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## COMPUTER NETWORKS (CN)

### LAB 6 ASSIGNMENT

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AMARNATH C

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CSE AIML A

3rd Year

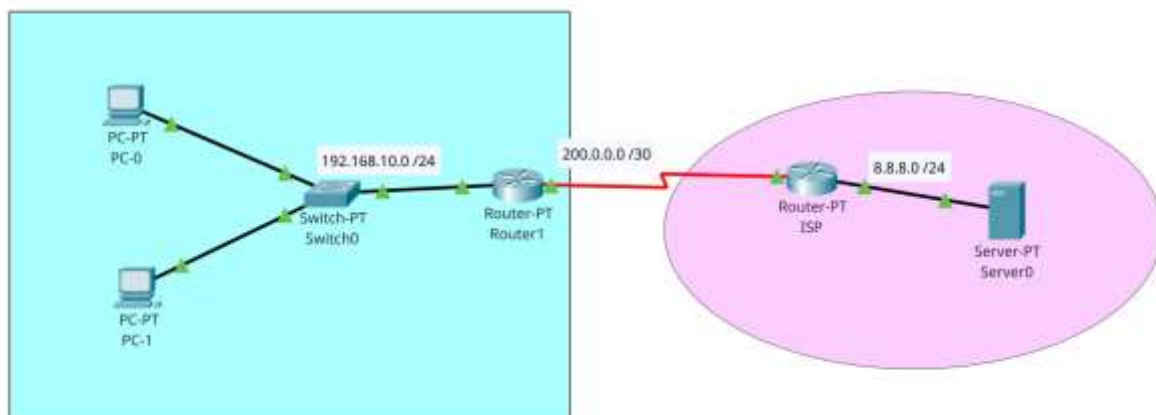
### Objective

- To configure Network Address Translation (NAT) on a router using Cisco Packet Tracer
- To demonstrate the setup and configuration of NAT to allow internal network devices to communicate with external networks.

### Steps taken to set up the network

#### Step 1:

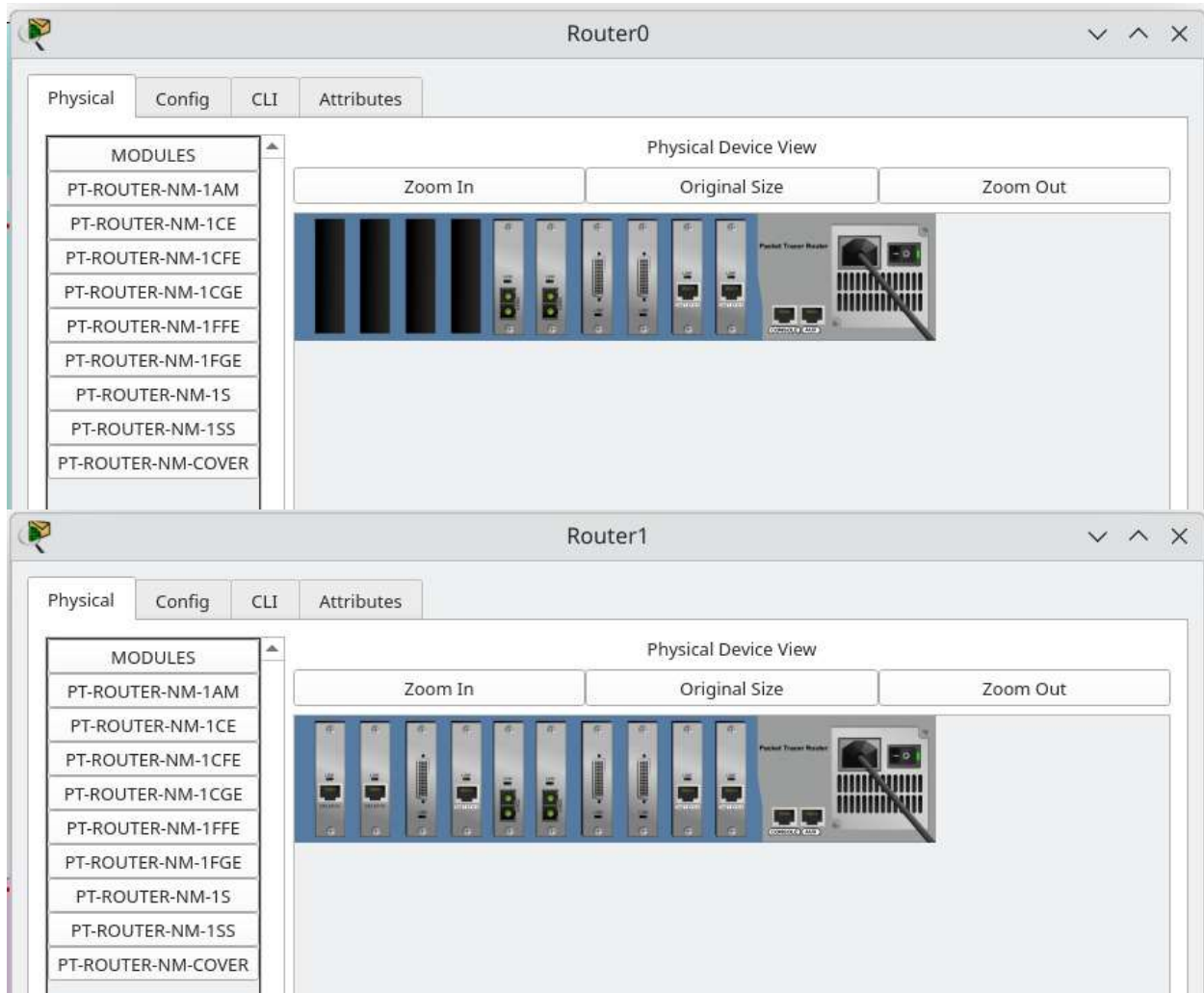
Drag and drop required Network devices (2 Router-PT's and 1 Switch-PT) and End devices (2 PC-PT's and a Server-PT) as shown below.



