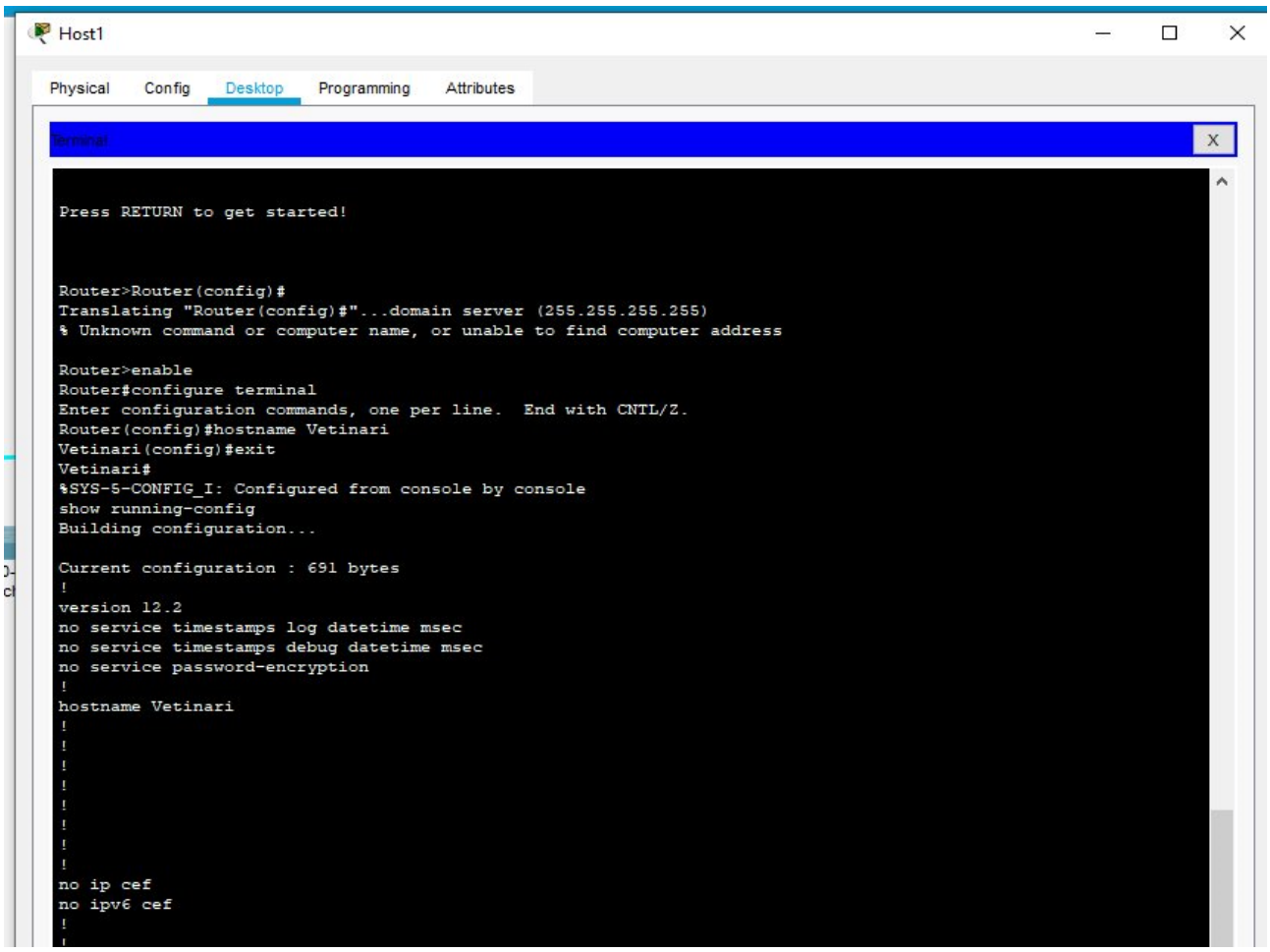
You can achieve that by typing “enable” to get into privilege mode, and then typing “configure terminal” to enter the global configuration mode. Moving back to the previous mode (if you need to do so) can be achieved by typing exit.

4.1 Router names: First task is to configure the router names. This can be easily achieved with the hostname command:

Router(config)# hostname *name*

Where *name* is the name of the device (Vetinary or Rincewind depending on which router you are configuring). If successful the prompt should change accordingly (can also verify by typing “**exit**” to go back to the privilege mode and using the “show running-config” there).





4.2 Interfaces: The next part is configuring the router interfaces. This can be accomplished by entering **interface configuration mode** from the global configuration mode and using the "IP address" command followed by the address and subnet mask you wish to configure. Use whatever IP address and subnet masks you assigned to these interfaces in the first part of the exercise. Write those down on the blank spaces provided in the following command sequences.

// Ethernet port for **Vetinari**:

```
Vetinari(config)# interface fa0/0
Vetinari(conf-if)# ip address          192.168.10.34      255.255.255.224
Vetinari(conf-if)# no shutdown
```

// Ethernet port for **Rincewind**:

```
Rincewind(config)# interface fa0/0
Rincewind(conf-if)# ip address         192.168.10.66      255.255.255.224
Rincewind(conf-if)# no shutdown
```

// Serial port for **Vetinari**:

```
Vetinari(config)# interface s0/2/0
Vetinari(conf-if)# ip address          192.168.10.100     255.255.255.224
Vetinari(conf-if)# no shutdown
```

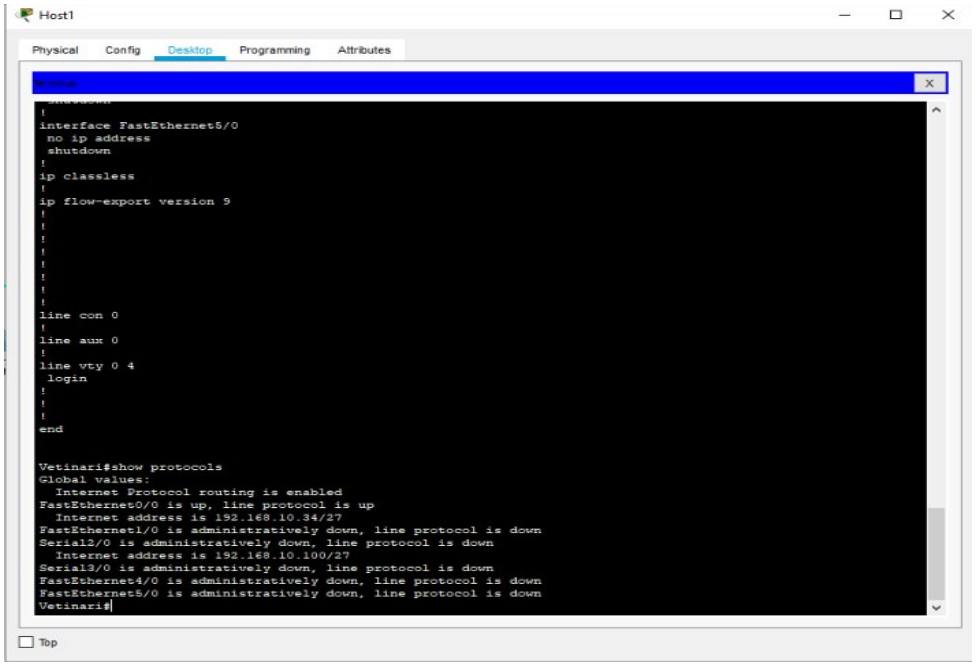
// Serial port for **Rincewind**:

```
Rincewind(config)# interface s0/2/0
Rincewind(conf-if)# ip address         192.168.10.99      255.255.255.224
Rincewind(conf-if)# clock rate 56000
Rincewind(conf-if)# no shutdown
```

Notice that the above command sequences make some **assumptions** regarding router port names. Those might not be entirely accurate. You can find out exactly how many ports each router has and how they are called (s0/2/0 or s0/0 or whatever) by typing the “show protocols” command in the privilege mode. For instance:

Vetinari# show protocols

This command is also useful for **troubleshooting** as it will tell you if the router ports are now operational or not (in which case check you cabling).

