VANIER COLLEGE – Computer Engineering Technology – Winter 2021

Network Fundamentals (247-409-VA)

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LABORATORY EXPERIMENT 9

NAT and IP Configurations

NOTE:
To be completed in one lab session of 3 hrs.
To be submitted using the typical lab format, one week later – **at the start** of your respective lab session.
This exercise is to be done individually except where specified in the procedure. **Each** student must submit a lab report with original observations and conclusions.

OBJECTIVES:

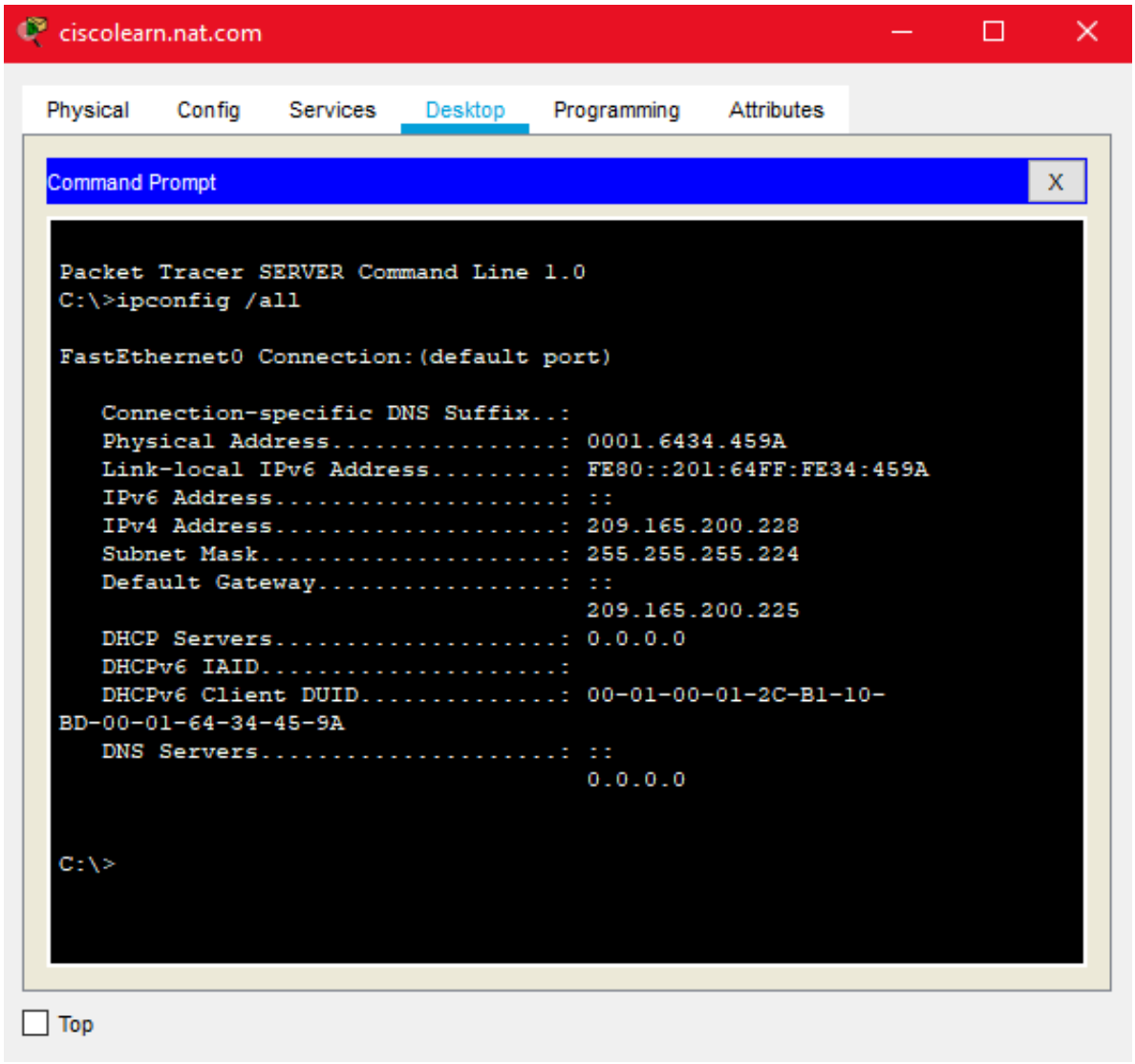
After performing this experiment, the student will be able to:

1. Examine the Linksys GUI for NAT configuration.
2. Set up 4 PCs to connect to the Linksys device with DHCP enabled.
3. Examine traffic that crosses the network using NAT.
4. Set up PCs to connect to the Linksys device with manual configuration.

PROCEDURE

1. Run the packet tracer file "247-409-Lab-9-NAT-and-IP-Configuration.pka" and follow the instructions to complete the basic setup and simulation process.
    a. Answer all questions in the packet tracer lab file and record the answers and analysis in your report.
    b. What are the IP addresses and subnet mask for the following components?
        i. Linksys router internet IP with subnet mask and local network IP with subnet mask:
            - The internet IP address is 209.165.200.227 and the subnet mask for it is 255.255.255.224 . The local network IP address is 192.168.1.1 and the subnet mask for it is 255.255.255.0 .

        ii. Server-PT.
            - The IP address is 209.165.200.228 and the subnet mask is 255.255.255.224 . Complete network details for this computer can be found in the screenshot on the next page.

