Assignment 3

Aim: To implement the concept of NAT Protocol in Packet tracer simulator

NAT Protocol

Network address translation (NAT) is a method of mapping an IP address space into another by modifying network address information in the IP header of packets while they are in transit across a traffic routing device. The technique was originally used to bypass the need to assign a new address to every host when a network was moved, or when the upstream Internet service provider was replaced, but could not route the network's address space. It has become a popular and essential tool in conserving global address space in the face of IPv4 address exhaustion. One Internet-routable IP address of a NAT gateway can be used for an entire private network.

As network address translation modifies the IP address information in packets, NAT implementations may vary in their specific behavior in various addressing cases and their effect on network traffic. The specifics of NAT behavior are not commonly documented by vendors of equipment containing NAT implementations

How does Network Address Translation work?

A NAT works by selecting gateways that sit between two local networks: the internal network, and the outside network. Systems on the inside network are typically assigned IP addresses that cannot be routed to external networks (e.g., networks in the 10.0.0.0/8 block).

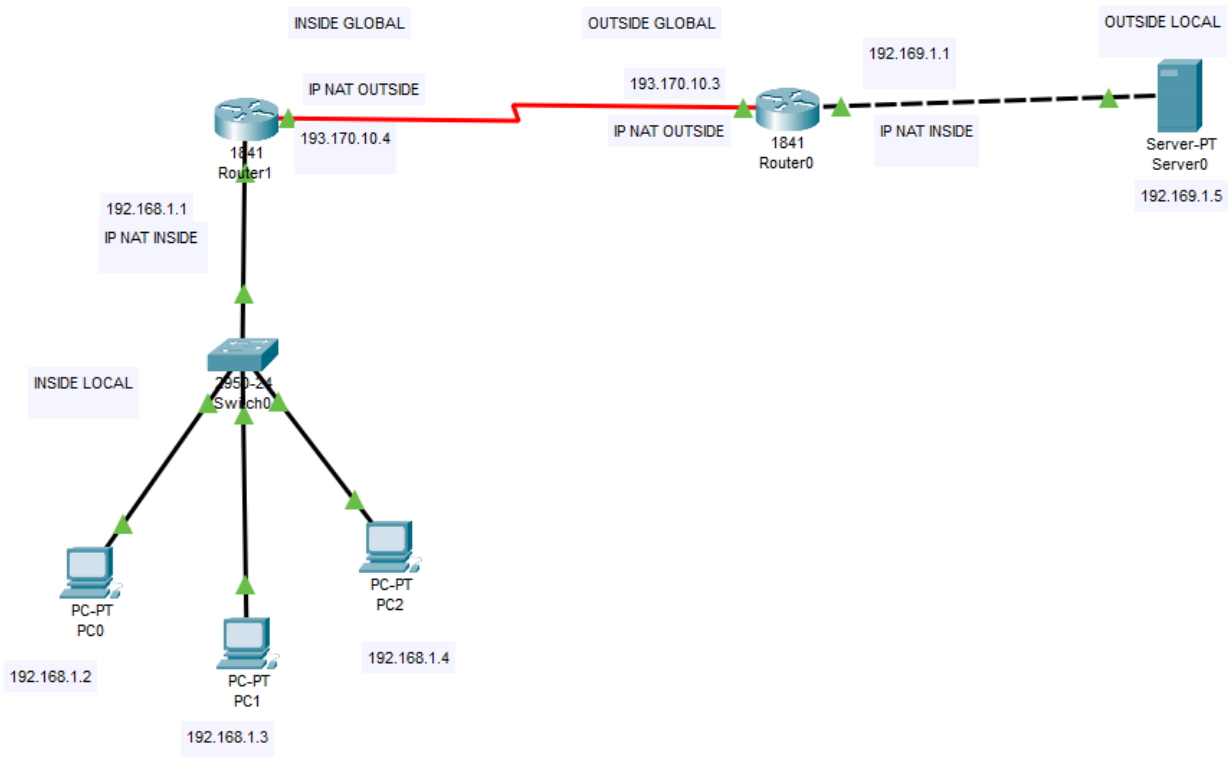
A few externally valid IP addresses are assigned to the gateway. The gateway makes outbound traffic from an inside system appear to be coming from one of the valid external addresses. It takes incoming traffic aimed at a valid external address and sends it to the correct internal system.

This helps ensure security. Because each outgoing or incoming request must go through a translation process that offers the opportunity to qualify or authenticate incoming streams and match them to outgoing requests

