Securing Networks with

Cisco FTD

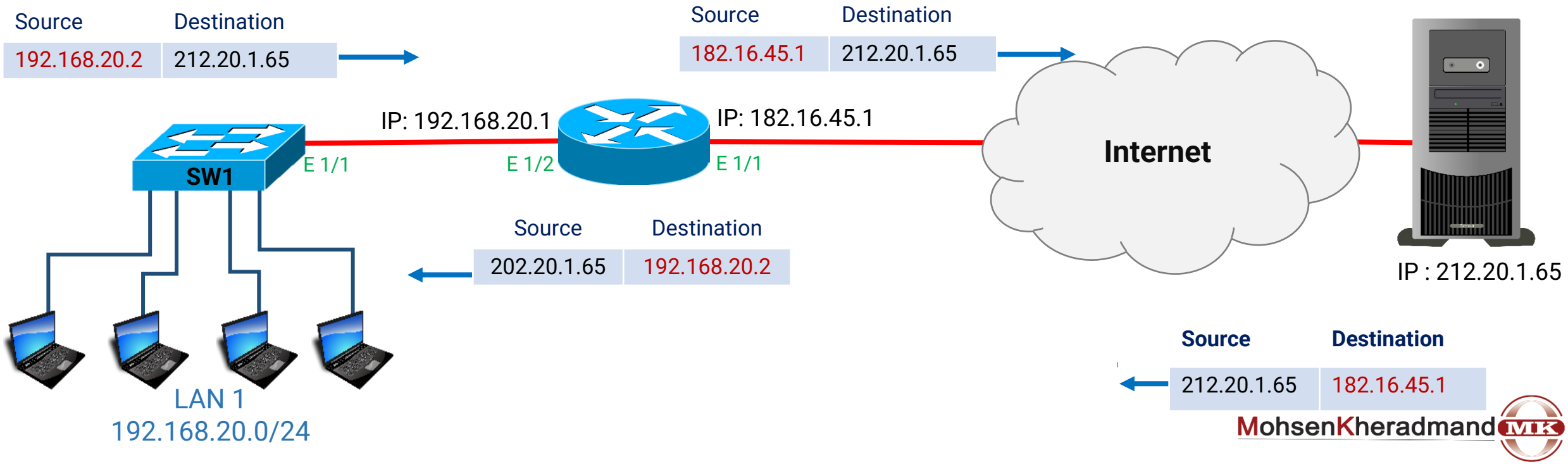
Chapter 15

Network Address Translation (NAT)

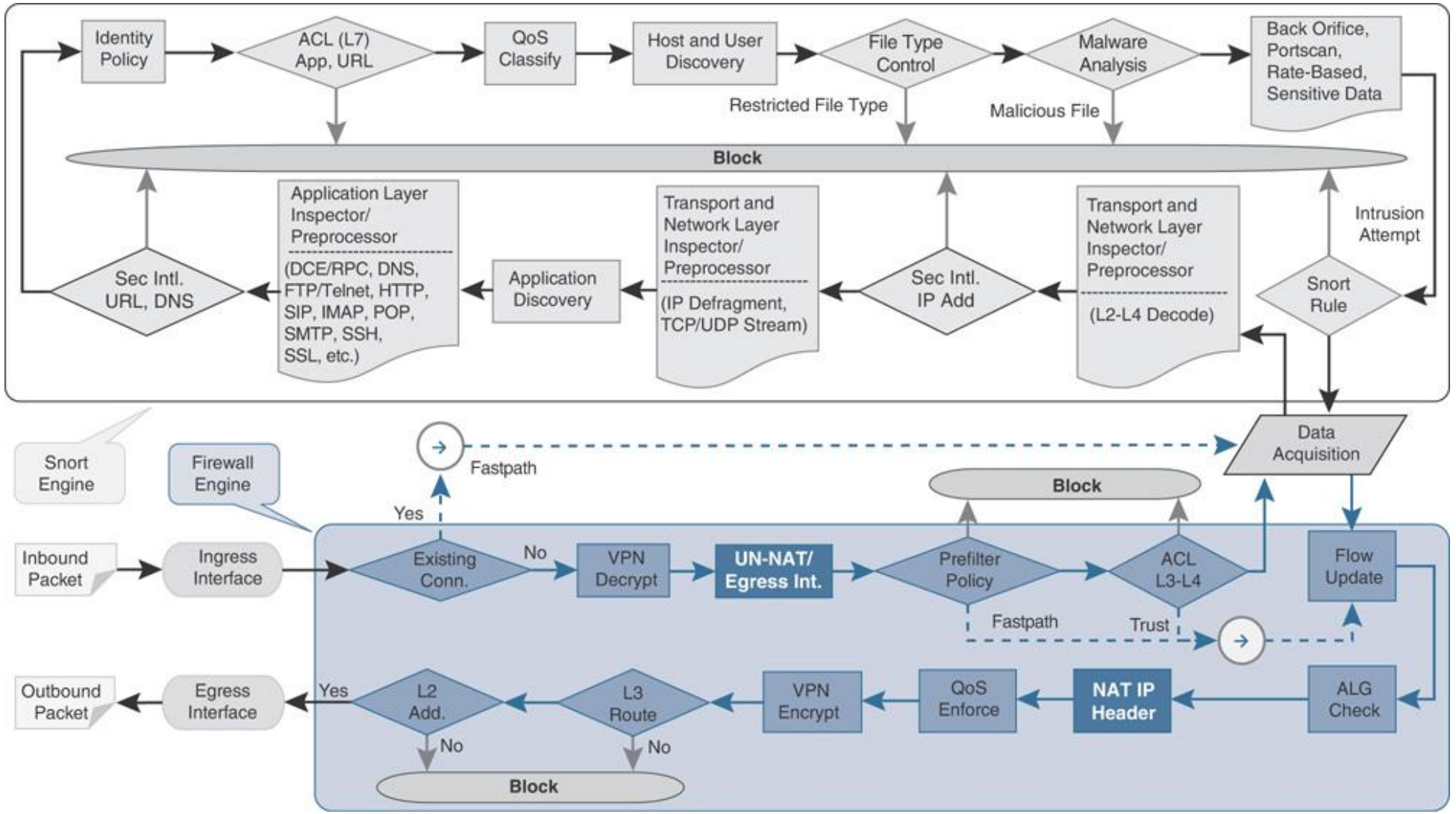
Mohsen Kheradmand

Network Address Translation

- Defined in RFC 3022
  - Describes methods for connecting private (internal) IP addresses to the external (Internet)
  - NAT uses a one-to-one, one-to-many, many-to-one, many-to-many, few to-many, and many-to-few mapping method
    - One or more private IP clients gain access to the Internet by mapping the private IP addresses to public IP addresses



Network Address Translation



NAT types:

Static NAT

- The simplest form of NAT
- A single private IP address is mapped to a single public IP address or vice-versa

Dynamic NAT

- Maps a one or group of local IP addresses to a group of Internet IP addresses

Port address translation (PAT)

- Also known as overloading , Is a special form of dynamic NAT
- Maps a group of local IP addresses to one or a group of Public IP addresses by using TCP and UDP ports

NAT implementation types

Source NAT:

- Internal users with private IP addresses connects to the internet.

Destination NAT:

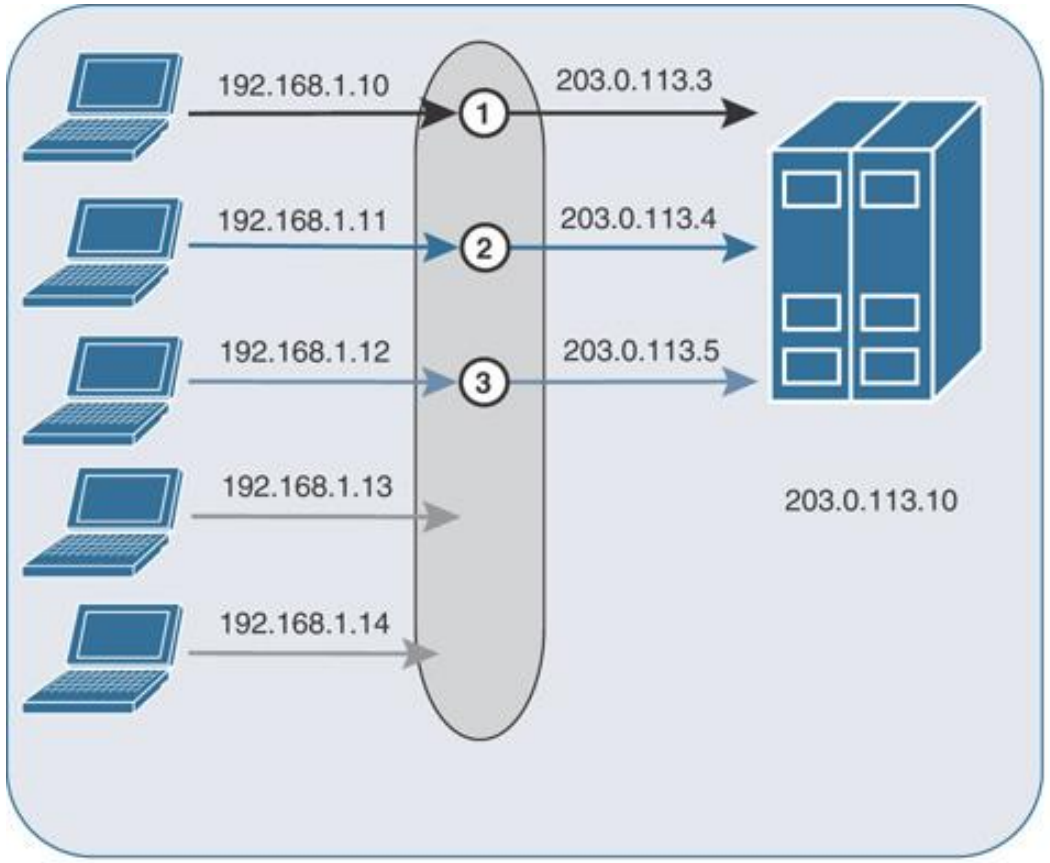
- Users from the internet, connect to the enterprise servers with private IP addresses.

