

Goal: In this assignment, you will learn how to build network topology using Mininet Python APIs and how to assign parameters like bandwidth and delay for different links in the topology. You'll also learn how to do performance testing of topology using ping and iperf tools.

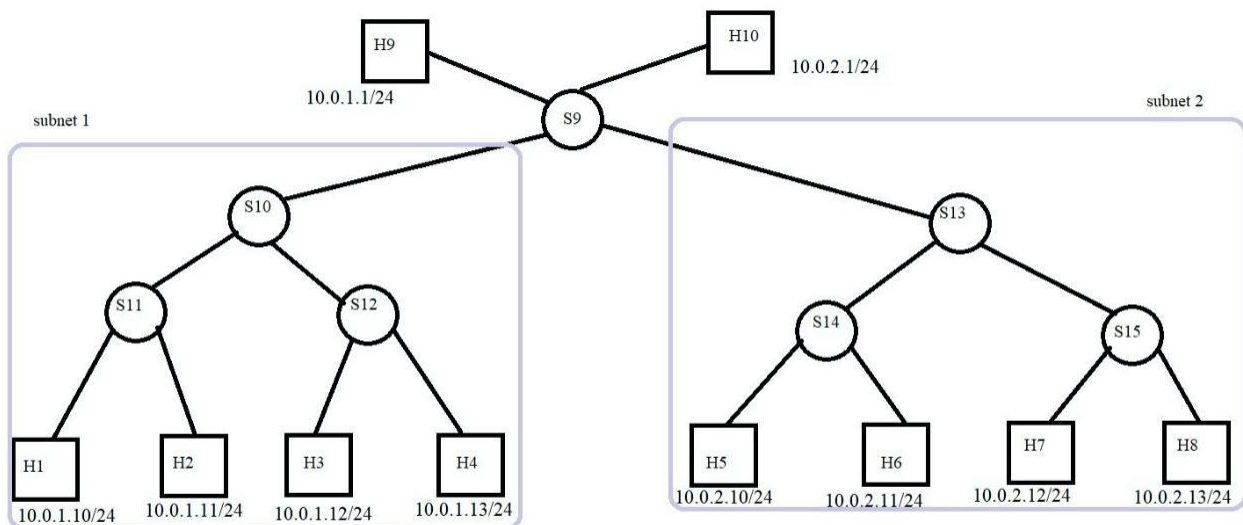
Discussion Topic: Mininet API – Post any questions and collaborate with your peers.

Overview:

You should familiarize yourself with the following important classes, methods, functions and variables to create the network topology

- Topo: the base class for Mininet topologies
- addSwitch(): adds a switch to a topology and returns the switch name
- addHost(): adds a host to a topology and returns the host name
- addLink(): adds a bidirectional link to a topology (and returns a link key, but this is not important). Links in Mininet are bidirectional unless noted otherwise.
- Mininet: main class to create and manage a network
- start(): starts your network
- pingAll(): tests connectivity by trying to have all nodes ping each other
- stop(): stops your network
- net.hosts: all the hosts in a network
- setLogLevel('info' | 'debug' | 'output'): set Mininet's default output level; 'info' is recommended as it provides useful information.

1. Create mininet topology script for the network topology given below (5 points)



2. Run the topology script in the provided VM as shown below (5 points)

e.g sudo python filename.py

Verification and required information/output along with program code:

3. Use pingall command in mininet terminal and check the connectivity **(5 points)** If you see a packet drop, please identify the reason for packet drop.

Iperf is a traffic generation / network performance measurement tool that can operate in client / server mode. The server mode operation will open a port and accept the incoming connection requests. Client mode operation will generate requests towards the Iperf server. We will be using this tool extensively for measuring the end-to-end network bandwidth.

Example: To measure the end-to-end bandwidth between h1 and h9, do the following start iperf server on host h9 use the following command in xterm of h9's terminal: *iperf -s*

To connect to the server use iperf client on host h1 by running the following command in terminal:
iperf -c 10.0.1.1

4. You must think about interconnection between each node and create a tabular format **(30 points)** below to analyze the network topology

Scenario: 1

Set link bandwidth between S9<-> S10 as bw=10Mbps

Set link bandwidth between S10<-> S12 as bw=15Mbps, delay = 10ms

Scenario: 2

Set link bandwidth between S9<-> S13 as bw=20Mbps

Set link bandwidth between S13<-> S14 as bw=20Mbps, delay = 5ms

Host	IP address	Is this host pingable from h9?	Is this host pingable from h10?	Scenario: 1 Measure bw and delay using iperf on H9	Scenario: 2 Measure bw and delay using iperf on H10
H1					
H2					
H3					
H4					
H5					
H6					
H7					
H8					
H9					
H10					

5. In Short, explain about why some nodes are not reachable from h9 and h10 in the given topology. **Submitting your Code**

- You need to submit 2 separate python files for 2 scenarios.
- You should turn in your python script on CANVAS course site assignment section with filename named in the following format:

yourname_sc1.py and yourname_sc2.py

Along with codes, take snapshots of all verification steps and place in a single word file. Submit the document and program code as a zip file.

1. <http://mininet.org/api/hierarchy.html>
2. <https://github.com/mininet/mininet/wiki/Documentation>
3. <https://www.tutorialspoint.com/python/>
4. Additional example code may be found in mininet/examples
5. This assignment includes partial content adopted from other academic courses on SDN