

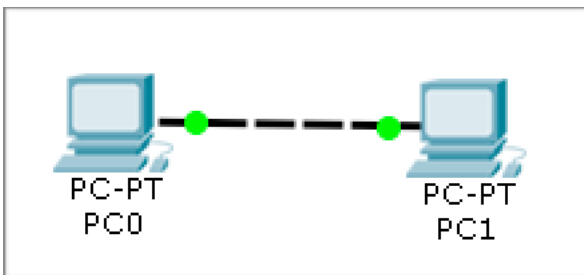
### LAB BRIEF

During this Lab we will learn the basics of setting up networks of computers in Packet Tracer. We will aim to complete the following steps

- Create a network by connecting two computers together
- Getting the computers to communicate with each other
- Adding more computers using a switch
- Add a router that allows us to communicate outside of the network we have created

### BASIC NETWORK

First we create a basic network by adding two computers to the simulation connecting them together. When we connect them together we use a cross-over cable because we are connecting two devices of the same type.



This image shows two computers that have been connected together. The dashed cable shows that it is a cross-over cable.

Before they can communicate we must set up the network on each device.

By clicking on each individual component, we can reconfigure the devices so that they can communicate with each other. In PC0 set up the computer with the IP address 192.168.1.1 and subnet Mask of 255.255.255.0. This defines address that the computer can be contacted by and which part of the address means the same network.

In PC1 set up the computer with the IP address 192.168.2.1 and the subnet mask of 255.255.255.0. Now send a message from PC0 to PC1. Because the two computers are not in the same subnet, ie the part of their address where the subnet mask is 255 are not the same, they cannot communicate with each other and the message is not sent. This means that 192.168.1 does not match 192.168.2, the rest of the address does not need to match as the subnet mask is 0 at that part.

To solve this we either need to change the subnet mask in both devices so that the parts that match are the same have 255 or we change the ip address of one of the computers so that the addresses match for the current subnet mask. The easiest solution is to change the IP address of PC1 to 192.168.1.2.

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## ADDING A SWITCH

For two computers communicating a single cable is an acceptable approach, however in reality we usually want more computers to be able to communicate and work together. To do this we can add a switch. There are different types of switches that can be added to the network simulations, but we want to choose exactly what is available on ours, so we will add an empty switch (Switch-PT-Empty).

Now that we have the switch, we need to add the necessary ports, in the example we will connect 4 devices, so we must add 4 ports to the switch (after we have powered it off). There are different types of ports, ethernet (10 mbps), fast ethernet (100 mbps), and gigabit ethernet (1 gbps) these are labeled ending in CE, CFE and CGE respectively. As the computers we have created all have fast ethernet connections we should drag 4 of these to the switch and power it back on.

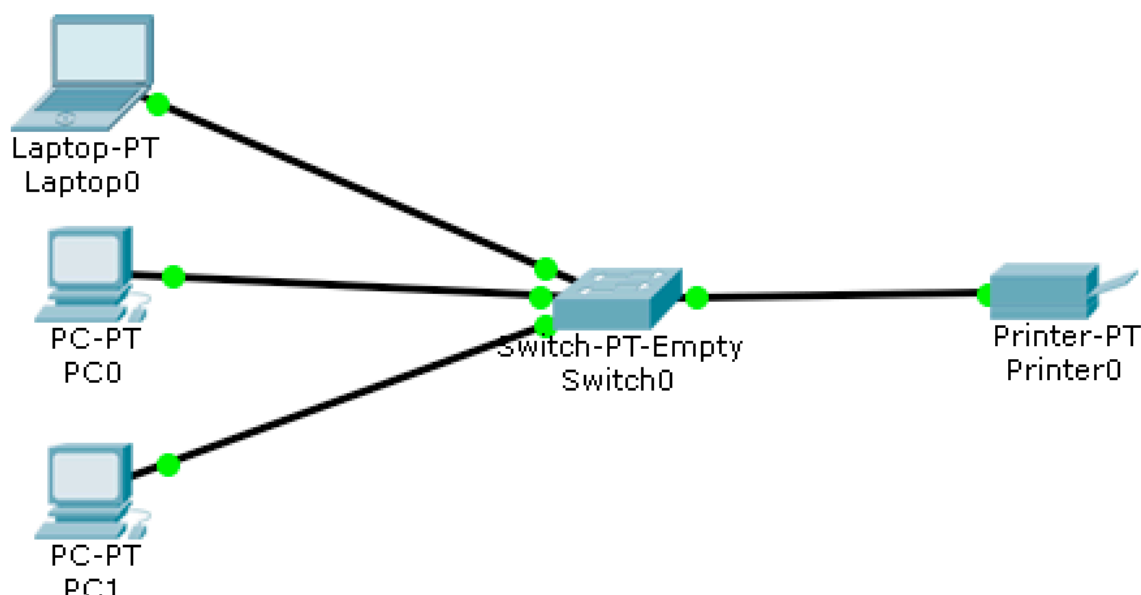
Now we can add some more devices, I added a laptop and a printer. These should all be connected to the switch using a straight copper cable. Just like the previous example. we need to set the ip address of each of the devices and their subnet masks. They should be set to the following values

