

# NAT Lab Workshop

## Objective

The purpose of this workshop is to observe the mapping of an IP address space into another. The tool that will be used to keep track of IP addresses and port numbers is Wireshark. Network address translation (NAT) is a method of remapping one IP address space into another by modifying network address information in Internet Protocol (IP) datagram packet headers while they are in transit across a traffic routing device.

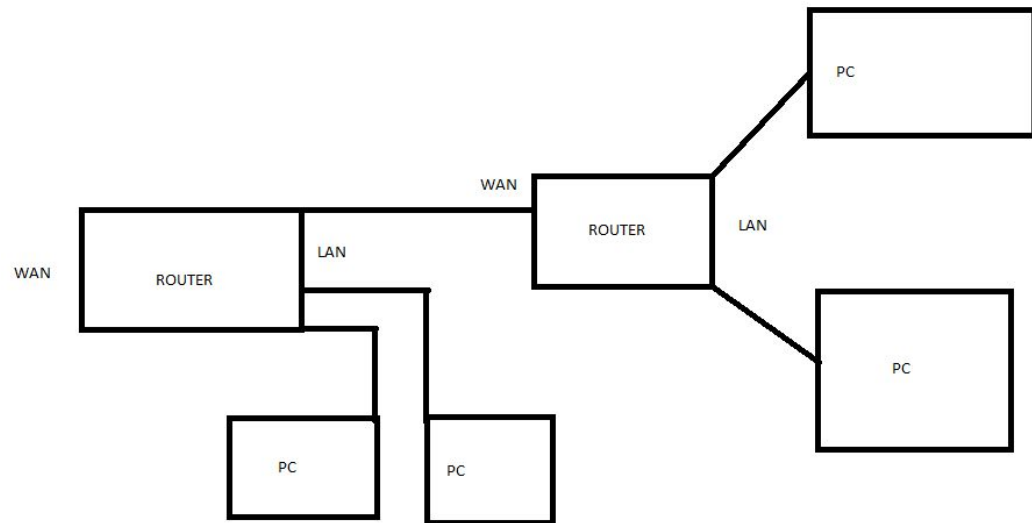
## Tools

- Two routers
  - One router is used as the local/client router, the other router will act as the host router
- At least two computers; one connected to each of the LAN connections of each router
- Wireshark application on both client-side computers and host-side computers - used to track the IP addresses of requests
- Ethernet cables