Policy NAT:

- Occurs based upon matching both the source and destination of traffic

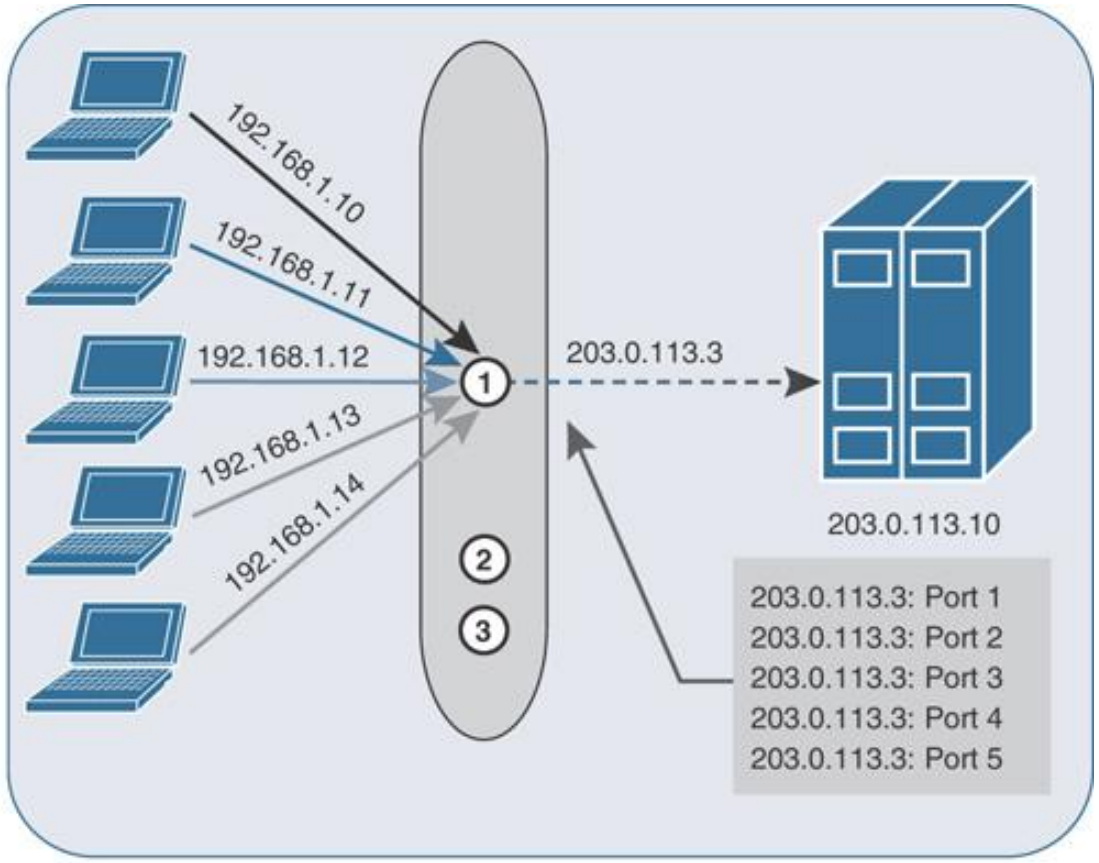
Identity NAT:

- We will exclude some traffic to be translated especially over VPN tunnels.



Network Address Translation (NAT)

If the first three hosts are dynamically assigned, the last two hosts must wait until the timeout value expires. But if they are assigned statically, the last two hosts have no chance.



Port Address Translation (PAT)

One address can multiplex more than 65,000 connections over a single IP address before another address is selected from a pool.

NAT Rule Types

Auto NAT:

- An Auto NAT rule can translate one address—either a source or destination address—in a single rule.
- This means that to translate both source and destination addresses, two separate Auto NAT rules are necessary.

Manual NAT:

- A Manual NAT rule allows the translation of both source and destination addresses within the same rule.
- A Manual NAT rule may be necessary when you want to make an exception for translation.

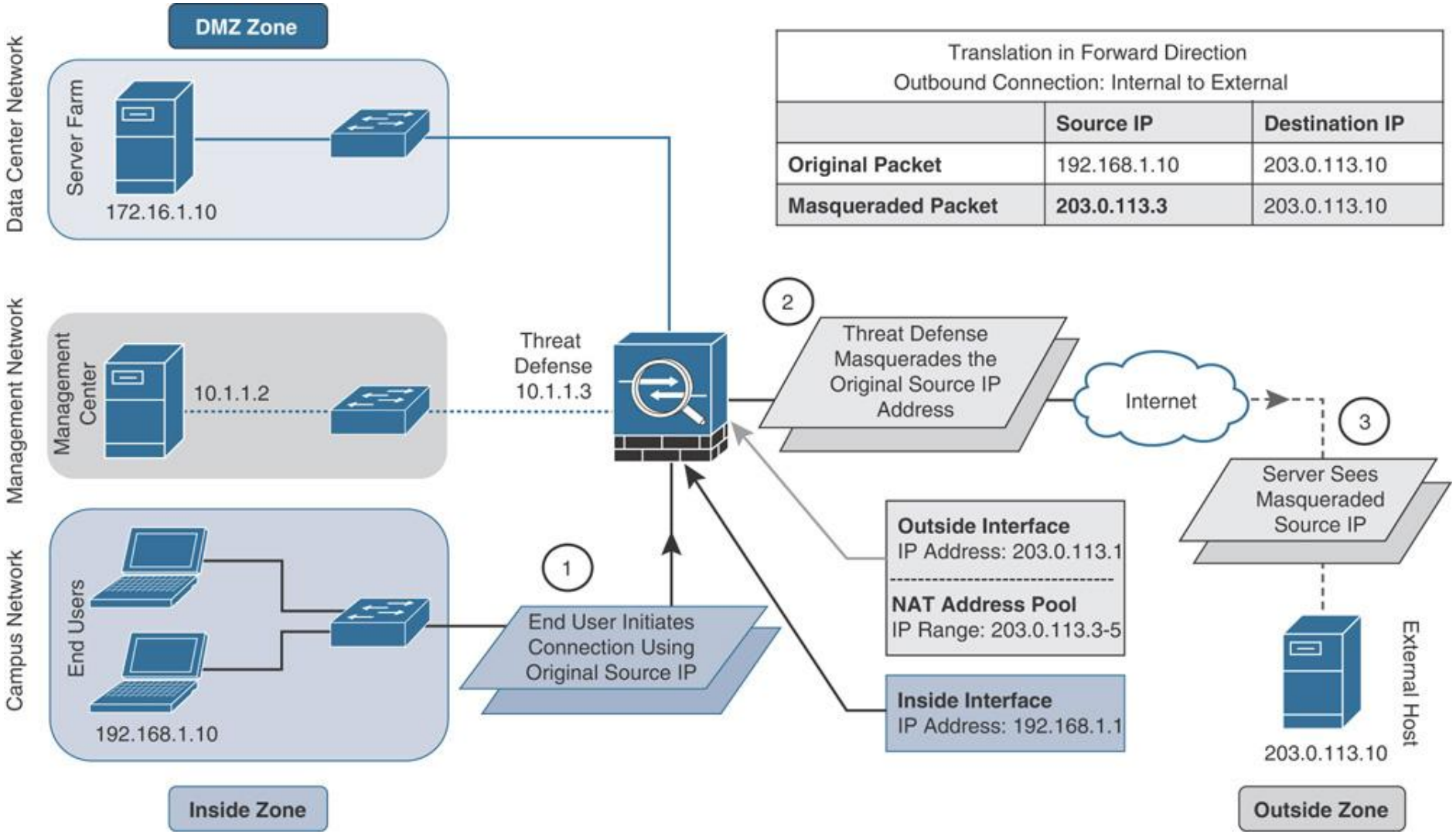
A NAT policy editor categorizes NAT rules into three groups

- ✓ NAT Rules Before (manual NAT policies)
- ✓ Auto NAT Rules
- ✓ NAT Rules After (manual NAT policies)

NAT Prerequisites

- Configuring an Auto NAT rule is simpler than configuring a Manual NAT rule (recommended)
- If you modify or redeploy a new NAT policy , the new policy does not work until the timer for any existing connections expires. (use **clear xlate** command to act immediately)
- To improve performance, prefer static NAT to dynamic NAT or PAT
- Interfaces that participate in a NAT have to be in a regular firewall mode—routed or transparent (FTD , does not support NAT on IPS-only)
- If you used a threat defense in an IPS-only mode, make sure all the associated interfaces where you want to enable NAT are now configured with IP address and security zones
- Static NAT always has higher priority than dynamic NAT. So if an IP address is matched with both static and dynamic NAT, static NAT has more priority.