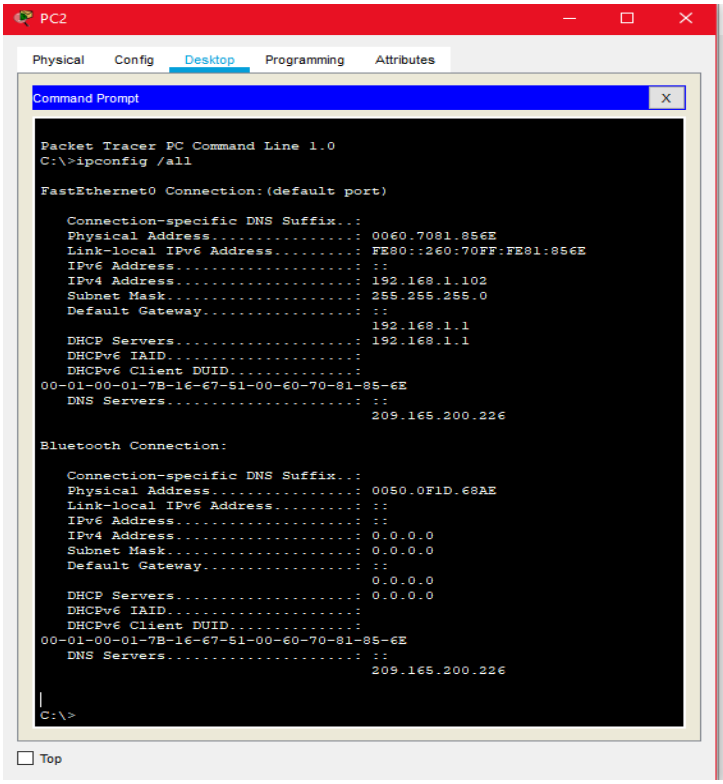


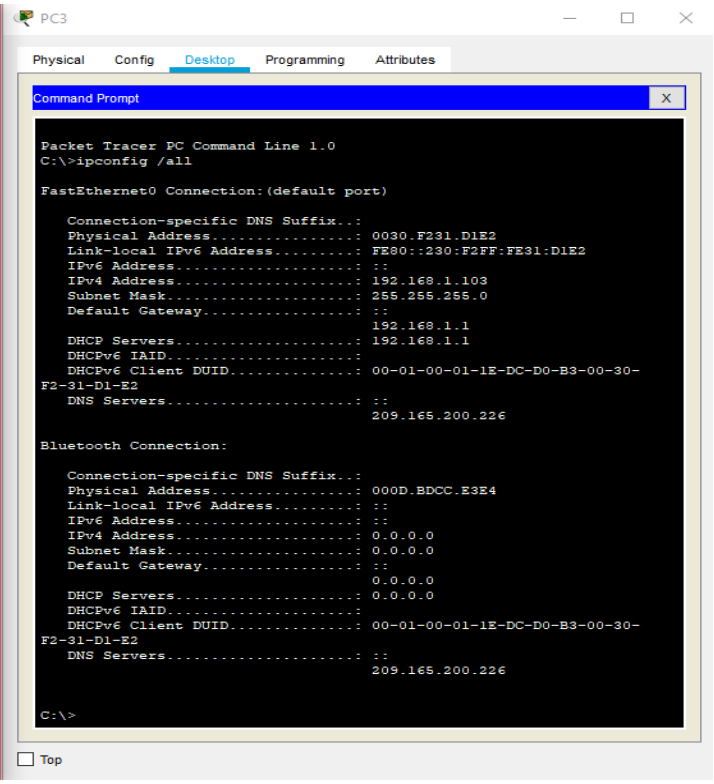
Complete network info for Server-PT shown above.

c. What are the dynamic IP addresses obtained by all the PCs (in step 3(c) of the packet tracer file)?

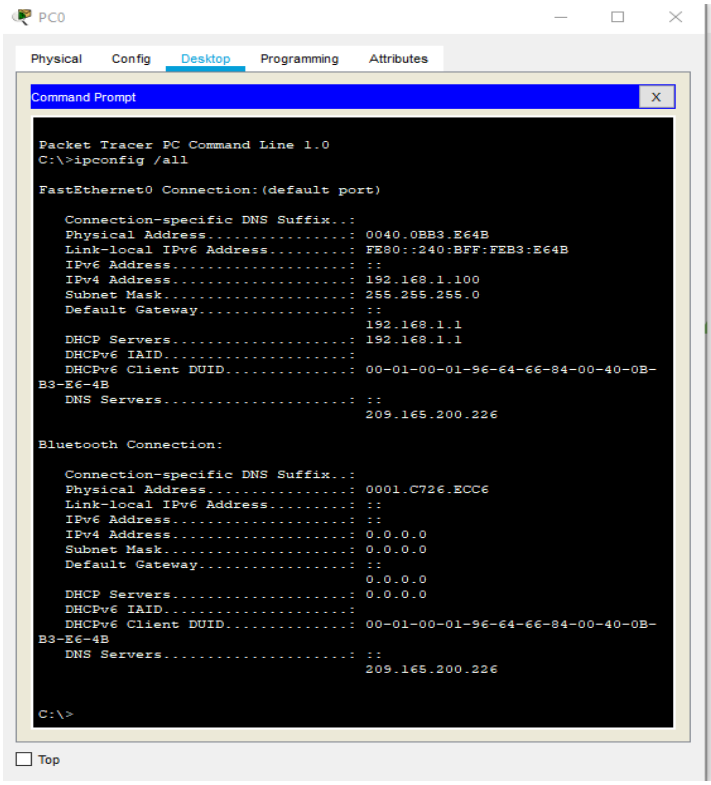
➢ See screenshots on next page for complete network details.

