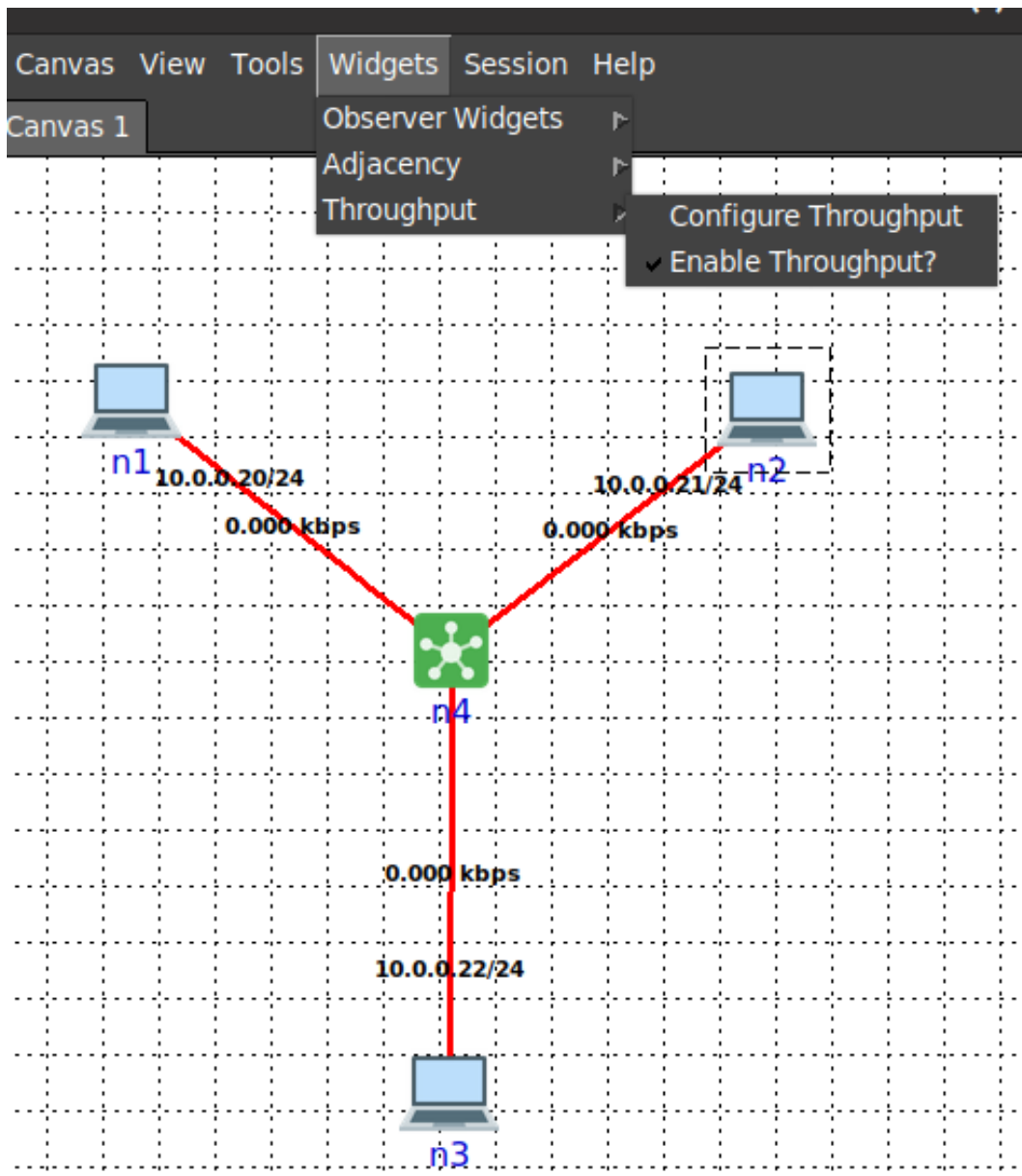# HW7 (12 points)

Setup:

1) Setup a CORE scenario as shown below. Note that the node in between n1, n2, and n3 is a "hub" node. Recall, hub nodes are broadcast devices: they repeat anything they get on an incoming port onto all other ports (no learning). Also make sure to enable the Throughput widget

Part 1: Observing ARP (6points)