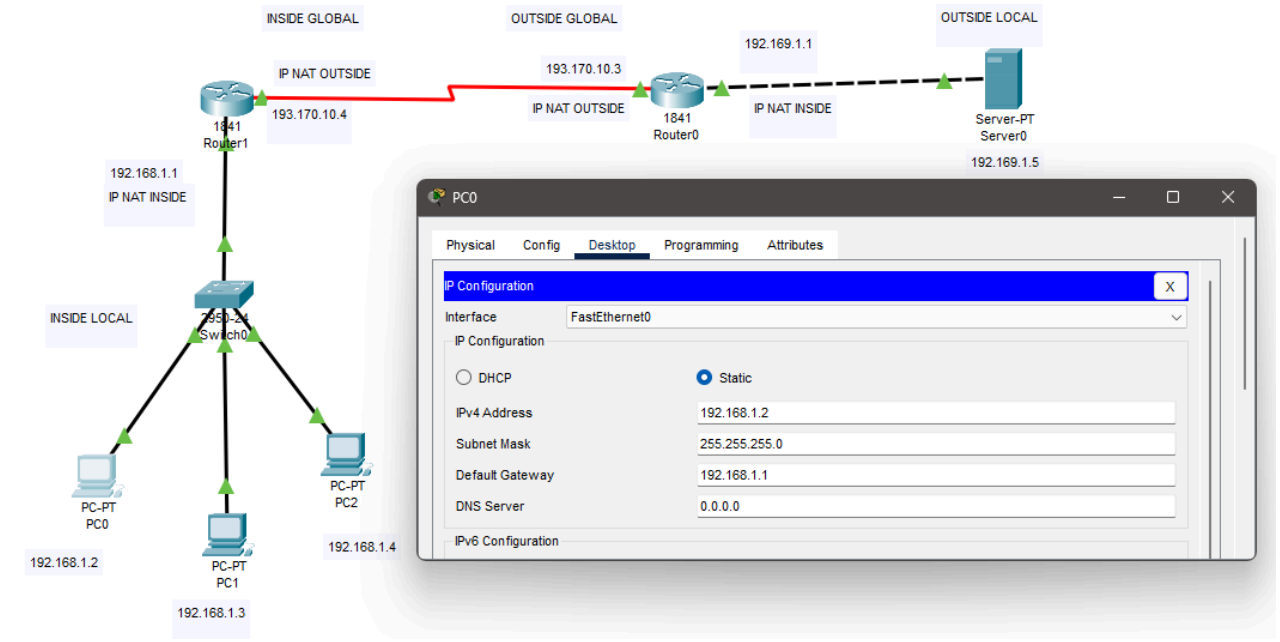
ADVANTAGES:

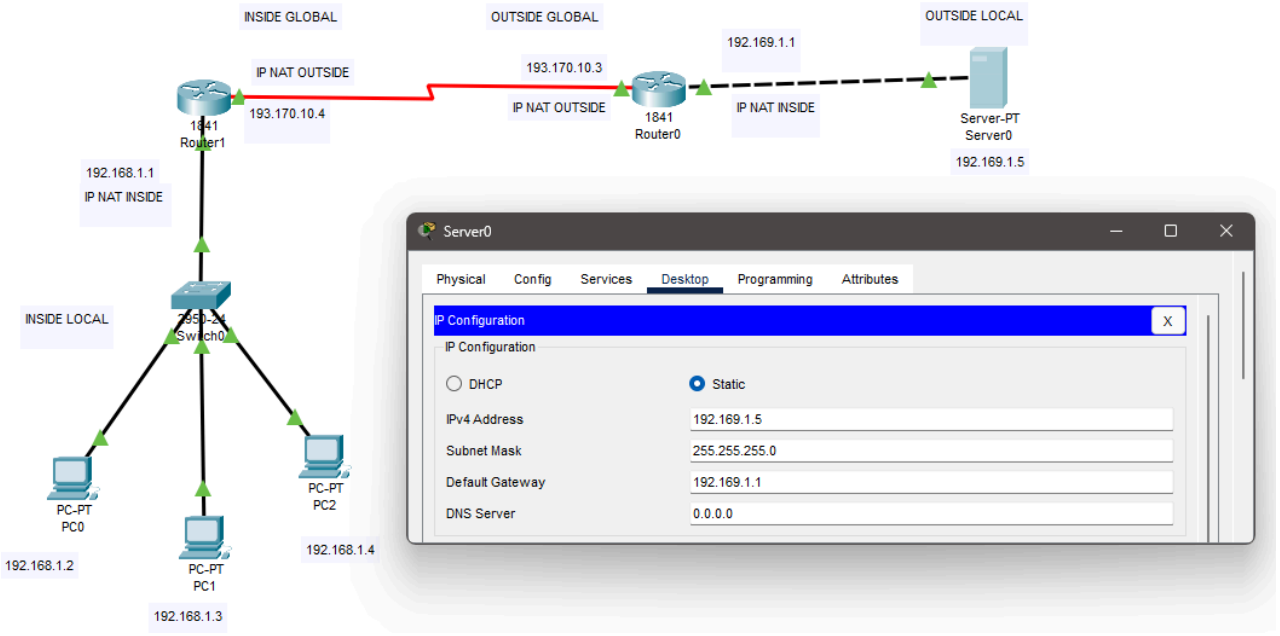
NAT offers several advantages for IP networking, such as saving IPv4 addresses and delaying the need to migrate to IPv6. It also provides enhanced security by hiding the internal network structure and private IP addresses from the internet, as well as acting as a basic firewall. Additionally, NAT simplifies network management by not requiring devices to have unique public IP addresses or route information, and allowing devices to move within the network without changing their IP settings.