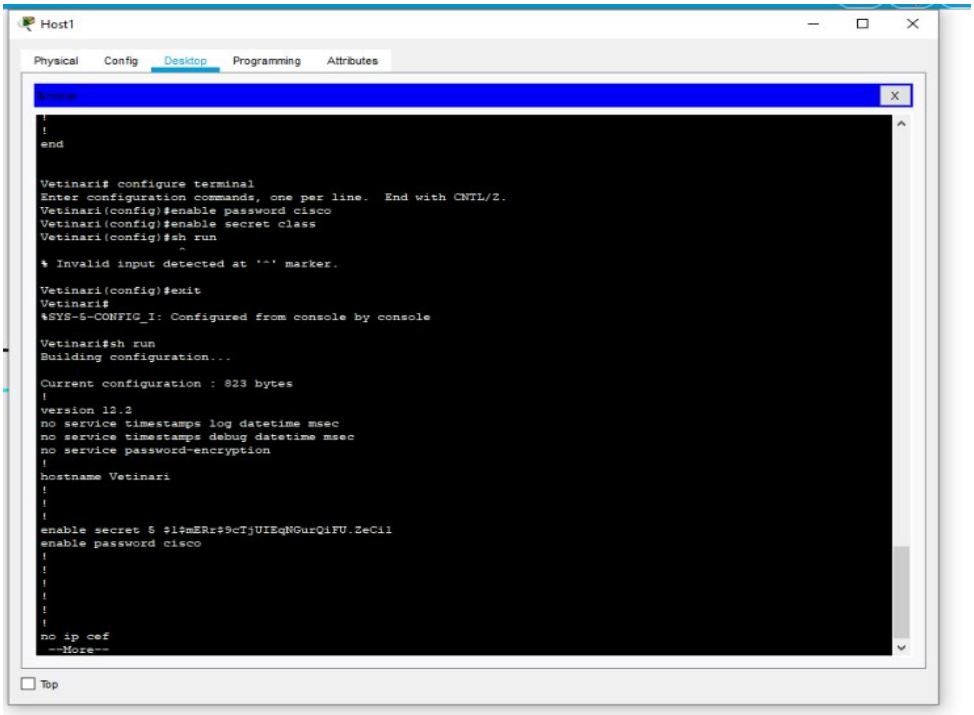


4.3 Setting up passwords: Clearly in a real environment we do not want unauthorised personnel been able to change our configurations. The following commands can be used to setup some basic security in our routers. Apply them to **both Vetinari and Rincewind**.

// Passwords for telnet session (enter **line configuration mode**)
Router(config)# line vty 0 4
Router(config-line)# password cisco
Router(config-line)# login

// Console and privilege mode passwords
Router(config)#enable password cisco
Router(config)#enable secret class

After you finish you might want to inspect the router’s running config files again in order to see the changes. **Show** the runiing-config and the output of the “show protocols” command to your **instructor**.



5. Making it all work

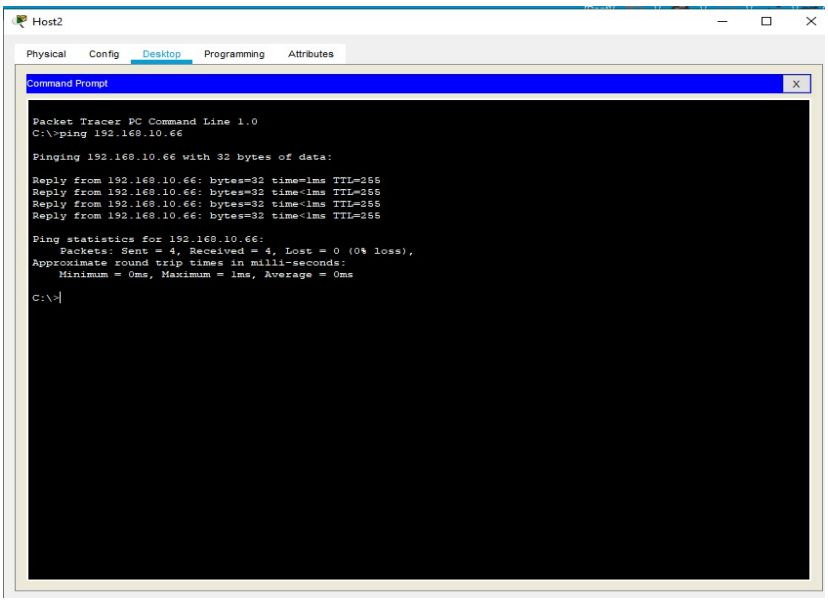
It is time to configure the hosts and the routing protocol on the routers and test our network. We start by configuring the two hosts.

5.1 Configuring the computers: Setup the IP address for the two hosts (like you did for the first exercise) and use the “ipconfig” command in the DOS prompt (start->run-> cmd). Note that the **default gateway** for the two hosts will be the IP address for the Ethernet port of the router they are connected to (if I do not know where a network is, then I send the message to the router).

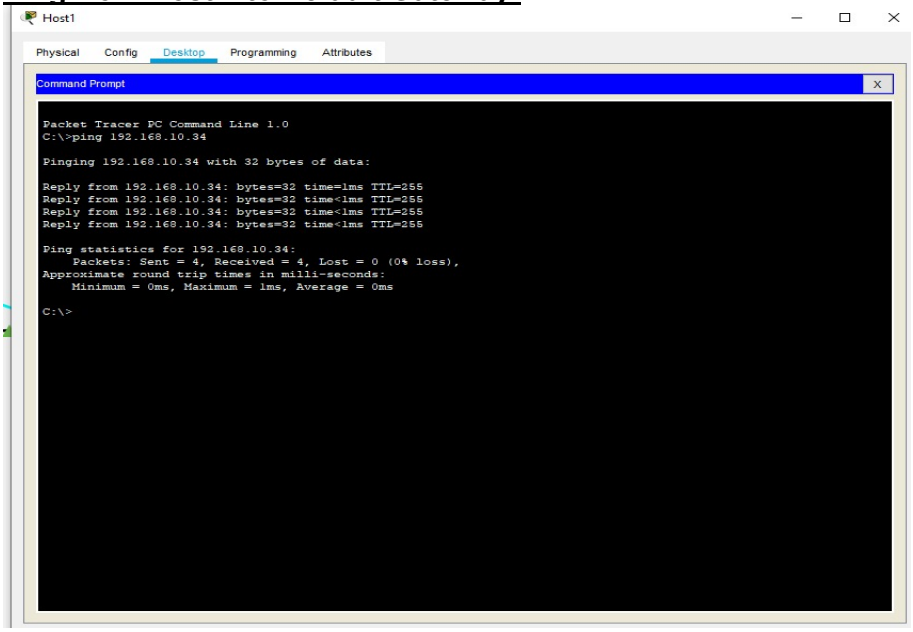
After you configured the computers try to ping your default gateway from each host. Was it successful?