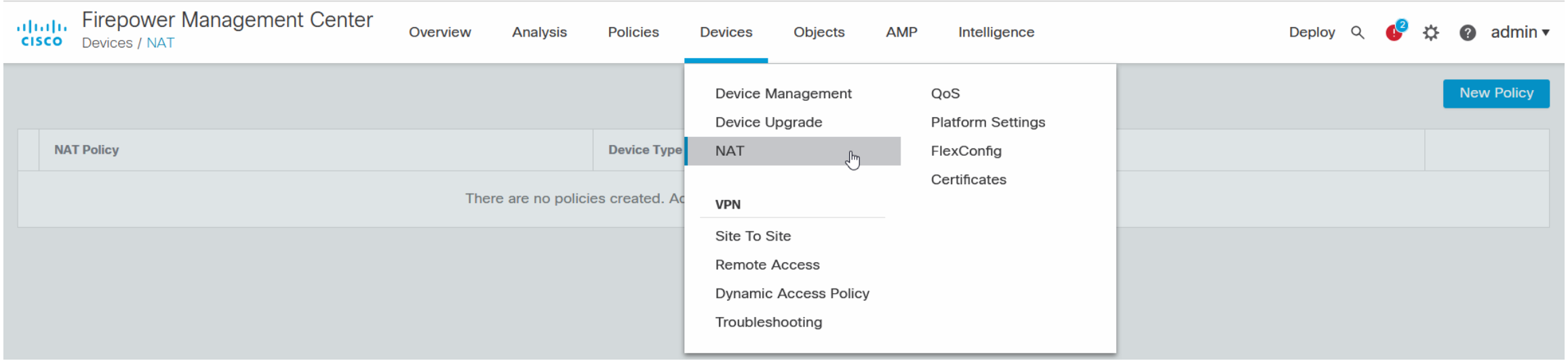
NAT Configuration



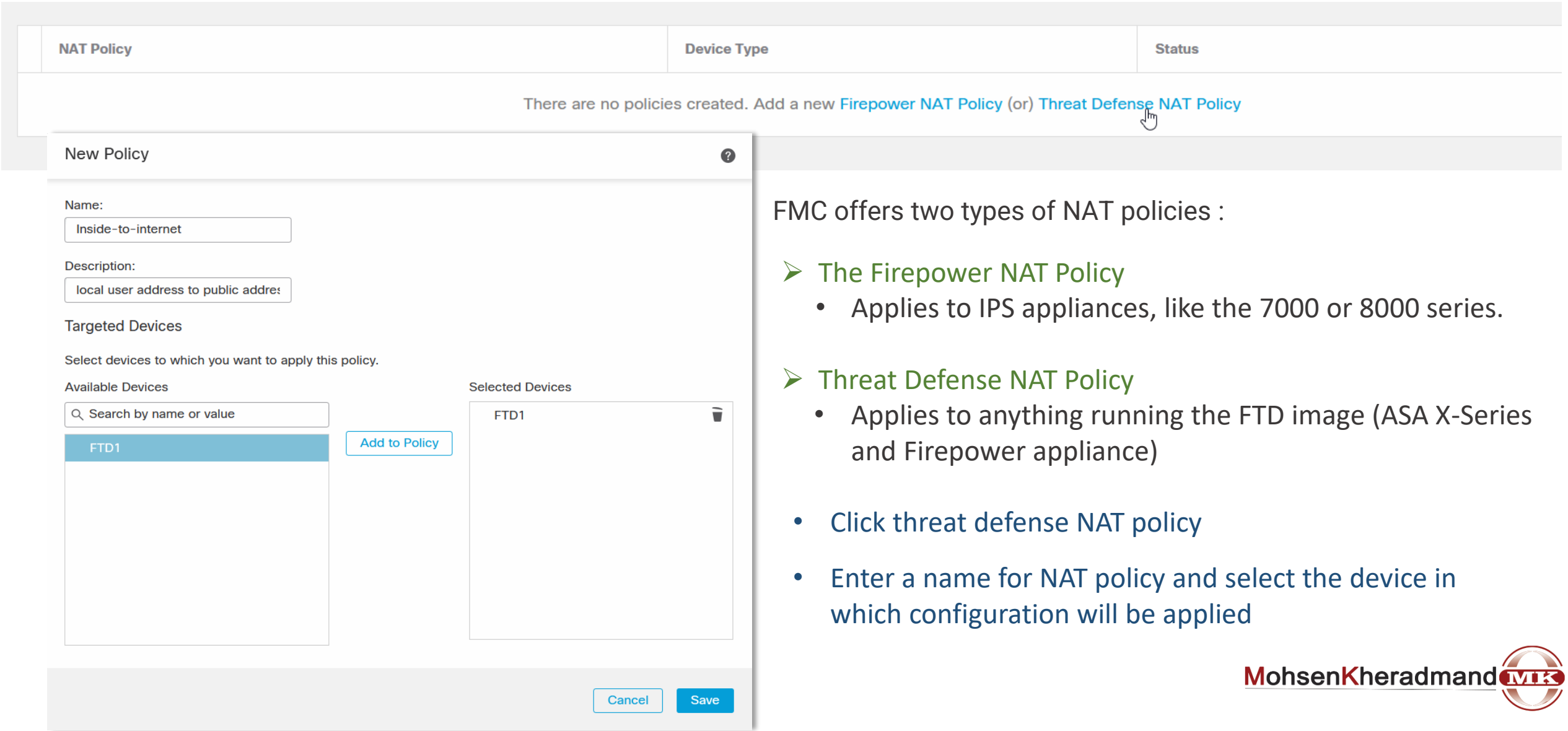
Translation in Forward Direction Outbound Connection: Internal to External		
	Source IP	**Destination IP**
Original Packet	192.168.1.10	203.0.113.10
Masqueraded Packet	**203.0.113.3**	203.0.113.10

NAT Configuration

- Devices > NAT
- Select Threat Defense NAT Policy



NAT Configuration



FMC offers two types of NAT policies :

- The Firepower NAT Policy
  - Applies to IPS appliances, like the 7000 or 8000 series.
- Threat Defense NAT Policy
  - Applies to anything running the FTD image (ASA X-Series and Firepower appliance)

- Click threat defense NAT policy
- Enter a name for NAT policy and select the device in which configuration will be applied

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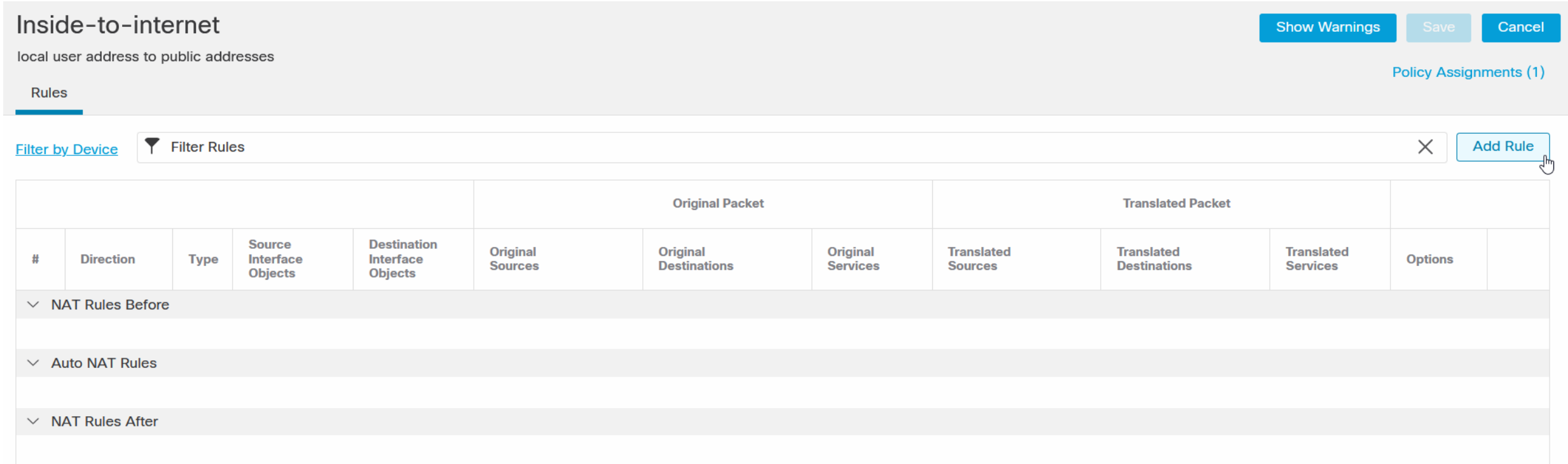
NAT Configuration