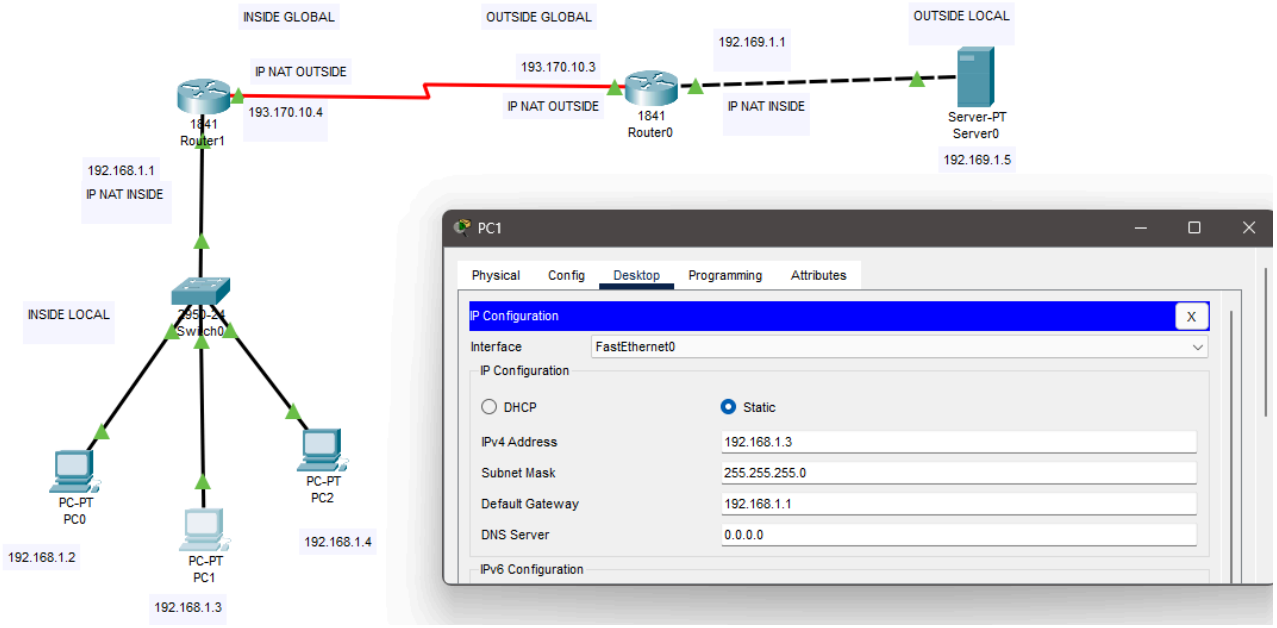
Implementation

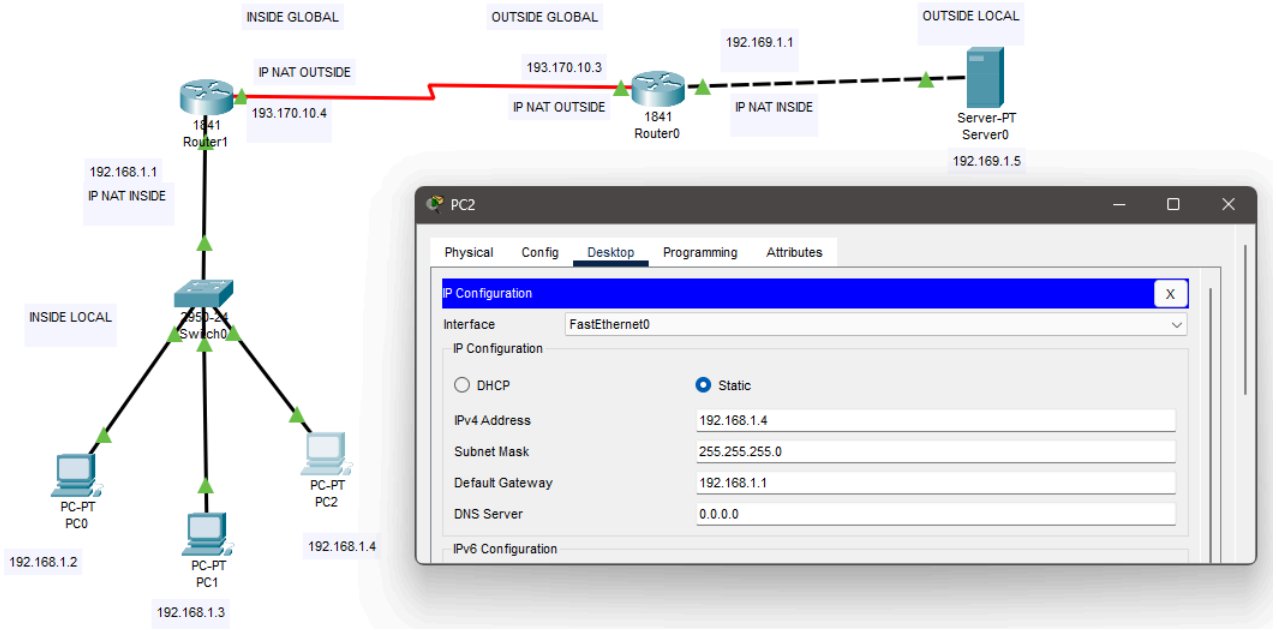


Provide IP address to both PC and Server

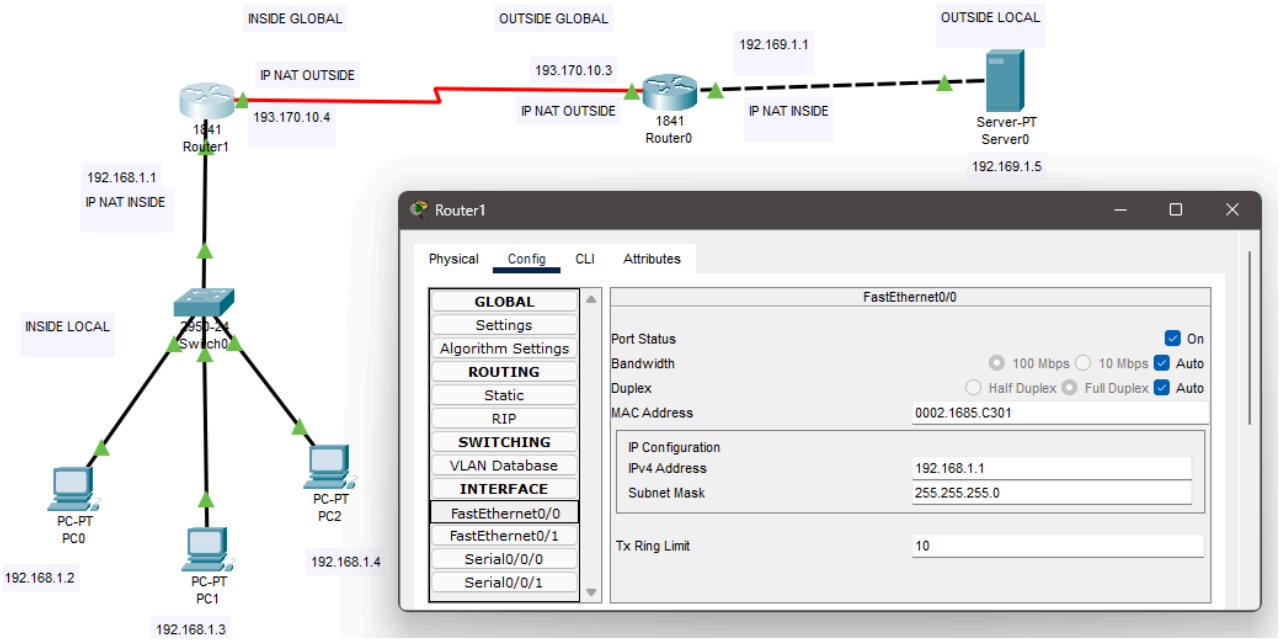


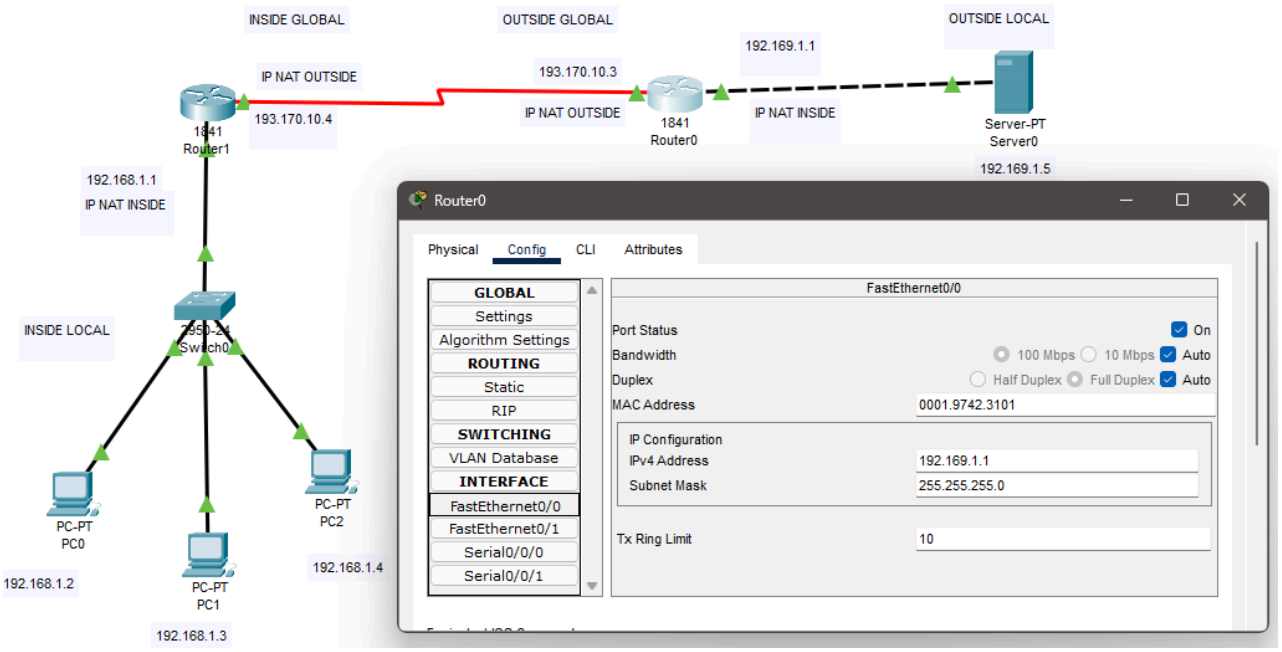



INSIDE GLOBAL
OUTSIDE GLOBAL
OUTSIDE LOCAL
IP NAT OUTSIDE
193.170.10.3
192.169.1.1
193.170.10.4
IP NAT OUTSIDE
IP NAT INSIDE
1841
Router1
1841
Router0
Server-PT
Server0
192.169.1.5
192.168.1.1
IP NAT INSIDE
INSIDE LOCAL
2950-24
Switch0
PC-PT
PC0
PC-PT
PC2
PC-PT
PC1
192.168.1.2
192.168.1.4
192.168.1.3
PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.3
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration