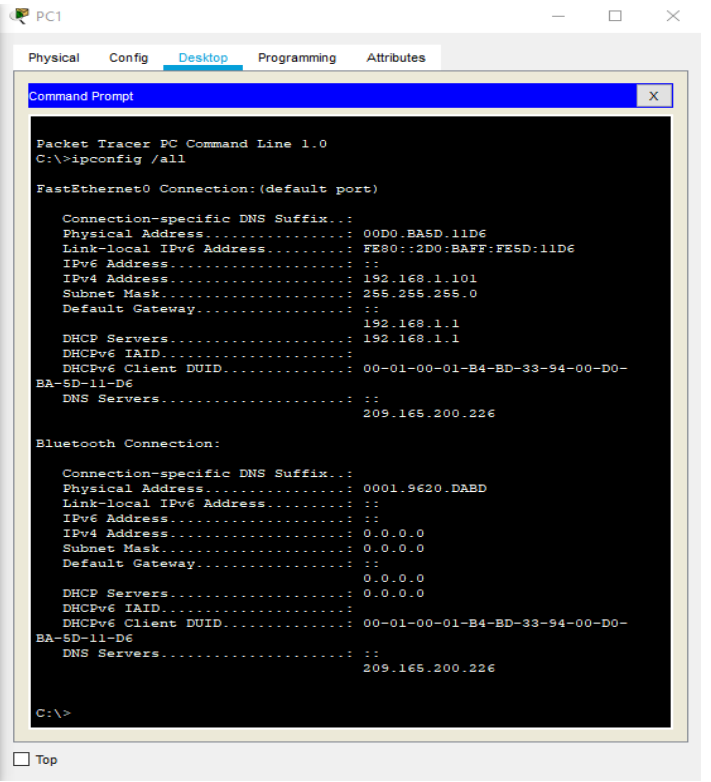
PC	DHCP assigned IP Address
PC0	192.168.1.100
PC1	192.168.1.101
PC2	192.168.1.102
PC3	192.168.1.103





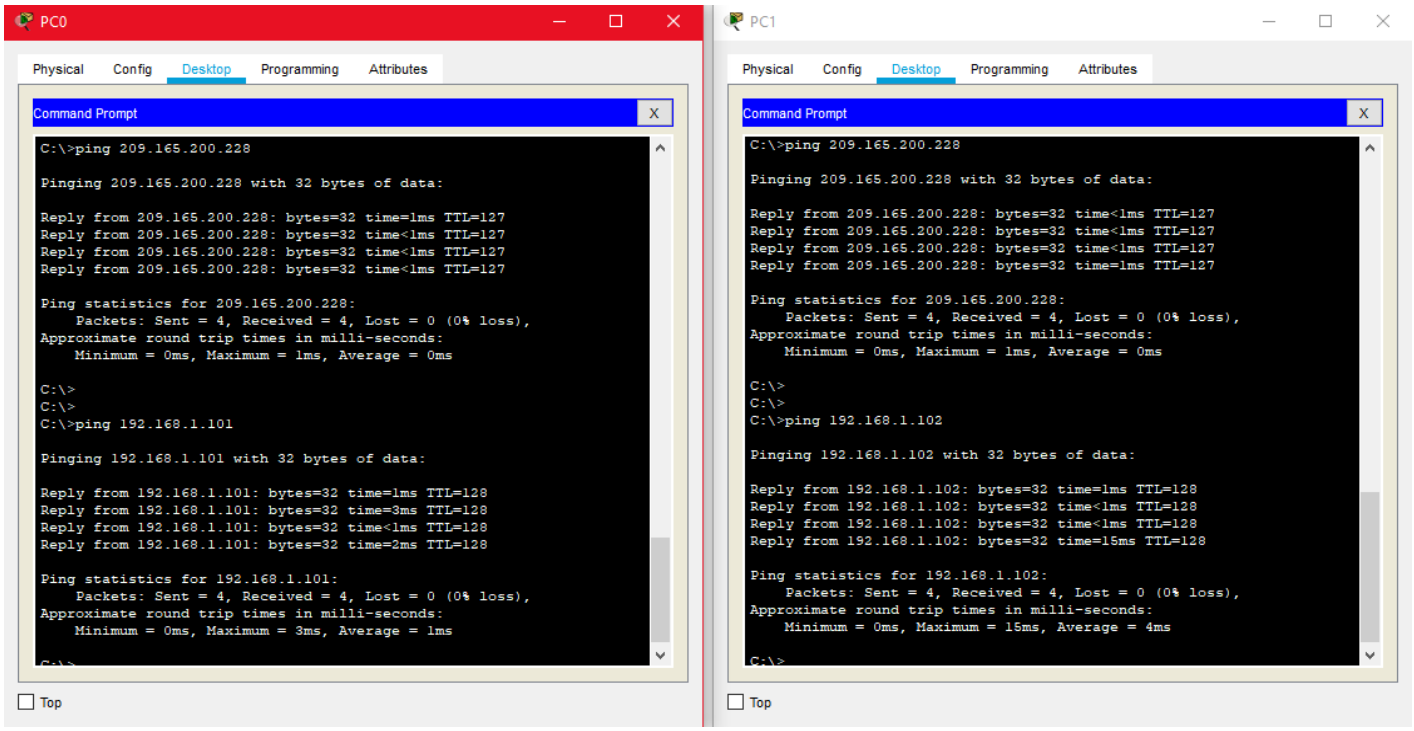
Complete network info for PC2 (left) and PC3 (right) shown above.