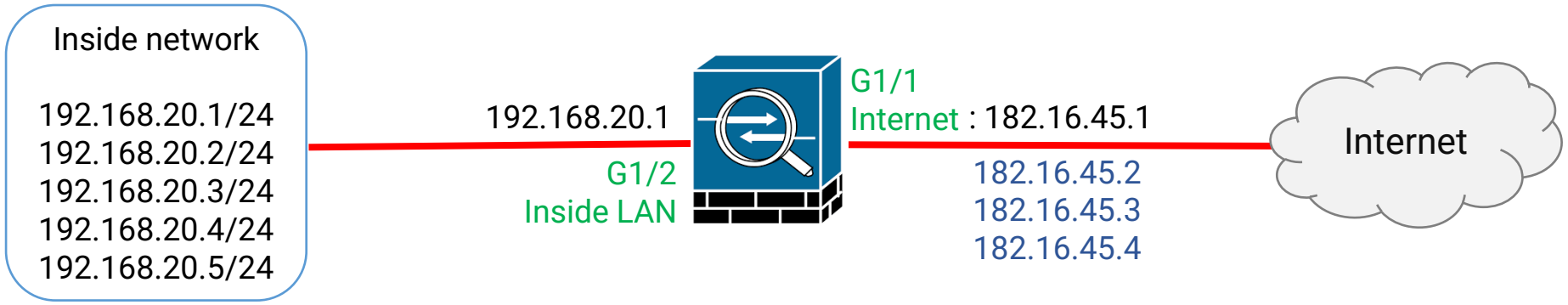
- Click Add Rule



NAT Configuration

1) Dynamic Source NAT

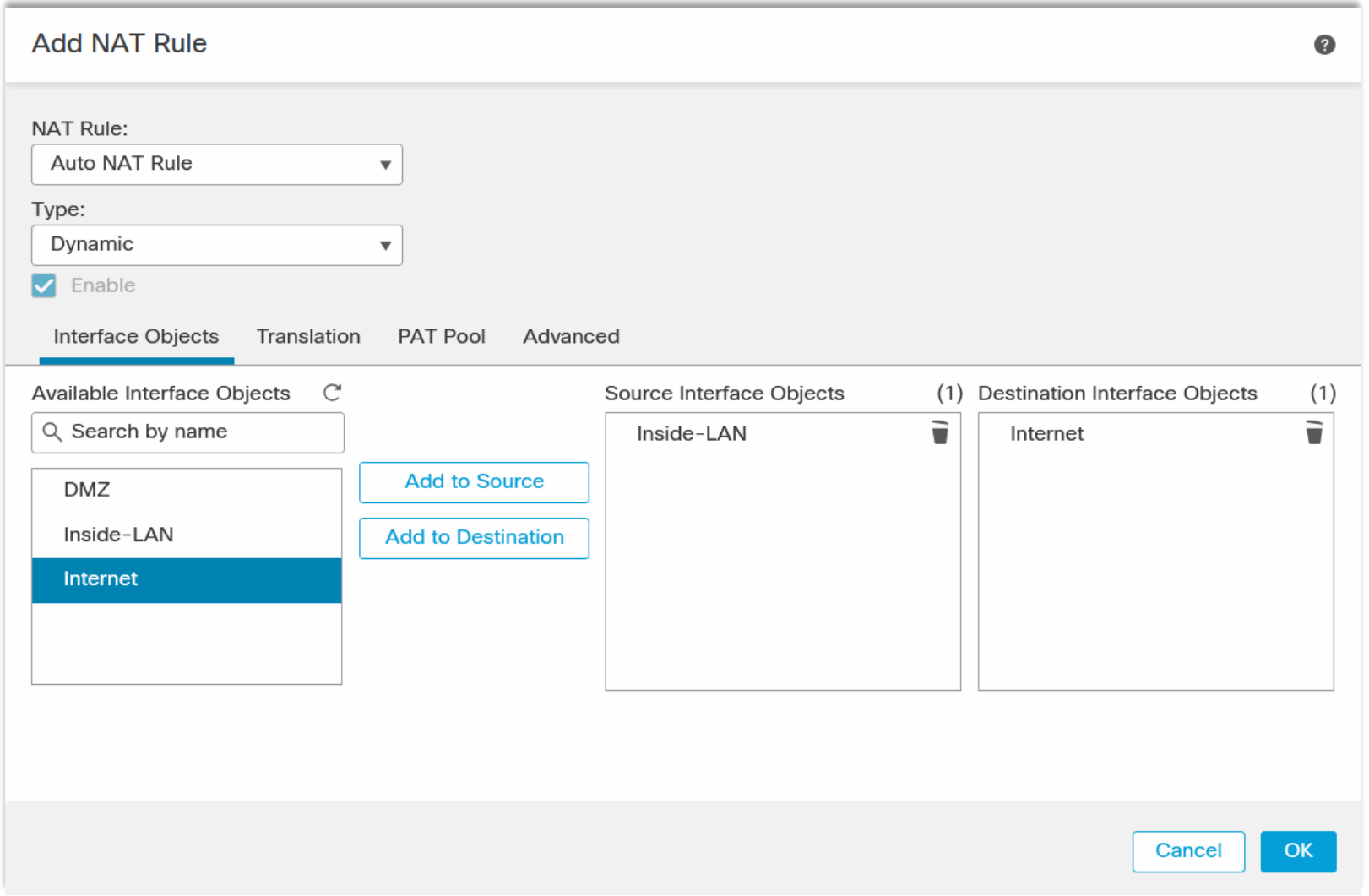
- A group of real IP addresses are mapped to a (usually smaller) group of mapped IP addresses
- The translation is created only when the real host initiates the connection



NAT Configuration

1) Dynamic Source NAT

- Select Auto NAT Rule
- Select Dynamic type
- Add inside local interface to source
- Add global interface with translated address to destination



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NAT Configuration

1) Dynamic Source NAT

- **Original source**

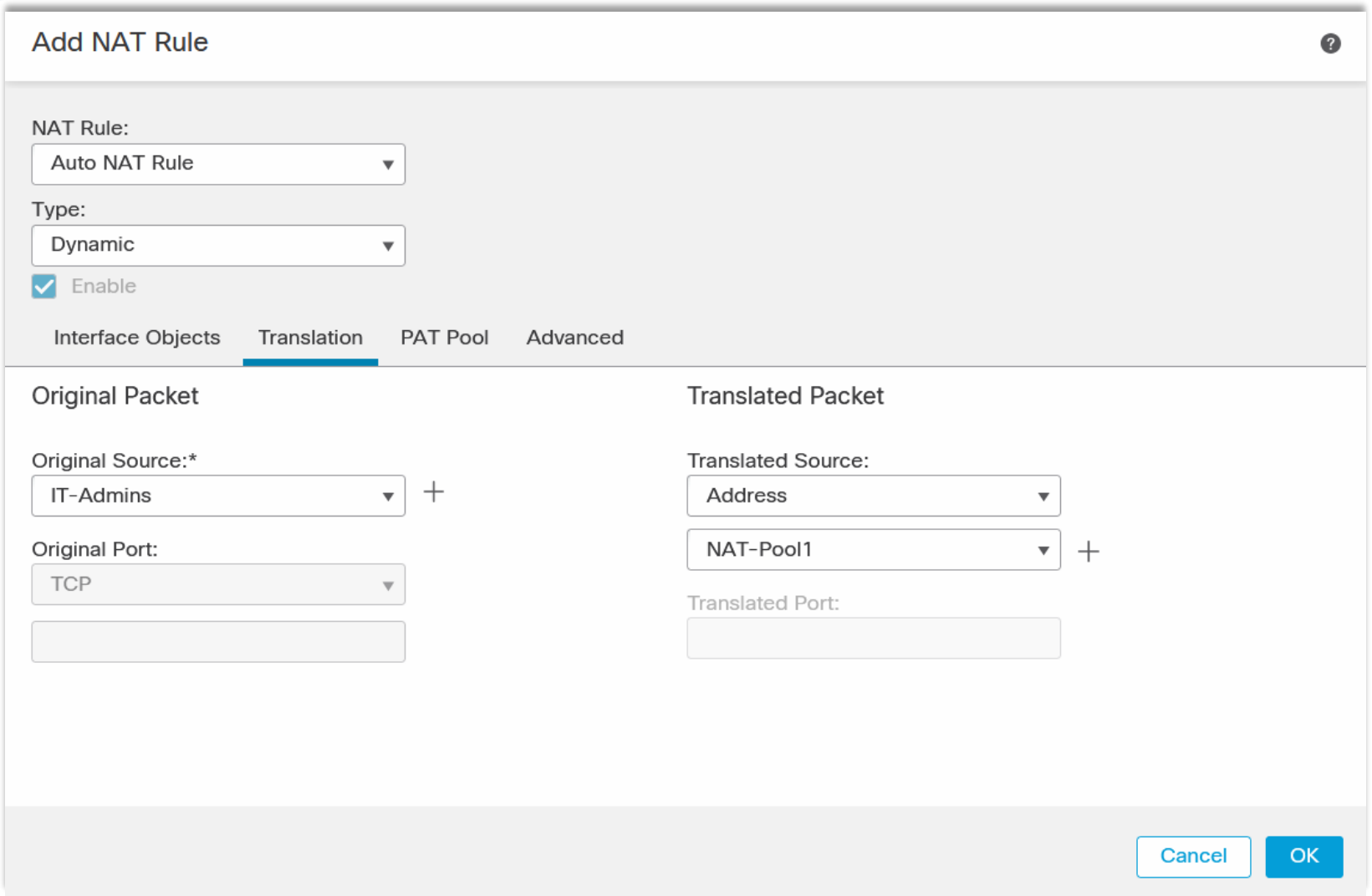
  The network or IP to use NAT

- **Translated Source** :

  Destination Interface IP : NAT all inside addresses via outbound interface

  Address : use a network or Range of IP

- Click OK to add this Rule



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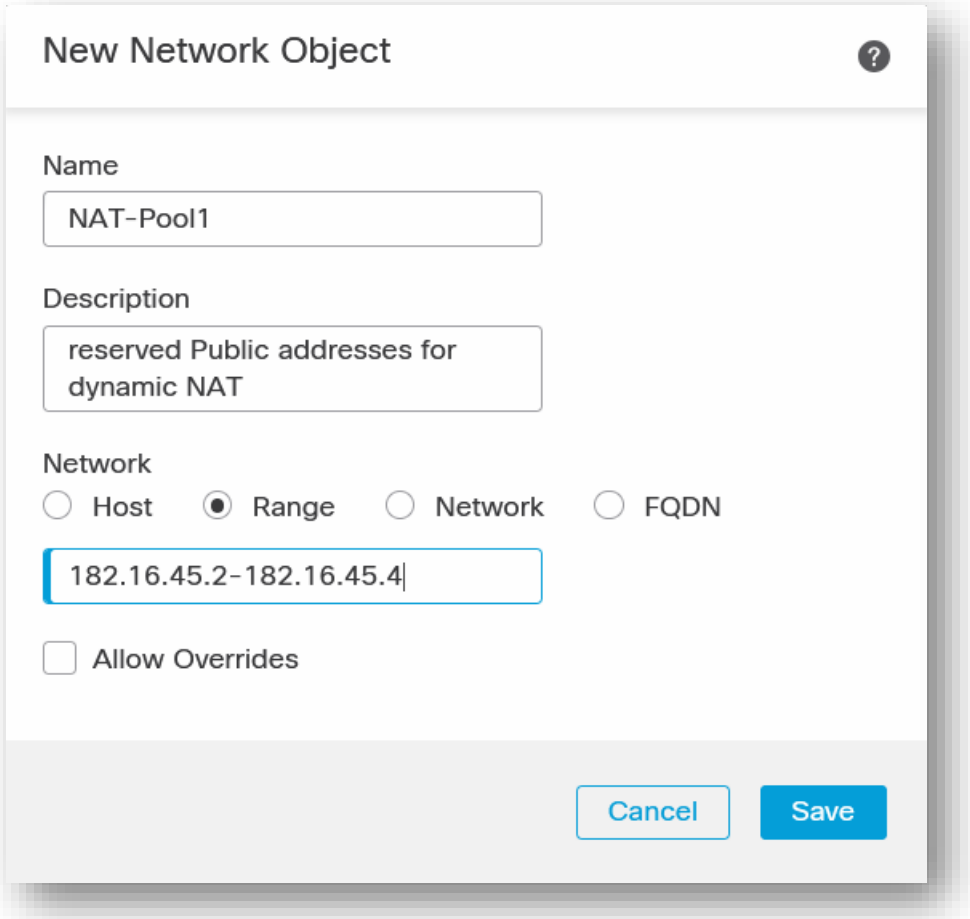
NAT Configuration

1) Dynamic Source NAT

- Note :

