NAT

- It creates relationship between Public IP address and Private Ip address.
- Private IP address : - It can be used only in a particular LAN. Private IP address needs to be unique only in a particular LAN and can be reused in every LAN.
- Public IP address : - This one can be used in Internet and must be unique in the Internet. These IP addressed are purchased and managed by the ISPs.

NAT

- As long as a PC stays inside a LAN it is sufficient to have Private IP address but if it wants to communicate across the Internet, Public Address is mandatory. In fact the gateway device for that LAN will simply convert or translate the IP address of the PC into a suitable Public IP Address when PC wants to communicate outside of the Private network. The gateway device can be a Router, ADSL Router Modem, etc. This devices can also be called as NAT agent. NAT agents also maintains a translation table inside its memory to keep track of the relationship between a Private IP and its corresponding Public IP address. If any entry point is not found in the translation table then that particular PC will not be able to access the Internet.

NAT

- Private IP Address : -

  Class A – 10.0.0.0 – 10.255.255.255

  Class B – 172.16.0.0 – 172.31.255.255

  Class C – 192.168.0.0 – 192.168.255.255

  And all the remaining IP address are all Public IP Address.

NAT

- Advantages : -

  -> Loss of IP address can be prevented, as IP addresses are reusable.

  -> Obviously a good security for the LAN hosts as their real IP addresses are hidden by their Public IP Address.

- Disadvantages : -

  -> End to end communication across the internet is not possible.

  -> Data transfer delayed as the IP addressed need to be translated at first.

  -> Sometimes difficult to manage.

NAT

- Types Of NAT : -

  -> Static NAT : - In this case a particular Private IP address is permanently associated with a particular Public IP address. It has some disadvantages,

  * We need to buy same number of Public IP according to the number of Private IP address. So, very costly situation.

  * A particular Public IP addresses can not be used for another Private IP address unless and until manually freed from its Private IP address, so very difficult to manage.

  * The Network Admin has to maintain all the necessary translation details.

NAT

- -> Dynamic LAN : -

  In this case the Network Admin only specifies a collection of Private IP address and a Collection of Public IP address. The NAT agent will associate any private IP address to any available Public IP address as and when required. NAT agent also can use the same Public IP address for some other Private IP address. So, here the Network Admin is free, the NAT agent takes care of all the translation dynamically.

NAT

- PAT (Port Address Translation) : - This is a special kind of dynamic NAT where theoretically 65535 Private IP address can associated with a single IP address dynamically by the NAT agent. So it is the most economical solution as only 1 Public IP address is sufficient to connect the entire LAN to Internet. In this case the NAT agent adds a unique logical port number to the public IP address for each LAN host that need to have a Public IP address. So, different LAN host can be easily distinguished on the basis of