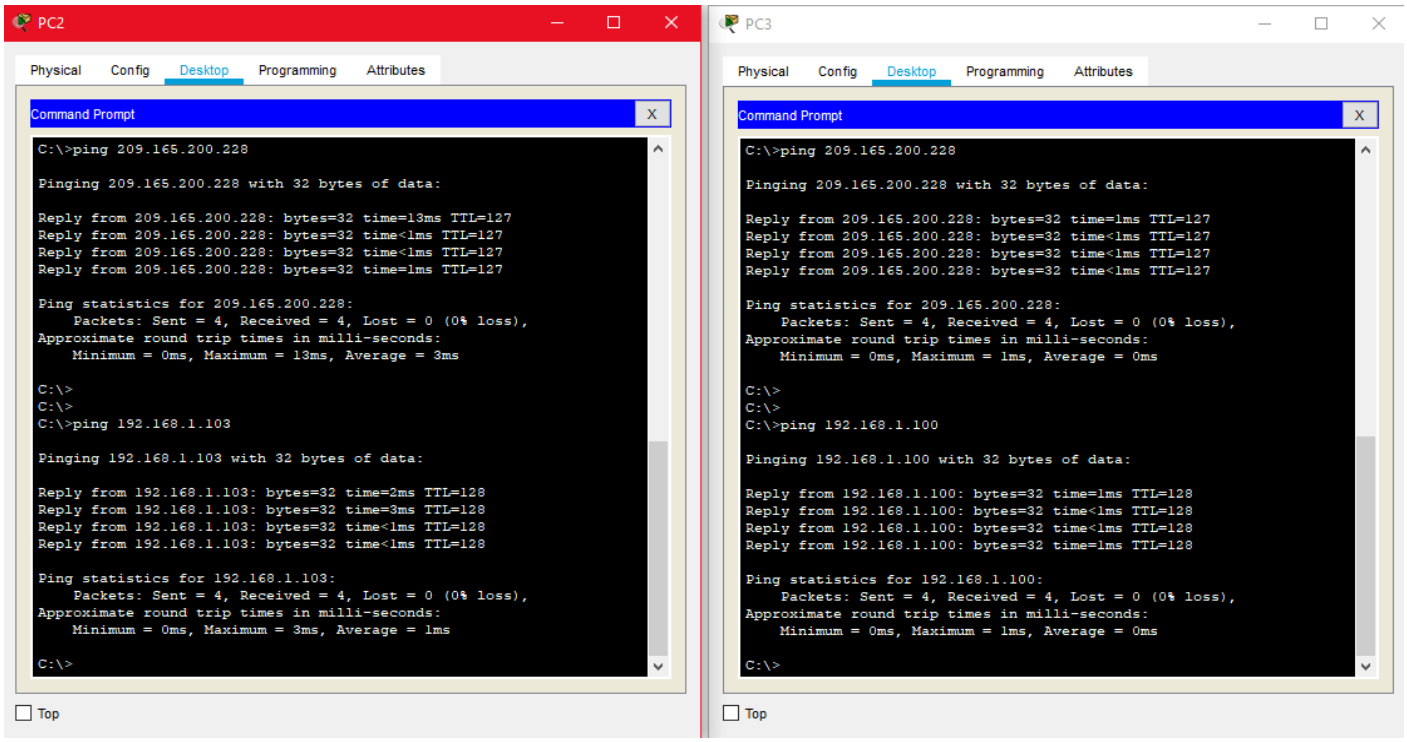


Complete network info for PC0 (left) and PC1 (right) shown above.

2. Verify connection between PCs and Server-PT using ping command.



Result of PC0 (left) and PC1 (right) after ping command executed. PC0 can ping PC1 and PC1 can ping PC2.



Result of PC2 (left) and PC3 (right) after ping command executed. PC2 can ping PC3 and PC3 can ping PC1.

3. Disable DHCP server on Linksys router and perform manual IP configuration on the local network. In this step, you will manually reconfigure Linksys local network based on 3rd subnet of 192.168.1.0 /27.
    a. Work out the following parameters-based subnet design for 192.168.1.0/27:
        i. Address class and custom subnet mask.

*Note: red indicates number of bits borrowed. Orange indicates host bits.

Address class	Default subnet mask	Custom subnet mask
Class C address	(1111 1111.1111 1111.1111 1111.0000 0000) 255.255.255.0	(1111 1111.1111 1111.1111 1111.1110 0000) 255.255.255.224

        ii. Total number of subnets.
            - 8 subnets (2^# of bits borrowed = 2^3 = 8).

        iii. Total number of host addresses.
            - 32 per subnet (2^# of bits left for host = 2^5 = 32).

        iv. What is the subnet broadcast address for the 3rd subnet?