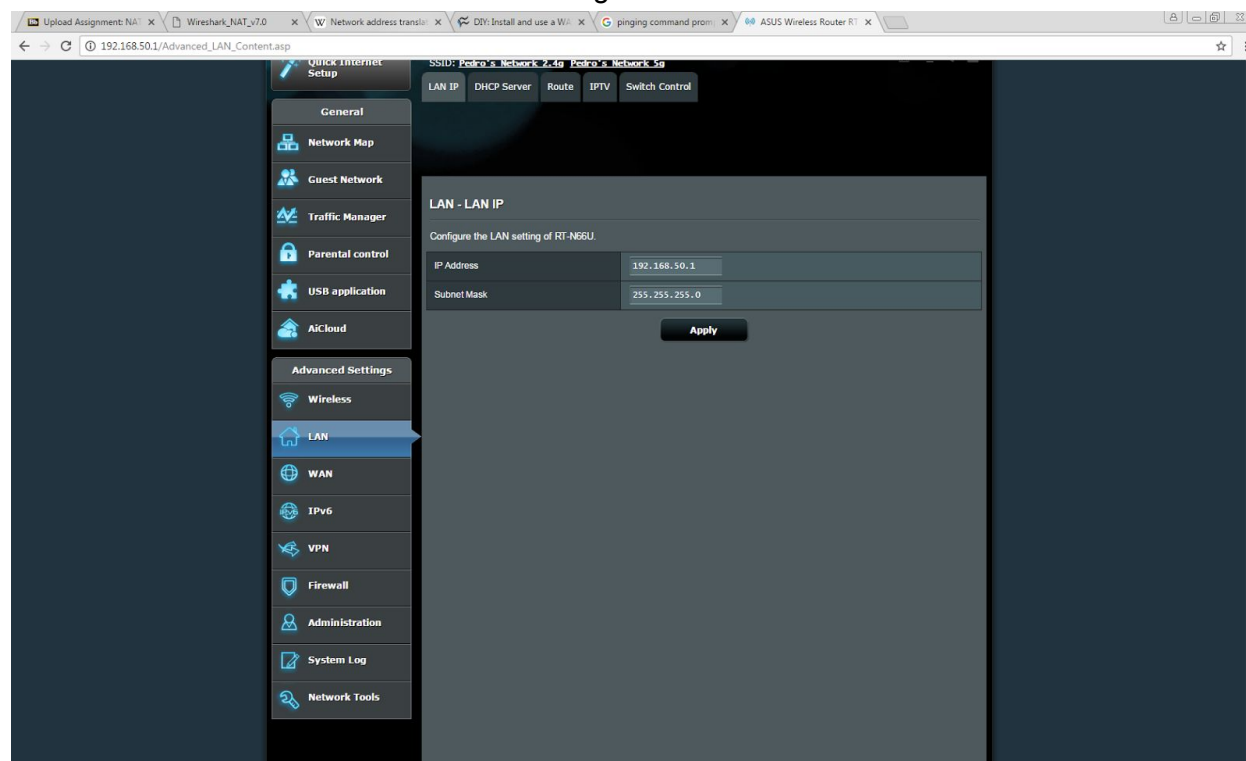
## Instructions

1. Plug in routers with power cords
2. Connect host-related computers to 'host' router
3. Connect client-side computers to the client router
4. Connect host router's LAN to client routers WAN connection ports
5. Every client-side and host-side computer should use their command prompt/terminal using 'ipconfig' to learn their own personal IP address

- The following illustration represents our correct example configuration of the router connections



- Once all connections are made and routers are running, change the host-side router's IP address from the standard 192.168.1.1 to a different IP address (we used 192.168.50.1)
  - You must access the router's dashboard using a browser



- Ensure computers within the client-side router can connect to each other and ensure that computers on the host-side router can also connect to each other via using ping.
- When both local area networks are connected, from the client-side computer, ping an ip address of a host-side computer. A connection from client-side computer to host-side

should be the only way a connection can/should be made. Not from host-side to client-side. Singular directional

9. Once the connection between host and client is successfully made via ping, run Wireshark on both computers.
10. Both the host-side and the client-side computer select 'local area network' from the opening screen of Wireshark
11. From the next screen, click 'Start'
12. This will cause both computers to 'Start' listening for packets across the local network
13. Ping the host-side from the client-side computer once more
14. Stop listening for packets on Wireshark
15. Filter the output from the packet output window to "icmp", which shows all of the ping connections.
16. You should see 8 total packets labelled ICMP. 4 ping 'requests' and 4 ping 'responses'.

**-The end of the document provides a summary report of the ping request between the client and host-**

## Questions

1. Why are two routers needed for a client/host LAN connection?
2. Why would it be needed to change the router IP address?
3. When emulating our example layout, why does can the ping/connection be made uni-directionally? (Hint: think hardware)
4. Define the difference between the LAN and WAN ports on a router.

Local Area Connection

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icmp

No.	Time	Source	Destination	Protocol	Length	Info
478	27.326819	192.168.50.72	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=31/7936, ttl=127 (reply in 479)
479	27.326939	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=31/7936, ttl=128 (request in ...)
501	28.329981	192.168.50.72	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=32/8192, ttl=127 (reply in 502)
502	28.330099	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=32/8192, ttl=128 (request in ...)
525	29.337553	192.168.50.72	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=33/8448, ttl=127 (reply in 526)
526	29.337671	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=33/8448, ttl=128 (request in ...)
559	30.351026	192.168.50.72	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=34/8704, ttl=127 (reply in 560)
560	30.351146	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=34/8704, ttl=128 (request in ...)

Frame 559: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0  
Ethernet II, Src: AsustekC\_b0:4f:58 (ac:9e:17:b0:4f:58), Dst: Dell\_c4:f0:7f (98:90:96:c4:f0:7f)  
Internet Protocol Version 4, Src: 192.168.50.72, Dst: 192.168.50.53  
Internet Control Message Protocol