Yes.

<u>Ping from Host 2 to Default Gateway:</u>

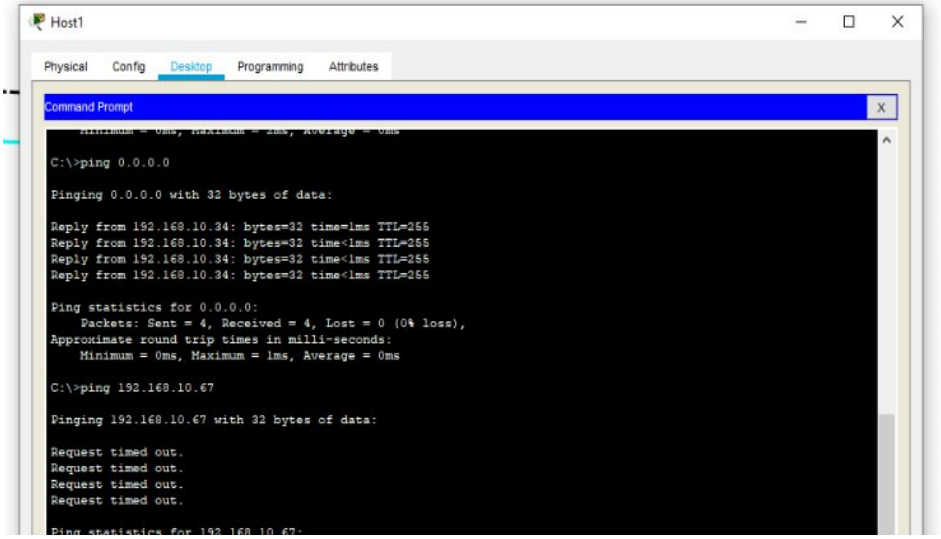


Ping from Host 1 to Default Gateway:



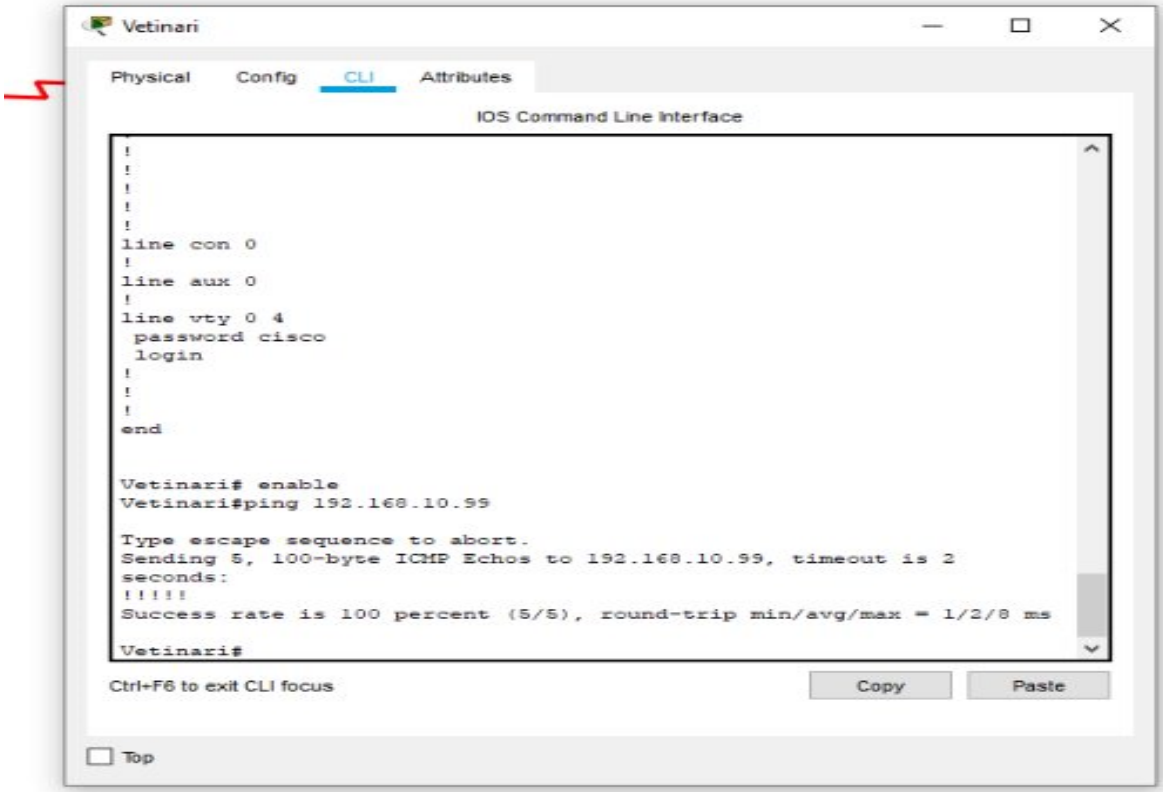
Now try to ping the other host on the other end of the network. Was it successful?

No.



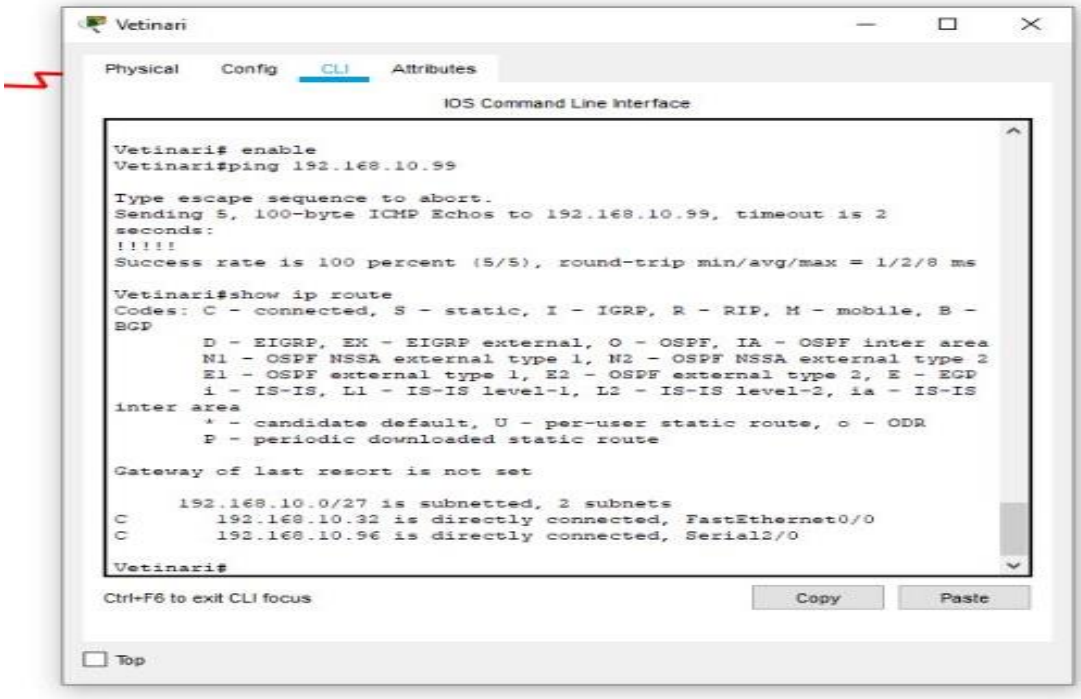
Note that you can also use the ping command in the privilege mode of the routers. Try to ping the serial port of Vetinari from Rincewind and vice versa. Was it successful?

