CSE 4512 [Computer Networks Lab]
Lab # 1

1. Objectives:
- Get an introductory idea on Cisco Packet Tracer
- Download and install Cisco Packet Tracer
- Understand the packet tracer environment
- Learn how to work with different network components inside Cisco Packet Tracer
- Understand the working principle of a network simulator (Cisco Packet Tracer)
- Learn how to set up routers and switches

2. Introduction:

In this lab (meaning the whole semester), you'll be working on simulating different real-life networks and understand the networking concepts introduced in the theory course. Over the course of completing each lab, you will get to know how various protocols and mechanisms work and also you'll have an idea on how to operate an industry-standard network simulator. A network simulator is basically a software that allows users to create and analyze computer networks. One can create different network topologies and understand how various components of a network interact with each other. These are used in both academia and industry to understand system behavior without requiring any physical network component.

In all of the labs, you'll be working with a specific network simulator called **Cisco Packet Tracer**. There are also other network simulators like GNS3, NS2 etc. But we've selected Cisco Packet tracer for its large adoption across the industry and widely available documentation. We believe, by being acquainted and well-versed with this network simulator, students will acquire fundamental knowledge of modern network components and as a bonus, will have easier time acing the different Network Professional (CCNA, CCNP etc.) certifications that require working with Cisco Packet Tracer.

Some quick points about the labs:

- Skim the whole pdf before starting the tasks.

- Concepts and tasks introduced in each lab will be needed for completing next labs. So make sure you fully understand each lab and don't skip any lab.

- Do not copy and paste from your fellow classmates. You may discuss with them but the tasks must be done by yourself and the corresponding lab report must be your own production. You might take help from online resources but Do Not Copy and Paste. In case of online resource, please give a reference. It doesn't cost any to acknowledge someone's work.

- In case of any problem or query, feel free to ask/contact the instructors.

3. Introduction to Cisco Packet Tracer:

As mentioned in introduction, Cisco Packet Tracer is a widely used network simulator that's being used to simulate and visualize different network topologies along with the various network components. It provides an easy to use drag-and-drop interface which enables the users to create complex network topologies with ease. Users can configure all types of proprietary cisco devices using a simulated command line interface and simulate different application-layer and basic routing protocols within those devices. In an educational setting, Cisco Packet Tracer is a good fit as it allows designing complex and large networks. Although it can't simulate production level networks due to limited feature set, Cisco Packet Tracer is suitable for introductory understanding of basic networking principles and their applicability in practical scenario. For further reading, you can consult Cisco's official webpage and Packet Tracer Wikipedia page.

4. Theory:

In this lab, you'll be implementing basic switch and router configuration in cisco packet tracer. So, before anything, lets first understand what a router and a switch is.

Switch:

A switch operates in the data-link layer and is responsible for connecting different devices in a *single network*. As with any data-link layer device, a switch sends and receives data in *frames*. In general, switches use *MAC addresses* for forwarding data and these are restricted to wired connections only.

Router:

Router operates in the network layer and connects *different networks* together to form inter-networks. Routers unit of data is a *packet* and *IP addresses* are used to forward data packets. Unlike switches, routers can work with both wired and wireless connections.

Figure 1: Router and switch in real-life (leftmost two) and inside Cisco Packet Tracer (rightmost two)

Now that you've got an idea about switch and router, let's get your hands dirty.

5. Downloading and installing Cisco Packet Tracer:

I.   For downloading the software, you need to create an account on Cisco Networking Academy or Cisco Netacad for short. Goto https://www.netacad.com/courses/packet-tracer/introduction-packet-tracer and sign-up.

II.   Then head over to https://www.netacad.com/portal/resources/packet-tracer to download the most recent version of packet tracer. Make sure you select the *right OS version* for the software.

III. Now, open the downloaded exe file and follow the prompts to complete the installation. In case of any problem while installing, consult with the instructor or just google.

IV.   After installation, you should login as normal user with the credentials used to sign-up in step I. Its recommended not to use the guest user as you can only save 3 files with it.

V.   Assuming you've followed everything properly, you are now ready to start the actual work.

6. Implement the Demo