# Static NAT

**Understanding Static NAT**

* **Static NAT**: A one-to-one mapping between a private inside address and a public outside address.
* **Purpose**: Allows external devices to initiate connections to internal devices using a public address.
* **Use Case**: Commonly used for services like web servers that need to be accessible from outside the network.

**Scenario Overview**

* **Example Setup**:
  + **Web Server IP**: 192.168.10.254 (Inside Network).
  + **Client IP**: 209.165.200.254 (Outside Network).
  + **Static NAT Translation**: Maps 192.168.10.254 to 209.165.201.5.
  + **Router R2**: Handles NAT between the inside and outside networks.

**Steps to Configure Static NAT**

1. **Create a Static NAT Mapping**:
   * Command: ip nat inside source static [inside\_local] [inside\_global]
   * Example: R2(config)# ip nat inside source static 192.168.10.254 209.165.201.5
2. **Configure NAT Interfaces**:
   * **Inside Interface**:
     + Assign IP: R2(config-if)# ip address 192.168.1.2 255.255.255.252
     + Set as Inside: R2(config-if)# ip nat inside
   * **Outside Interface**:
     + Assign IP: R2(config-if)# ip address 209.165.200.1 255.255.255.252
     + Set as Outside: R2(config-if)# ip nat outside

**Analyzing Static NAT Process**

1. **Client Initiates Connection**:
   * Sends packet to the web server using the public IP: 209.165.201.5.
2. **R2 Translates Address**:
   * R2 checks NAT table and translates 209.165.201.5 to 192.168.10.254.
   * Packet is forwarded to the web server.
3. **Web Server Responds**:
   * Response packet uses 192.168.10.254 as source IP.
4. **R2 Re-translates for Client**:
   * R2 translates the source address back to 209.165.201.5 before sending it to the client.

**Verifying Static NAT Configuration**

1. **Check NAT Translations**:
   * Command: show ip nat translations
   * Displays active translations, showing inside local and global addresses.
   * Example output:

Pro Inside global Inside local Outside local Outside global

--- 209.165.201.5 192.168.10.254 --- ---

1. **Check NAT Statistics**:
   * Command: show ip nat statistics
   * Provides summary of active translations and interface hits/misses.
   * Clear previous stats before testing with: clear ip nat statistics.

Example output after establishing a session:

Total active translations: 1 (1 static, 0 dynamic; 0 extended)

Hits: 4 Misses: 1

**Key Commands Summary**

* **Static NAT Mapping**: ip nat inside source static 192.168.10.254 209.165.201.5
* **Set Inside Interface**: ip nat inside
* **Set Outside Interface**: ip nat outside
* **View Translations**: show ip nat translations
* **View Statistics**: show ip nat statistics
* **Clear Statistics**: clear ip nat statistics

## Pros and Cons of Static NAT

**Pros**

1. **Consistency**: The same public IP is always mapped to the same internal device, making it easy to predict and manage.
2. **Security**: Allows controlled access to specific internal devices, such as web servers, from external networks.
3. **Simplicity**: Easy to configure for small networks where only a few internal devices need to be accessible from the outside.
4. **No Port Overloading**: Each internal IP has a dedicated public IP, avoiding issues with port conflicts.

**Cons**

1. **Limited IP Usage**: Requires a separate public IP for each internal device, which can be inefficient and costly.
2. **Scalability**: Not suitable for large networks, as it doesn't handle a large number of internal devices efficiently.
3. **Complexity in Management**: Can become difficult to manage if the network grows and more static mappings are needed.
4. **Public Exposure**: Exposes specific internal devices directly to the internet, which could be a security risk if not properly managed.