1) Start the CORE scenario.
2) Observe the content of the ARP table by running the command at node n1:
    a. arp -na
    b. (1pts) What do you get as an output?
        i. No return
3) Now ping node n1 from node n2
    a. When you did a ping, n2 will automatically try to resolve the MAC address of n1 by sending an ARP Request. Node n1 will respond with an ARP Reply. Their respective ARP tables will then be populated with their MAC addresses
4) Repeat 2
    a. (10.0.0.21) at 00:00:00:aa:00:01 [ether] on eth0
5) Now we will do the adding of the IP to MAC address mapping manually to the ARP table instead of using dynamic ARP.
6) (1pts) Use the arp command to delete the ARP entry of node n2 from n1. What command did you use?
    a. arp -d 10.0.0.21
7) Repeat 2.
    a. No return
8) (1pts) Use the arp command to add an ARP entry of node n2 from n1. What command did you use?
    a. arp -s 10.0.0.21 00:00:00:aa:00:01
9) Repeat 2.
    a. ? (10.0.0.21) at 00:00:00:aa:00:01 [ether] PERM on eth0

Part 2: Observing behavior of Hub (3points)

10) Now ping node n1 from n2
11) The Throughput Widget on all three links should show activity
12) (1pts) Show a screenshot of the numbers showing on the links

a.
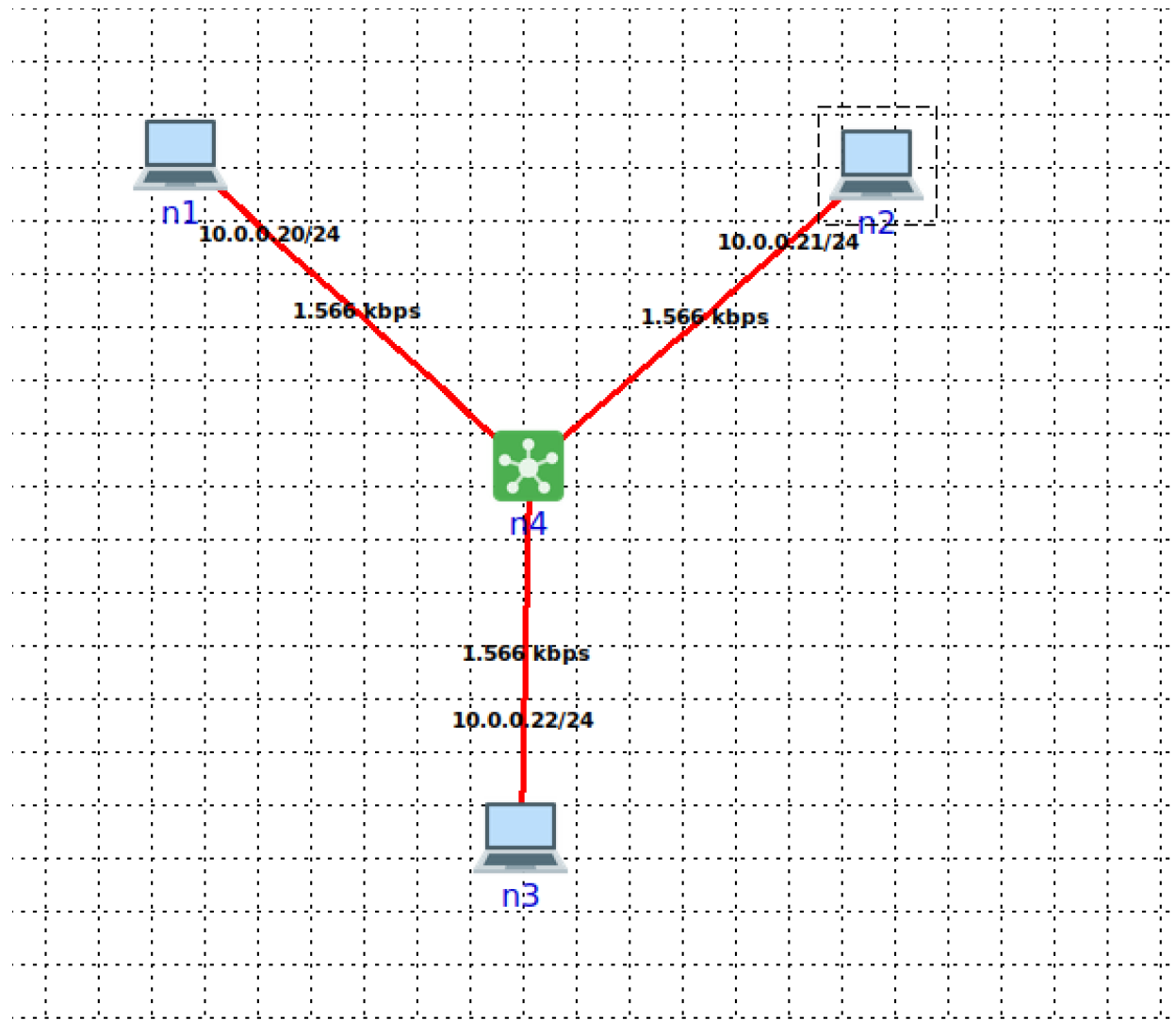
13) (2pts) Without actually performing this experiment, if you would run:
   a. An iperf TCP servers on n1
   b. An iperf TCP servers on n2
   c. An iperf TCP client on node n3 connecting to node n1.
   d. An iperf TCP client on node n3 connecting to node n2.
   e. What data rate would each client get, assuming n1 and n2 links had a capacity of 100kbps and n3 link had a capacity of 200kbps?
      i. Input flow from n3 to n1, n2 are broadcasted to both n1,n2. Resulting doubling the actual required traffic.
      ii. So as n1,n2 link has 100kbps, the real usage is around 50 kbps. So 50kbps will be reported by client.

