

Aim → Implementation and understanding the use of DNAT and PAT with Cisco Packet Tracer.

Objective 1 → An overview on DAT (Dynamic Network Address Translation) and PAT (Port Address Translation).

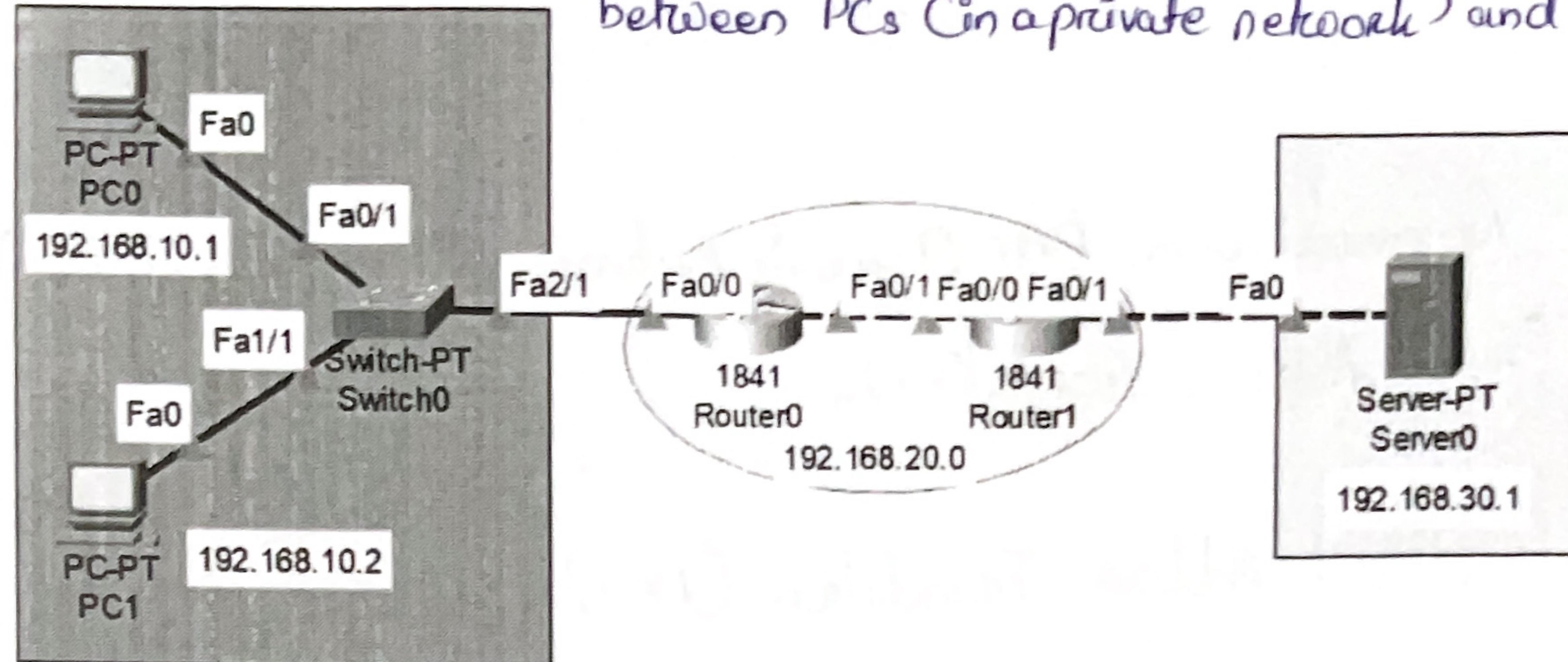
Dynamic Network Address Translation (DAT) →

- How it works : Maps private IPs to a pool of public IPs dynamically. Each session is assigned a public IP temporarily.
- Features : i) Efficient use of a limited pool of public IPs.
ii) New connections may be denied if all public IPs are in use.
- Use case : Small to medium networks with manageable traffic.