Yes.

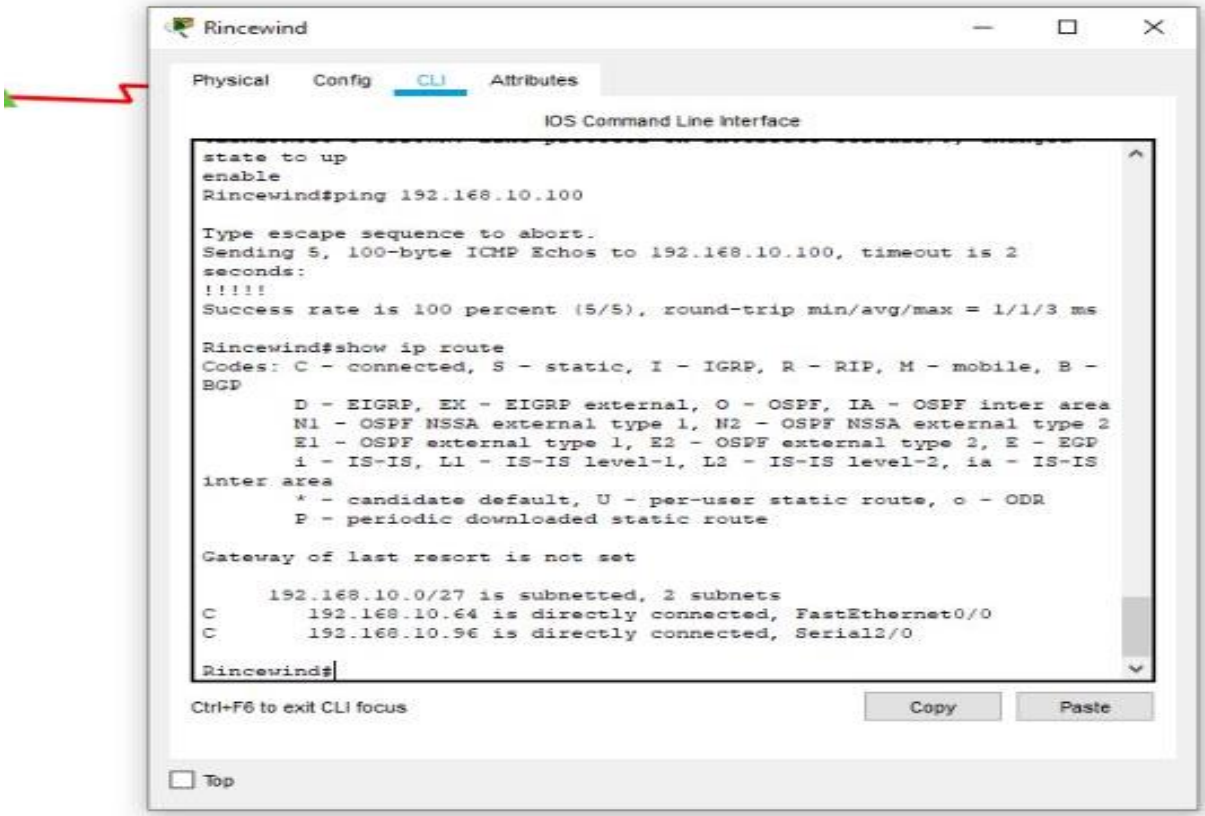


5.2 Configuring RIP: It is time to configure the routing protocol so that routers can exchange information about networks with each other. We are going to use the RIP routing protocol for this exercise. Type "show ip route" on the privilege mode of each router. What is the output of this command?

IP Route for Vetinari:



IP route for Rincewind:



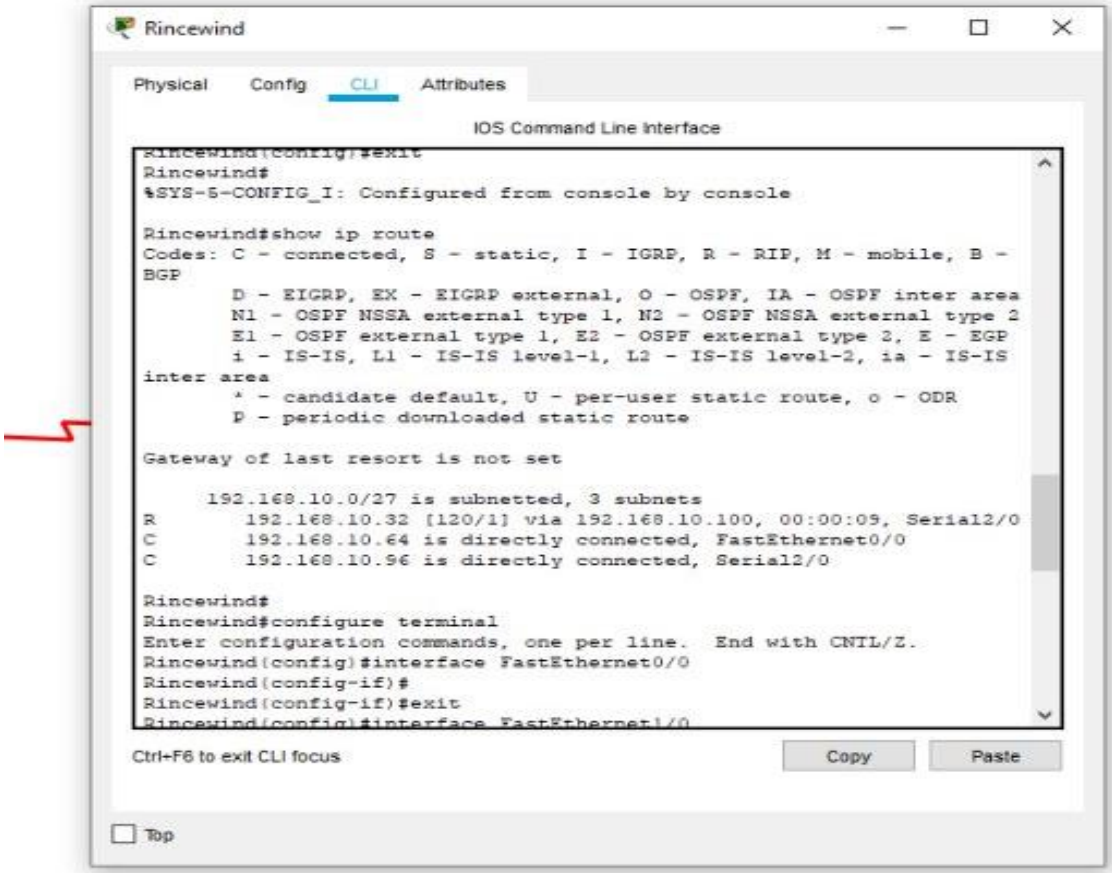
Each router has a number of networks **directly connected** to it (it knows about them as they are connected to **its own interfaces**). Those are **the networks** it needs to ***advertise*** to other routers, therefore the ones that should be used when configuring the routing protocol. Use this info to fill in the gaps provided in the instruction sequences that follow.