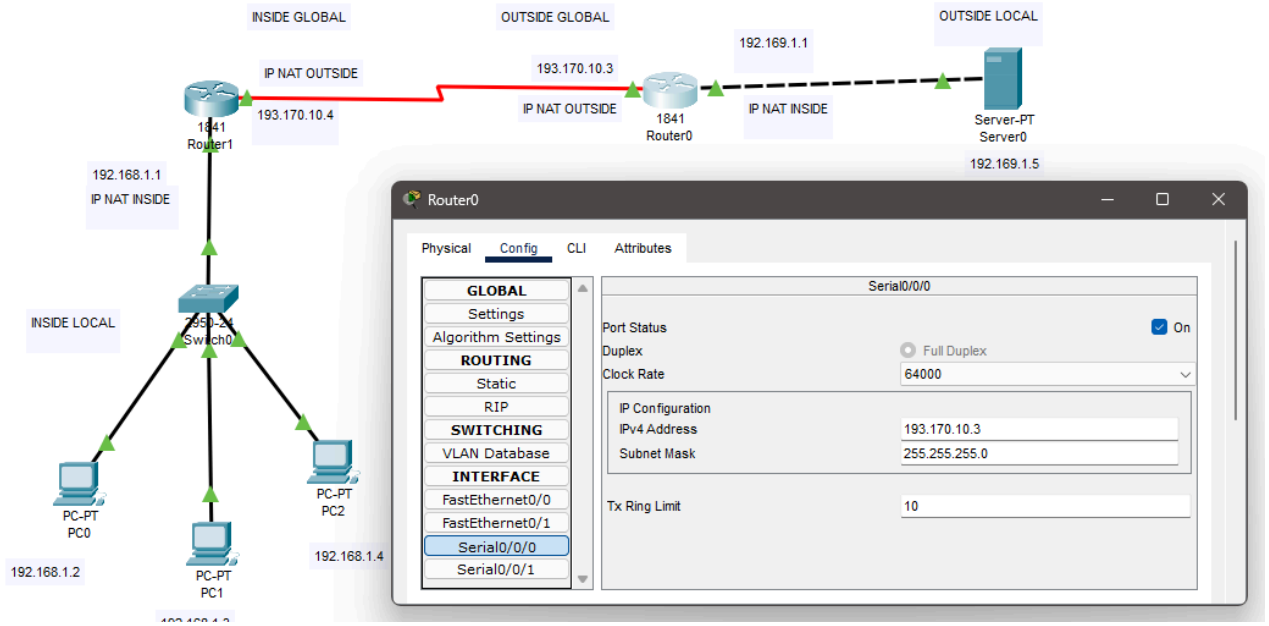

INSIDE GLOBAL
OUTSIDE GLOBAL
OUTSIDE LOCAL
IP NAT OUTSIDE
193.170.10.3
192.169.1.1
193.170.10.4
IP NAT OUTSIDE
IP NAT INSIDE
1841
Router1
1841
Router0
Server-PT
Server0
192.169.1.5
192.168.1.1
IP NAT INSIDE
INSIDE LOCAL
2950-24
Switch0
PC-PT
PC0
PC-PT
PC2
PC-PT
PC1
192.168.1.2
192.168.1.4
192.168.1.3
PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.4
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration

