

C01507 Introduction to Networking

Lab 1 - Numbering systems and networking basics

Task 1 - Numbers

1. What is $2 \times 2 \times 2$?
2. What is $2 \times 2 \times 2 \times 2$?
3. Why might I be asking you these stupid questions? (seriously)
4. We don't need to write these out in full e.g. $2 \times 2 \times 2 \times 2$ can be expressed as 2^4 for 2 to the power of 4
 - a. What is the value of 2^4 ?
 - b. What is the value of 2^8 ?
 - c. What is the value of 2^{16} ? (don't worry you can use a calculator)

Task 2 - Binary and Hexadecimal conversions

5. Convert the following binary numbers to decimal.
 - a. 11110001
 - b. 11101000
 - c. 11110000
 - d. 11100100
 - e. 00000000
 - f. 11111111
 - g. 10000001
 - h. 11000011
 - i. 00111100
6. Convert the following decimal numbers to binary
 - a. 224
 - b. 252
 - c. 225
 - d. 256
 - e. 129
7. Convert the following hex numbers to binary
 - a. AC
 - b. CB
 - c. CF
 - d. AB
 - e. FF
 - f. 27
8. Convert the following binary numbers to hex
 - a. 1110 0101 1110 1000
 - b. 1010 0101 1100 1001
 - c. 1010 1101 1110 1100
 - d. 1011 0101 1110 1001

Task 3 - General networking questions and research

The following are general networking questions, you may have to do some research and look some of the answers up online

9. What do you understand by the term 'computer network'?
10. What do you understand by the term 'IP address'?
11. Give an example of an IP address.
12. What do you understand by the term 'domain name'?
13. What is a network switch? And what is it used for?
14. What is a network router? And what is it used for?
15. How do you connect to the Internet from home? What devices that is supplied by the Internet provider?
16. Name 3 services which are used "on the internet" (HINT: I do NOT mean 3 websites)

17. Name 4 items which could be connected to a network.
18. What does UTP stand for?
19. How does fibre-optic differ from UTP?
20. Which is faster wired networking or wireless networking?
21. Which is more secure wired networking or wireless networking?

Task 4 - Register account for Packet Tracer

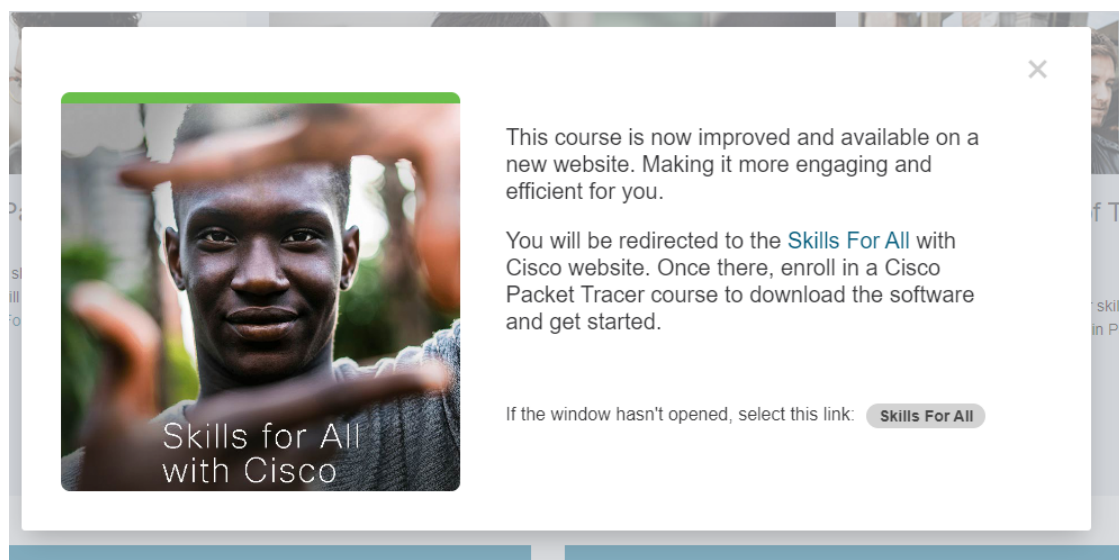
To install Packet Tracer and use it on your computer just follow the steps below: Enter the link below in any internet browser:

<https://www.netacad.com>

Scroll down and click on Packet Tracer as shown below:



look for "Getting started with Cisco Packet tracer" and click View Course. This will bring up a popup linking you to "Skills For All"



On the following screen click on the green "get Started" button

when prompted to login chose "or continue with" Cisco Networking Academy

You will be prompted to login but you will not have an account so Sign Up

Don't have an account? [Sign up](#)

Once you have login in, if you are at home you should be able to download packet tracer from the netacademy website however in hte lab we have packet tracer installed

Open packet tracer from the Desktop Icon (if there isn't one look in the start menu)

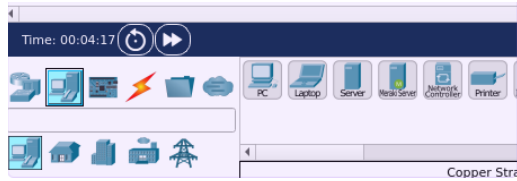
You will be prompted to login before you will be allowed to use packettracer

Task 5 - Building your first simple using Packet Tracer

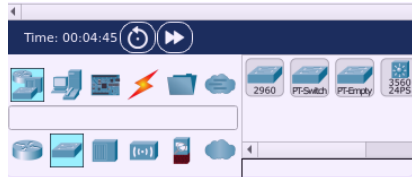
In this exercise we will build one of the most simple networks possible using 2 PCs and 1 switch.