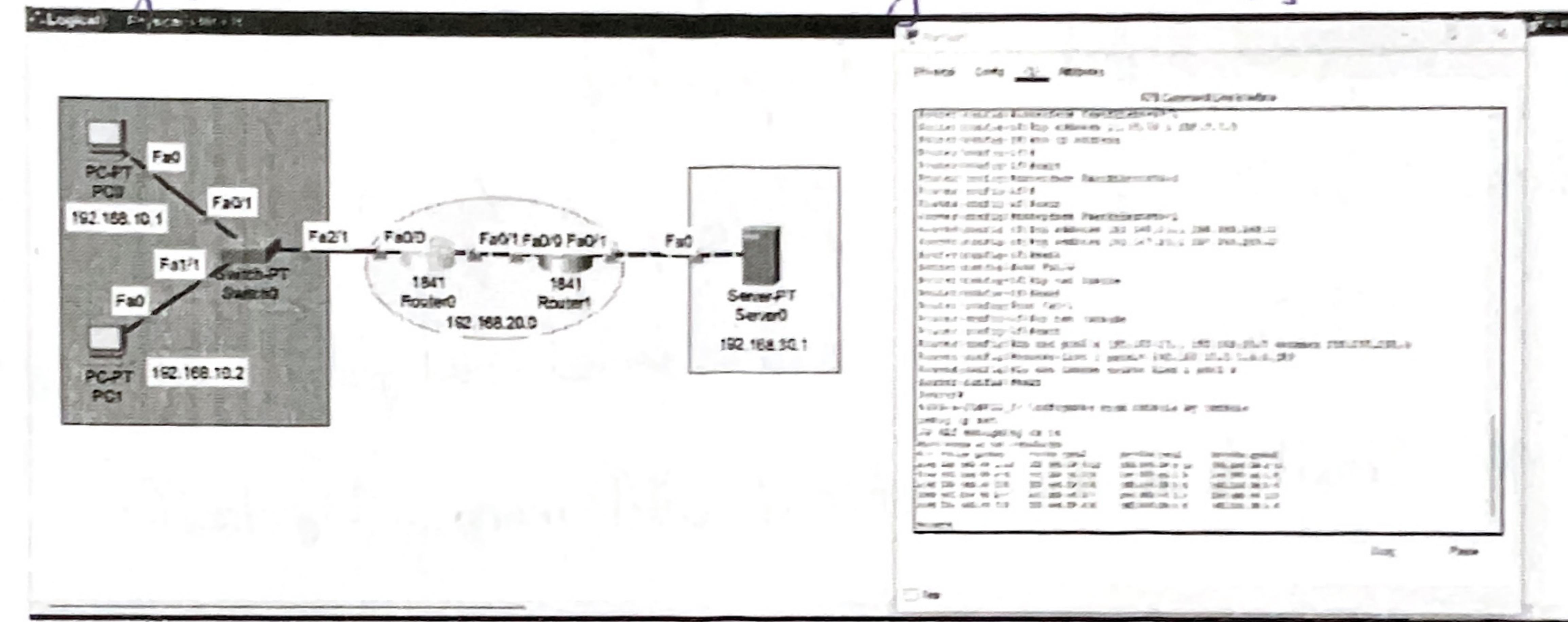
Port Address Translation (PAT) →

- How it works → Maps multiple private IPs to a single public IP by assigning unique port numbers for each session.
- Features → i) Highly scalable and conserves public IPs.
ii) Uses ports to differentiate sessions.
- Use case → Large networks with many devices, such as ISPs or enterprises.