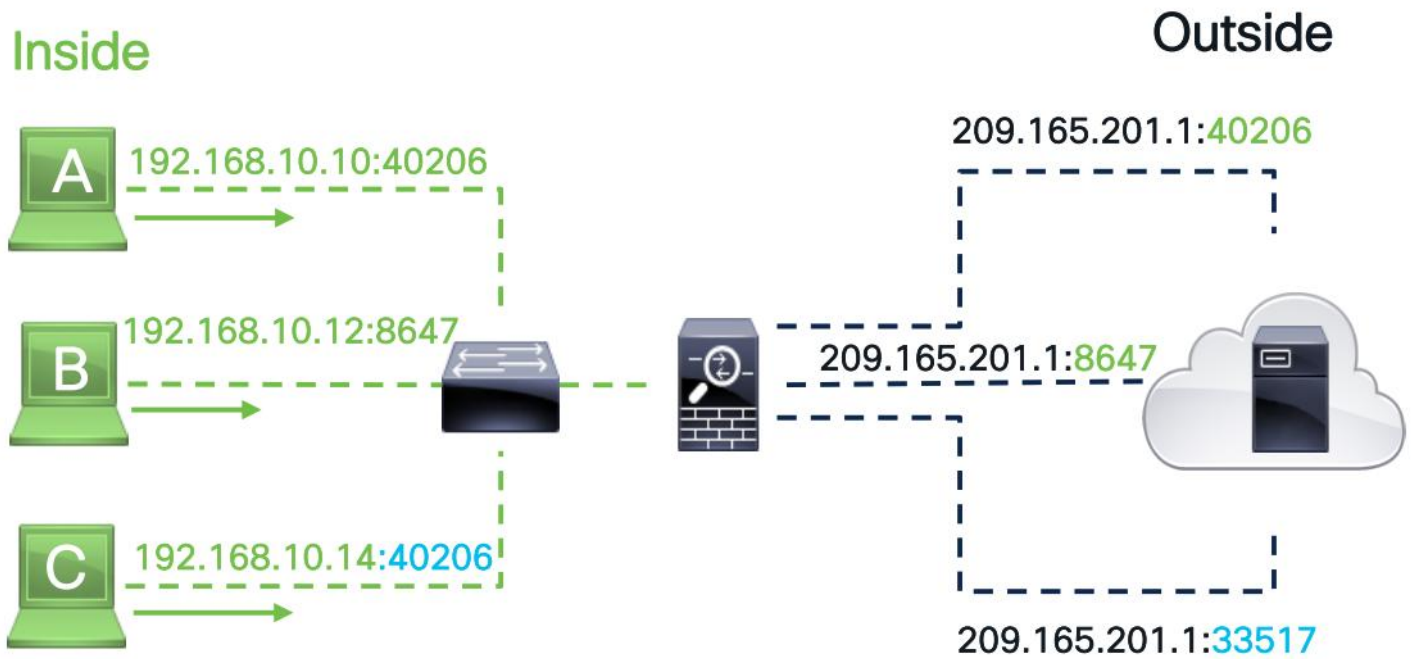
  You can define a new Host , Range of IP addresses , A network or FQDN to use in NAT



NAT Configuration

2) Dynamic source **PAT**

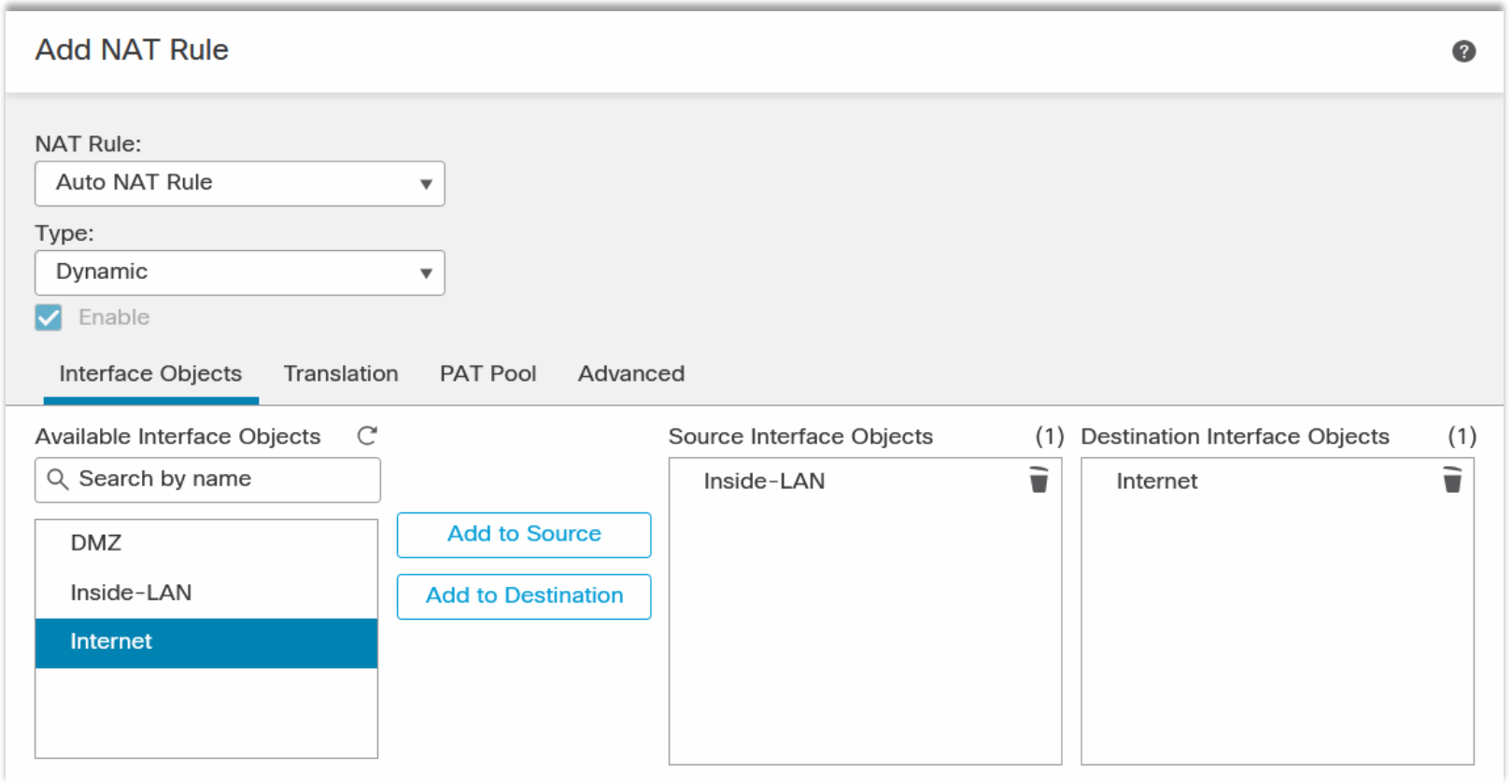
- A group of real IP addresses are mapped to a single IP or group of addresses using a unique source port of that IP