Vetinari(config)# router rip
Vetinari(config-router)# no auto-summary
Vetinari(config-router)# network 192.168.10.34
Vetinari(config-router)# network 192.168.10.100

Rincewind(config)# router rip
Rincewind(config-router)# no auto-summary
Rincewind(config-router)# network 192.168.10.66
Rincewind(config-router)# network 192.168.10.99

Type the “show ip route” command in the privilege mode again. What has changed (if nothing you done something wrong)?

A new R has been added to the gateway as shown below:

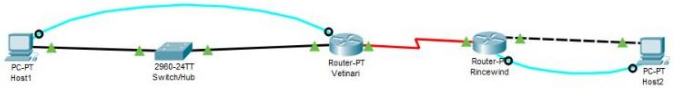


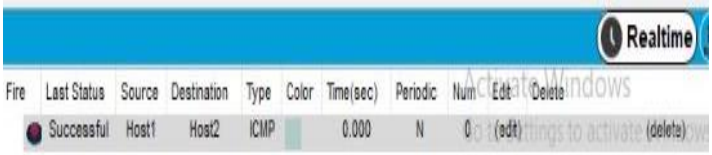
6. Testing the network

At this point the network **should be fully operational**. In order to verify it we need to make a number of tests. **Show the output of those test to you instructor**.

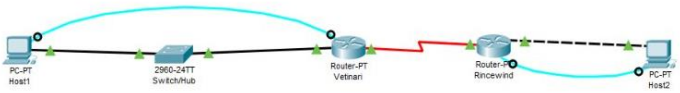
6.1 Ping Host 1 from Host 2 and vice versa.

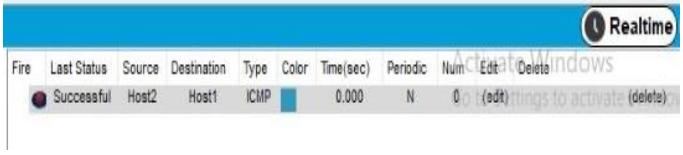
Ping from Host 1 to Host 2:





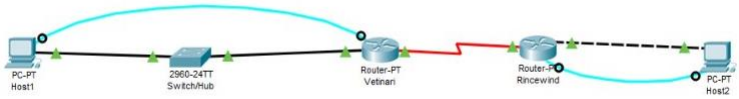
Ping from Host 2 to Host 1:

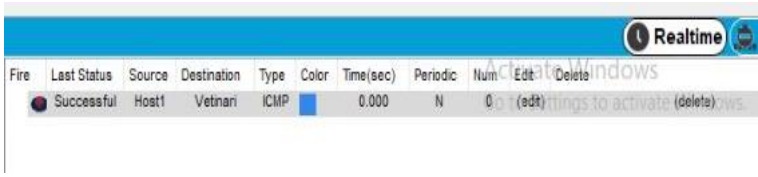




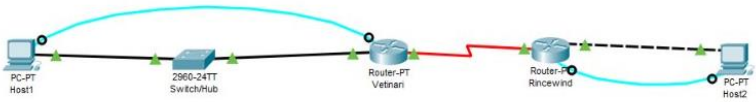
6.2 Ping both host from each router.

Ping from host 1 to Vetinari:

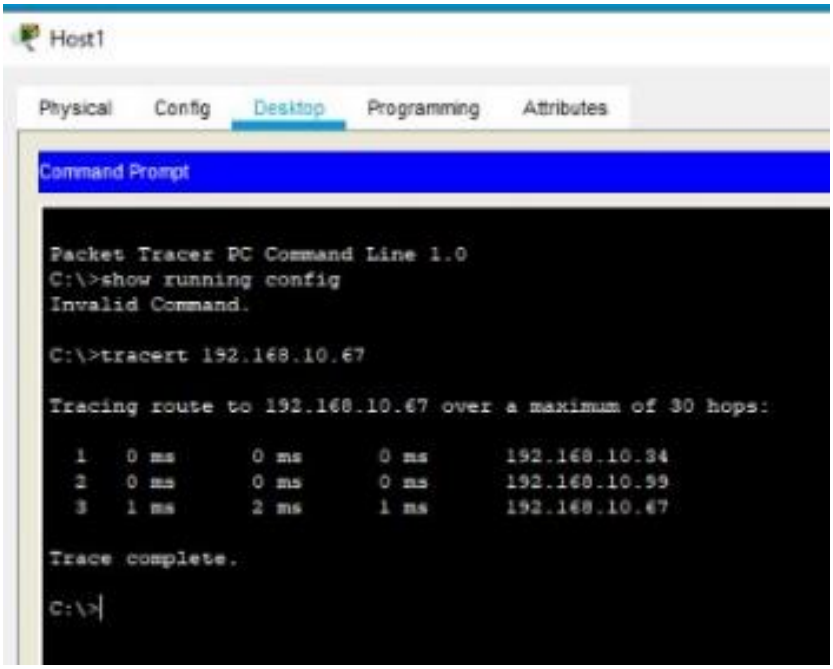




Ping from host 2 to Rincewind



6.3 Trace the route from host 1 to host 2 from the command prompt (tracert xx.xx.xx.xx) command (replace x with the host 2 IP address).



Tracing the route from host 1 to host 2.
In the bottom of the image you can see that the trace has been completed.

6.4 Telnet to Vetinari from Host 2

After you finish you might want to **save the configurations** for the devices to a flash drive for future reference. You can either do so by cut and pasting the output of the show run command to notepad or by using the **capture** facility offered by the HyperTerminal application. You might also want to reload (reboot the router) in order to erase your work and restore the router to factory settings.

250 CT Portfolio Exercise 2

Submission Instructions

Group Members

Ideally this task should be completed in groups of two. Groups of three are allowed but not recommended.

Name: Jeffy Mathew Jigy	Student ID: 8520524
Name: Simabarshe Nyakambangwe	Student ID: 8316064
Name: David Basil Akang	Student ID: 8251628

Instructor signatures

After completing each task, demonstrate to the instructor that the task was completed successfully in order to be signed off. Signatures indicate that the student/group successfully **completed** and **demonstrated** the activities at a satisfactory level, and as such, they contribute towards the marks allocated for these activities.

Portfolio Submission

You are required to **fill in the portfolio exercise sheets**. Those are **to be submitted later** (all portfolio exercises to be submitted together) as indicated by the module guide/schedule. The completion level and correctness of the submitted portfolio exercise sheets contributes towards you mark.

250 CT Portfolio Exercise 3

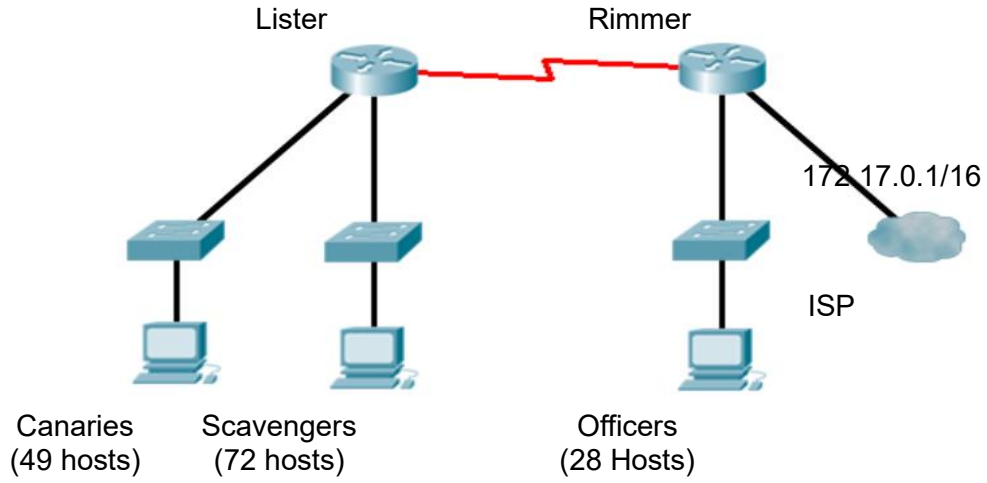
Academic year 2019/2020

Read me 1st

This activity is part of the coursework portfolio for this module. **This particular activity does not need to be signed off – the router configurations and screenshots that demonstrate end to end connectivity need to be submitted instead.** You must do portfolio exercises in the order provided. Ensure each activity is completed prior to attempting the next one. Ideally students should work in **groups of two**.

