

CO1507 Introduction to Networking

Lab 7 - Custom subnetting

Task 1 - Practical

We are going to do a practical involving splitting the class into 4 groups similar to in week two.

Each group is assigned a network address

Important: all mentions of left/right below relate to in you were stood at the front of the classroom looking toward the back wall

Group A: Left wall: Network address 192.168.10.16/28 (255.255.255.240)

Group B: Left centre: Network address 192.168.10.32/28 (255.255.255.240)

Group C: Right centre: Network address 192.168.10.32/27 (255.255.255.224)

Group D: Right wall: Network address 192.168.10.64/27 (255.255.255.224)

For all 4 of the network addresses make note of the following:

- First valid host IP address
- Last valid host IP address
- Broadcast address
- Maximum number of possible hosts

In your groups construct your LANs - like week 2 but you must address the network using the custom subnetting scenario given to you.

Below I have copied the instructions on the equipment setup from week 2's lab for you to refer to.

The network you are building will follow the following topology (adjusting for whether you have 4 or 5 in your group)

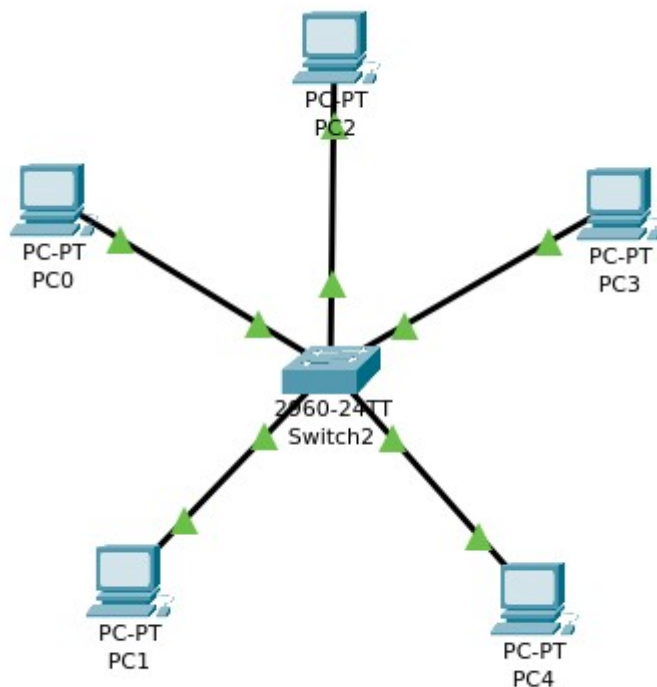


Figure 1 Logical topology of the described network

However physically it will look quite different for several reasons.

Equipment:

- 1x Ethernet cable (UTP) per team member - collect from tutor

Instead of connecting directly from the back of the PC to a switch we will use the patch panel and rack mounted switches. Your tutor will explain all this at the beginning of the session.

However, it's important that you all note down the number of the port you will be connecting - this can be found on the box on your desk (see photos)

Essentially the backs of the PCs are wired to the box on the top of your desk for convenience. Those boxes are then in turn wired to the patch panel in the rack (unless you pull out the cables) DON'T remove the cable simply note down your number.

Each PC in the lab has two available ethernet cards available for student lab work. You only need to use one of them today.



Figure 2 The tabletop box clearly showing port numbers for the PCs two available network interface cards

You will need to locate the SAME number on the patch panel.