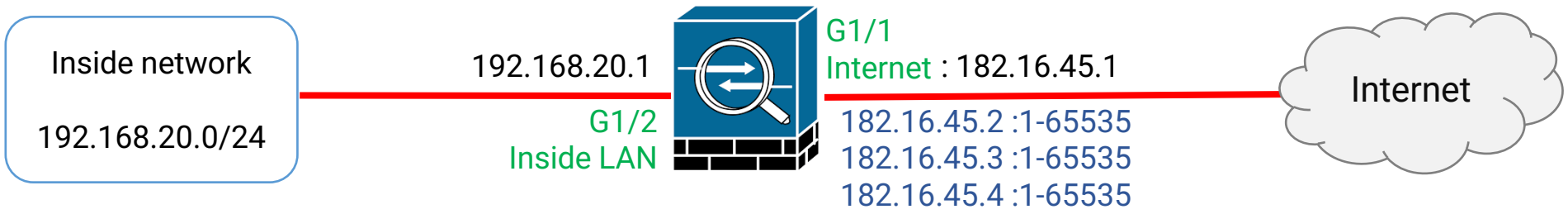


NAT Configuration

2) Dynamic source **PAT**

- Same as previous section select source and destination zone to use in NAT

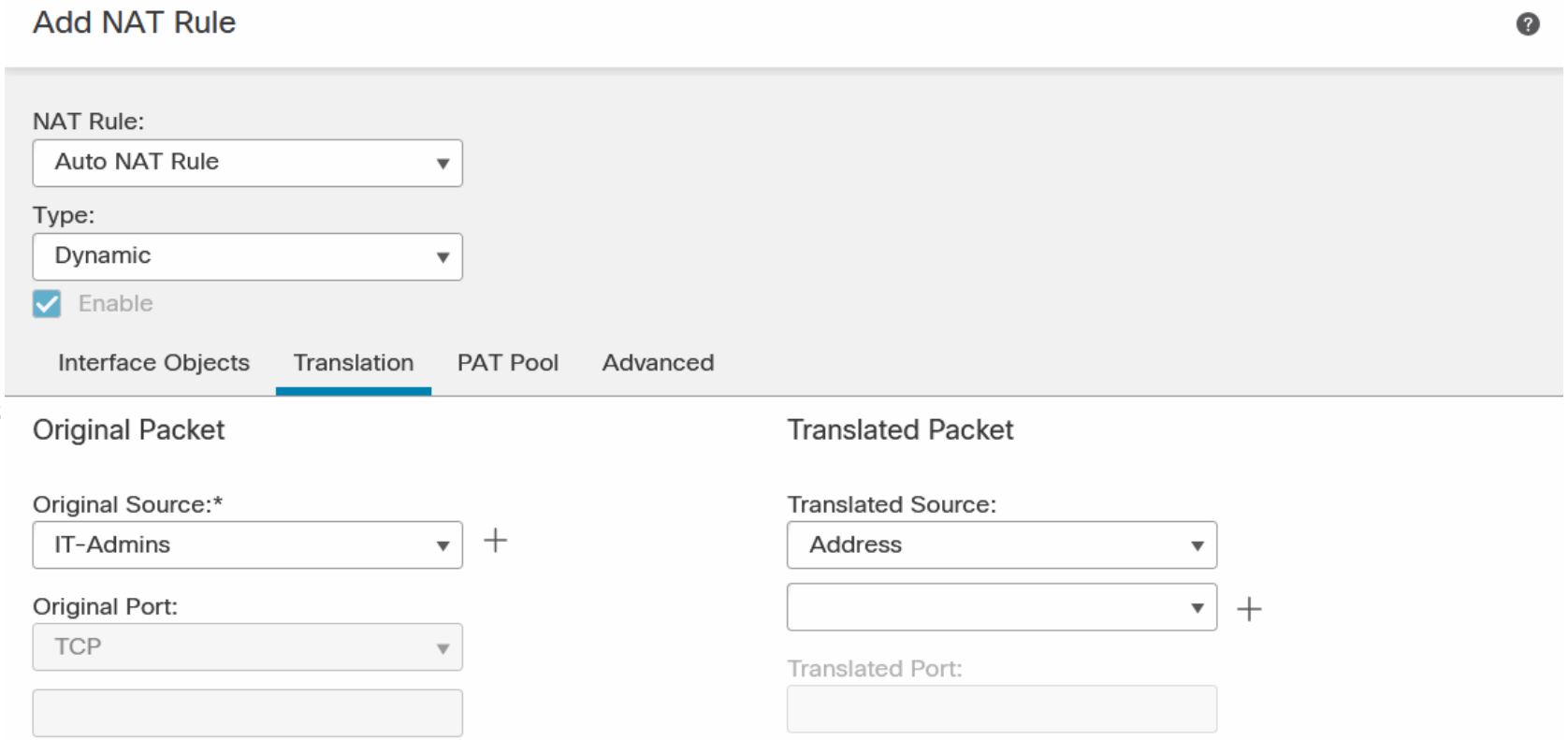


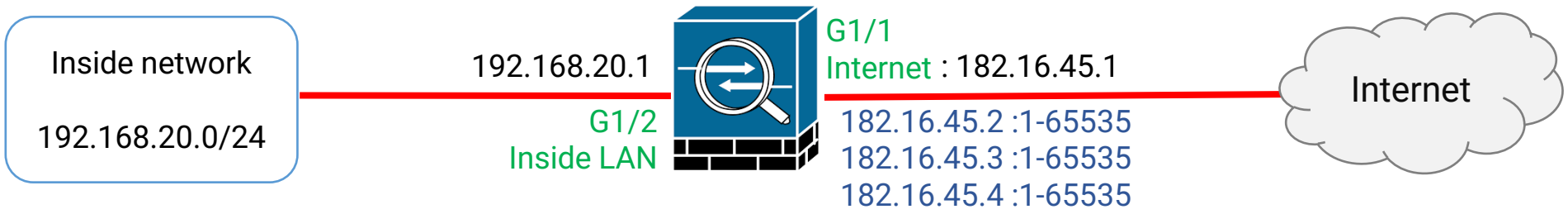


NAT Configuration

2) Dynamic source **PAT**

- Translation Tab
- Select original source IP / network
- Select **Address** from translated address but leave the value , blank

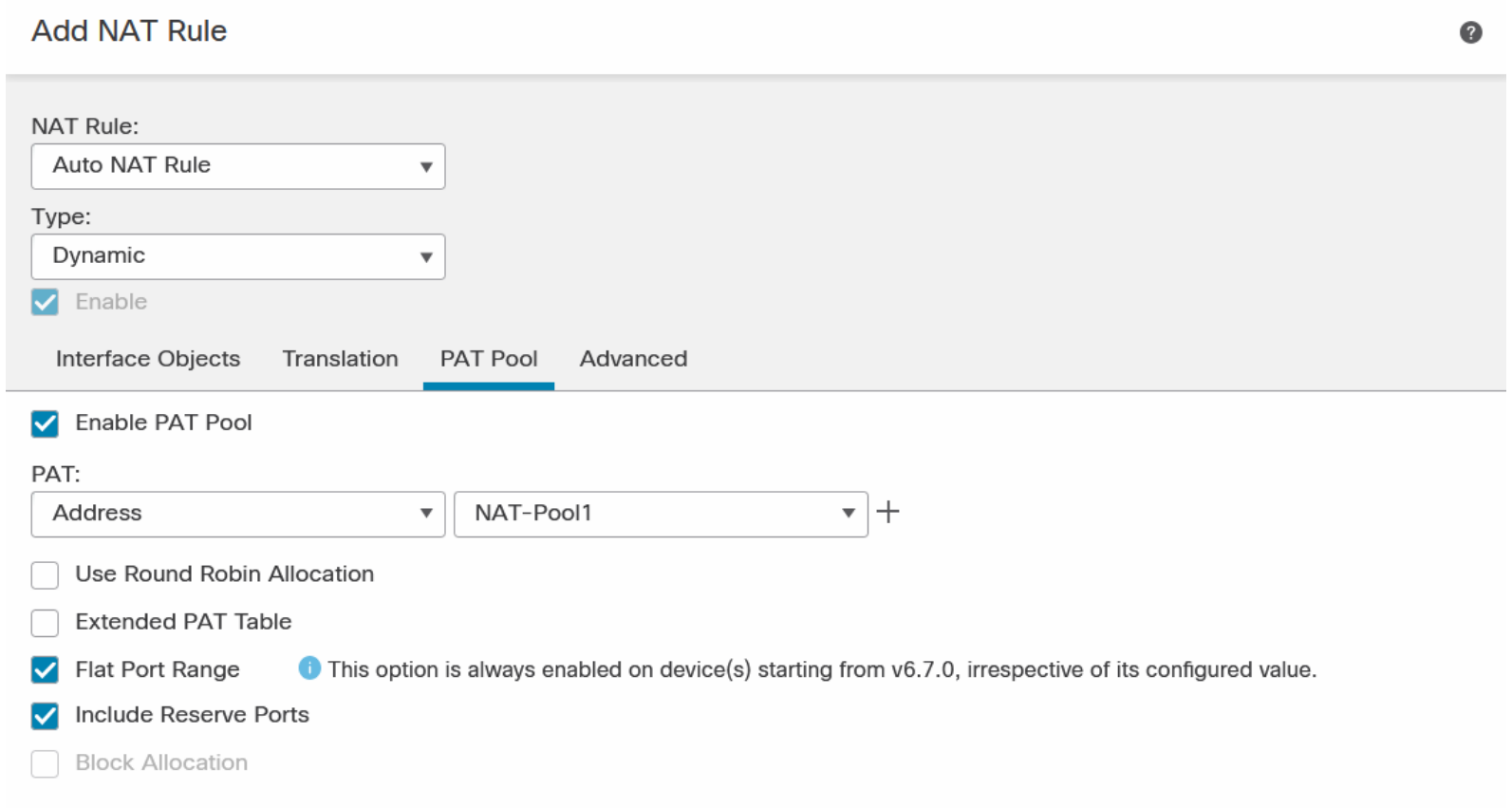


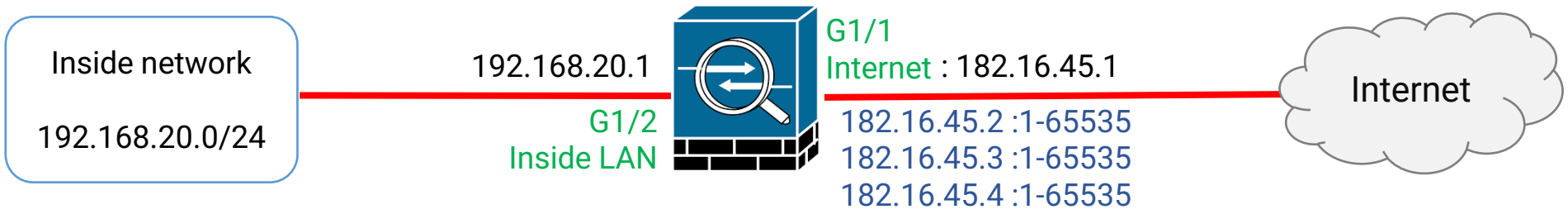


NAT Configuration

2) Dynamic source **PAT**

- PAT Pool tab
- Select Address form PAT drop down
- Then select translated IP/network





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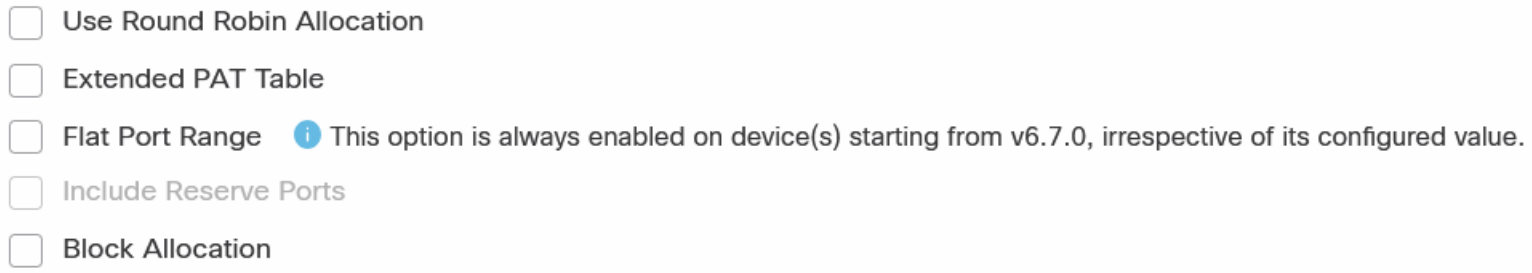
NAT Configuration

PAT pool options:



- **Use the round robin Allocation :** A source port from one IP is allocated, then the next request will take a port from the next IP address, and so on. If not enabled, all ports from one IP are used until they are exhausted.

- **Extended PAT Table** :enables the use of all available ports per service rather than uses the ports per source IP address.
- Round robin, especially when combined with extended PAT, can consume a large amount of memory.

- **Flat Port Range** : When the original source port is unavailable to use in PAT , tells Threat Defense to use a port that's close to the original source port.
- It does this by dividing all the source ports into groups of 512 ports
- **Include Reverse Ports** : By default, translation only uses ports from 1024 and above. This option extends this to all ports. (entire range of 1 to 65535)

- **Block allocation** : subsequent connections from the host use new randomly selected ports within the same block
- port blocks are allocated in the 1024-65535 range only.