255.255.255.224 -> 1111 1111.1111 1111.1111 1111.1110 0000
192.168.1.0 -> 1100 0000.1010 1000.0000 0001.0000 0000

Subnet Number	Subnet Address *2 = 010	Usable Host Range	Broadcast Address
2 (3rd subnet)	(1100 0000.1010 1000.0000 0001.0100 0000) 192.168.1.64	192.168.1.65 to 192.168.1.94	(1100 0000.1010 1000.0000 0001.0101 1111) 192.168.1.95

        v. What is the 3rd subnet range?
            - Look at table above.

b. Access the Linksys GUI menu, click the **Setup** menu option. Disable DHCP server.

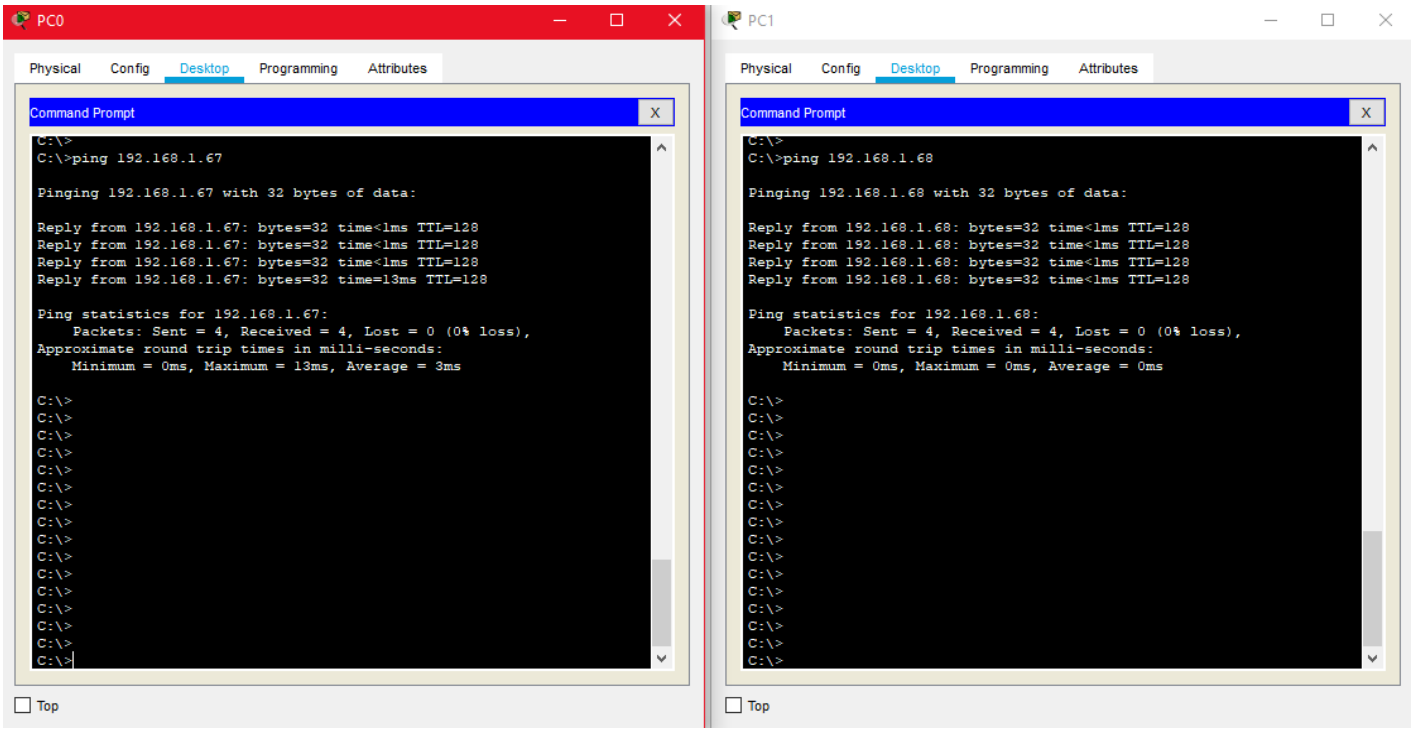
c. Change the **IP address** and **Subnet Mask**, based on 3rd subnet of 192.168.1.0/27. Assign the *first usable address* to this IP setting.

d. Set all your PCs' network interface to **Static** configuration, and assign them with the appropriate **IP address**, **subnet mask** and **gateway**.