#### Step 2:

Open each Router and navigate to physical tab, and add PT-ROUTER-NM-1CGE, PT-ROUTER-NM-1S, PT-ROUTER-NM-1FFE Modules to the Router1 and add the same

modules as Router1 except for PT-ROUTER-NM-1FFE, add PT-ROUTER-NM-1CGE module.



### Step 3:

Make connections using cables between all the devices as shown in the picture.

Use Copper Straight through cable to connect different devices and use a Serial DCE cable to connect ISP Router and Router 1.

### Step 4:

Now, Configure IP address of the routers and end devices according to the configuration table below;

Device Name	Interface	IP Address	Subnet Mask
Router1	FastEthernet0/0	192.168.10.1	255.255.255.0
Router1	Serial0/0/0	200.0.0.1	255.255.255.252
ISP Router	Serial0/0/0	200.0.0.2	255.255.255.252

### PC Configuration Table:

Device Name	IP Address	Subnet Mask	Gateway
PC0	192.168.10.2	255.255.255.0	192.168.10.1
PC1	192.168.10.3	255.255.255.0	192.168.10.1

PC-0

Physical

Config

Desktop

Programming

Attributes

IP Configuration

Interface

FastEthernet0

IP Configuration

DHCP

Static

IPv4 Address

192.168.10.2

Subnet Mask

255.255.255.0

Default Gateway

192.168.10.1

DNS Server

0.0.0.0

IPv6 Configuration

PC-1

Physical

Config

Desktop

Programming

Attributes

IP Configuration

Interface

FastEthernet0

IP Configuration

DHCP

Static

IPv4 Address

192.168.10.3

Subnet Mask

255.255.255.0

Default Gateway

192.168.10.1

DNS Server

0.0.0.0

IPv6 Configuration

```

Router>
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
      ^
% Invalid input detected at '^' marker.

Router(config)#int fa 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int se 2/0
Router(config-if)#ip address 200.0.0.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#

