

Active class 10: Physical Connections and Protocols

The learning objective of this class is to learn about different physical layer connections and how all different computer network protocols and concepts we learned in each module work together to facilitate a simple (but most used) network application.

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

1. Describe the behind-the-scenes process of accessing a web page.
2. Explain and analyse different physical layer connections and relevant link layer protocols.

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 all the modules in the unit.** You need to have a good understanding of TCP/IP protocol stack starting from application layer to physical layer. If you are not familiar with any of the above, please head to the CloudDeakin unit site and complete it 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.

To carry out the class activities, you need to form a group of four people. The class activities are split into three parts.

Activity 1: Behind the scenes process of a web page request

We have now learned about all the layers of TCP/IP protocol stack, and we fully understand the behind-the-scenes process of accessing a web page. In Module 7, we have looked at the process and networking protocols involved in a simple web page request.

Consider a scenario where you have just turned on your laptop and first thing you want to do is, access SIT202 CloudDeakin site (<https://d2l.deakin.edu.au>). You have a similar network configuration to the example we reviewed in Module 7. However, your laptop is now connected

via Wi-Fi to a home network that does not use NAT, rather than an Ethernet cable as we discussed in the sample scenario in Module 7. As a group,

1. Outline the major steps used by your laptop after it is first powered on until it downloads the page from CloudDeakin.
2. For each of the major steps you have outlined, identify the network protocols that are used and explain what functionality they provide in achieving the task.
3. Explain what would change in your answer to the above questions if your home network uses NAT.

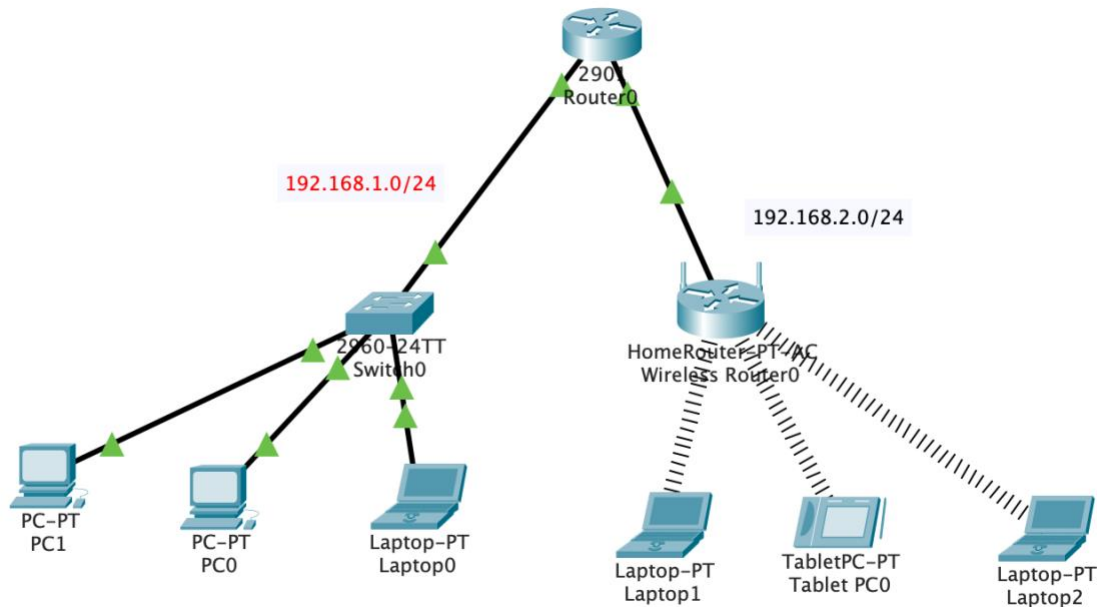
If you understood the entire process of accessing a web page. Well done! You have learned the fundamentals of computer networking and you are ready to rock and roll in the world of computer networks.

Activity 2: Wireshark, explain the process

In this activity, we are going to use our good old friend, Wireshark to analyse the process you discussed in Activity 1.