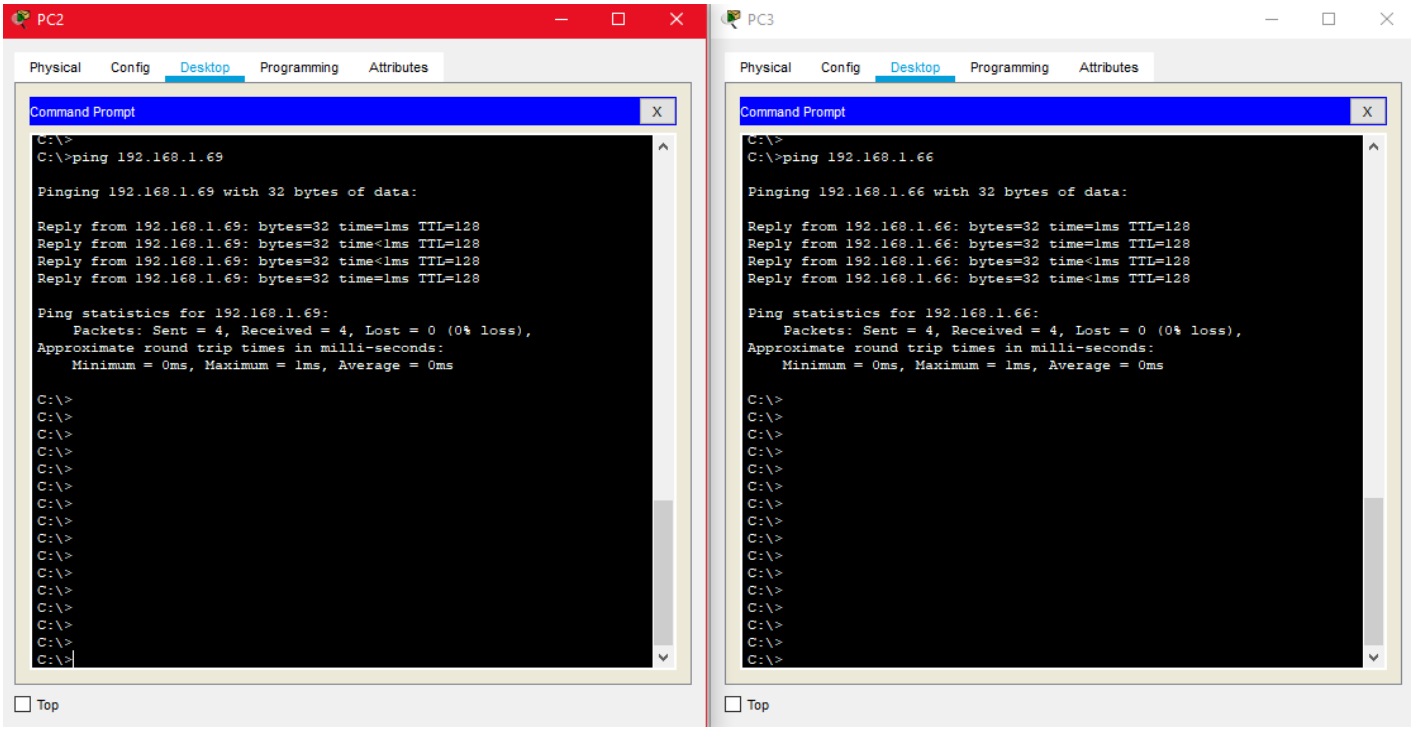
4. Verify connectivity by pinging between the PC and Server-PT. Show your results and submit a copy of your final packet tracer file via MS Teams.

➢ New IP addresses assigned to PCs manually can be found in the table below (based off calculations done on the previous page). Connectivity test results can be found on the next page.

PC	New static assigned IP Address
PC0	192.168.1.66 (192.168.1.65 is the Linksys router)
PC1	192.168.1.67
PC2	192.168.1.68
PC3	192.168.1.69



Result of PC0 (left) and PC1 (right) after ping command executed. PC0 can ping PC1 and PC1 can ping PC2.



Result of PC2 (left) and PC3 (right) after ping command executed. PC2 can ping PC3 and PC3 can ping PC1.

