

# NAT (Network Address Translation)

## Participated Groups:

### Group Number: 20

Student 1: Kübra Özdamar

Student 2: Kerem Aydoğan

### Group Number: 6

Student 1: Ayça Akyol

Student 2: Gamze Ergin

### Group Number: 5

Student 1: Oğuz GÖZLÜ

Student 2: Betül Sema MANAV

Before starting we'd like to note that our router's name was Router-Section-1-Group-1, likely left over from the previous section as we were the GROUP 4 in section 2 but we did not change the name in the lab.

```
Router-Section-1-Group-1#show user
  Line      User      Host(s)      Idle      Location
*  0 con 0
  idle      00:00:00

  Interface  User      Mode      Idle      Peer Address
```

Figure 1: show user command on our gateway router before any configuration

## Basic Router Configurations

In this part we configure password settings in order to be able to use telnet to connect to other routers in the network.

```
Router-Section-1-Gro(config)#enable pas
Router-Section-1-Gro(config)#enable password cisco
Router-Section-1-Gro(config)#line vty 0 4
Router-Section-1-Gro(config-line)#passwo
Router-Section-1-Gro(config-line)#password ciscot
Router-Section-1-Gro(config-line)#login
Router-Section-1-Gro(config-line)#end
Router-Section-1-Group-1#
*Jan  1 00:54:04.271: %SYS-5-CONFIG I: Configured from console by console
```

Figure 2: setting the enable password and the telnet password

After setting the passwords accordingly, we've logged out of the router's interface using the **disable** command and logged back in with the **enable** command and the set password.

```
Router-Section-1-Group-1#disable
Router-Section-1-Group-1>enable
Password:
Password:
Password:
Router-Section-1-Group-1#~
```

*Figure 3: Logout and login to the router's interface*

After running show running-config and inspecting the config details, we've seen that our password was stored in plain text as we hadn't set encryption, see the configuration details in the screenshot below.

```
Router-Section-1-Group-1#show running-config
Building configuration...

Current configuration : 1031 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router-Section-1-Group-1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$bwyd$RURC.o5K0QlELh.jSdKd00
enable password cisco
!
no aaa new-model
!
resource policy
!
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
ip subnet-zero
ip cef
!
```

*Figure 4: running-config details, plain text password highlighted*

The screenshot below demonstrates the usage of the command **service password-encryption** and showcases the changes on the running-config after running the command.

```

Router-Section-1-Gro(config)#service password-encryption
Router-Section-1-Gro(config)#show
Router-Section-1-Gro(config)#show r
Router-Section-1-Gro(config)#exit
Router-Section-1-Group-1#show r
Router-Section-1-Group-1#show r
*Jan  1 00:58:03.959: %SYS-5-CONFIG_I: Configured from console by conso
% Type "show ?" for a list of subcommands
Router-Section-1-Group-1#show runn
Router-Section-1-Group-1#show running-config
Building configuration...

Current configuration : 1047 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname Router-Section-1-Group-1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$bwyd$rURC.o5K0QlELh.jSdkd00
enable password 7 045802150C2E
!
no aaa new-model
!
resource policy
!
mmi polling-interval 60
no mmi auto-configure
no mmi pvc

```

*Figure 5: running-config details, encrypted password highlighted*

Once we were ready to telnet the routers other than our gateway router, we've logged in on those routers using telnet and ran **show users** command to see the logged-in connections on those routers, you can observe that we've logged in on routers with interface IP addresses **10.200.7.2**, **10.200.8.2** and **10.200.9.2** in the screenshots below.

**NOTE:** We've used reverse telnet to connect to other routers in the following screenshots (fig. 6 and fig. 7), jumping from our router to the other routers. That is why our IP address in the following screenshots is shown as 10.200.7.1.

```

Router-Section-1-Group-1#telnet 10.200.7.2
Trying 10.200.7.2 ... Open

User Access Verification

Password:
Section2_Group3>show users

```

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:00:01	
* vty 195		idle	00:00:00	10.200.7.1
vty 196		idle	00:00:00	10.100.9.3

Figure 6: Connection with 10.200.7.2

```

Router-Section-1-Group-1#telnet
*Jan 1 01:06:39.795: %SYS-5-CONFIG_I: Configured from console by console
Host: 10.200.8.2
Trying 10.200.8.2 ... Open

User Access Verification

Password:
Router>show user

```

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:00:23	
* vty 194		idle	00:00:00	10.200.7.1

```

Interface      User           Mode          Idle      Peer Address
Router>exit

[Connection to 10.200.8.2 closed by foreign host]
Router-Section-1-Group-1#telnet 10.200.9.2
Trying 10.200.9.2 ... Open

User Access Verification

Password:
Router1>show users

```

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:05:20	
vty 194		idle	00:01:37	10.100.8.2
* vty 195		idle	00:00:09	10.200.7.1

```

Interface      User           Mode          Idle      Peer Address
Router1>

```

Figure 7: Connections with 10.200.8.2 and 10.200.9.2

As you can also see in the above figure, on the connection with 10.200.9.2, we could see another logged-in connection on the router.