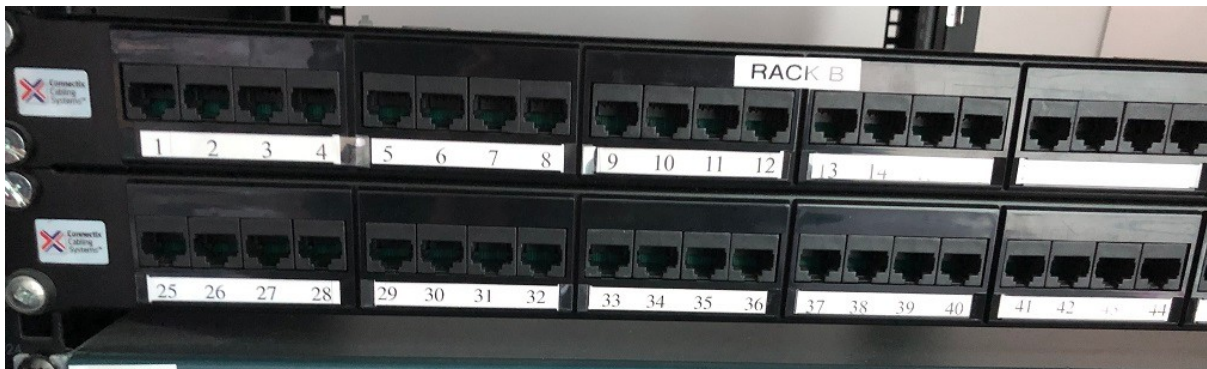


Figure 3 The patch panel (one of 2 panels in CM142)

In order to connect your PC to a switch in the rack you will need to run an ethernet patch cable from the correct numbered port on the patch panel, to a free port on the desired switch.