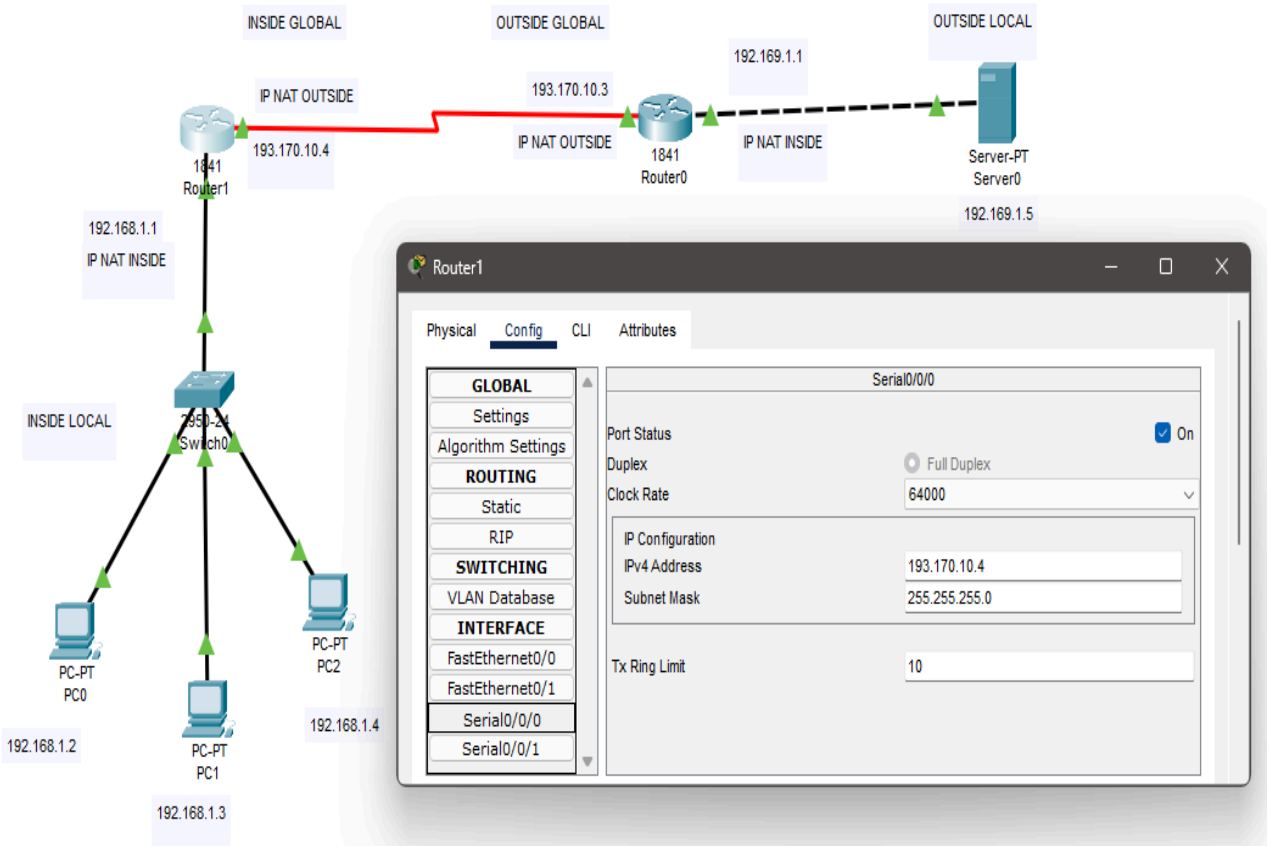
Provide FastEthernet to both network





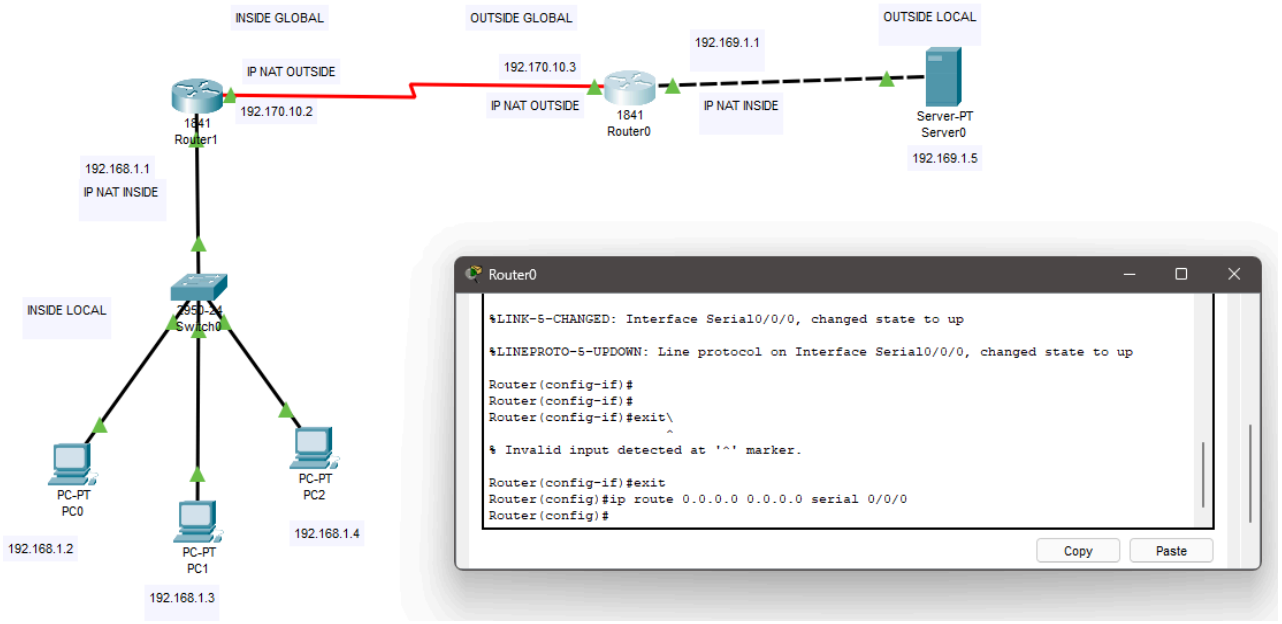
Provide Serial Port Address To the all network