0000 98 90 96 c4 f0 7f ac 9e 17 b0 4f 58 08 00 45 00 ..... ..OX..E.  
0010 00 3c 19 9a 00 00 7f 01 3c 59 c0 a8 32 48 c0 a8 ..<..... <Y..2H..  
0020 32 35 08 00 4d 39 00 01 00 22 61 62 63 64 65 66 25..M9.. "abcdef  
0030 67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 ghijklmn opqrstuv  
0040 77 61 62 63 64 65 66 67 68 69 wabdefgh hi

wireshark\_pcapng\_BD1E4D93-141B-4F69-8145-BEF3C23EC3F3\_20170315110457\_a01300

Packets: 670 · Displayed: 8 (1.2%) · Dropped: 0 (0.0%) Profile: Default

Local Area Connection

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icmp

No.	Time	Source	Destination	Protocol	Length	Info
43	4.253154	192.168.1.27	10.0.0.1	ICMP	74	Echo (ping) request id=0x0001, seq=438/46593, ttl=32 (no response found)
75	6.153839	192.168.1.27	10.0.0.1	ICMP	74	Echo (ping) request id=0x0001, seq=439/46649, ttl=32 (no response found)
117	8.154897	192.168.1.27	10.0.0.1	ICMP	74	Echo (ping) request id=0x0001, seq=440/47105, ttl=32 (no response found)
147	10.143883	192.168.1.27	10.0.0.1	ICMP	74	Echo (ping) request id=0x0001, seq=441/47361, ttl=32 (no response found)
544	48.195776	192.168.1.27	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=442/47617, ttl=128 (reply in 545)
545	48.196012	192.168.50.53	192.168.1.27	ICMP	74	Echo (ping) reply id=0x0001, seq=442/47617, ttl=127 (request in 544)
578	49.199566	192.168.1.27	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=443/47873, ttl=128 (reply in 579)
579	49.200173	192.168.50.53	192.168.1.27	ICMP	74	Echo (ping) reply id=0x0001, seq=443/47873, ttl=127 (request in 578)
585	50.203915	192.168.1.27	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=444/48129, ttl=128 (reply in 586)
586	50.204426	192.168.50.53	192.168.1.27	ICMP	74	Echo (ping) reply id=0x0001, seq=444/48129, ttl=127 (request in 585)
603	51.209026	192.168.1.27	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=445/48385, ttl=128 (reply in 604)
604	51.209670	192.168.50.53	192.168.1.27	ICMP	74	Echo (ping) reply id=0x0001, seq=445/48385, ttl=127 (request in 603)

Frame 429: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0  
Ethernet II, Src: Dell\_ca:6a:99 (98:90:96:ca:6a:99), Dst: AsustekC\_b0:4f:58 (ac:9e:17:b0:4f:58)  
Internet Protocol Version 4, Src: 192.168.1.27, Dst: 10.0.0.1  
Internet Control Message Protocol

0000 ac 9e 17 b0 4f 58 90 96 ca 6a 99 08 00 45 00 ..... ..OX..E.  
0010 00 3c 19 9a 00 00 7f 01 3c 59 c0 a8 32 48 c0 a8 ..<..... <Y..2H..  
0020 00 01 00 00 4d 39 00 01 00 22 61 62 63 64 65 66 25..M9.. "ABCDEF  
0030 47 48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 GHIJKLMNOPQRSTUVWXYZ  
0040 57 41 42 43 44 45 46 47 48 49

Internet Control Message Protocol: Protocol

Packets: 4438 · Displayed: 12 (0.3%) Profile: Default

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\*Local Area Connection

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icmp

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526	29.337671	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=33/8448, ttl=128 (request in ...)
→ 559	30.351026	192.168.50.72	192.168.50.53	ICMP	74	Echo (ping) request id=0x0001, seq=34/8704, ttl=127 (reply in 560)
← 560	30.351146	192.168.50.53	192.168.50.72	ICMP	74	Echo (ping) reply id=0x0001, seq=34/8704, ttl=128 (request in ...)

▶ Frame 560: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0  
 ▶ Ethernet II, Src: Dell\_c4:f0:7f (98:90:96:c4:f0:7f), Dst: AsustekC\_b0:4f:58 (ac:9e:17:b0:4f:58)  
 ▶ Internet Protocol Version 4, Src: 192.168.50.53, Dst: 192.168.50.72  
 ▶ Internet Control Message Protocol

0000	ac 9e 17 b0 4f 58 98 90 96 c4 f0 7f 08 00 45 00	....OX.. .....
0010	00 3c 43 21 00 00 80 01 00 00 c0 a8 32 35 c0 a8	..<C!.... ..25..
0020	32 48 00 00 55 39 00 01 00 22 61 62 63 64 65 66	2H..U9.. ."abcdef
0030	67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76	ghijklmn opqrstuv
0040	77 61 62 63 64 65 66 67 68 69	wabdefgh hi

Bytes 0-2: IG bit (eth.ig)

Packets: 670 · Displayed: 8 (1.2%) · Dropped: 0 (0.0%) Profile: Default