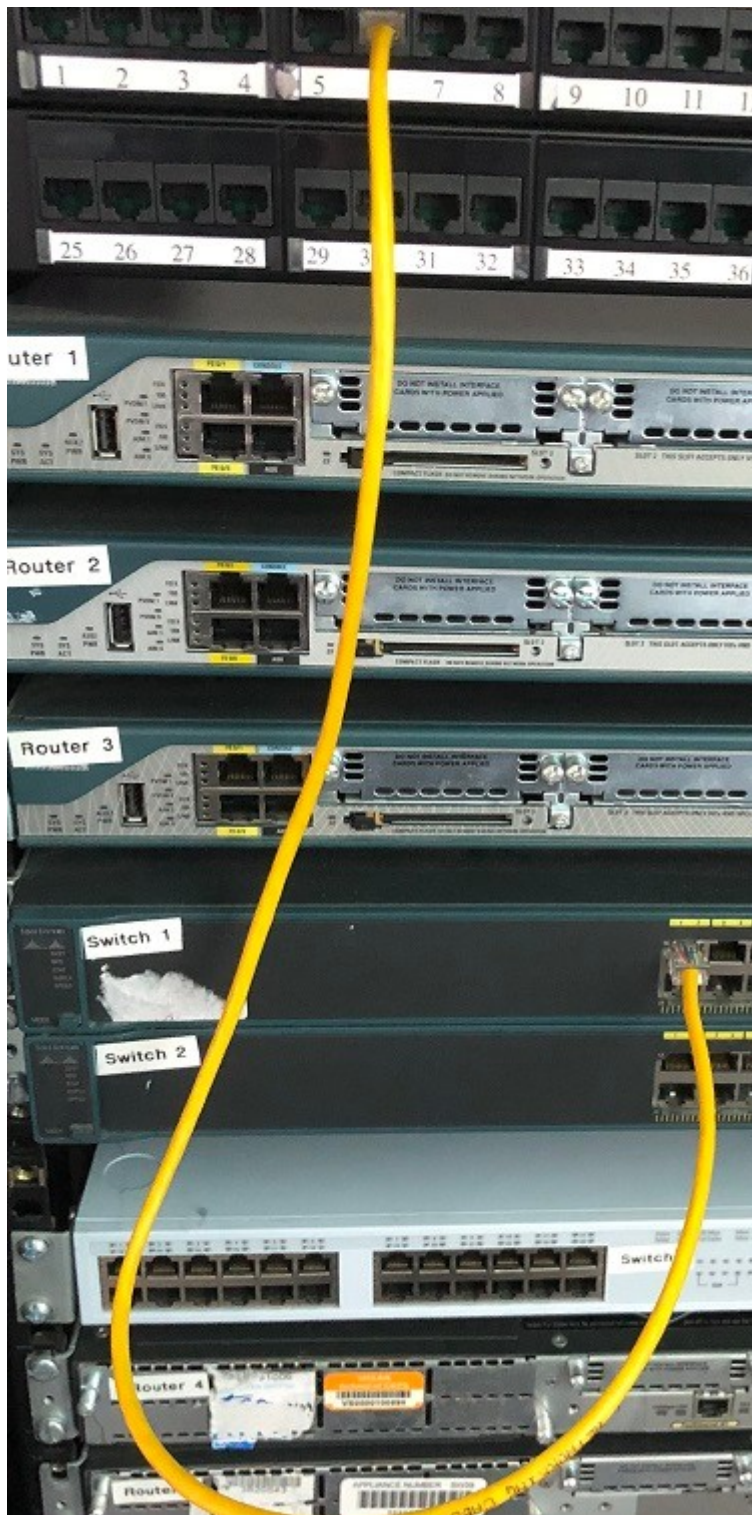


Figure 4 An ethernet patch cable connecting port #6 on the patch panel to switch 1 in the rack

Addressing requirements:

Computer	IP Address	Subnet Mask
Group member 1	192.168.???	255.255.255.?
Group member 2	192.168.???	255.255.255.?
Group member 3	192.168.???	255.255.255.?
Group member 4	192.168.???	255.255.255.?
Group member 5	192.168.???	255.255.255.?

Go to the start menu and type "network" it should reveal "Network Status" in the search results. Open Network status and you should see a screen like below.

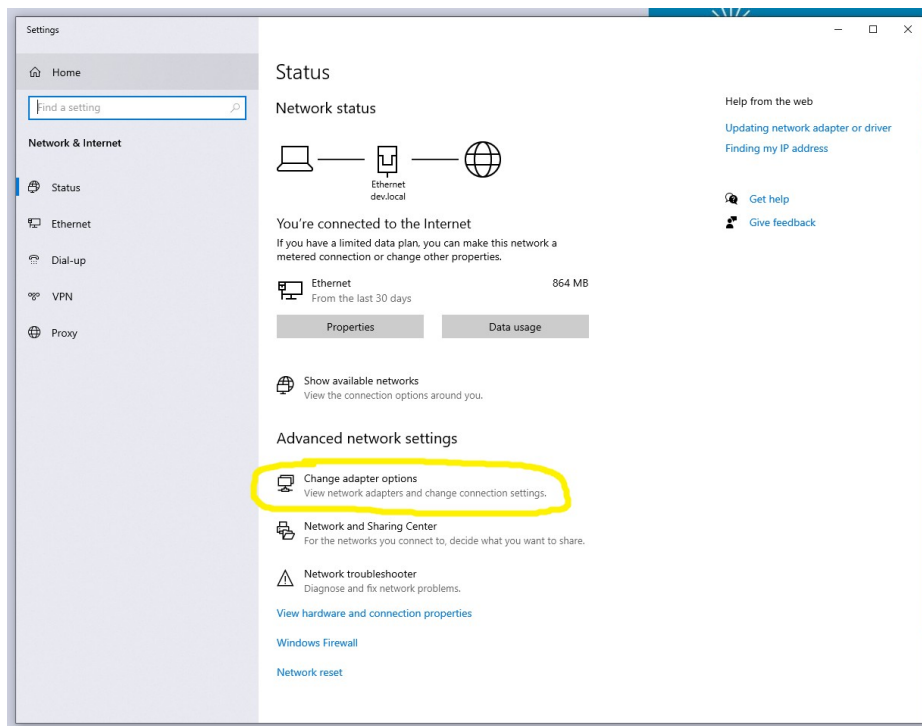


Figure 5 Network status panel

Click on "change adapter options"