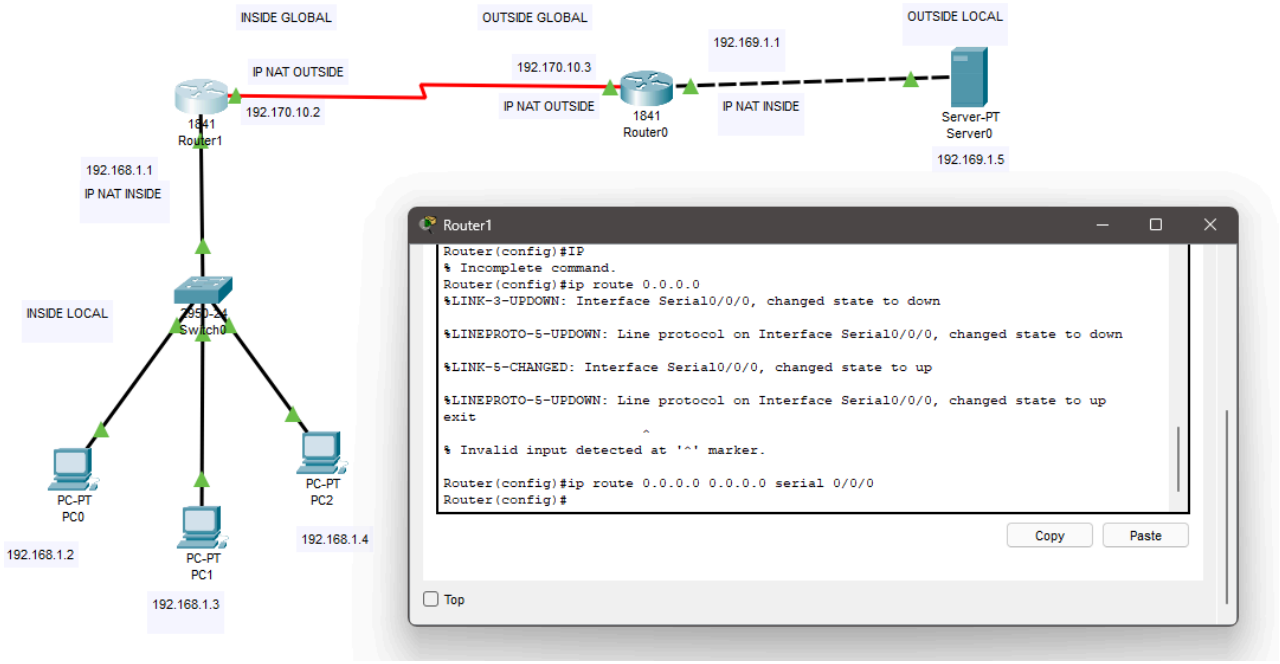


Provide IP Routes To the Routers

To Router 0



To Router 1

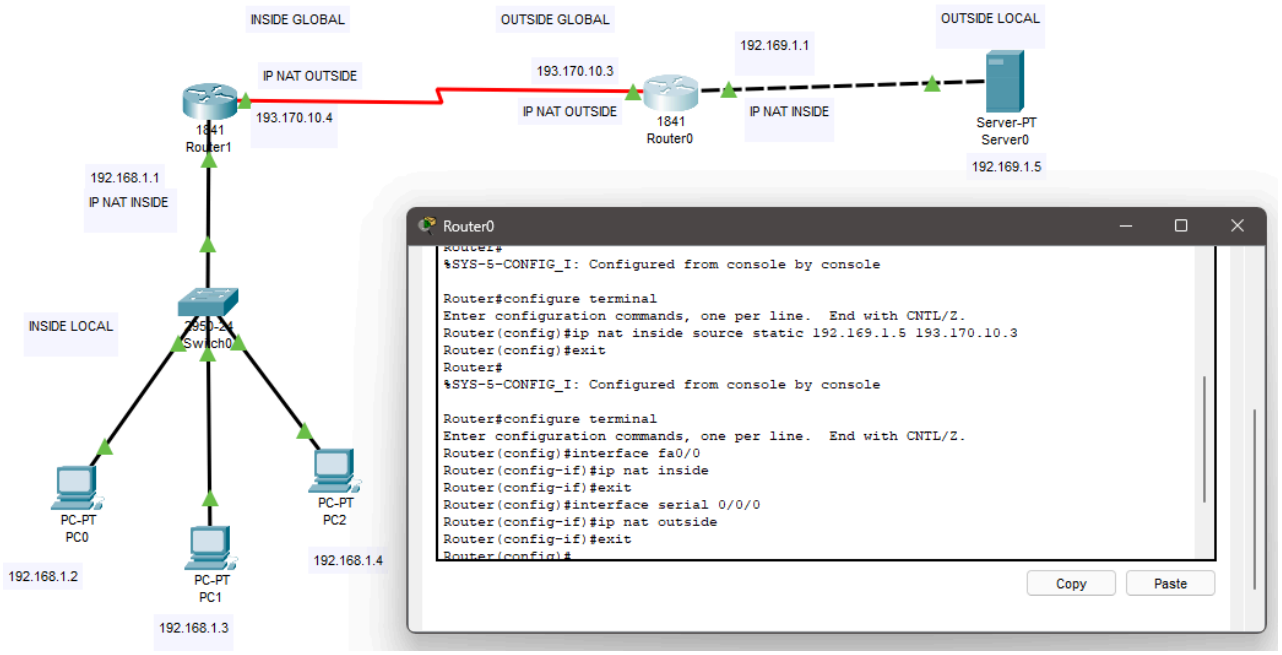

INSIDE GLOBAL
OUTSIDE GLOBAL
OUTSIDE LOCAL
IP NAT OUTSIDE
192.170.10.3
192.169.1.1
192.170.10.2
IP NAT OUTSIDE
IP NAT INSIDE
1841
Router1
1841
Router0
Server-PT
Server0
192.169.1.5
192.168.1.1
IP NAT INSIDE
INSIDE LOCAL
2950-24
Switch0
PC-PT
PC0
PC-PT
PC2
192.168.1.2
PC-PT
PC1
192.168.1.4
192.168.1.3
Router1
Router(config)#IP
% Incomplete command.
Router(config)#ip route 0.0.0.0
%LINK-3-UPDOWN: Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
exit
% Invalid input detected at '^' marker.
Router(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0
Router(config)#
Copy
Paste
Top

Successful transmission of Packet from PC1 to Server

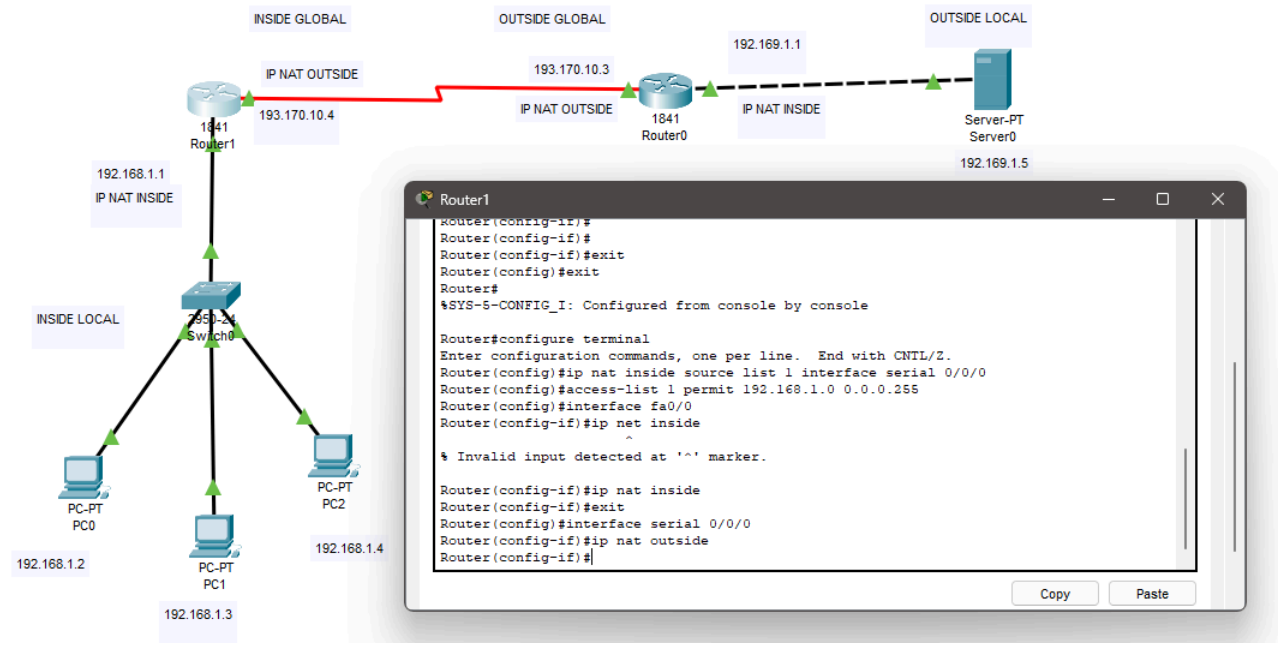
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Server0	ICMP		0.000	N	0	(edit)	(delete)

