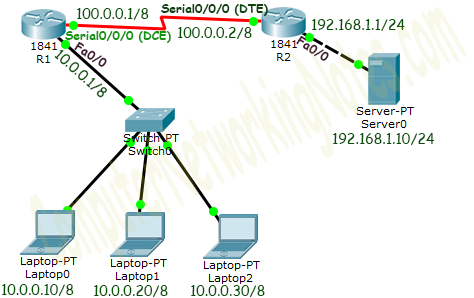
How to Configure Static NAT in Cisco Router

This tutorial explains how to configure static NAT (Network Address Translation) in Cisco Router step by step with Packet Tracer examples.

address.

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| **Term** | **Description** |
| Inside Local IP Address | Before translation source IP address located inside the local network. |
| Inside Global IP Address | After translation source IP address located outside the local network. |
| Outside Global IP Address | Before translation destination IP address located outside the remote network. |
| Outside Local IP Address | After translation destination IP address located inside the remote network |

Create a lab as illustrates in following figure.



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| Initial IP Configuration   |  |  |  | | --- | --- | --- | | **Device / Interface** | **IP Address** | **Connected With** | | Laotop0 | 10.0.0.10/8 | Fa0/0 of R0 | | Laptop1 | 10.0.0.20/8 | Fa0/0 of R0 | | Laptop2 | 10.0.0.30/8 | Fa0/0 of R0 | | Server0 | 192.168.1.10/24 | Fa0/0 of R1 | | Serial 0/0/0 of R1 | 100.0.0.1/8 | Serial 0/0/0 of R2 | | Serial 0/0/0 of R2 | 100.0.0.2/8 | Serial 0/0/0 of R2 | |  |  |
| **To assign IP address in Laptop click Laptop and click Desktop and IP configuration and Select Static and set IP address as given in above table.**  **Static NAT Assign IP Laptop**  **Following same way configure IP address in Server.**  **Static NAT Assign IP Server**  [**Download NAT Practice LAB with initial IP configuration**](https://www.computernetworkingnotes.com/download/cisco/ccna-study-guide/pkt/nat-practice-ip-configured.pkt)  ***If you are following this tutorial on my practice topology, skip this IP configuration section as that topology is already configured with this initial IP configuration***  **To assign IP address in Laptop click Laptop and click Desktop and IP configuration and Select Static and set IP address as given in above table.**  **Static NAT Assign IP Laptop**  **Following same way configure IP address in Server.**  **Static NAT Assign IP Server**  **To configure IP address in Router1 click Router1 and select CLI and press Enter key.**  **Static NAT Assign IP router**  **Two interfaces of Router1 are used in topology; FastEthernet0/0 and Serial 0/0/0.**  **By default interfaces on router are remain administratively down during the start up. We need to configure IP address and other parameters on interfaces before we could actually use them for routing. Interface mode is used to assign the IP address and other parameters. Interface mode can be accessed from global configuration mode. Following commands are used to access the global configuration mode.**  **Router>enable**  **Router# configure terminal**  **Enter configuration commands, one per line. End with CNTL/Z.**  **Router(config)#**  **Before we configure IP address in interfaces let’s assign a unique descriptive name to router.**  **Router(config)#hostname R1**  **R1#**  **Now execute the following commands to set IP address in FastEthernet 0/0 interface.**  **R1(config)#interface FastEthernet0/0**  **R1(config-if)#ip address 10.0.0.1 255.0.0.0**  **R1(config-if)#no shutdown**  **R1(config-if)#exit**  ***interface FastEthernet 0/0* command is used to enter in interface mode.**  ***ip address 10.0.0.1 255.0.0.0* command assigns IP address to interface.**  ***no shutdown* command is used to bring the interface up.**  ***exit* command is used to return in global configuration mode.**  **Serial interface needs two additional parameters clock rate and bandwidth. Every serial cable has two ends DTE and DCE. These parameters are always configured at DCE end.**  **We can use show controllers interface command from privilege mode to check the cable’s end.**  **R1(config)#exit**  **R1#show controllers serial 0/0/0**  **Interface Serial0/0/0**  **Hardware is PowerQUICC MPC860**  **DCE V.35, clock rate 2000000**  **[Output omitted]**  **Fourth line of output confirms that DCE end of serial cable is attached. If you see DTE here instead of DCE skip these parameters.