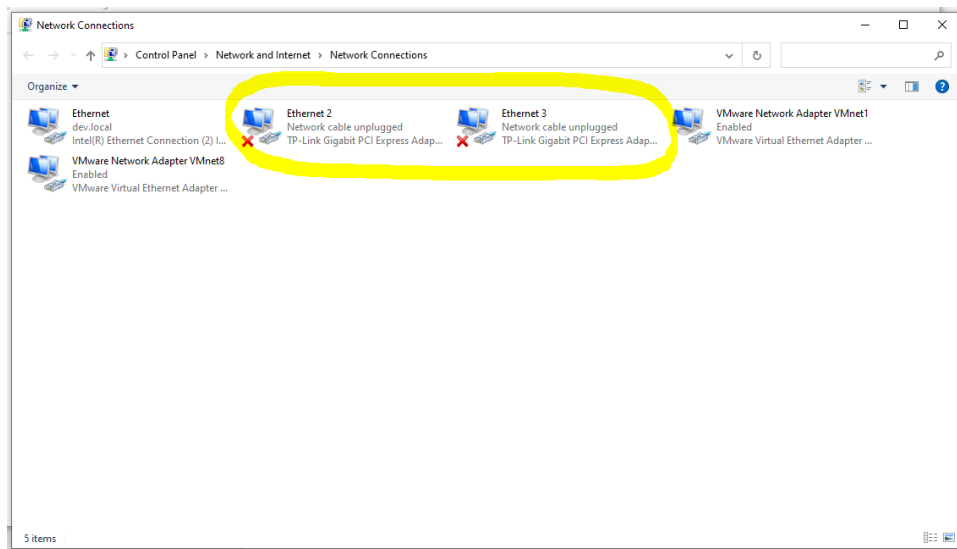


Figure 6 Network interfaces

Warning!

Do not make any changes to the network interface card connected to dev.local. The interface SHOULD be named 'DoNotUse' but I can't guarantee it hasn't been changed by students etc. However regardless of its name do not use the 'dev.local' connection!

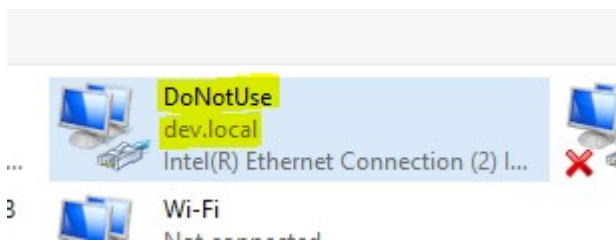


Figure 7 the dev.local connection

Locate the correct interface. It will be one of the two remaining ethernet cards after the dev.local one which we must not touch. Ignore any interfaces named as VMWare virtual devices. It should be obvious which one it is because the interfaces NOT plugged in should all show with a red cross on them. Once you have located the correct interface, double click on it.

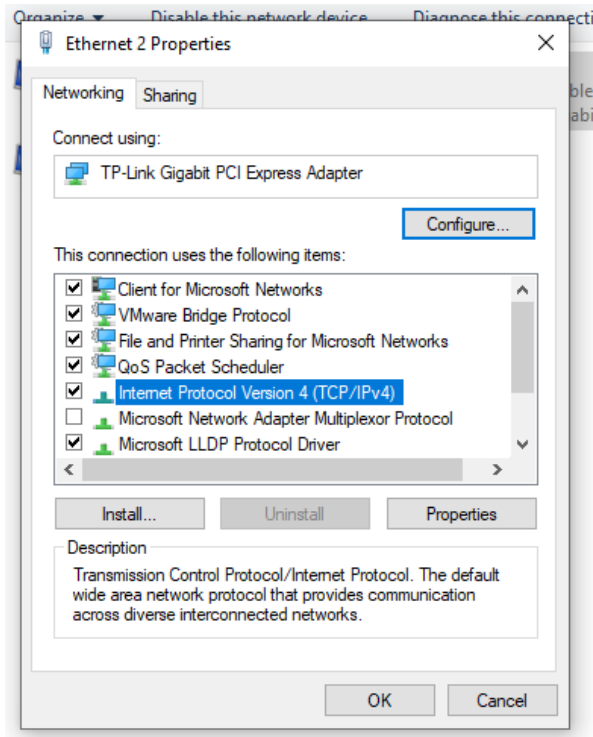


Figure 8 Ethernet properties

Choose "internet protocol version 4"

