

Project Name:  
**PORT ADDRESS TRANSLATION**

A project by:  
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## Description:

Port Address Translation (PAT), is an extension to network address translation (NAT) that permits multiple devices on a local area network (LAN) to be mapped to a single public IP address. The goal of PAT is to conserve IP addresses.

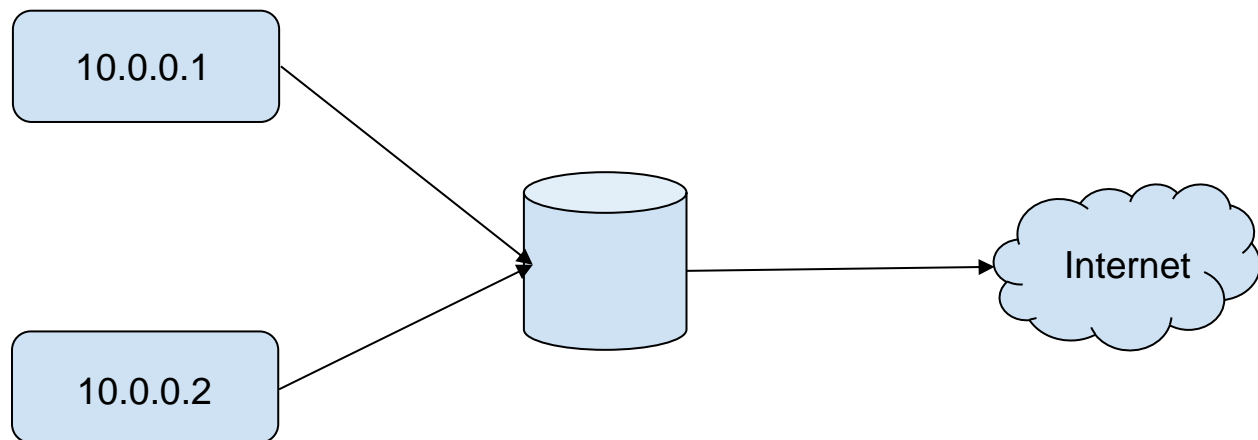
Port Address Translation is also called porting, port overloading, port-level multiplexed NAT and single address NAT.

## Necessity:

PAT allows a single public IP address to be used by many hosts on the private network, which is usually a LAN.

Thus, Port Address Translation allows conservation of IP addresses which reduces cost, increases security and convenience to connect multiple devices to an outside network.