The Problem

As a first grade technician for the mining company Red Dwarf you have been assigned with the task of designing the addressing scheme for their network (see diagram). In order to do so you have to **subnet the network 192.168.42.0/24** ensuring that there will be enough addresses to accommodate the needs of each department. Note that the network connects to the outside world through network 172.17.0.0/16 – you can choose an IP address for this connection (ISP's IP is 172.17.0.1) but it has to be within the same address space.



Network Diagram

1. Addressing Scheme

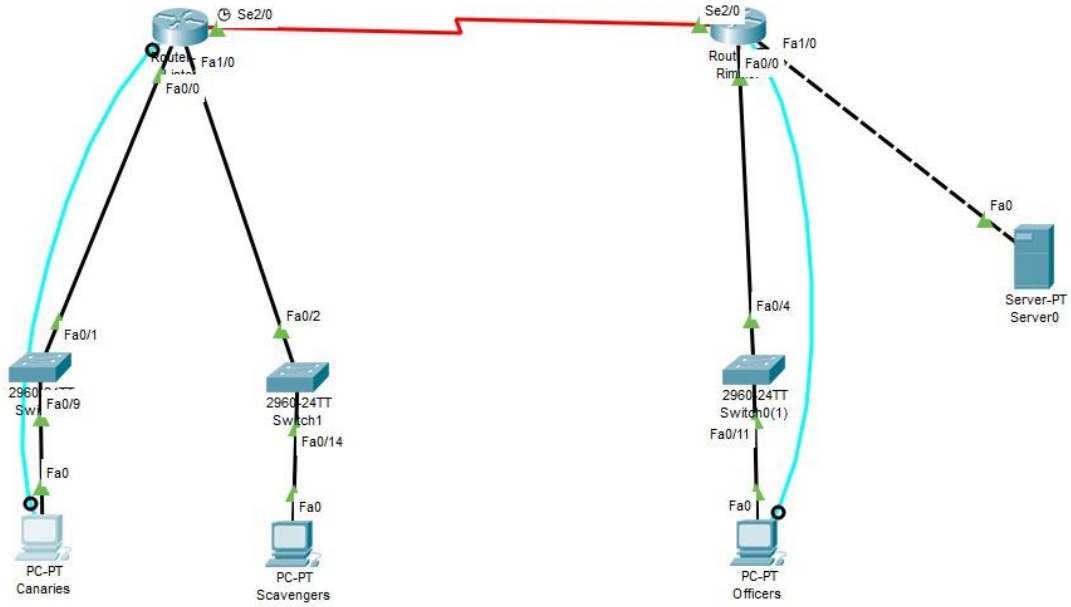
Design the addressing scheme for the network above using VLSM subnet masking. You are allowed to use subnet zero[1].

	Subnet	First host	Last host	Broadcast	Mask
Router link	192.168.42.224	192.168.42.225	192.168.42.226	192.168.42.227	255.255.255.252
Officers	192.168.42.192	192.168.42.193	192.168.42.222	192.168.42.223	255.255.255.224
Canaries	192.168.42.128	192.168.42.129	192.168.42.184	192.168.42.190	255.255.255.192
Scavengers	192.168.42.0	192.168.42.1	192.168.42.126	192.168.42.127	255.255.255.128

[1] The first subnet can be the one where all network bits are set to zero. This in effect makes the formula giving the number of subnets 2^n-1.

2. Basic Configuration

For this task you are required to connect the devices using the appropriate cables and configure the interfaces. The commands to do that can be found in the previous portfolio exercise.



Lister Setting-Password Configuration:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.225 255.255.255.0
Router(config-if)#ip address 192.168.42.225 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.225 255.255.255.252
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no ip address
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address
% Incomplete command.
```

```
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.42.225 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.42.225 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to
up

Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address 192.168.42.1 255.255.255.252
Router(config-if)#ip address 192.168.42.1 255.255.255.128
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed
state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#no ip address
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.129 255.255.255.252
Router(config-if)#no ip address
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.128 255.255.255.252
Bad mask /30 for address 192.168.42.128
Router(config-if)#no ip address
Router(config-if)#ip address 192.168.42.129 255.255.255.252
Router(config-if)#ip address 192.168.42.129 255.255.255.192
Router(config-if)#exit
```

```
Router(config)#line vty 04
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#enable password cisco
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh run
Building configuration...

Current configuration : 863 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
enable password cisco
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.42.129 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 192.168.42.1 255.255.255.128
 duplex auto
 speed auto
```

```
!
interface Serial2/0
 ip address 192.168.42.225 255.255.255.252
 clock rate 2000000
!
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 3
 login
line vty 4
 password cisco
 login
!
!
!
end
```

Rimmer Setting-Password Configuration:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.42.226 255.255.255.0
Router(config-if)#ip address 192.168.42.226 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to
up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.193 255.255.255.252
Router(config-if)#ip address 192.168.42.193 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address 172.17.0.1 255.255.0.0
Router(config-if)#ip address 172.17.0.1 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed
state to up
%IP-4-DUPADDR: Duplicate address 172.17.0.1 on FastEthernet1/0, sourced by
0007.EC69.6B0C

Router(config-if)#exit
Router(config)#line vty 04
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#enable password cisco
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh run
Building configuration...

Current configuration : 837 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
enable password cisco
!
!
!
!
```

```
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.42.193 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 172.17.0.1 255.255.0.0
 duplex auto
 speed auto
!
interface Serial2/0
 ip address 192.168.42.226 255.255.255.252
!
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
```

```
!
line vty 0 3
 login
line vty 4
 password cisco
 login
!
!
!
end
```

3. EIGRP

EIGRP[2] routing protocol configuration is similar to that of RIP (see portfolio 2) but at the same time differs in a number of significant ways. Routers can support multiple instances of this protocol running at the same time, forming different autonomous systems. As such a positive number must be specified when configuring. This number has to be **the same for all routers** participating to that autonomous system (and thus can exchange information about the networks that form this system).