Familiarise yourself with the packettracer tool box

The PC can be found within "End devices" amongst other things



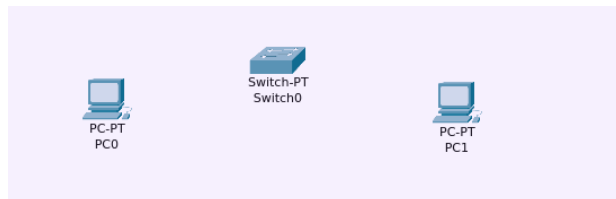
Switches can be found within "Network devices" amongst other things



The type of connection we are going to use which is "copper straight through" can be found within "Connections"



Construct the following layout by dragging the relevant components onto the screen.



Then once you have your 2 PCs and switch in place go to "Connections" and click on "Copper straight through" (the black solid line).

Now when you click on the PC a dropdown will open up, select FastEthernet0. You have now plugged in the virtual ethernet cable.

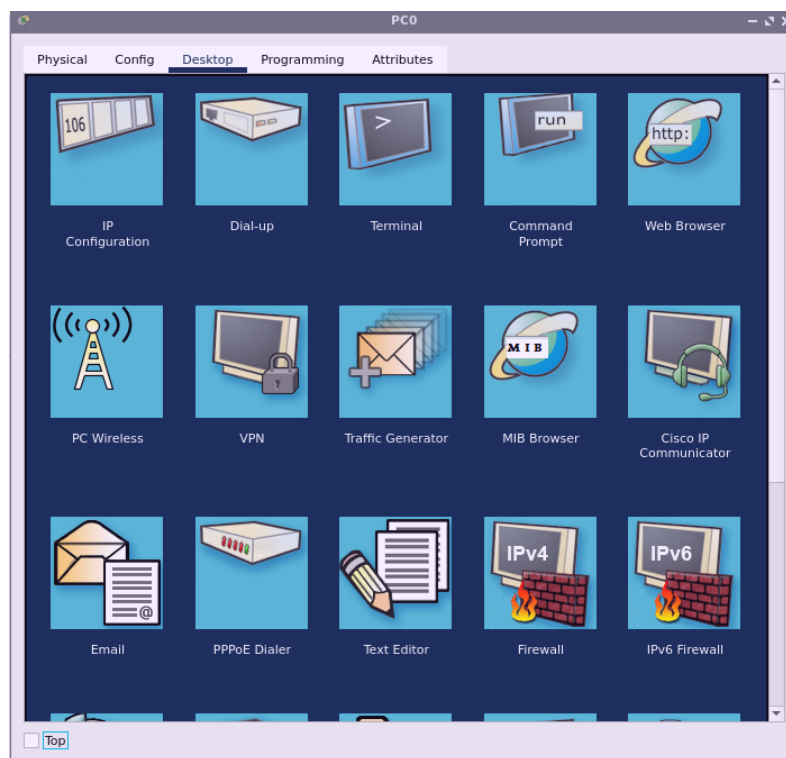
Move your mouse toward the switch and click again. Another dropdown will be revealed. Here we should have many Fastethernet ports available so choose any.

Repeat the steps for the connection between the other PC and the switch.

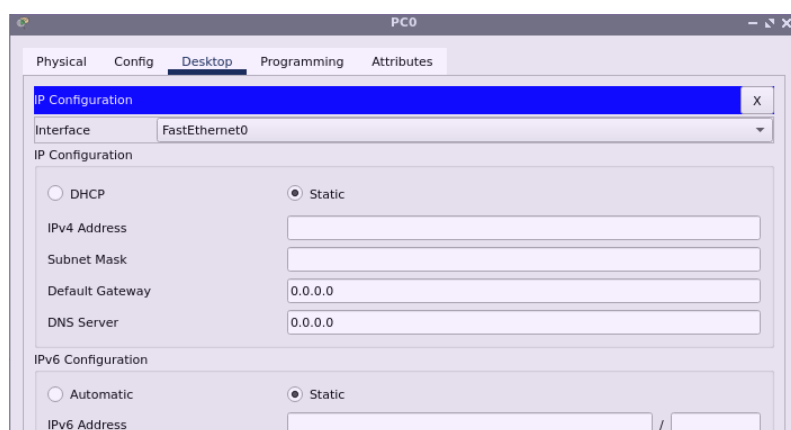
You should end up with something like this:

network

Now click on one of the PCs to bring up the configuration window. It will have several tabs along the top edge click on "Desktop"