**  **Now we have necessary information let’s assign IP address to serial interface.**  **R1#configure terminal**  **R1(config)#interface Serial0/0/0**  **R1(config-if)#ip address 100.0.0.1 255.0.0.0**  **R1(config-if)#clock rate 64000**  **R1(config-if)#bandwidth 64**  **R1(config-if)#no shutdown**  **R1(config-if)#exit**  **R1(config)#**  **Router#configure terminal Command is used to enter in global configuration mode.**  ***Router(config)#interface serial 0/0/0* Command is used to enter in interface mode.**  ***Router(config-if)#ip address 100.0.0.1 255.0.0.0* Command assigns IP address to interface.**  **Router(config-if)#clock rate 64000**  **In real life environment this parameter controls the data flow between serial links and need to be set at service provider’s end. In lab environment we need not to worry about this value. We can use any valid rate here.**  **Router(config-if)#bandwidth 64**  **Bandwidth works as an influencer. It is used to influence the metric calculation of EIGRP or any other routing protocol which uses bandwidth parameter in route selection process.**  **Router(config-if)#no shutdown Command brings interface up.**  **Router(config-if)#exit Command is used to return in global configuration mode.**  **We will use same commands to assign IP addresses on interfaces of Router2. We need to provided clock rate and bandwidth only on DCE side of serial interface. Following command will assign IP addresses on interface of Router2.**  **Initial IP configuration in R2**  **Router>enable**  **Router#configure terminal**  **Router(config)#hostname R2**  **R2(config)#interface FastEthernet0/0**  **R2(config-if)#ip address 192.168.1.1 255.255.255.0**  **R2(config-if)#no shutdown**  **R2(config-if)#exit**  **R2(config)#interface Serial0/0/0**  **R2(config-if)#ip address 100.0.0.2 255.0.0.0**  **R2(config-if)#no shutdown**  **R2(config-if)#exit**  **R2(config)#**  **That’s all initial IP configuration we need. Now this topology is ready for the practice of static nat.**  **Configure Static NAT**  **Static NAT configuration requires three steps: -**   * **Define IP address mapping** * **Define inside local interface** * **Define inside global interface**   **Since static NAT use manual translation, we have to map each inside local IP address (which needs a translation) with inside global IP address. Following command is used to map the inside local IP address with inside global IP address.**  **Router(config)#ip nat inside source static [inside local ip address] [inside global IP address]**  **For example in our lab Laptop1 is configured with IP address 10.0.0.10. To map it with 50.0.0.10 IP address we will use following command**  **Router(config)#ip nat inside source static 10.0.0.10 50.0.0.10**  **In second step we have to define which interface is connected with local the network. On both routers interface Fa0/0 is connected with the local network which need IP translation.**  **Following command will define interface Fa0/0 as inside local.**  **Router(config-if)#ip nat inside**  **In third step we have to define which interface is connected with the global network. On both routers serial 0/0/0 interface is connected with the global network. Following command will define interface Serial0/0/0 as inside global.**  **Router(config-if)#ip nat outside**  **Following figure illustrates these terms.**  **inside local inside global**  **Let’s implement all these commands together and configure the static NAT.**  **R1 Static NAT Configuration**  **R1(config)#ip nat inside source static 10.0.0.10 50.0.0.10**  **R1(config)#interface FastEthernet 0/0**  **R1(config-if)#ip nat inside**  **R1(config-if)#exit**  **R1(config)#**  **R1(config)#interface Serial 0/0/0**  **R1(config-if)#ip nat outside**  **R1(config-if)#exit**  **For testing purpose I configured only one static translation. You may use following commands to configure the translation for remaining address.