Active class 6: How do I get from My home to Your home - Journey of an IP packet

The learning objective of this class is to learn how the data being transported in the IP network.

At the end of this activity, you should be able to:

1. Describe “Internet Protocol”
2. Explain the data plane operation of the network layer.
3. Build a simple network in Cisco Packet Tracer and simulate the network you built.

This class activity is designed to be worked through active participation and collaborating with peers under the guidance of the teaching team in the class. The active classes are designed to be interactive, and they are here for you to extend your learning. However, these classes will only help you to enhance your learning if you come prepared. **To work on the class activities, you will be expected to have completed the Network Layer-Data Plane Module.** You need to have a basic understanding of layered model, TCP/IP, and data plane operation of the network layer. If you are not familiar with any of the above, please head back to the CloudDeakin unit site and complete the relevant modules before starting this active class.

The active classes are related to assessment tasks on OnTrack. After learning about different concepts from the content provided in the unit site, you will expand on this knowledge by working on activities designed to put these concepts in practice during the active classes and submit the completed task to OnTrack in the same week. The teaching team will guide and support your learning during these activities. This will help you manage your time and tasks better to avoid tasks piling up towards the deadlines. If you do not complete these activities in class, you will need to work on them in your own time, with limited support from us available.

The class activities are split into three parts. First, you will analyse IP datagrams using Wireshark. Then, you will conduct a group discussion and a role play to understand IP and data plane operation of the network layer. Finally, you will use Cisco Packet Tracer to build a small network and simulate the network to understand the packet forwarding, IP configurations, and subnet mask.

Activity 1: Analyzing IP using Wireshark

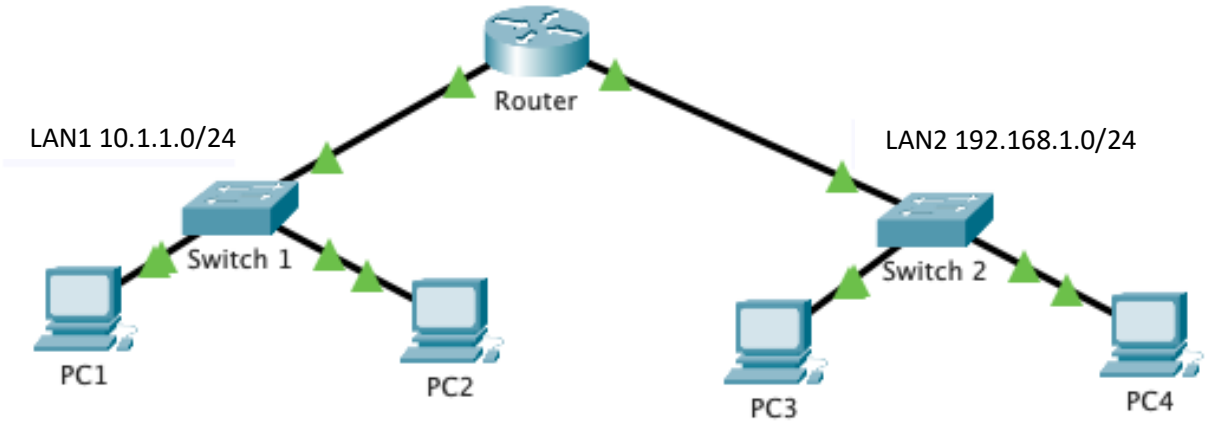
Now you are familiar with Wireshark. Therefore, you should be able to analyze protocols and packets with less instructions provided. Today, you are going to analyze IP (protocol). You need to first capture the packets of a couple of network applications such as web browsing, and MSTeams. Then, select DNS/HTTP request message/ TCP /UDP packet that is sent from your device and expand the Internet Protocol section of the packet in the packet details window.

1. Examine the IP datagram's header. Can you identify the IP address of your device and the IP address of the destination host?
2. Can you identify the version of IP addresses?
3. By examine the IP header, can you identify the transport layer protocol used? Does this match with the transport layer protocol listed in in the packet details window?
4. What is the size of IP header in Bytes? What is the size of the payload (in Bytes) of this IP datagram? How did you calculate the size of the payload?
5. Can you check whether this IP datagram is fragmented or not? Explain your answer.
6. Examine other important fields in the IP header.
7. Now, conduct a similar analysis using a different type of packet (if you have used HTTP before, now you can use DNS) and compare the findings.

Activity 2: IP and routing

This is a group activity. Therefore, you need to form a group of four (4)~ five (5) people. At your table (or in MS team chat) discuss the following questions with your group members. Remember to take notes as they will help you prepare your task submissions and complete other activities.

1. Assume you are sending a present to a friend in another country. Can you list the various places and steps that your parcel would go in the postal system before it reaches your friend?
2. How this analogous to a situation where you want to send a message to a friend in another country over the computer networks?
3. Assume we need to build the following network with two LANs (LAN1 and LAN2). Each group member has a role to play. One group member can be the router and four other group members could be PCs (PC1 and PC2 belong to LAN1 and PC3 and PC4 belong to LAN2). Each device needs to set their own network configuration. The Router needs to set its interfaces/port and PCs need to set its IP address and gateways to be able to make a communication between two LANs. Discuss the configurations of your own device with your group members.
4. Assume PC1 needs to send a packet to PC3, discuss the steps that the packet needs to go through to reach to PC3.



Activity 3: Implementing what you learnt.

1. Implement the above-mentioned network in Cisco Packet Tracer. You need to determine the IP addresses of all PCs depending on the LAN that they belong to (you have done this in Activity 2).
2. Once all the devices are configured and connected properly, verify the connectivity using command prompt "ping" in one of the PCs (ex: if PC3's IP address is 192.168.1.5 then from PC1's command prompt we can type "ping 192.168.1.5" to verify the connection)
3. Use the simulation mode to verify the steps that you have discussed in Activity 2 Step 4.
4. Make sure to take screenshots that you can use for task submissions.

<u>Above and Beyond Tasks:</u>

Those who are targeting for Credit and above can complete the following task as part of Task 4.1C and 5.2D to demonstrate your deeper understanding on network layer's data plane operation.

Connecting more devices to the network you built in Activity 3.

1. PC1 in the above diagram now wants to send a message to another PC (PC5) with the IP address of 198.168.2.4.
2. Discuss how PC5 is connected to the current network.
3. Add PC5 and other devices (if necessary) to the network you built in Activity 2 and verify the connectivity using "Ping" in one of the PCs.