Router(config)# router EIGRP number

We chose our EIGRP Number to be 20

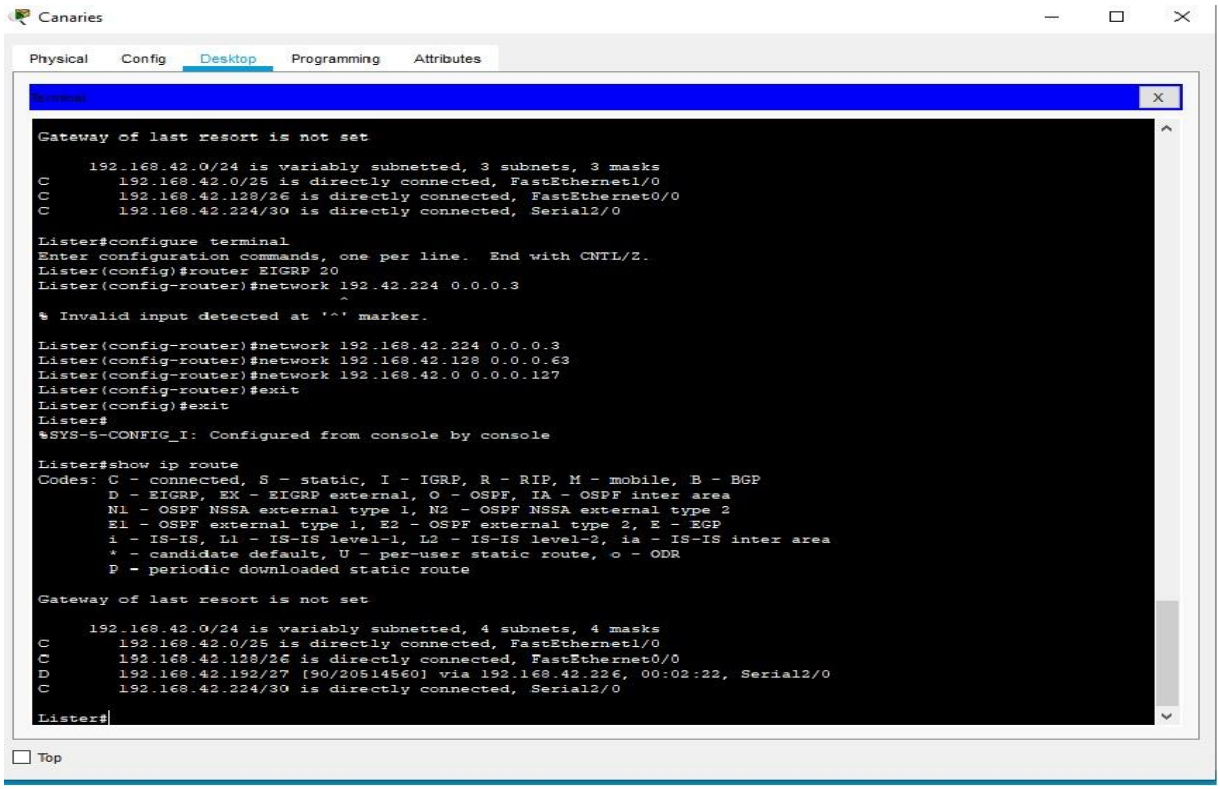
Another difference is that EIGRP expects hosts bits to be specified when adding networks during the routing protocol configuration. Host bit are indicated using a wildcard mask. Inverting the bits of the subnet mask can be used to derive the wildcard mask for each subnet. For instance: network 192.168.177.128 with subnet mask 255.255.255.192 will have 0.0.0.63 as its wildcard ($192=11000000_2$ while $63=00111111_2$). This network could be added to the list of networks the router advertises using the following instruction:

Router(config-router)# network 192.168.177.128 0.0.0.63

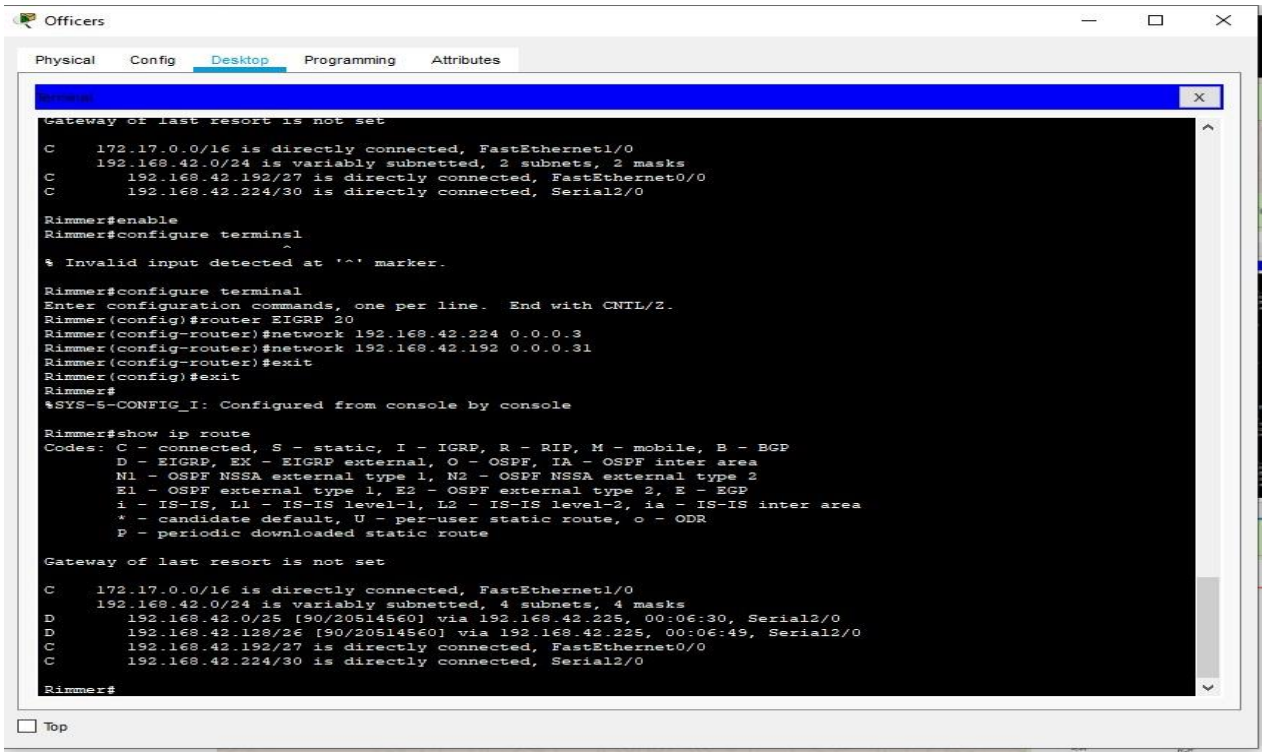
Configure the EIGRP protocol for both routers and verify that the configuration using the “show ip route” command and/or pinging addresses in other, not directly connected parts of you network.

Lister Show-IP Route:

[2] Enhanced Internal Gateway Routing Protocol (EIGRP) is a CISCO proprietary vector routing protocol. It supports variable length subnet masking, uses multiple metrics to rate routes and only sends updates when changes are detected. This makes it a better choice than RIP, especially for bigger and more complex networks - EIGRP offers many advanced features, consumes less bandwidth and offers faster convergence (time taken before all routers get updated with the latest information). The main drawbacks of EIGRP are that it is a proprietary protocol not supported by all vendors and that it is more complex than RIP (requiring more effort to implement and more processing power to run).