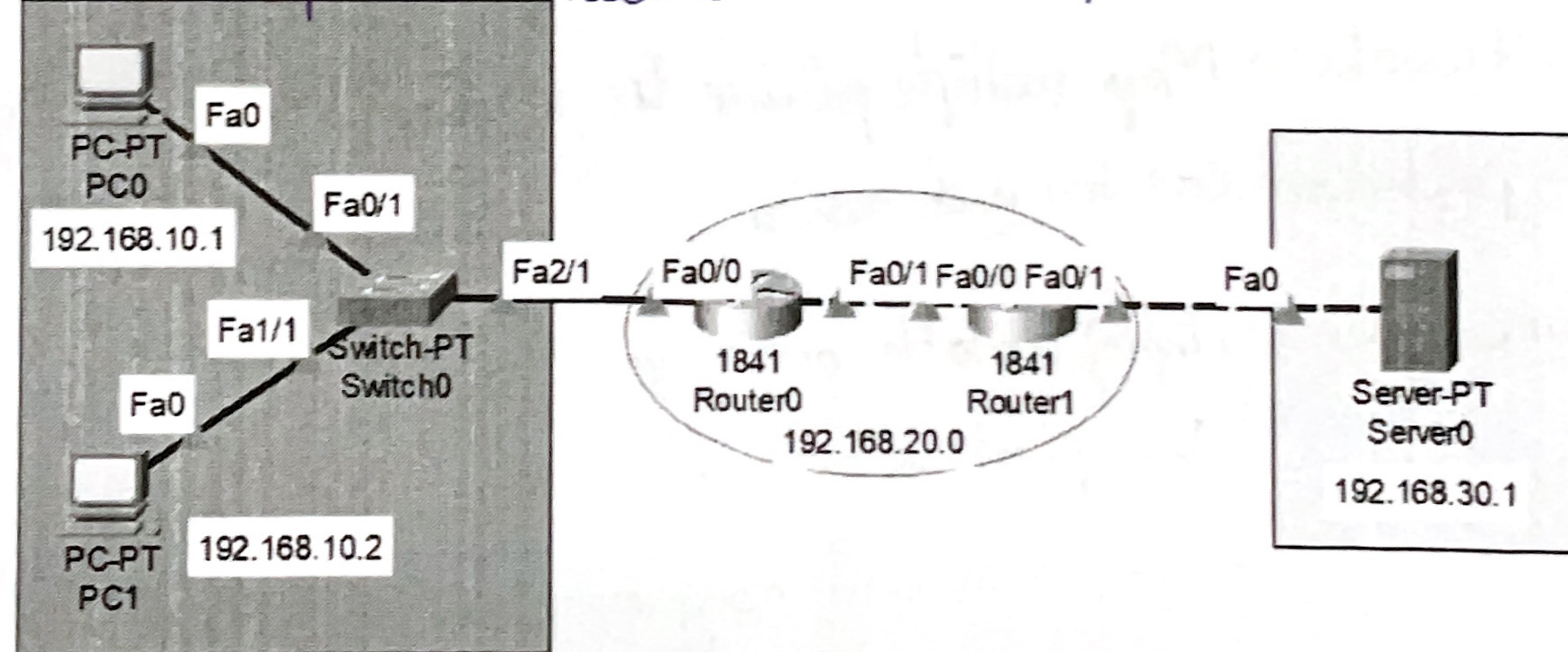
Objective 2 → Configuring and implementing DAT using a router to analyse the communication between PCs (in a private network) and public server.



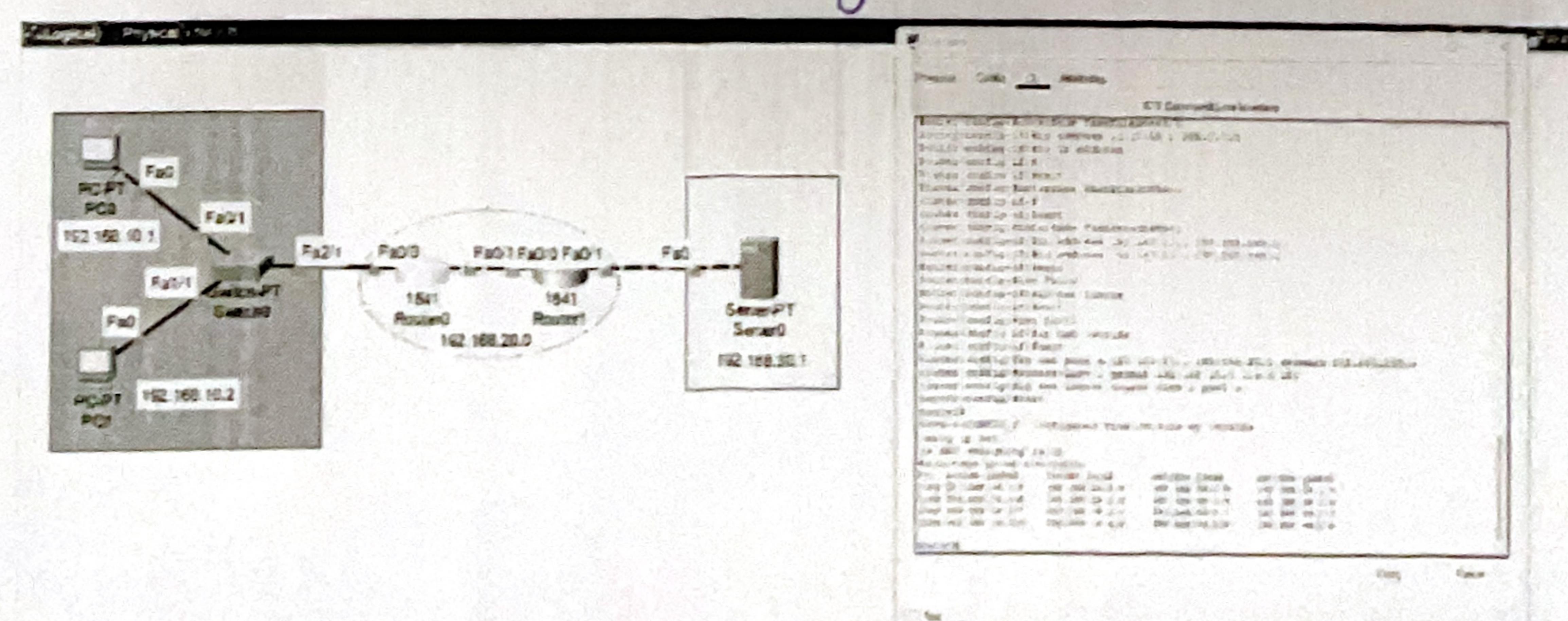
Sending messages from PC0 to Server0 using DAT commands.