## Architecture:

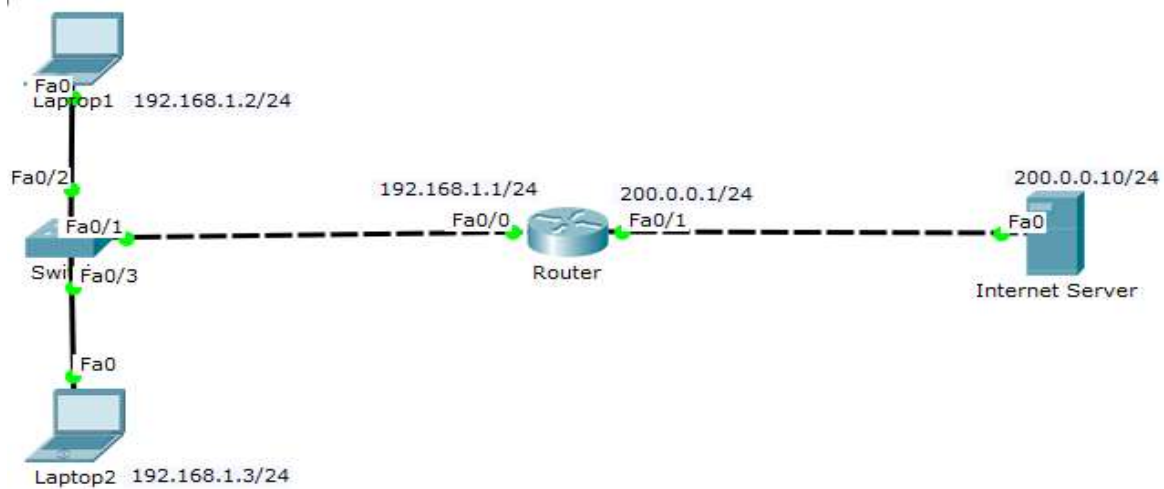


**PAT Table**

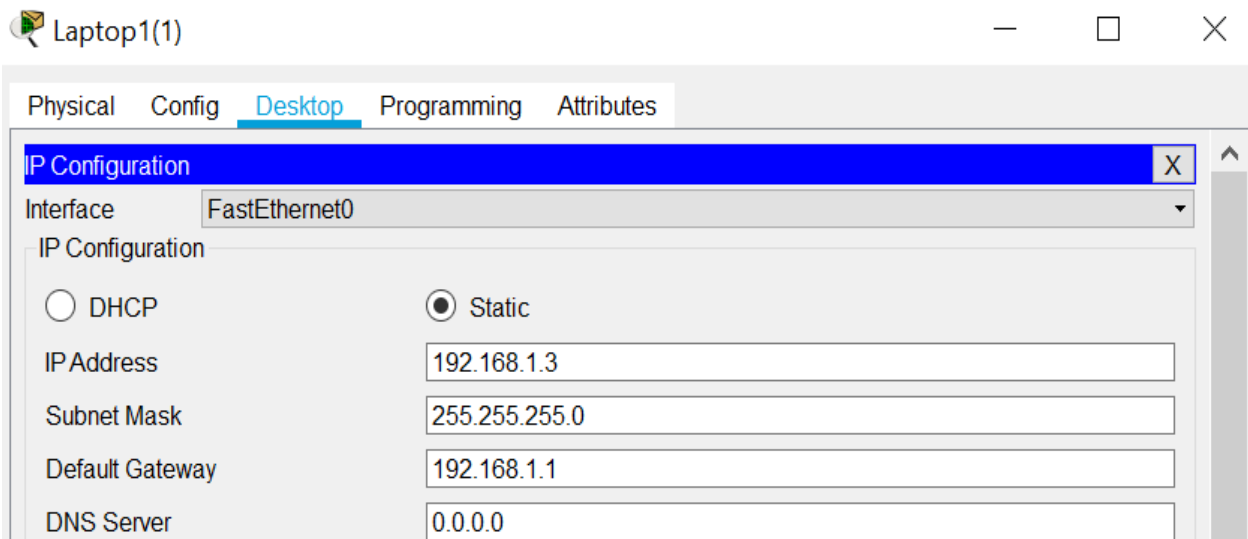
Inside Local	Inside Global
10.0.0.1	123.1.1.1:1000
10.0.0.2	123.1.1.1.:1001

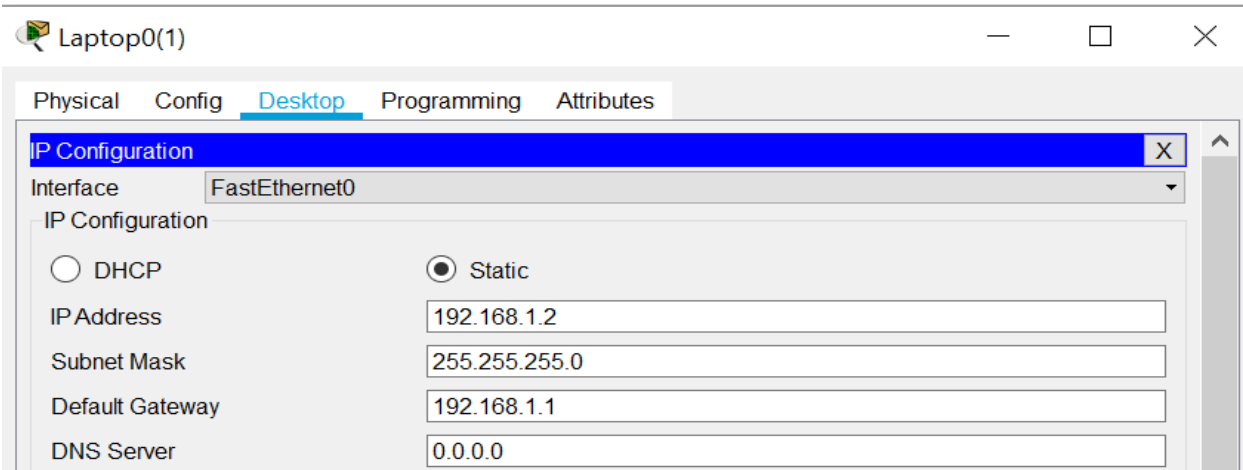
## Solution with screenshots:

- Creating a network topology



- Setting ip addresses of laptops





- Router Configuration

```
Router(config)#
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
Router(config-if)#int fa1/0
Router(config-if)#ip add 200.0.0.1
% Incomplete command.
Router(config-if)#ip add 200.0.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
```

