

Mininet Network Simulator Documentation

Overview

This Python script simulates a simple network topology using Mininet. The network includes:

- **3 Routers:** rA, rB, and rC
- **6 Hosts:** Two hosts per LAN
- **3 LANs** with various subnet masks
- **Static Routing** between hosts and routers to ensure both intra- and inter-LAN communication

The simulator is implemented with Mininet's Python API and includes custom Linux router nodes with IP forwarding.

Dependencies

Ensure Mininet is installed on your system. You can install it using:

Unset

```
sudo apt install mininet
```

Classes

LinuxRouter

Python

```
class LinuxRouter(Node):
```

A custom node class that enables IP forwarding, turning a Mininet node into a basic Linux router.

- **config()**: Enables IP forwarding
- **terminate()**: Disables IP forwarding on cleanup

CustomTopo

Python

```
class CustomTopo(Topo):
```

Defines the custom network topology.

Network Layout:

- **Routers**: rA, rB, rC
- **LAN A (/26)**: hA1, hA2 <-> rA
- **LAN B (/25)**: hB1, hB2 <-> rB
- **LAN C (/27)**: hC1, hC2 <-> rC
- **Router interconnection**: rA <-> rB <-> rC (/24 shared subnet)

Each link is configured with appropriate interfaces and subnet masks to simulate realistic network conditions.

Function: **run()**

Python

```
def run():
```

This function initializes and runs the Mininet network:

1. **Create and start the network**

2. **Set up static routes on hosts and routers**
3. **Ping tests** for intra- and inter-LAN connectivity
4. **Traceroute** test from hA1 to hC1
5. **Mininet CLI** is launched for manual testing

Route Configuration:

- Hosts have default routes and static entries for non-local subnets.
- Routers are manually configured to forward traffic between all subnets.

Diagnostics:

- Intra-LAN ping tests: Ensure hosts in the same LAN can communicate
- Inter-LAN ping tests: Ensure cross-LAN connectivity
- Traceroute from hA1 to hC1: Observe route traversal through routers

Running the Simulation

Run the script using root privileges:

```
Unset  
sudo python3 network_sim.py
```

Example Output

```
Unset  
===== Testing Intra-LAN Connectivity =====  
*** Ping: testing ping reachability
```

...

===== Testing Inter-LAN Connectivity =====

*** Ping: testing ping reachability across all nodes

...

===== Traceroute from hA1 to hC1 =====

traceroute to 20.10.172.193 ...

1 20.10.172.129

2 20.10.100.2

3 20.10.100.3

4 20.10.172.193