NAT Configuration

3) Static NAT with Auto NAT Rule

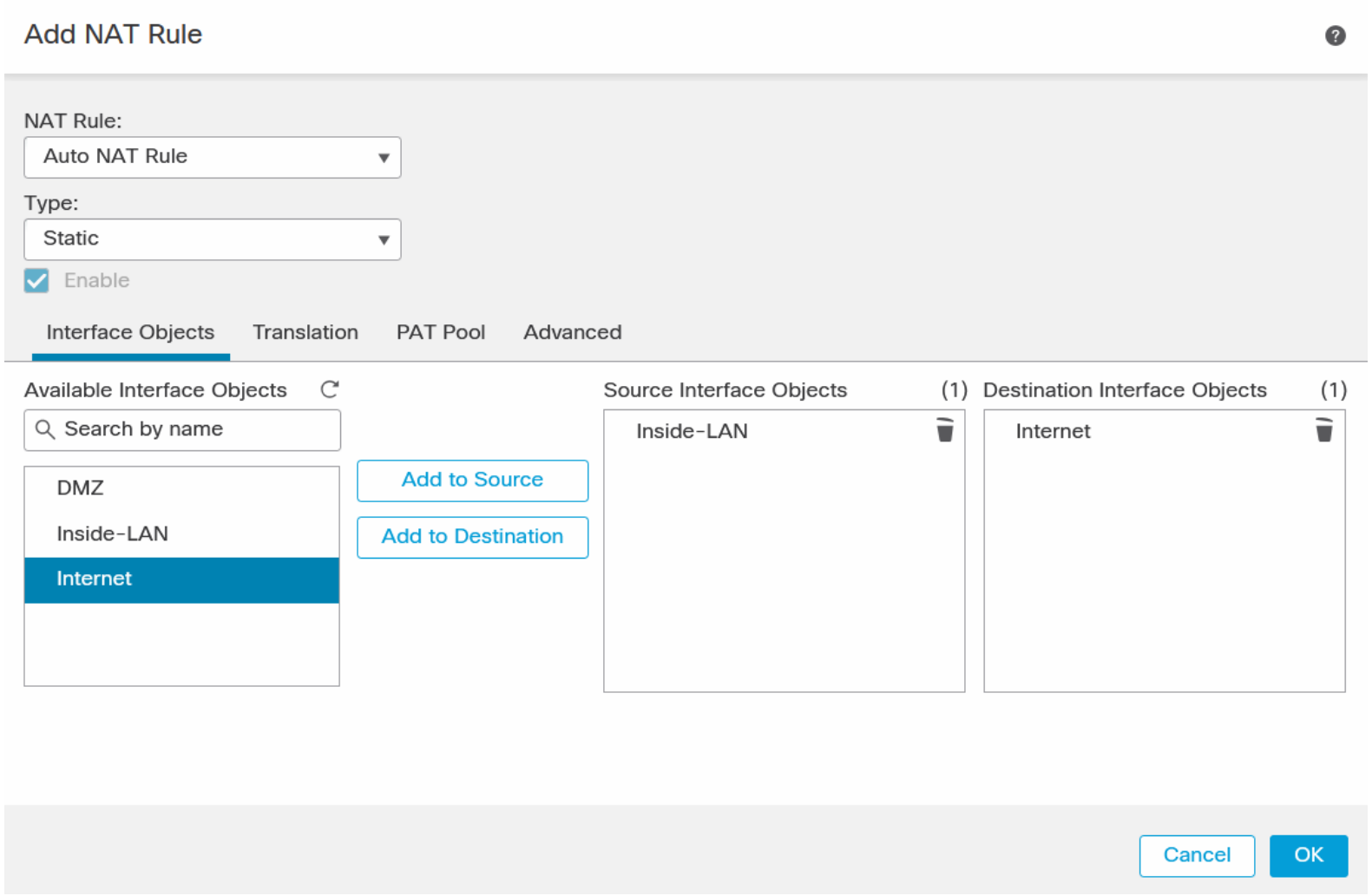
- One to one translation
- Two-way NAT

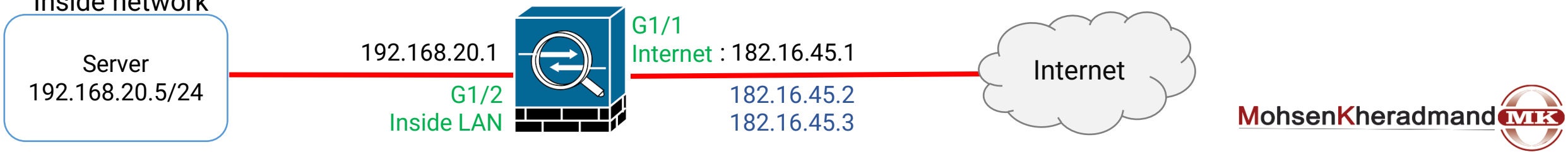
➢ Click add Rule

✓ Select Auto NAT Rule

✓ Select Static Type

✓ Add Source and Destination interfaces as well as you have done in previous section





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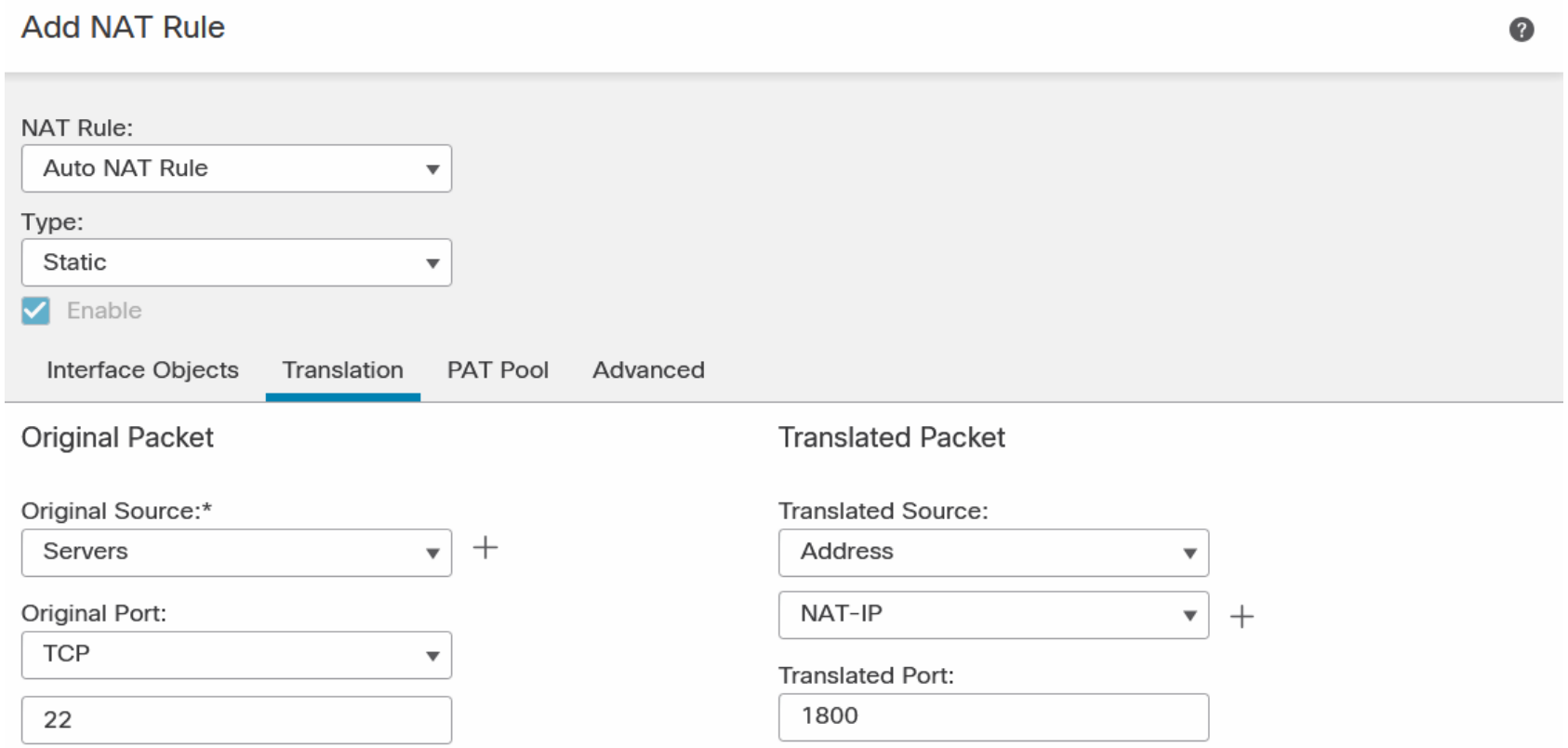
NAT Configuration

3) Static NAT with Auto NAT Rule

- Translation tab
- Select original source to translate
- Select original port of the source

