# Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

**AY: 2025-26**

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| **Class:** | **TE** | **Semester:** | **V** |
| **Course Code:** | **CSL501** | **Course Name:** | **Web Computing and Network Lab** |

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|---|---|
| **Name of Student:** | **Shravani Sandeep Raut** |
| **Roll No. :** | **51** |
| **Experiment No.:** | **10** |
| **Title of the Experiment:** | **Simulation of software defined network using mininet.** |
| **Date of Performance:** | **04/10/2025** |
| **Date of Submission:** | **08/10/2025** |

## Evaluation

| Performance Indicator | Max. Marks | Marks Obtained |
|---|---|---|
| Performance | 5 | |
| Understanding | 5 | |
| Journal work and timely submission | 10 | |
| Total | 20 | |

| Performance Indicator | Exceed Expectations (EE) | Meet Expectations (ME) | Below Expectations |
|---|---|---|---|
| Performance | 4-5 | 2-3 | 1 |
| Understanding | 4-5 | 2-3 | 1 |
| Journal work and timely submission | 8-10 | 5-8 | 1-4 |

**Checked by**

**Name of Faculty : Ms Kshitija Gharat**

**Signature :**

**Date:**

Aim: To simulate a Software Defined Network (SDN) environment using Mininet and observe communication between hosts.

Objective:

To understand the concept of Software Defined Networking

To simulate a virtual network topology using Mininet

To configure and test connectivity between hosts using ping command

To integrate a controller (such as POX/OVS) for centralized control of the SDN

Requirement:

Ubuntu Linux (or VM with Ubuntu installed)

Mininet installed (mininet.org)

Open vSwitch (default in Mininet)
Python support for running Mininet scripts

Theory:

Software Defined Networking (SDN) is a networking paradigm that separates the control plane
from the data plane. In SDN, a central controller manages the flow of traffic in the network, while switches and routers only forward packets based on rules defined by the controller.

Mininet is a popular network emulator that can create a realistic virtual network with hosts, switches, and controllers on a single machine. It allows testing of SDN applications quickly and efficiently.
Key components:

Host: Represents end devices in the network

Switch: Open vSwitch used for packet forwarding

Controller: Centralized controller (like POX, Ryu, ONOS) that manages the network

Link: Virtual connections between hosts, switches, and controllers

Procedure:

Step 1: Launch Mininet
Open a terminal in Ubuntu and run:
sudo mn --topo single,3 --mac --switch ovsk --controller remote
This command creates a simple topology with 1 switch and 3 hosts.
Step 2: Test connectivity
Use the command:
pingall
This sends ICMP packets between all hosts to verify connectivity.

Step 3: Start Mininet CLI
Run commands inside Mininet CLI:
h1 ping h2
h1 ping h3

Step 4: Create custom topology using Python
Create a Python script (topo.py):

```
from mininet.topo import Topo
from mininet.net import Mininet
from mininet.node import RemoteController
from mininet.cli import CLI

class MyTopo(Topo):
def build(self):
h1 = self.addHost('h1')
h2 = self.addHost('h2')
s1 = self.addSwitch('s1')
self.addLink(h1, s1)
self.addLink(h2, s1)

topo = MyTopo()
net = Mininet(topo=topo, controller=RemoteController)
net.start()
CLI(net)
net.stop()
```

Run the script using:

sudo python3 topo.py

Step 5: Attach a controller
Install and run POX controller:
git clone https://github.com/noxrepo/pox.git

cd pox
./pox.py forwarding.l2_learning

Step 6: Connect Mininet to POX controller
Run Mininet with remote controller option:
sudo mn --controller=remote,ip=127.0.0.1,port=6633

Output:

Pingall shows 100% packet delivery between hosts

Hosts communicate via switch controlled by the SDN controller
Routing and forwarding decisions are handled dynamically by the controller Conclusion:
Simulation of SDN using Mininet demonstrates how networks can be virtualized and centrally managed using controllers. This experiment shows host-to-host connectivity and highlights the role of the controller in defining packet forwarding behavior.