Ctrl+F6 to exit CLI focus

Copy

Paste

- Enabling PAT

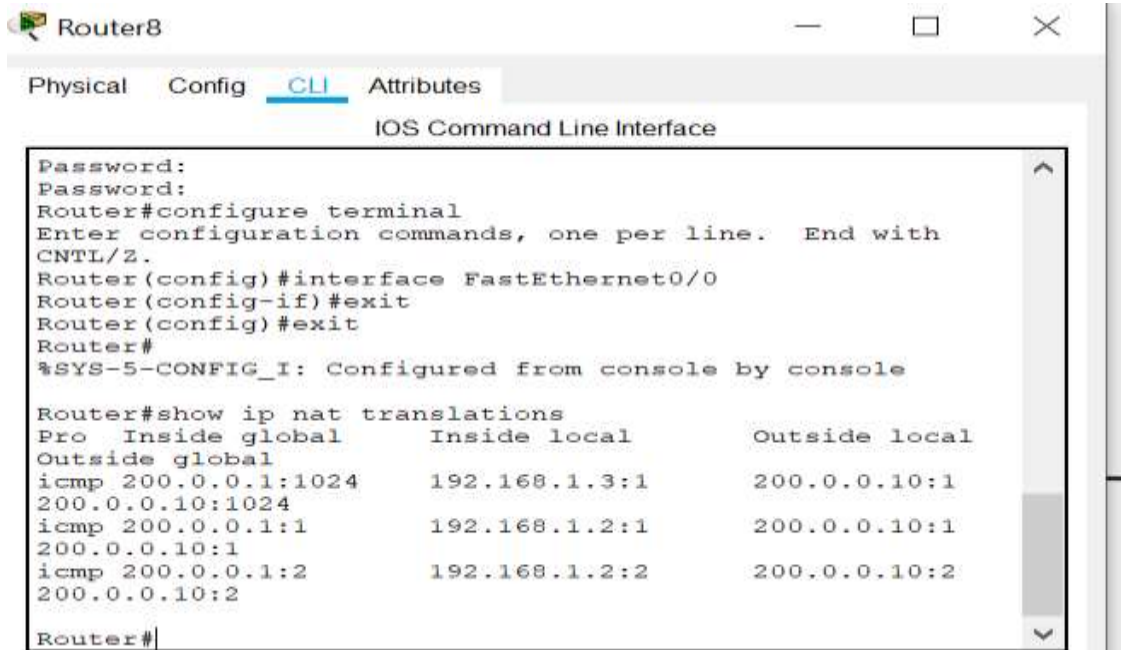
```
Router#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip nat inside
Router(config-if)#int fa1/0
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#access-list 1 permit 192.168.1.2 0.0.0.255
Router(config)#ip nat inside source list 1 int fa1/0
overload
Router(config)#
```

Ctrl+F6 to exit CLI focus

Copy

Paste

- Output:



The screenshot shows a window titled "Router8" with tabs for "Physical", "Config", "CLI" (selected), and "Attributes". The main area is titled "IOS Command Line Interface" and displays the following text:

```
Password:
Password:
Router#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip nat translations
Pro  Inside global      Inside local      Outside local
-----
Outside global
icmp 200.0.0.1:1024      192.168.1.3:1     200.0.0.10:1
200.0.0.10:1024
icmp 200.0.0.1:1       192.168.1.2:1     200.0.0.10:1
200.0.0.10:1
icmp 200.0.0.1:2       192.168.1.2:2     200.0.0.10:2
200.0.0.10:2
Router#
```

### Advantages:

It allows multiple internal hosts can share a single IP address for communication, thus conserving precious IP addresses.

The hosts on the private network don't have to expose their private IP addresses to the public network, making attacks from the public network less likely.

### Disadvantages:

An organization using PAT and a single IP address cannot easily run more than one of the same type of public service behind a PAT, e.g. two Web public servers using the default port 80; Also, a remote login is possible only to one (designated) host in the private network.

If many hosts on the private network make many connections to the public network, the PAT device may not have sufficient room in its internal table to keep track of the connections or it may simple run out of unused ports.

Translation results in switching path delays.

## **Conclusion:**

Thus, we have demonstrated the implementation of Port Address Translation, a type of Dynamic Network Address Translation and researched the advantages, disadvantages and applications of this method of Dynamic NAT.

## **References:**

- Network Protocols Handbook (2 ed.). Javvin Technologies Inc. 2005. P. 27, ISBN 9780974094526, Retrieved 2014-09-16.
- The Ohio State University Department of Computer Science and Engineering's presentation on Port Address Translation
  - <http://web.cse.ohio-state.edu/~athreya.14/cse3461-5461/Cse3461.NAT-PAT.pdf>
- Technopedia's Article on Port Address Translation
  - <https://www.techopedia.com/definition/4056/port-address-translation-pat>