Now click on IP configuration to open up the following screen:

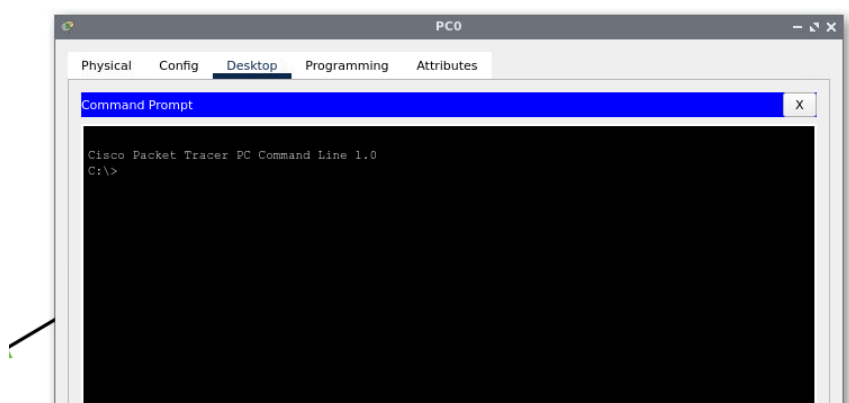


For IPv4 address enter **192.168.1.2**

For subnet mask enter **255.255.255.0** (it may auto fill this)

repeat these steps on the other PC but change the IPv4 address to 192.168.1.3

Go back to the first PC open up the control window and go once again to "Desktop" this time click on "Command prompt"

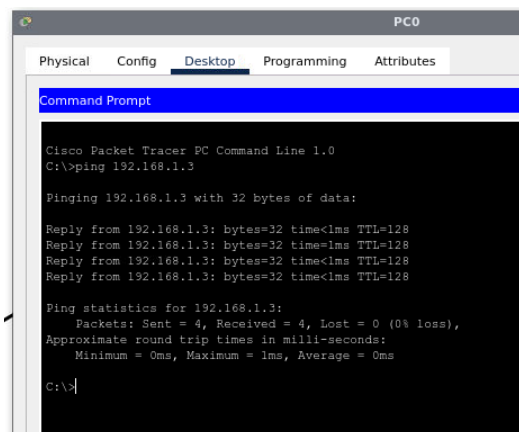


Type the following:

```
ping 192.168.1.3
```

What happens?

If your network is working you should get a result like this:



```

PC0
Physical  Config  Desktop  Programming  Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:\>

```

If you get a different result call your tutor for help

In short this output indicates success. We will talk at a later date about what exactly the ping tool is and what it's used for.

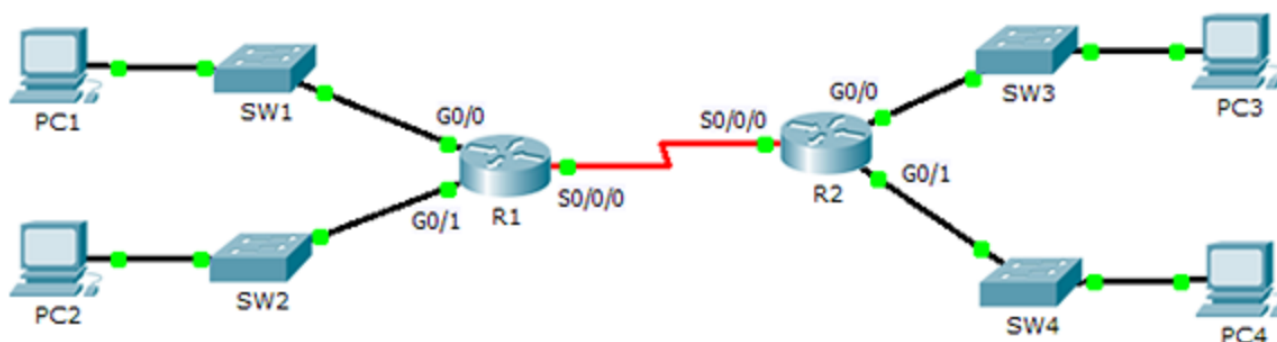
Task 6 - Building a more advanced topology using Packet Tracer

This lab we will explore the packet tracer. In this activity, you need to build a network as shown below, no worries you don't need to get in depth to setup the configuration at this stage. Just drag the devices and build the network. There are general Steps for Creating Computer Network Design in Cisco Packet Tracer

- Selection of end devices.
- Establishing communication links.
- Label the name of each device.

Copy as best you can the diagram below - if you get lost or cannot find a device call over your tutor

Nothing in todays exercise needs to function - we have not learned about IP addressing yet - this will come in future weeks



We will also in upcoming weeks complete some practicals using real equipment - however packettracer is a invaluable learning tool

Jonathan Edwards. 2022.