- Select translated IP/Range
- Select translated port to use in PAT



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NAT Configuration

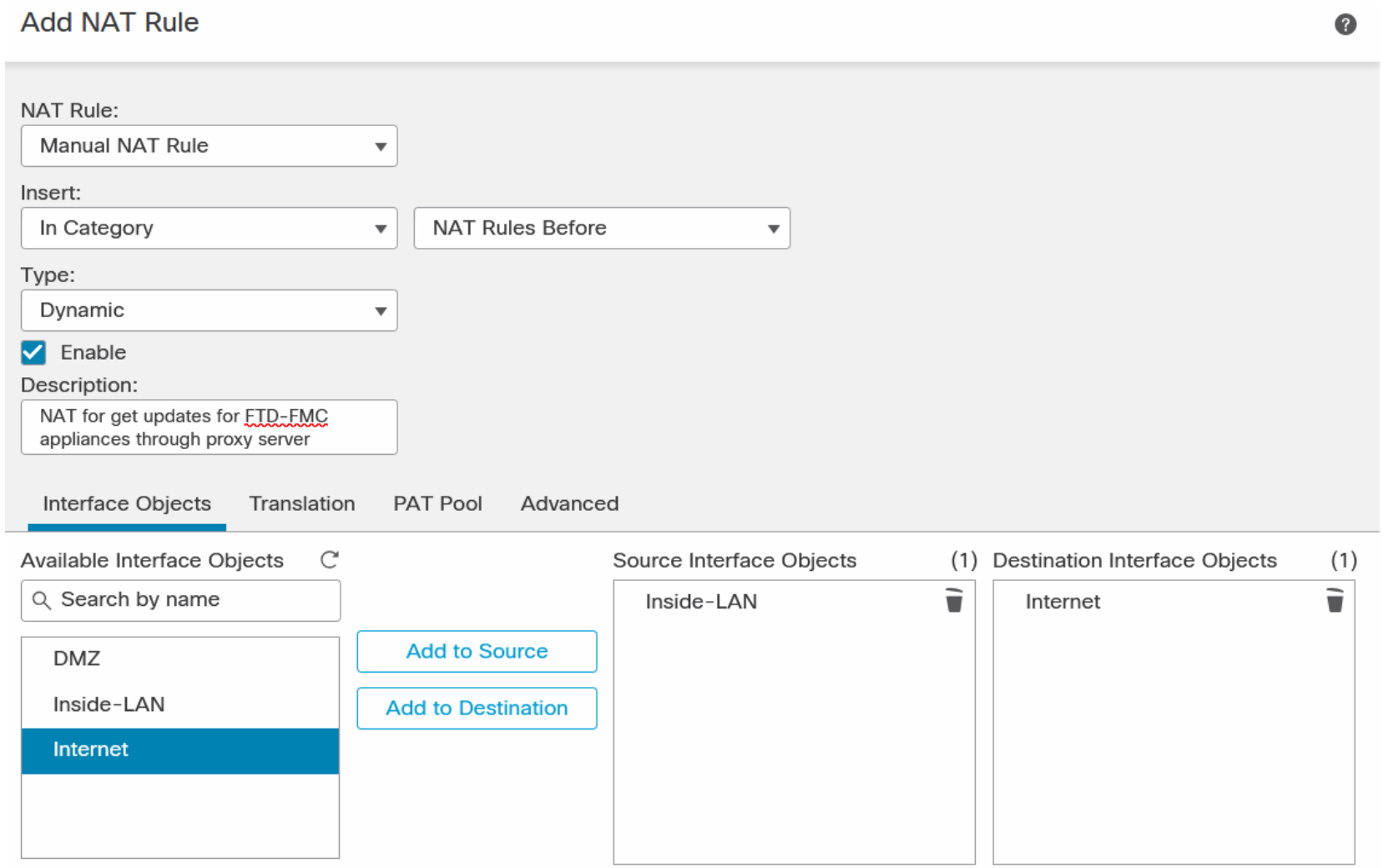
3) Manual NAT

- Using policy NAT specify a specific IP/port to specific client for NAT process
- In the following example we need to configure NAT , so if the Server2 needs to connect to public IP 191.1.5.2 , so the translate IP address (182.16.45.2) assign to the traffic

NAT Configuration

3) Manual NAT

- Click add Rule
- ➢ Interface object tab
- Select Manual NAT Rule
- You can select NAT Rule Before or after Auto Rules to perform
- Select Dynamic/Static type of NAT
- Description is optional
- Add source and destination interface



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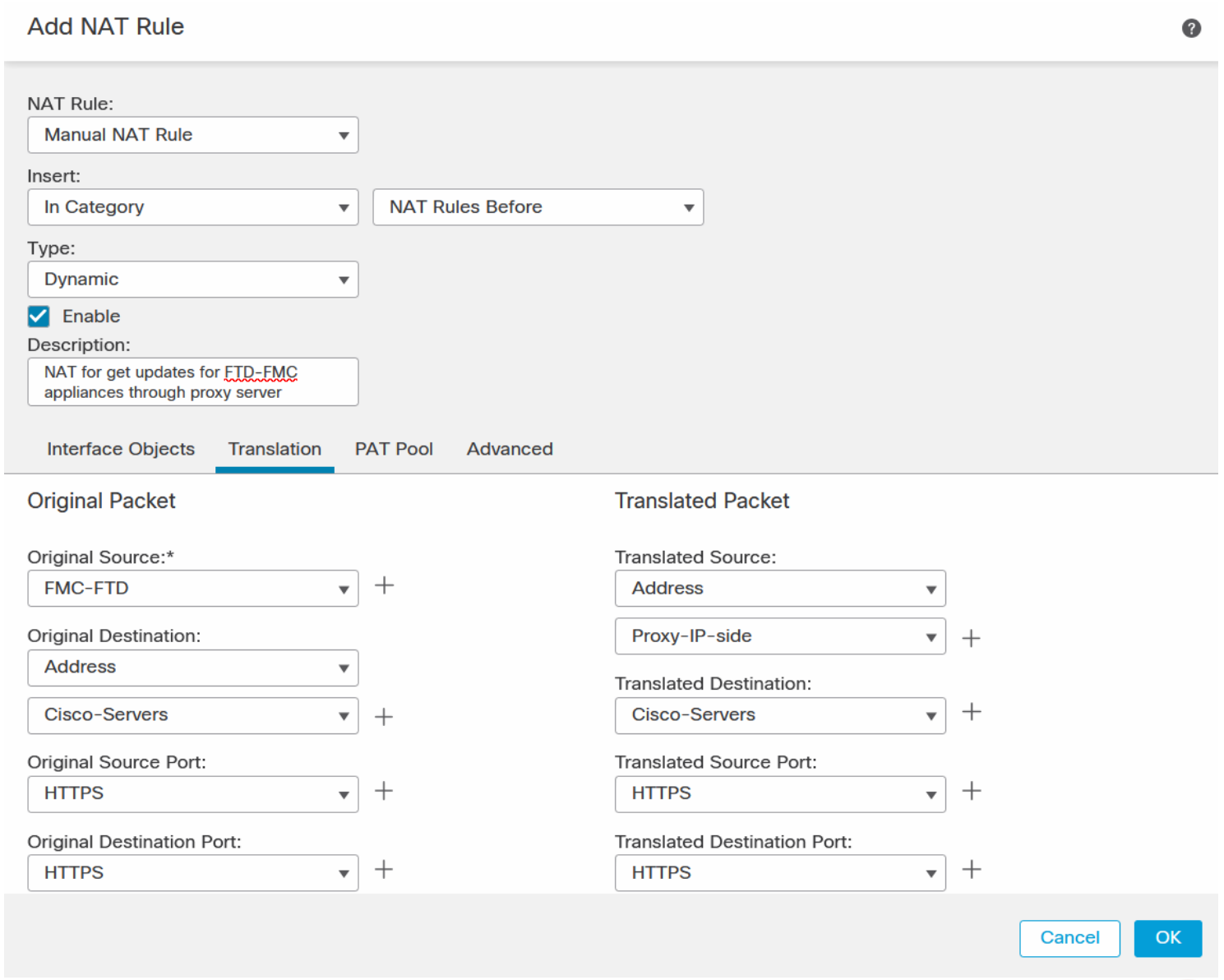
NAT Configuration

3) Manual NAT

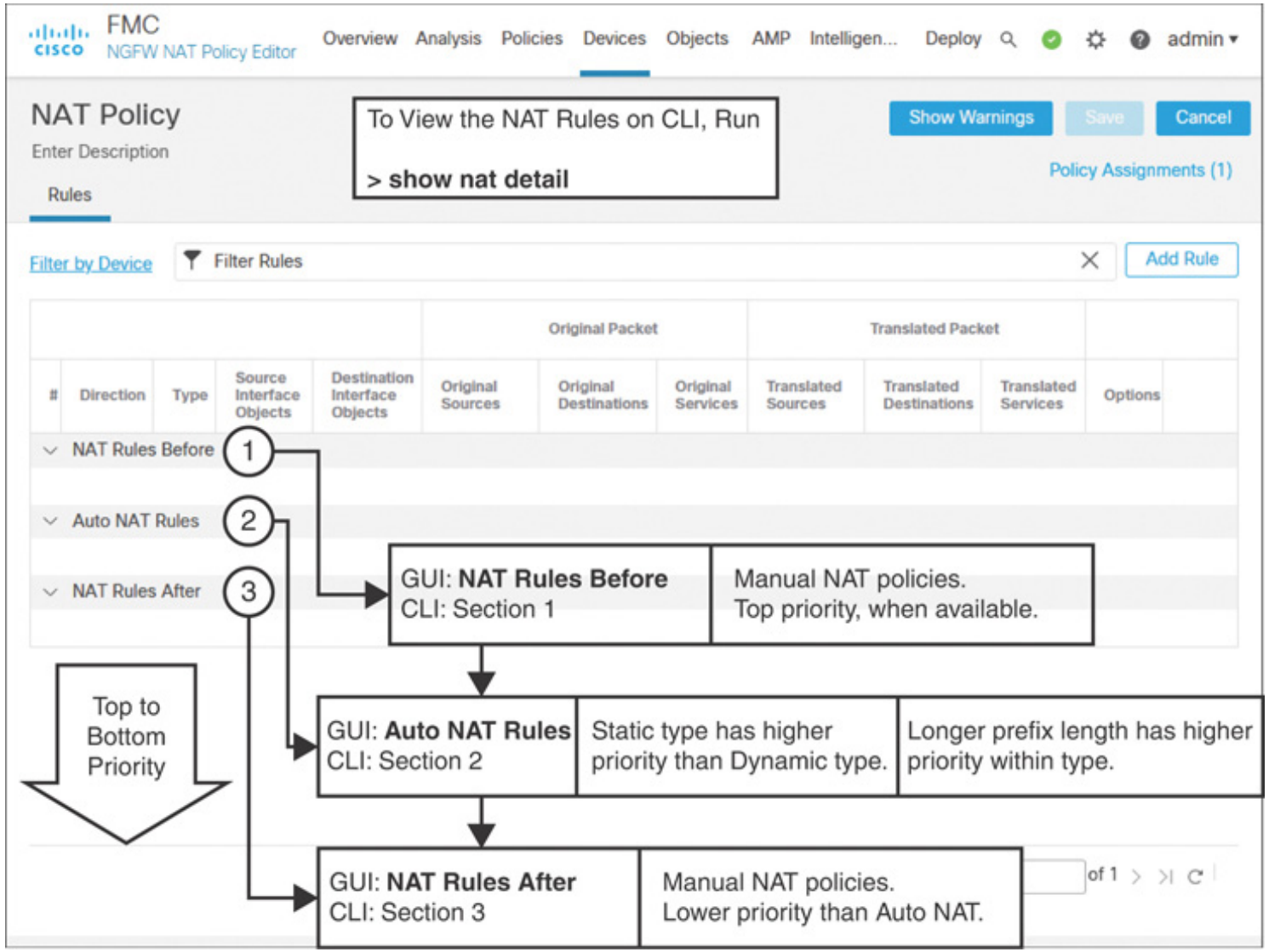
➢ Translation tab

- Select original source IP/Network
- Select original Destination IP/network
- Select translated interface/IP to NAT
- Translated Destination could be the same as original destination
- Select original/destination ports if you need
- Click OK

- If you need you can use PAT for this Rule



NAT Rule priority



NAT Configuration

ACP rule for NAT

- Create ACP to allow the traffic from inside to outside (Allow =All)
- Create ACP to allow the specific traffic from outside to DMZ (based on our NAT policied)

- Select original source IP/Network
- Select original Destination IP/network