Rimmer Show-IP Route:



Lister Show-running Configurations:

```
Lister#show running-config
Building configuration...

Current configuration : 1058 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Lister
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
enable password class
!
ip cef
no ipv6 cef
!
!
interface FastEthernet0/0
 ip address 192.168.42.154 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 192.168.42.124 255.255.255.128
 duplex auto
 speed auto
!
interface Serial2/0
 ip address 192.168.42.225 255.255.255.252
 clock rate 2000000
!
interface Serial3/0
 no ip address
 clock rate 2000000
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
router eigrp 20
 network 192.168.42.224 0.0.0.3
 network 192.168.42.128 0.0.0.3
 network 192.168.42.0 0.0.0.3
 network 192.168.42.128 0.0.0.63
 network 192.168.42.0 0.0.0.127
 auto-summary
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
 password class
 login
!
!
end
```

Rimmer Show-running Configurations:

```
Rimmer#show running-config
Building configuration...

Current configuration : 881 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Rimmer
!
!
ip cef
no ipv6 cef
!
!
interface FastEthernet0/0
 ip address 192.168.42.196 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 172.17.0.2 255.255.0.0
 duplex auto
 speed auto
!
interface Serial2/0
 ip address 192.168.42.226 255.255.255.252
!
interface Serial3/0
 no ip address
 clock rate 2000000
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
router eigrp 20
 network 192.168.42.224 0.0.0.3
 network 192.168.42.192 0.0.0.3
 network 192.168.42.192 0.0.0.31
 auto-summary
!
ip classless
!
ip flow-export version 9
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end
```

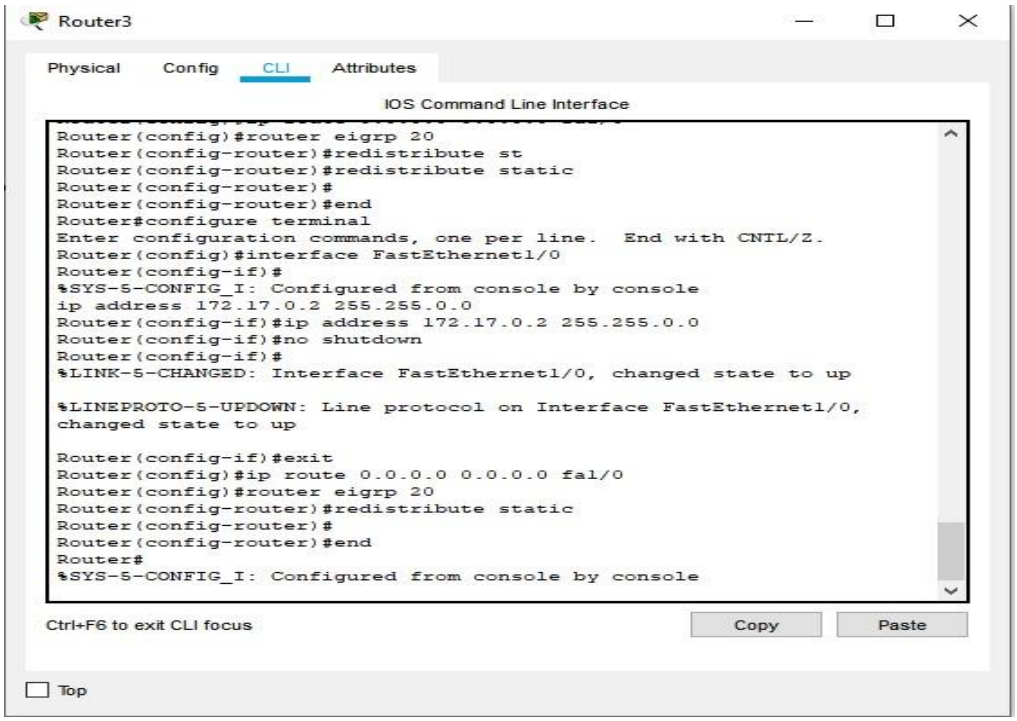
4. Static route

It is impossible for a router to have an entry for every network out there. A default gateway can be configured on router Rimmer to forward traffic towards unknown networks. This can be specified as a static route which redirects any network (0.0.0.0) with any subnet mask (0.0.0.0) we do not know about out of a particular interface (for instance fa0/1). The command to do that would look a bit like:

Router(config)# ip route 0.0.0.0 0.0.0.0 fa0/1

Following the configuration of that static route you might want to ensure that other routers in your autonomous system know about this route. This can be achieved by adding the “redistribute static” command to your router EIGRP configuration.

Router(config-router)# redistribute static



Static Route Show Running Configuration:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.42.226 255.255.255.0
Router(config-if)#ip address 192.168.42.226 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to
up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

```
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.42.193 255.255.255.252
Router(config-if)#ip address 192.168.42.193 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address 172.17.0.1 255.255.0.0
Router(config-if)#ip address 172.17.0.1 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed
state to up
%IP-4-DUPADDR: Duplicate address 172.17.0.1 on FastEthernet1/0, sourced by
0007.EC69.6B0C

Router(config-if)#exit
Router(config)#line vty 04
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#enable password cisco
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh run
Building configuration...

Current configuration : 837 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
enable password cisco
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
```

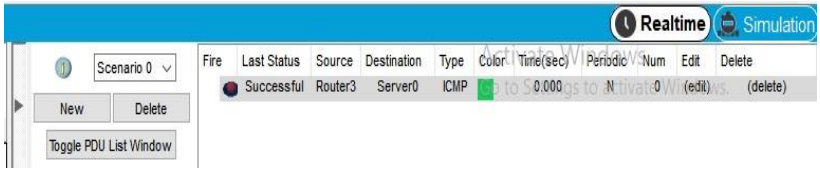
```
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.42.193 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 172.17.0.1 255.255.0.0
 duplex auto
 speed auto
!
interface Serial2/0
 ip address 192.168.42.226 255.255.255.252
!
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 3
 login
line vty 4
 password cisco
 login
```

```
!
!
!
end


Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 fa0/1
%Invalid interface type and number
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip route 0.0.0.0 0.0.0.0 fa0/1
%Invalid interface type and number
Router(config)#ip route 0.0.0.0 0.0.0.0 fa1/0
Router(config)#router eigrp
% Incomplete command.
Router(config)#router eigrp 20
Router(config-router)#redistribute static
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh run
Building configuration...

Current configuration : 933 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
enable password cisco
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
!
```

```
!
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.42.193 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 172.17.0.1 255.255.0.0
 duplex auto
 speed auto
!
interface Serial2/0
 ip address 192.168.42.226 255.255.255.252
!
interface Serial3/0
 no ip address
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
router eigrp 20
 redistribute static
 auto-summary
!
ip classless
ip route 0.0.0.0 0.0.0.0 FastEthernet1/0
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 3
 login
line vty 4
 password cisco
 login
!
!
!
end
```

After configuring the gateway try to device a test to verify that this is working as expected.

Ping from Router to Server:



Important: You need to **submit screenshots that demonstrate connectivity**. You can either do so by cut and pasting the output of the show run command to notepad or by using the **capture** facility offered by the HyperTerminal application. Clearly label the configurations and do not forget to include you addressing scheme as part of your submission.

Group Members

Ideally this task should be completed in groups of two. Groups of three are allowed but not recommended.

Name: Jeffy Mathew Jigy	Student ID: 8520524
Name: David Basil Akang	Student ID: 8251628
Name: Simbarashe Nyakambangwe	Student ID: 8316064

Instructor signatures

No instructor signatures are needed for this portfolio exercise. Submissions should include:

1. Group member composition
2. Addressing scheme
3. Router configurations (clearly labelled)
4. Evidence that end to end connectivity was achieved (i.e. ping and trace route screenshots)