Objective 3 → Configuring and implementing PAT using router to analyse the communication between PCs (in a private network) and a PC in a public network.



Sending messages from PC0 to Server0 using PAT commands.

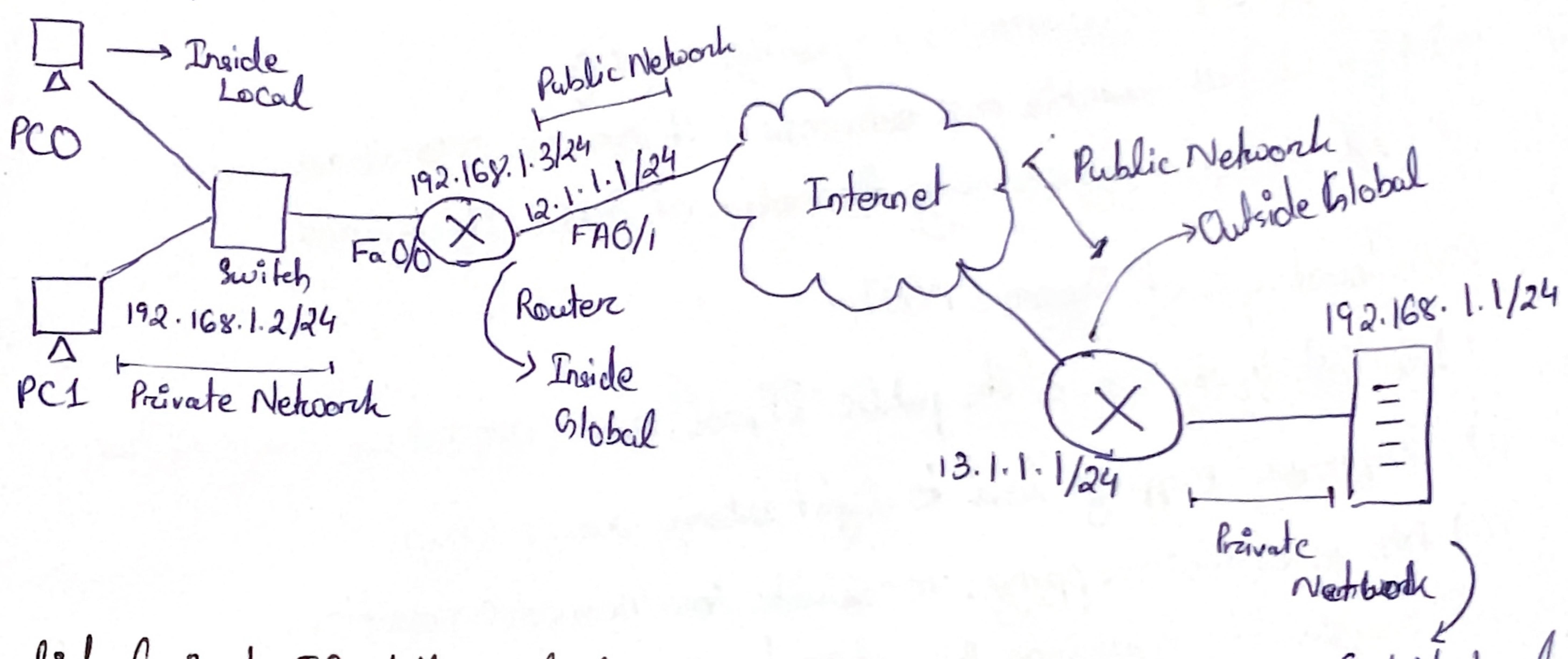


Conclusion → DAT and PAT are techniques to conserve public IPs and enable private networks to access the internet. DAT dynamically assigns IPs from a pool, suitable for moderate traffic. PAT uses a single public IP with unique ports, ideal for high traffic and scalability. Both optimise connectivity efficiently.

Exercises →

- 1) Illustrate diagrammatically Inside Local, Inside Global, Outside Local, Outside Global address with an example network comprising of a private network with two PCs with a switch, two routers belonging to a public network and a public server.

Ans → 192.168.1.1/24



- 2) The list of private IP and the pool of public IP are as given below. Show the translation of each private IPs to public IP using dynamic NAT based on the access to public address by the PCs in the order PC2, PC4, PC1 followed by PC3.

List of Inside Local Address

PC1: 10.7.7.61
PC2: 10.7.7.62
PC3: 10.7.7.63
PC4: 10.7.7.64

Pool of Inside Global Address

55.4.4.1
55.4.4.2
55.4.4.3

- Ans → i) PC2 (10.7.7.62) Accessed First
Allocated inside global IP: 55.4.4.1
ii) PC4 (10.7.7.64) Accessed Next
Allocated inside global IP: 55.4.4.2

iii) PC₁ (10.7.7.61) Access Next

Allocate inside global IP: 55.4.4.3

iv) PC₃ (10.7.7.63) Access Last

No IP is available in the inside global pool at this moment. PC₃ will have to wait for an inside global IP to be freed or face reject or depending on the NAT configuration.

Q3) What are the advantages and disadvantages of dynamic NAT?

Ans → Advantages of Dynamic NAT →

i) Efficient use of public IP address (allocated only when needed)

ii) Hides private IP addresses, improving security.

iii) Flexible and suitable for networks with variable external access needs.

iv) Cost-effective by reducing the number of public IPs required.

Disadvantages of Dynamic NAT →

i) Limited by the size of the public IP pool, excess demand can cause failure.

ii) Temporary mappings lead to slight latency during setup.

iii) No persistent mapping, unreliable for inbound connections.

iv) Scalability issues as the network grows.

v) More complex to configure and manage than static NAT.

Q4) Show the port address translation table at the router of the following network.

Ans →

Private IP/Port

10.0.1.2:5000

10.0.1.3:5000

Public IP/Port

192.168.35.4:4001

192.168.35.4:4002

Destination

34.1.20.117.196:80

34.1.20.117.190.80

Q5) Describe the function of following CLI commands:

i) ip nat inside → This command issued to configure an interface on the router as an inside NAT interface. It identifies the interface connected to the private (internal) network.

ii) ip nat outside → This command issued to configure an interface on the router as an outside NAT interface. It identifies the interface connected to the public (external) network such as the internet.

- iii) ip nat pool → Defines a pool of public IP addresses that the router can use for NAT translation.
- iv) ip nat inside source list ALL-Number PoolName global configuration → Configures Dynamic NAT by mapping the internal (private) IP's specified in an ALL to a pool of Public IPs.
- v) router (config) # ip nat pool pool-name start-in end-in {netmask netmask1 prefix-length prefix-length ?}Ans → Specifies the range of public IP addresses in a NAT pool for use in Dynamic NAT.