Questions from PT activity file

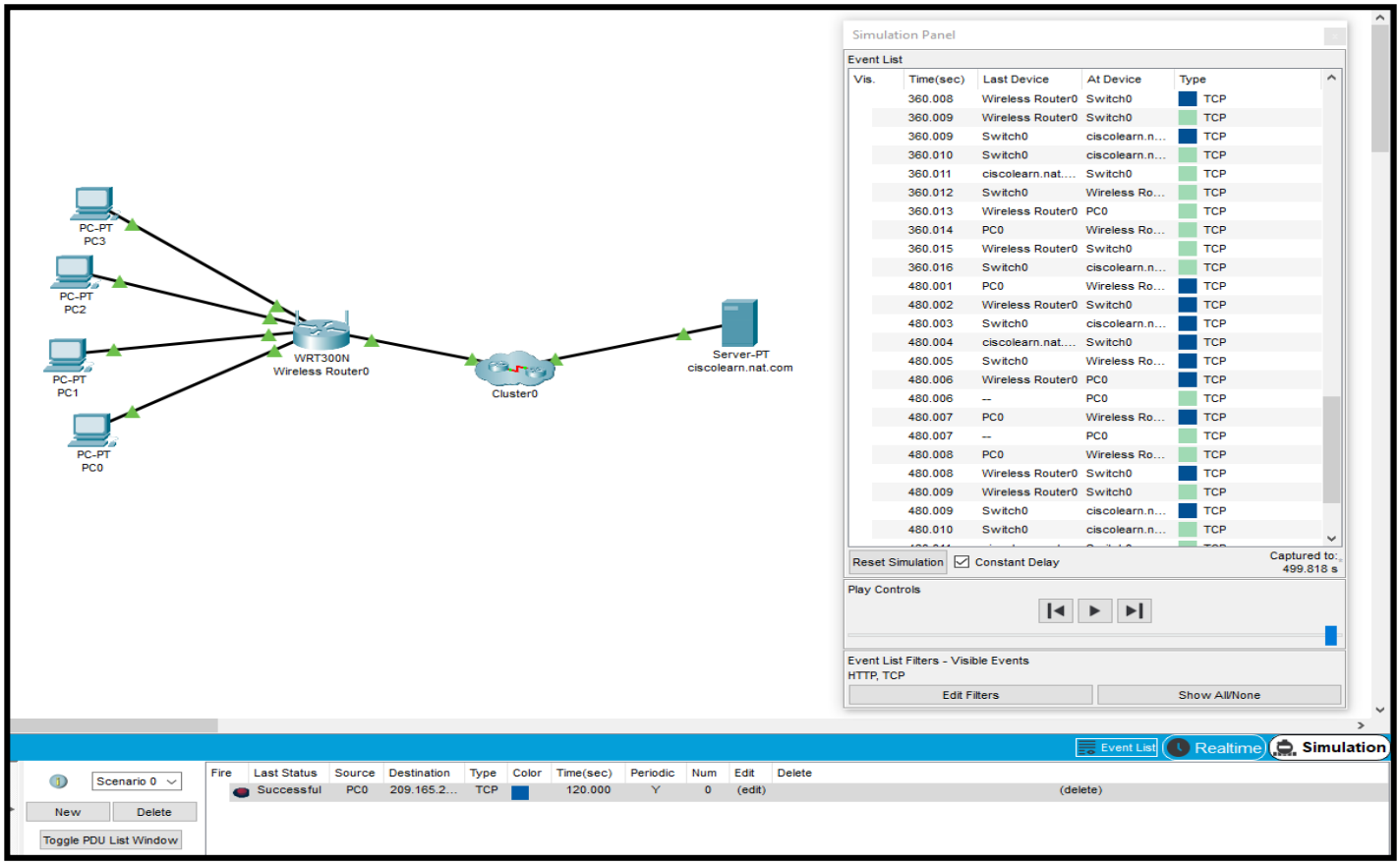
From step 1:

- The address shown is assigned to the Internet port on the Linksys device. Is this a private or public address?
  - This is a public IP address (unique to the outside of the network – handled by the ISP).

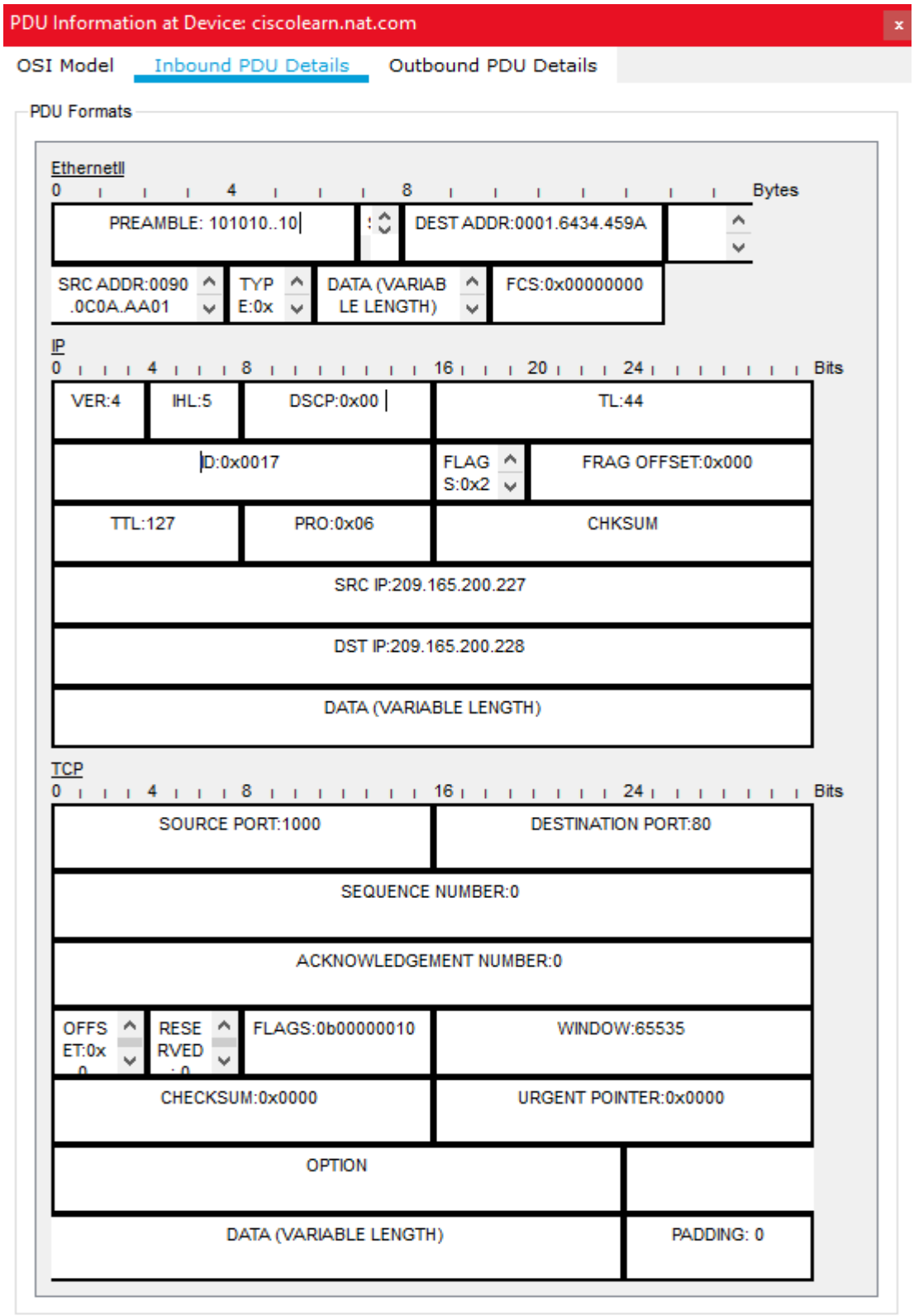
From step 2:

- Are these private or public addresses?
  - These are private IP addresses (unique to the inside of the network).

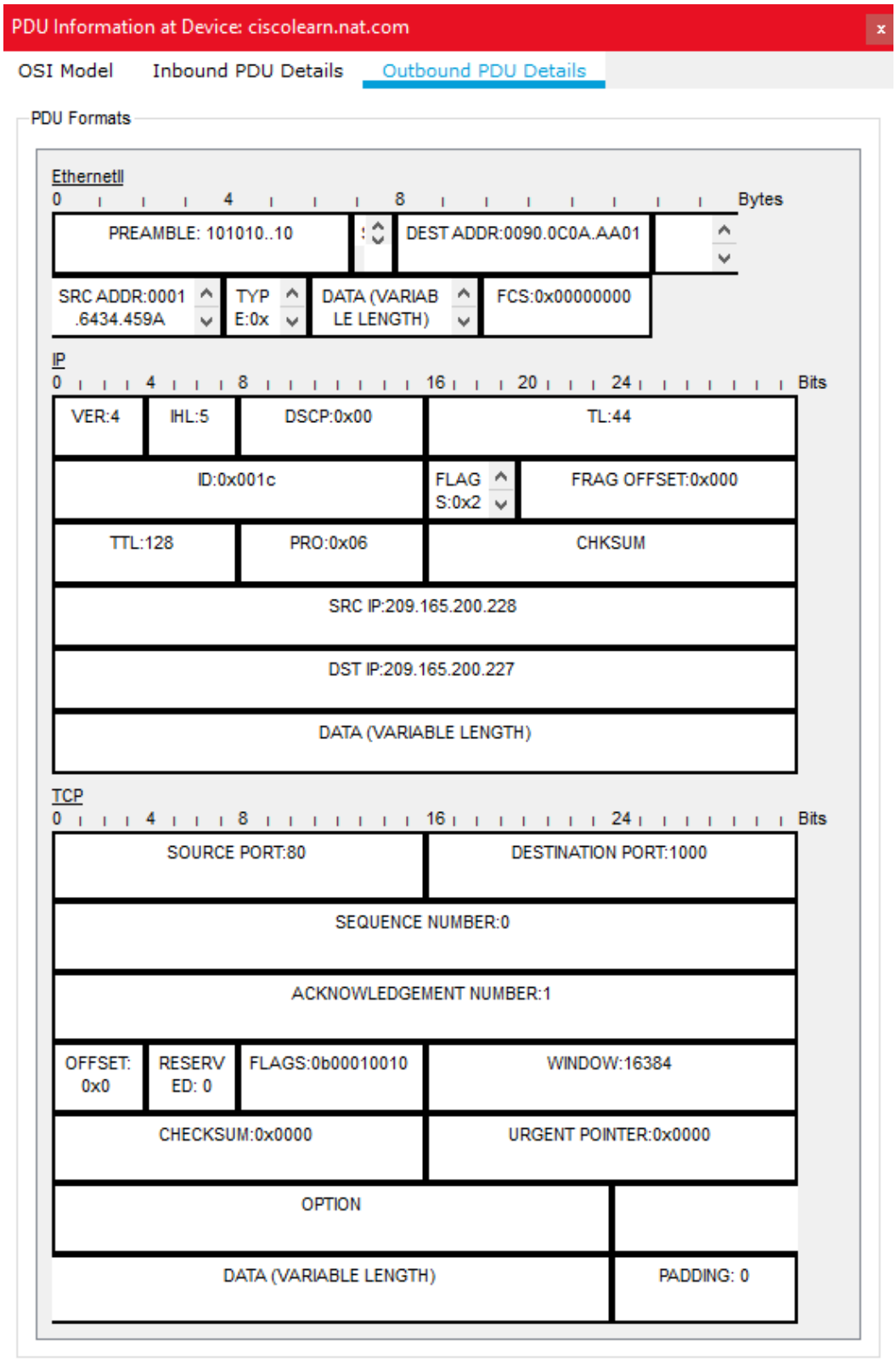
Examining NAT in PT activity file



Result after simulation was done executing shown above (done in Step 4 in PT activity file). Event list is fully populated.



Result from Step 5 a2a in PT activity file. Source (SRC) IP address is 209.165.200.227 (ISP router) and the destination (DST) IP address is 209.165.200.228 (Server-PT). The complete opposite will be seen on the next page.



Result from Step 5 a2b in PT activity file. Here, the source IP address and the destination address have been swapped. The source IP address is now 209.165.200.228 (Server-PT) and the destination IP address is 209.165.200.227 (ISP router).