14) Stop the scenario

Part 3: Observing behavior of Switch (3points)

15) Replace the Hub with a Switch

16) Repeat 10-14
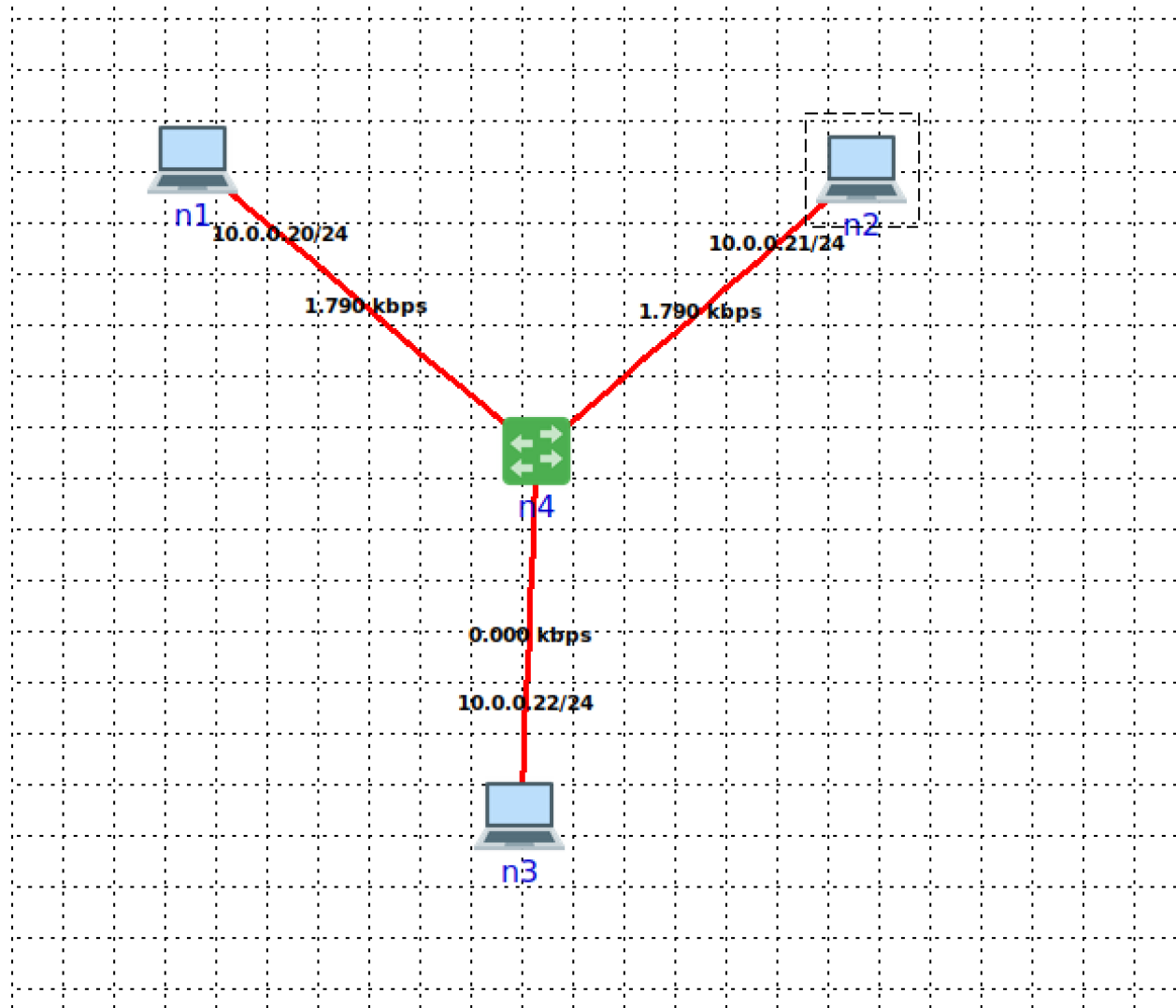
a.
b. With switch, traffics are no longer broadcasted. So n3 can establish a 100kbps link to n1 and another 100kbps link to n2. So, Both client in n3 will get 100kbps data rate.