Now Establishing NAT PROTOCOL for both the routers

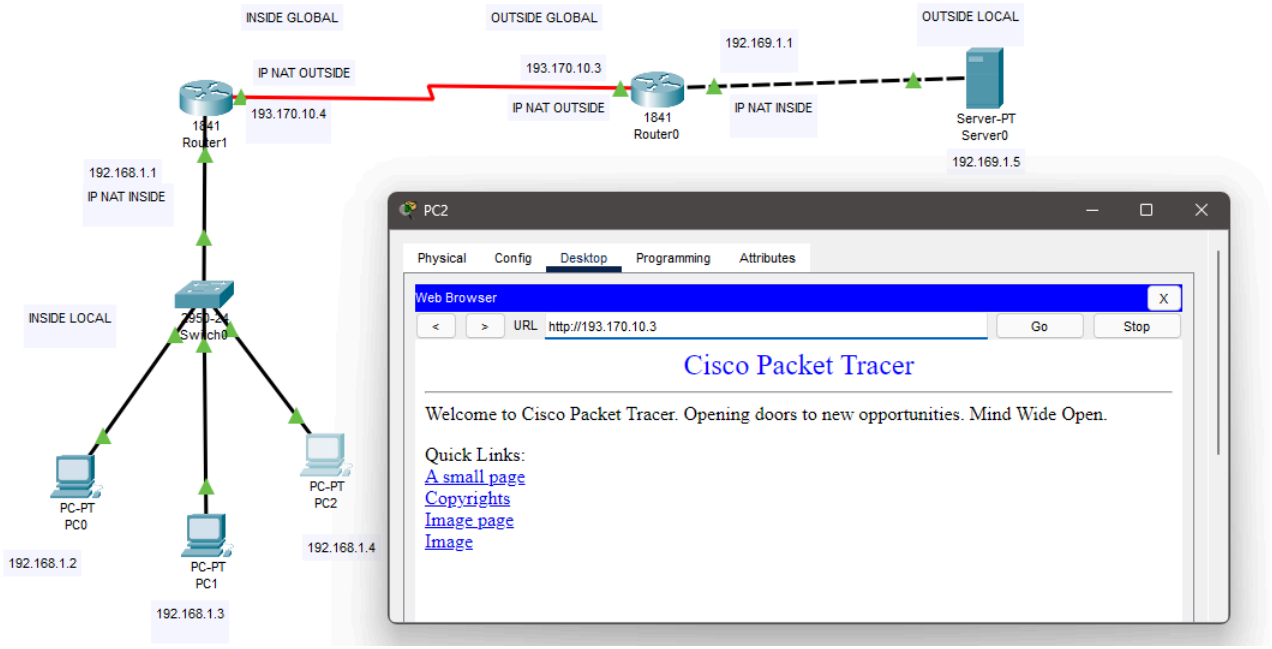
For Router 0

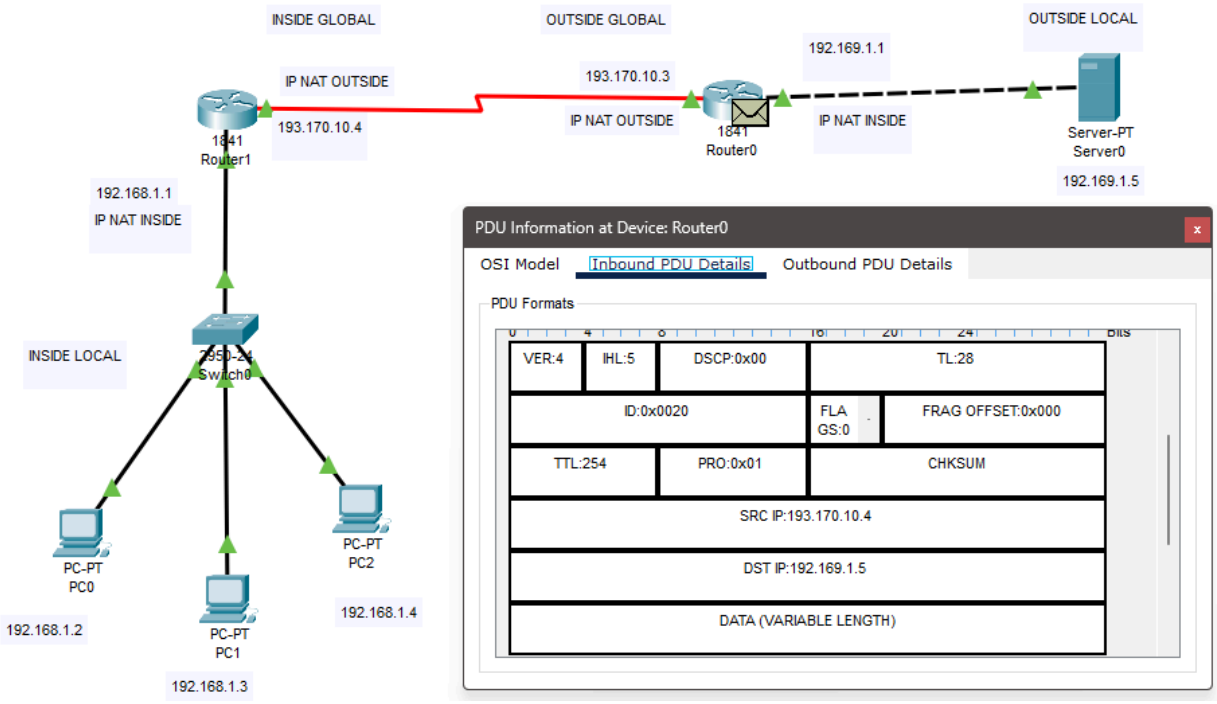


For ROUTER 1



Now , Checking wheather the NAT protocol is established or not





The protocol is well established ….