**  **R1(config)#ip nat inside source static 10.0.0.20 50.0.0.20**  **R1(config)#ip nat inside source static 10.0.0.30 50.0.0.30**  **R2 Static NAT Configuration**  **R2(config)#ip nat inside source static 192.168.1.10 200.0.0.10**  **R2(config)#interface FastEthernet 0/0**  **R2(config-if)#ip nat inside**  **R2(config-if)#exit**  **R2(config)#**  **R2(config)#interface Serial 0/0/0**  **R2(config-if)#ip nat outside**  **R2(config-if)#exit**  **Before we test this lab we need to configure the IP routing. IP routing is the process which allows router to route the packet between different networks. Following tutorial explain routing in detail with examples**  [**Routing concepts Explained with Examples**](http://www.computernetworkingnotes.com/ccna-study-guide/basic-routing-concepts-and-protocols-explained.html)  **Configure static routing in R1**  **R1(config)#ip route 200.0.0.0 255.255.255.0 100.0.0.2**  **Configure static routing in R2**  **R2(config)#ip route 50.0.0.0 255.0.0.0 100.0.0.1**  **Testing Static NAT Configuration**  **In this lab we configured static NAT on R1 and R2. On R1 we mapped inside local IP address 10.0.0.10 with inside global address 50.0.0.10 while on R2 we mapped inside local IP address 192.168.1.10 with inside global IP address 200.0.0.10.**   |  |  |  | | --- | --- | --- | | **Device** | **Inside Local IP Address** | **Inside Global IP Address** | | **Laptop0** | **10.0.0.10** | **50.0.0.10** | | **Server** | **192.168.1.10** | **200.0.0.10** |   **To test this setup click Laptop0 and Desktop and click Command Prompt.**   * **Run ipconfig command.** * **Run ping 200.0.0.10 command.** * **Run ping 192.168.1.10 command.**   **NAT Testing**  **First command verifies that we are testing from correct NAT device.**  **Second command checks whether we are able to access the remote device or not. A ping reply confirms that we are able to connect with remote device on this IP address.**  **Third command checks whether we are able to access the remote device on its actual IP address or not. A ping error confirms that we are not able to connect with remote device on this IP address.**  **Let’s do one more testing. Click Laptop0 and click Desktop and click Web server and access 200.0.0.10.**  **NAT testing**  **Above figure confirms that host 10.0.0.10 is able to access the 200.0.0.10.**  **Now run ping 200.0.0.10 command from Laptop1.**  **Static NAT testing**  ***Why we are not able to connect with the remote device from this host?***  **Because we configured NAT only for one host (Laptop0) which IP address is 10.0.0.10. So only the host 10.0.0.10 will be able to access the remote device.**  **To confirm it again, let’s try to access web service from this host.**  **static nat testing**  ***If you followed this tutorial step by step, you should get the same output of testing. Although it’s very rare but some time you may get different output. To figure out what went wrong you can use my practice topology with all above configuration. Download my practice topology***  [**Download NAT Practice LAB with Static NAT configuration**](https://www.computernetworkingnotes.com/download/cisco/ccna-study-guide/pkt/nat-practice-static-configred.pkt)  **We can also verify this translation on router with *show ip nat translation* command.**  **Following figure illustrate this translation on router R1.**  **show ip nat translation**  **Following figure illustrate this translation on router R2**  **show ip nat translation**  ***Pay a little bit extra attention on outside local address filed. Have you noticed one interesting feature of NAT in above output? Why actual outside local IP address is not listed in this filed?***  **The actual IP address is not listed here because router is receiving packets after the translation. From R1’s point of view remote device’s IP address is 200.0.0.10 while from R2’s point of view end device’s IP address is 50.0.0.10.**  **This way if NAT is enabled we would not be able to trace the actual end device.**  **That’s all for this tutorial. In next part we will learn dynamic NAT configuration step by step with examples.** |  |  |
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