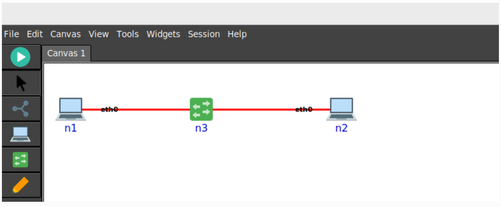
Basic Network Setup

This guide walks you through setting up a basic network topology with one switch and two hosts. You'll learn how to configure IP addresses, run a network emulation, and explore how the switch handles MAC addresses and ARP resolutions. This tutorial is designed for beginners, so each step includes explanations to help you understand the underlying concepts.

Topology Setup

Creating a Three-Node Topology

Step 1. Create a topology with one switch and two hosts as shown in the figure below. Run the network emulation by clicking on the play button.



Step 2. Set IP addresses on the hosts: *10.0.0.10/24* for *n1* and *10.0.0.20/24* for *n2*. To set the IP address, enter to the terminal of the hosts by clicking on their icons, and run the following command:

- On host *n1*:

```
ip addr add 10.0.0.10/24 dev eth0
```

- On host *n2*:

```
ip addr add 10.0.0.20/24 dev eth0
```

Switching concepts

Getting the bridge (switch) name and connected interfaces

Step 1. Issue the following command on a new terminal started from the host operating system:

```
core-links
```

Step 2. Inspect the MAC address table on the bridge:

```
brctl showmacs b.3.1
```

Flushing the MAC Address Table

Step 3. Flush the MAC address table on the switch to clear any existing entries.

- Switch to the root user:

```
sudo su
```

- Flush the MAC address table:

```
echo 1 > /sys/class/net/<bridge_name>/bridge/flush
```

Checking the MAC Address Table

Step 4. After flushing, check the MAC address table to verify it is empty:

```
brctl showmacs <bridge_name>
```

The output should show no learned MAC addresses.

Working with ARP

Checking ARP Resolutions on the Hosts

Step 5. On each host, check the ARP table to see the current IP-to-MAC address mappings:

```
arp
```

Flushing ARP Tables on Both Hosts

Step 6. To remove all ARP entries on both hosts:

```
arp -d -a
```

This command will delete all ARP entries, forcing the hosts to re-learn the MAC addresses.

Traffic Analysis

Starting Wireshark on the Switch Interface

Step 7. Start Wireshark on any of the switch's interfaces to monitor traffic:

- Launch Wireshark from the command line:

```
wireshark
```

- Select the appropriate interface to start capturing packets.

Generating Traffic with Ping

Step 8. From the first host, send a ping to the second host to generate traffic:

```
ping 10.0.0.20
```

This will cause the hosts to exchange packets, which should be visible in Wireshark.

Verifying MAC Address Learning

Step 9. Check the MAC address table on the switch again:

```
brctl showmacs <bridge_name>
```

You should now see the learned MAC addresses from the ping traffic.

Verifying ARP Resolutions

Step 10. On the first host, check the ARP table again:

```
arp
```

You should see the MAC address of the second host listed.