```

## Router1

```

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gi 8/0
Router(config-if)#ip address 8.8.8.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet8/0, changed state to up

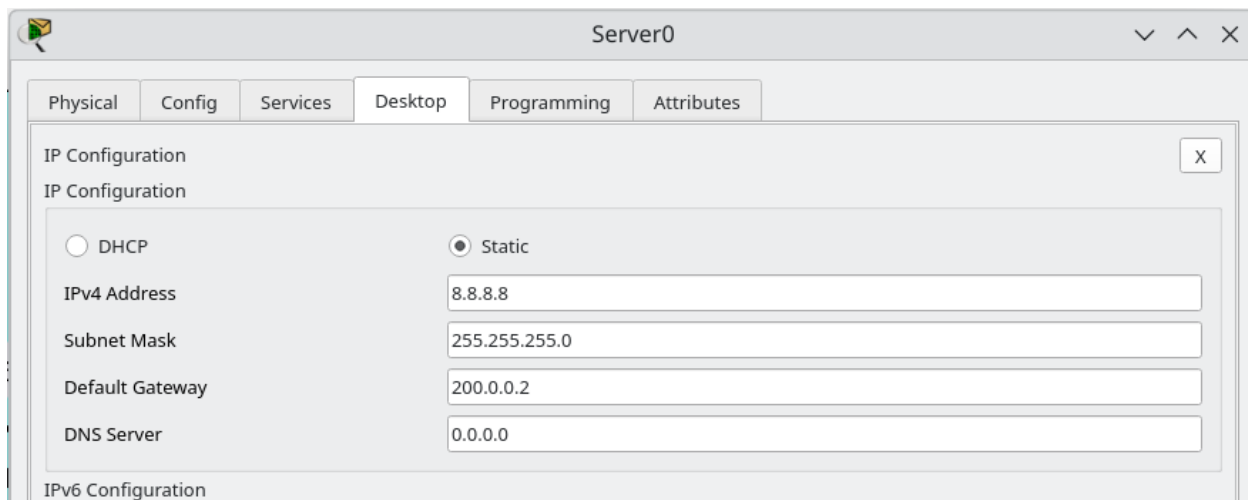
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet8/0, changed state to up

Router(config-if)#exit
Router(config)#

```

## ISP Router

And configure the Ip address of the server as ;



The screenshot shows a window titled "Server0" with tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The "Config" tab is active, and the "IP Configuration" section is expanded. It shows two radio buttons: "DHCP" (unselected) and "Static" (selected). Below the radio buttons are four input fields for Static IP configuration:

Field	Value
IPv4 Address	8.8.8.8
Subnet Mask	255.255.255.0
Default Gateway	200.0.0.2
DNS Server	0.0.0.0

Below these fields is a section for "IPv6 Configuration" which is currently empty.

## Step 5:

We shall enable ospf routing protocol between both routers.

In Router 1;

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#int se 2/0
      ^
% Invalid input detected at '^' marker.

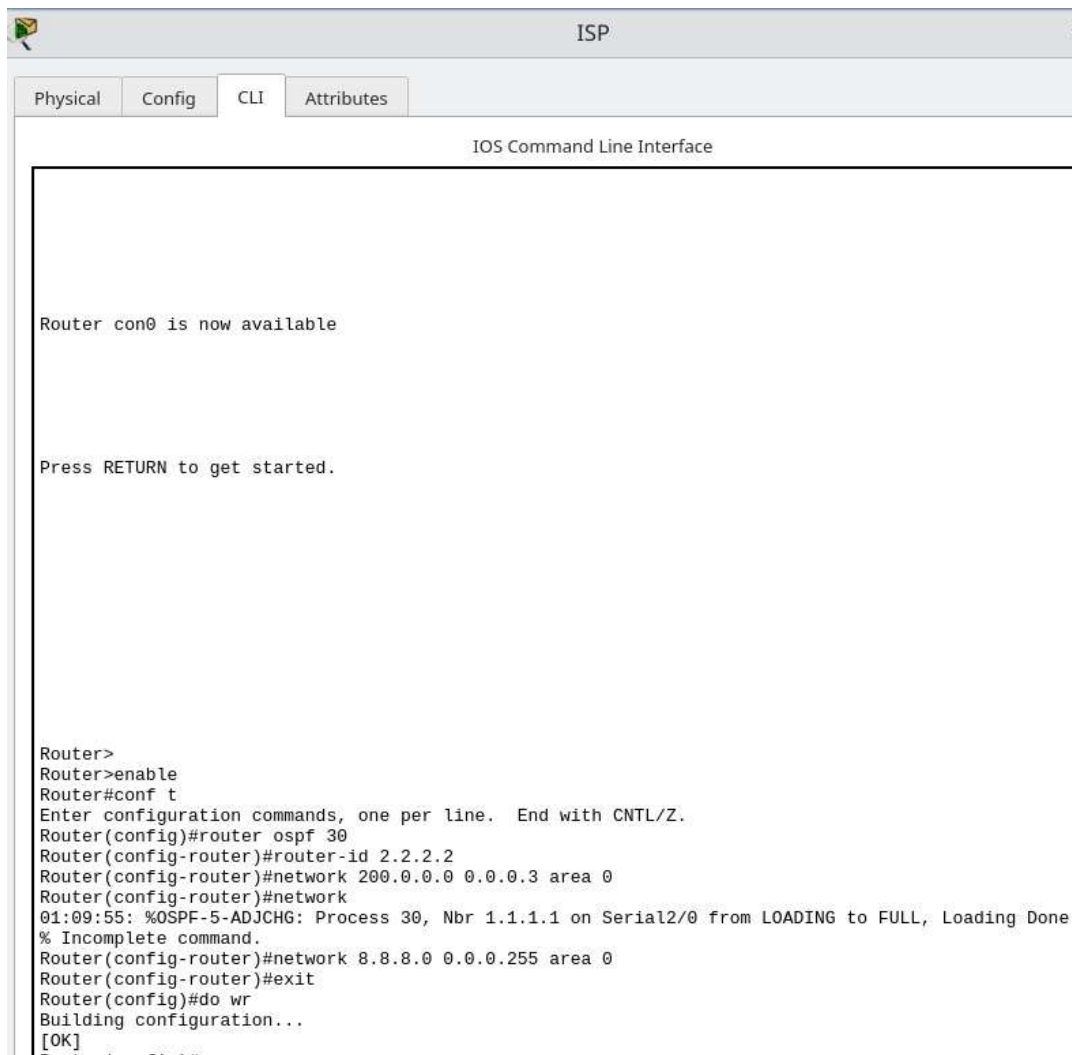
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se 2/0
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.1 255.255.255.252
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