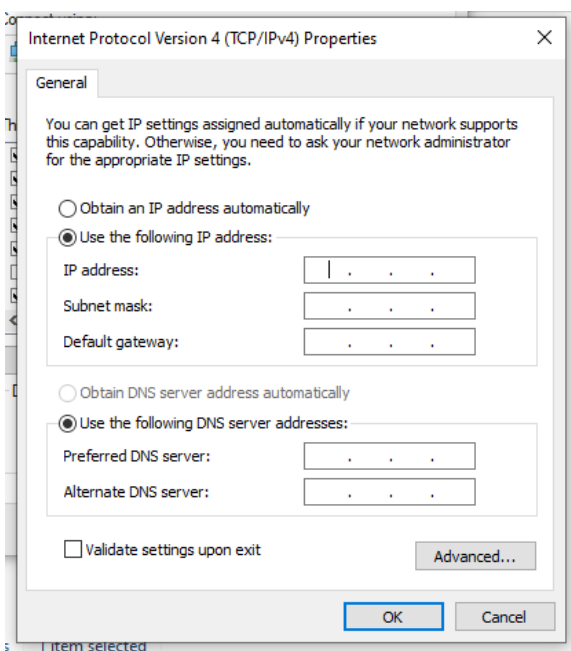


Figure 9 IPv4 settings

Click on the radio button for "Use the following IP address" as it will probably have previously been set to "Obtain an IP address automatically"

Enter the IP address and Subnet mask for your computer. Refer to the table above, substitute the 3rd section of the IP address for your group number (assigned by tutor)

and the 4th section of the IP address for your individual number (agreed amongst the group)

Leave "default gateway" and all other boxes blank and click "OK"

Repeat steps for each group member - work together and help one another if any of you get stuck!

Test the network for full connectivity.

Task 2 - Subnet calculations

Fill in the table below with the relevant information

*Hint in the task below "number of subnet bits" refers to the difference in bits between the original mask and the custom e. e.g. the difference between /24 (255.255.255.0) and /27 (255.255.255.224) is 3 bits giving 8 combinations, and 8 subnets.

Address given:

Host IP Address:	192.168.100.139
Original Subnet Mask:	255.255.255.0
Custom Subnet Mask:	255.255.255.224

Find:

1. The Number of subnet bits
2. The Number of subnets created
3. The Number of host bits per subnet
4. The Number of valid host IPs per subnet
5. The Network address of this subnet
6. The First valid host address on this subnet
7. The Last valid host address on this subnet
8. The Broadcast address on this subnet

Address given:

Host IP Address:	192.168.33.26
Original Subnet Mask:	255.255.255.0
Custom Subnet Mask:	255.255.255.192

Find:

1. The Number of subnet bits
2. The Number of subnets created
3. The Number of host bits per subnet
4. The Number of valid host IPs per subnet

5. The Network address of this subnet
6. The First valid host address on this subnet
7. The Last valid host address on this subnet
8. The Broadcast address on this subnet

Address given:

Host IP Address: 172.16.32.12
Original Subnet Mask: 255.255.0.0
Custom Subnet Mask: 255.255.224.0

Find:

1. The Number of subnet bits
2. The Number of subnets created
3. The Number of host bits per subnet
4. The Number of valid host IPs per subnet
5. The Network address of this subnet
6. The First valid host address on this subnet
7. The Last valid host address on this subnet
8. The Broadcast address on this subnet

Task 3- Planning a subnet scenario

A local college has just finished a new building to house a Computer and Networks departments. The college needs to setup 6 networked teaching labs. Each lab is required to support between 24 and 28 computers and must be on a separate network. You have been given the following network address: 192.168.85.0/24. You must choose a suitable custom subnet mask so that we can accommodate the college's requirements within the same address space.

Once you have chosen the appropriate subnet mask calculate the following information for EACH lab:

- The network address of the subnet
- The first host address
- The last host address
- The broadcast address

Task 4- Packet Tracer

Construct the THIRD subnet from task 3 in packet tracer. You need a switch and some PC hosts. You only need to include the first 5 hosts as to address 28 would be a waste of your time.

Test the network for full connectivity. Show your tutor.