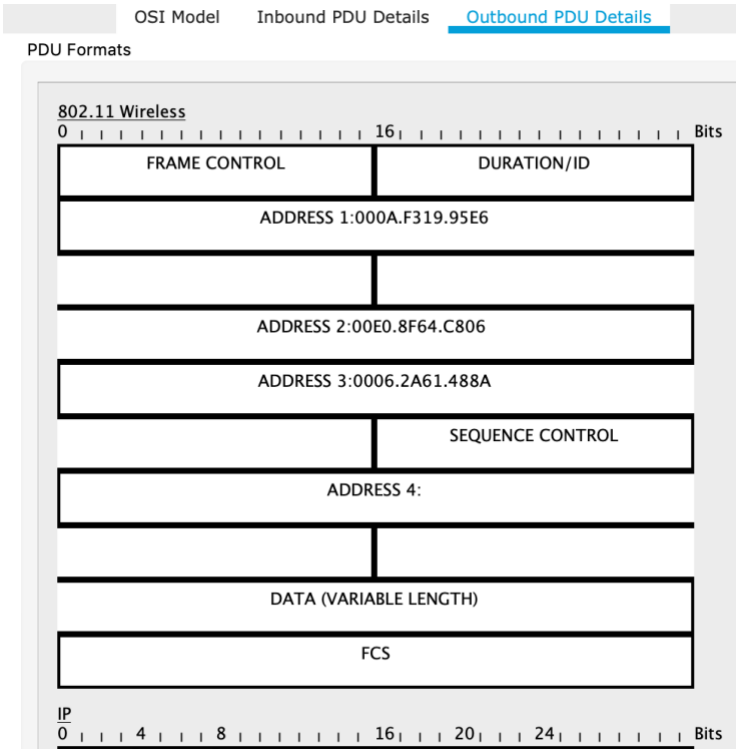
1. Use ipconfig in your command prompt/ terminal to empty the DNS cache in your host using ipconfig /flushdns. (MacOS Mojave use: sudo killall -HUP mDNSResponder)
2. Open Google Chrome and empty your browser cache.
3. Turn off your network connection (turn your WiFi off or disconnect your ethernet cable)
4. Open Wireshark and start packet capture (remember to select your typical network interface). You will see an empty window.
5. Turn on your network connection again.
6. Open your browser, visit the web page: <http://www.discoverourtown.com> and stop packet capture.
7. Now, you can start analyzing the packet capture.
 - a) List down the order of protocols used and their messages.
 - b) Explain the use of each protocol indicating the layer that they belong to.
 - c) Check the details of each packet such as ARP, DHCP, DNS, and HTTP. Make sure you include screenshots in your submission that capture key details of your analysis.
8. Compare the results of your analysis in the above step (7) with the findings of Activity 1.

Activity 3: Wireless network Vs wired networks/ connectivity



In this activity, you explore more on wired and wireless LANs. Implement the above network in Cisco Packet Tracer. You need to use static IP configuration to configure hosts and router interfaces. Make sure to take screenshots of your findings as you need to include the evidence in the task submissions.

1. Use the simulation mode and send a simple PDU,
 - a. From PC1 to PC0
 - b. From Laptop 1 to Tablet 0
2. Note down the similarities and differences you observed in 1.a and 1.b. You may check the details of PDUs in each device. Explain the reasons behind the differences you observed.
3. Check the details of PDUs in both wired and wireless LANs. The PDUs of wired LAN, you can find source and destination MAC addresses. However, there are three MAC addresses listed in the PDUs of Wireless LAN as shown below.



4. Explain why there are three MAC addresses listed in 802.11 Wireless PDUs?

Above and Beyond Tasks:

Those who are targeting for Credit and above can complete the following task as a part of Task 4.1C and 5.2D to demonstrate your deeper understanding of the physical layer.

There are two types of Ethernet cables used in computer network, i.e., straight through and crossover cables. Explain,

- What is a straight through Ethernet cable? When do we need to use a straight through Ethernet cable?
- What is a crossover Ethernet cable? When do we need to use a crossover Ethernet cable?
- How do you identify the type of an Ethernet cable?