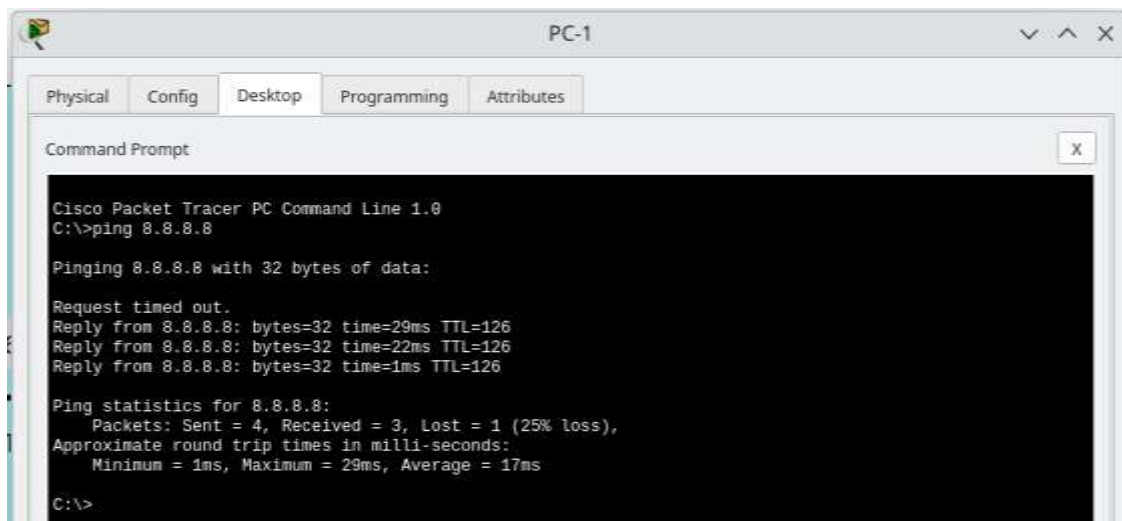
Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config)#router ospf 30
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 200.0.0.0 0.0.0.3 area 0
Router(config-router)#
Router(config-router)#
Router(config-router)#exit
Router(config)#
Router(config)#do wr
Building configuration...
[OK]
Router(config)#
```

In ISP router;



## Step 6: Ping Server (8.8.8.8) from PC-1



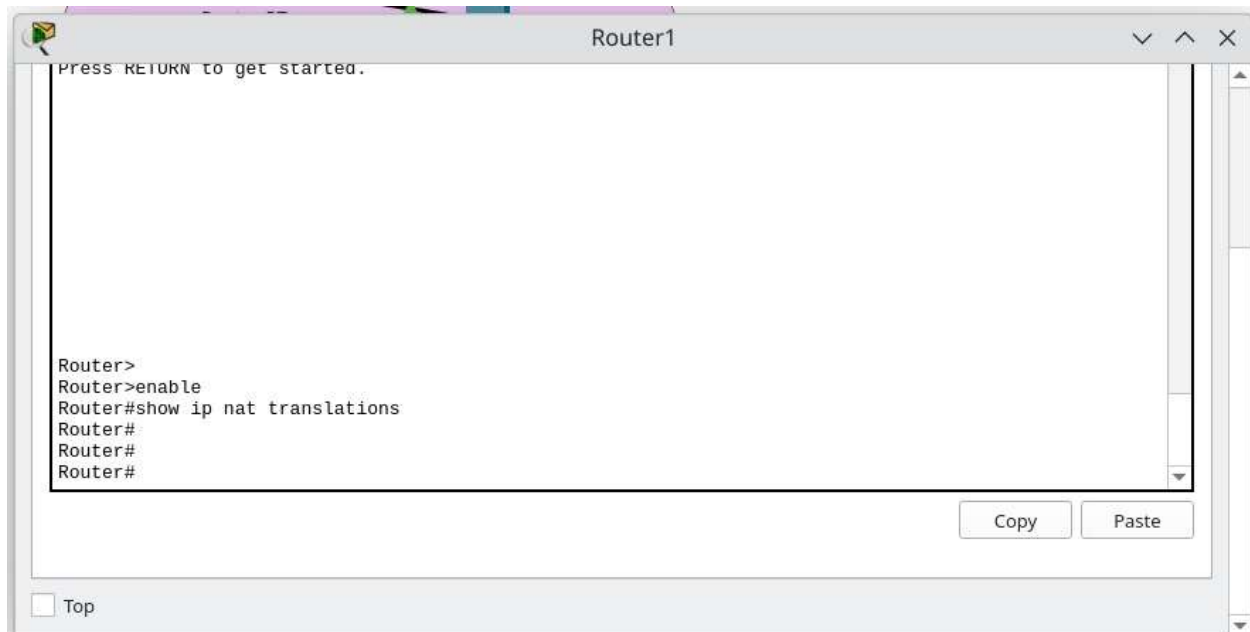
```
C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    192.168.10.1
  2  0 ms    1 ms    0 ms    200.0.0.2
  3  1 ms    0 ms    1 ms    8.8.8.8