PC0: 192.168.1.2 255.255.255.0

PC1: 192.168.1.3 255.255.255.0

Laptop0: 192.168.1.4 255.255.255.0

Printer0: 192.168.1.5 255.255.255.0



Now

we can send messages between any of the devices that are connected and in the same subnet

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## CONNECTING TO OTHER NETWORKS

The example network that we have built is useful, all of the devices can communicate with each other. This means that we can send data to each other and share the printer, but we cannot communicate with anybody else. We are going to add a router such that we can communicate with other devices outside our network. Routers are more complicated to setup and configure than a simple switch so we will have to learn how to configure them.

First we add an empty router to our simulation. To this we should add two ports of fast ethernet, one for connecting to our switch and one for connecting to something else. We also need to add a new port to the switch in our network. Connect the switch to the router using a straight copper cable and click on the router to configure the device. Remember which port number in the router that we connected the switch to.

### CONFIGURING THE ROUTER

To configure the router, we need to type commands into the CLI (Command Line Interface). This can be opened by choosing the CLI tab and pressing enter. We should see a terminal like this:

```
Router>
```

This allows us to type commands into the system to change the settings. If we are unsure what the correct command is we can type ? or add it to a command that we are not sure of. Before we can start changing settings we have to enable the privileged mode by typing the command enable (or en). This gives us more options that we can execute to change the settings. After the prompt should be changed.

```
Router>enable
```

To start setting up the device, we use the configure terminal command, this allows us to configure the different network interfaces. This should also change the prompt slightly.

```
Router# configure terminal
```

After this we must select the correct interface, defining the type of the connection, and the port number. I connected using fastEthernet over port 9/0 so the command is:

```
Router(config)# interface fastEthernet 9/0
```

Now we have selected the interface, we can set details like the ip address and subnet mask. This is done with the command ip address followed by the ip address and the subnet mask. Here we are going to give the address 192.168.1.1 to the network interface connected to the switch and give it the same subnet mask as the other devices in the network.

```
Router(config-if)# ip address 192.168.1.1 255.255.255.0
```

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Lastly, we need to activate the interface so that it is operational. This is done with the command `no shutdown`. This means that the interface will remain on when the device is powered up.

```
Router(config-if)# no shutdown
```

Assuming that everything else is done correctly, you should see a message ending 'changed in state to up'. Finally, we need to exit the interface (so we can configure another interface).

```
Router(config-if)# exit
```

## ADD A SERVER

Now we are going to add a Server to our simulation and connect it to the second port on the router. These should be connected using a cross-over cable. We will go through the same steps to set the ip address of this network interface to 10.1.1.1 with a subnet of 255.255.255.0.

```
Router(config)# interface fastEthernet 8/0
```

```
Router(config-if)# ip address 10.1.1.1 255.255.255.0
```

```
Router(config-if)# no shutdown
```

```
Router(config-if)# exit
```

After this we need to set the ip address of the server to 10.1.1.2 with a subnet of 255.255.255.0. Additionally, we need to set the gateway to the ip address of the router in this network (10.1.1.1). Lastly we need to change the settings of the devices in the first network so that the default gateway is set to the ip address of the router in the first network (192.168.1.1). Then the devices should now know where to send messages to when the destination address is not in our network. Now we should be able to send messages to devices that are outside our network.