## Router NAT Configurations

```
Router-Section-1-Gro(config)#interface fa
Router-Section-1-Gro(config)#interface fastEthernet 0/0
Router-Section-1-Gro(config-if)#ip na
Router-Section-1-Gro(config-if)#ip nat ins
Router-Section-1-Gro(config-if)#ip nat inside
Router-Section-1-Gro(config-if)#
*Jan 1 01:01:19.679: %LINEPROTO-5-UPDOWN: Line protocol on Interface NVI0, changed state to upexit
Router-Section-1-Gro(config)#inter
Router-Section-1-Gro(config)#interface seri
Router-Section-1-Gro(config)#interface serial 0/0/0
Router-Section-1-Gro(config-if)#ip na
Router-Section-1-Gro(config-if)#ip nat out
Router-Section-1-Gro(config-if)#ip nat outside
Router-Section-1-Gro(config-if)#exit
Router-Section-1-Gro(config)#
```

### Dynamic NAT and Overloading NAT

```
Router-Section-1-Gro(config)#ip nat pool pool7 10.100.7.99 10.100.7.99 netm
Router-Section-1-Gro(config)#$100.7.99 10.100.7.99 netmask 255.255.255.0
Router-Section-1-Gro(config)#acce
Router-Section-1-Gro(config)#access-list 10 permit 10.100.7.0 0.0.0.255
Router-Section-1-Gro(config)#ip nat in
Router-Section-1-Gro(config)#ip nat inside sour
Router-Section-1-Gro(config)#ip nat inside source lis
Router-Section-1-Gro(config)#ip nat inside source list 10 po
Router-Section-1-Gro(config)#ip nat inside source list 10 pool pool7 overload
Router-Section-1-Gro(config)#
```

Try to ping other groups' client IP addresses and translated IP addresses. Discuss the results.

```
cc-mim@lsg-mim:~$ ssh root@10.100.7.99
[root@localhost ~]# ping 10.100.10.1
PING 10.100.10.1 (10.100.10.1) 56(84) bytes of data.

--- 10.100.10.1 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 999ms

[root@localhost ~]# ping 10.100.9.2
PING 10.100.9.2 (10.100.9.2) 56(84) bytes of data.

--- 10.100.9.2 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 999ms

[root@localhost ~]# ping 10.100.9.2
PING 10.100.9.2 (10.100.9.2) 56(84) bytes of data.

--- 10.100.9.2 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 999ms

[root@localhost ~]# ping 10.100.9.99
PING 10.100.9.99 (10.100.9.99) 56(84) bytes of data.
64 bytes from 10.100.9.99: icmp_seq=1 ttl=61 time=49.1 ms
64 bytes from 10.100.9.99: icmp_seq=2 ttl=61 time=48.0 ms

--- 10.100.9.99 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 999ms
rtt min/avg/max/mdev = 48.078/48.622/49.167/0.587 ms
```

```

[root@localhost ~]# ping 10.100.8.99
PING 10.100.8.99 (10.100.8.99) 56(84) bytes of data.
64 bytes from 10.100.8.99: icmp_seq=1 ttl=62 time=25.1 ms
64 bytes from 10.100.8.99: icmp_seq=2 ttl=62 time=24.2 ms
64 bytes from 10.100.8.99: icmp_seq=3 ttl=62 time=24.0 ms

--- 10.100.8.99 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 24.089/24.486/25.141/0.500 ms
[root@localhost ~]# ping 10.100.10.99
PING 10.100.10.99 (10.100.10.99) 56(84) bytes of data.
64 bytes from 10.100.10.99: icmp_seq=1 ttl=252 time=73.0 ms
64 bytes from 10.100.10.99: icmp_seq=2 ttl=252 time=71.8 ms
64 bytes from 10.100.10.99: icmp_seq=3 ttl=252 time=71.8 ms

--- 10.100.10.99 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1999ms
rtt min/avg/max/mdev = 71.852/72.246/73.006/0.620 ms
[root@localhost ~]# ping 10.100.8.2
PING 10.100.8.2 (10.100.8.2) 56(84) bytes of data.

--- 10.100.8.2 ping statistics ---
18 packets transmitted, 0 received, 100% packet loss, time 17001ms

[root@localhost ~]# 

```

Use show ip nat translation command to show translated IP addresses and port numbers. Discuss each column on the table (inside/outside, local/global).

```

Router-Section-1-Group-1#show ip nat translations
Pro Inside global      Inside local           Outside local          Outside global
icmp 10.100.7.99:1128   10.100.7.3:1128       10.100.10.99:1128     10.100.10.99:1128
icmp 10.100.7.99:1384   10.100.7.3:1384       10.100.8.2:1384       10.100.8.2:1384
icmp 10.100.7.99:38412  10.100.7.99:38412     10.100.10.99:38412    10.100.10.99:38412
tcp  10.100.7.99:23     10.100.7.254:23       10.100.10.1:42696     10.100.10.1:42696
Router-Section-1-Group-1#

```

Connect to other remote Routers using telnet, and display connected users and observe your IP address.

```
[root@localhost ~]# telnet 10.200.9.2
Trying 10.200.9.2 ... Open
```

User Access Verification

Password:

Router1>show users

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:00:15	
vty 194		10.200.9.2	00:00:00	10.100.7.99
* vty 195		idle	00:00:09	10.200.9.2
vty 196		idle	00:03:52	10.100.9.99

Interface	User	Mode	Idle	Peer Address
-----------	------	------	------	--------------

```
[root@localhost ~]# telnet 10.200.7.2
Trying 10.200.7.2 ... Open
```

User Access Verification

Password:

Section2\_Group3>show users

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:04:36	
* vty 194		idle	00:00:00	10.100.7.99

Interface	User	Mode	Idle	Peer Address
-----------	------	------	------	--------------

Section2\_Group3>exit

```
[root@localhost ~]# telnet 10.200.9.1
Trying 10.200.9.1 ... Open
```

User Access Verification

Password:

Router>show users

Line	User	Host(s)	Idle	Location
0 con 0		idle	00:00:02	
* vty 194		idle	00:00:00	10.100.7.99

Interface	User	Mode	Idle	Peer Address
-----------	------	------	------	--------------

Router>exit