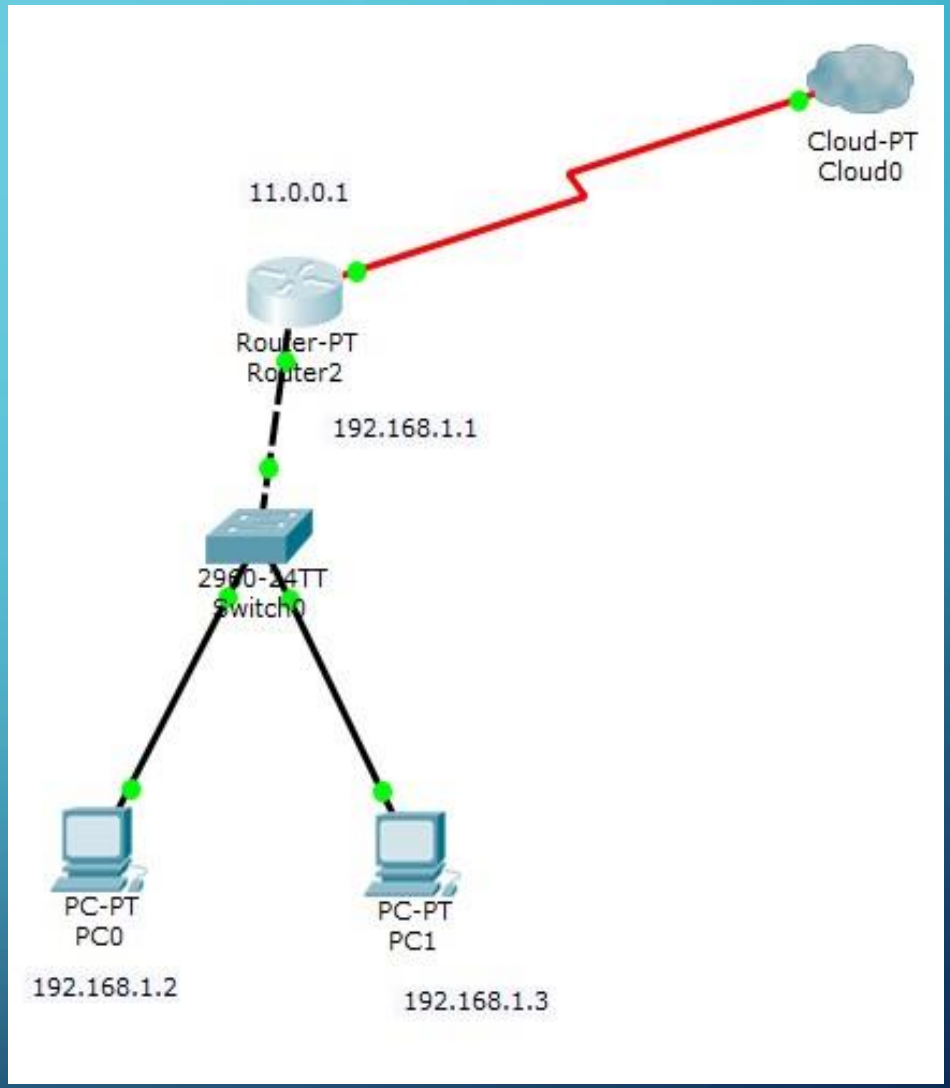
  “Public IP address : unique port No.”

NAT

- How to configure NAT : - At first the Network Admin has to create different policies called as NAT rules, that are applied on the outgoing and incoming ports of the NAT agent.
- From the point of view of any LAN, any IP addresses of that LAN is considered as Inside and others are considered as Outside address. And any Private IP address is considered Local address and any Public IP address is considered Global address.
- Here addresses can be considered as Inside Local, Inside Global, Outside Local and Outside Global.

NAT

- Simple NAT Topology : -



NAT

- Static NAT Configuration : -

  Let, 192.168.1.2 will be translates to 11.0.0.1

  and 192.168.1.3 will be translated to 11.0.0.2

- Create NAT rule

  Router(config)#ip nat inside source static 192.168.1.2 11.0.0.2

  Router(config)#ip nat inside source static 192.168.1.3 11.0.0.3

- Apply NAT rule at incoming and exiting interface

  Router(config)#interface fastEthernet 0/0

  Router(config-if)#ip nat inside

  Router(config)#interface serial 2/0

  Router(config)#ip nat outside

NAT

- Dynamic NAT Configuration : -

  Let, the entire network 192.168.1.0/24 to be translated to 11.0.0.0/24

- Specify the Private Network by a Standard Numbered ACL

  Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255

- Specify the range of Public IP Address by a NAT pool

  Router(config)#ip nat pool icss 11.0.0.2 11.255.255.254 netmask 255.0.0.0

- Create NAT rule

  ip nat inside source list 1 pool icss

NAT

- Apply NAT rule at the incoming and outgoing interface

  Router(config)#interface fastEthernet 0/0

  Router(config-if)#ip nat inside

  Router(config)#interface serial 2/0

  Router(config)#ip nat outside

NAT

- PAT Configuration : -
- Specify Private Network by a Standard Numbered ACL
  Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
- Specify the range of Public Address by a NAT Pool
  Router(config)#ip nat pool icss 200.0.0.1 200.0.0.1 netmask 255.255.255.0
- Create NAT Rule
  Router(config)#ip nat inside sourse pool icss overload
- Apply NAT rule at the incoming and outgoing interface
  Router(config)#int f0/0
  Router(config)#ip nat inside
  Router(config)#int s2/0
  Router(config)#ip nat outside

END OF DAY 10

NETWORKING (CCNA TRAINING)

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