Trace complete.
```

## Step 7: Check for Address Translation



## Step 8:

Configure Static NAT and configure interfaces as NAT inside and outside.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=31ms TTL=126

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 31ms, Average = 8ms
```



Router1
⌵ ⌴ ✕

Physical
Config
CLI
Attributes

IOS Command Line Interface

```

Router>
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#sh ip nat confi
Router(config)#sh ip nat configs
      ^
% Invalid input detected at '^' marker.

Router(config)#do sh ip nat configs
sh ip nat configs
      ^
% Invalid input detected at '^' marker.

Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#do show ip nat tran
Router(config)#do show ip nat translation
Router(config)#do show ip nat translations
Router(config)#
Router(config)#
Router(config)#
Router(config)#ip nat inside source static 192.168.10.2
Router(config)#ip nat inside source static 192.168.10.2 200.0.0.1
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip nat outside
Router(config-if)#
Router(config-if)#exit
Router(config)#do wr
Building configuration...
[OK]

```

Copy
Paste

☐ Top

```

Router(config)#do sh ip nat translations
Pro  Inside global    Inside local    Outside local    Outside global
---  200.0.0.1           192.168.10.2    ---              ---

```

Now, let us ping again and verify the NAT;

In Router1;



Router(config)#do sh ip nat translations

Pro	Inside global	Inside local	Outside local	Outside global
icmp	200.0.0.1:10	192.168.10.2:10	8.8.8.8:10	8.8.8.8:10
icmp	200.0.0.1:11	192.168.10.2:11	8.8.8.8:11	8.8.8.8:11
icmp	200.0.0.1:12	192.168.10.2:12	8.8.8.8:12	8.8.8.8:12
icmp	200.0.0.1:13	192.168.10.2:13	8.8.8.8:13	8.8.8.8:13
icmp	200.0.0.1:1	192.168.10.2:1	8.8.8.8:1	8.8.8.8:1
icmp	200.0.0.1:2	192.168.10.2:2	8.8.8.8:2	8.8.8.8:2
icmp	200.0.0.1:3	192.168.10.2:3	8.8.8.8:3	8.8.8.8:3
icmp	200.0.0.1:4	192.168.10.2:4	8.8.8.8:4	8.8.8.8:4
icmp	200.0.0.1:8	192.168.10.2:8	8.8.8.8:8	8.8.8.8:8
icmp	200.0.0.1:9	192.168.10.2:9	8.8.8.8:9	8.8.8.8:9
---	200.0.0.1	192.168.10.2	---	---