



CHAPTER 23

Configuring NAT

This chapter describes Network Address Translation, and includes the following sections:

- [NAT Overview, page 23-1](#)
- [Configuring NAT Control, page 23-15](#)
- [Using Dynamic NAT, page 23-16](#)
- [Using Static NAT, page 23-25](#)
- [Using NAT Exemption, page 23-30](#)
- [NAT Field Descriptions, page 23-31](#)

NAT Overview

This section describes how NAT works on the security appliance, and includes the following topics:

- [Introduction to NAT, page 23-1](#)
- [NAT Control, page 23-4](#)
- [NAT Types, page 23-6](#)
- [Policy NAT, page 23-10](#)
- [NAT and Same Security Level Interfaces, page 23-12](#)
- [Order of NAT Rules Used to Match Real Addresses, page 23-13](#)
- [Mapped Address Guidelines, page 23-13](#)
- [DNS and NAT, page 23-13](#)

Introduction to NAT

Address translation substitutes the real address in a packet with a mapped address that is routable on the destination network. NAT is composed of two steps: the process by which a real address is translated into a mapped address, and the process to undo translation for returning traffic.

The security appliance translates an address when a NAT rule matches the traffic. If no NAT rule matches, processing for the packet continues. The exception is when you enable NAT control. NAT control requires that packets traversing from a higher security interface (inside) to a lower security

interface (outside) match a NAT rule, or processing for the packet stops. See the “Default Security Level” section on page 5-4 for more information about security levels. See the “NAT Control” section on page 23-4 for more information about NAT control.


Note

In this document, all types of translation are referred to as NAT. When describing NAT, the terms *inside* and *outside* represent the security relationship between any two interfaces. The higher security level is inside and the lower security level is outside. For example, interface 1 is at 60 and interface 2 is at 50; therefore, interface 1 is “inside” and interface 2 is “outside.”

Some of the benefits of NAT are as follows:

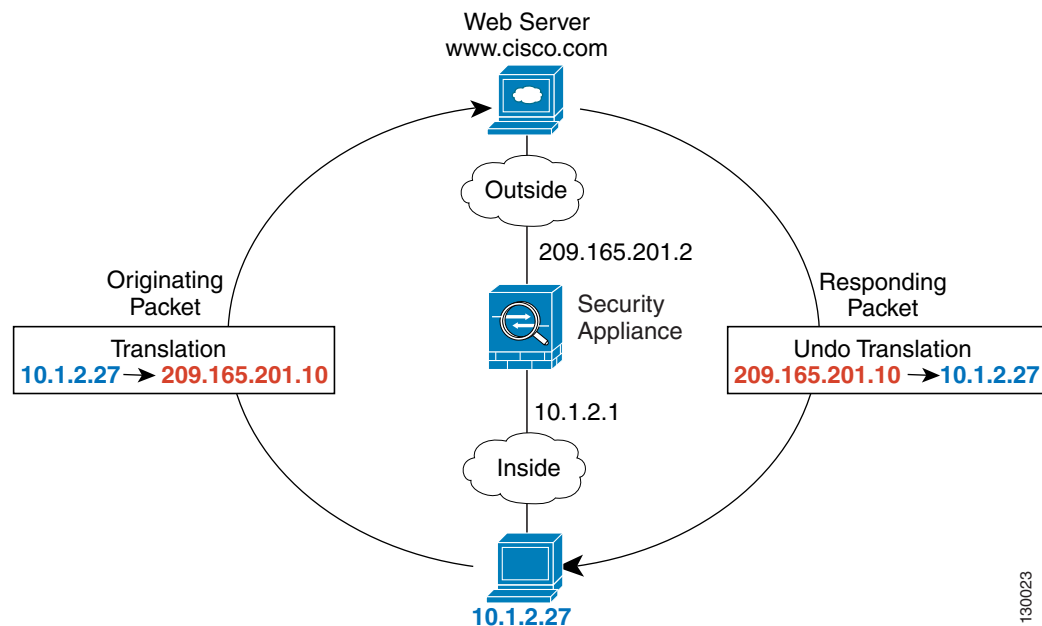
- You can use private addresses on your inside networks. Private addresses are not routable on the Internet.
- NAT hides the real addresses from other networks, so attackers cannot learn the real address of a host.
- You can resolve IP routing problems such as overlapping addresses.

See Table 22-1 on page 22-3 for information about protocols that do not support NAT.

NAT in Routed Mode

Figure 23-1 shows a typical NAT example in routed mode, with a private network on the inside. When the inside host at 10.1.1.27 sends a packet to a web server, the real source address, 10.1.1.27, of the packet is changed to a mapped address, 209.165.201.10. When the server responds, it sends the response to the mapped address, 209.165.201.10, and the security appliance receives the packet. The security appliance then changes the translation of the mapped address, 209.165.201.10 back to the real address, 10.1.1.1.27 before sending it to the host.

Figure 23-1 NAT Example: Routed Mode



130023

NAT in Transparent Mode

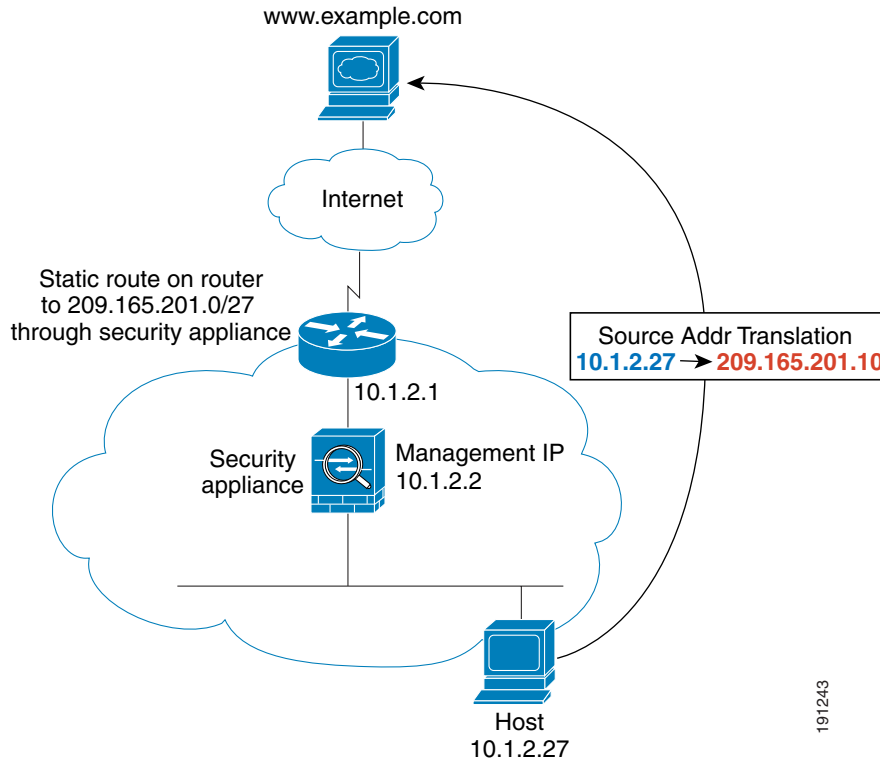
Using NAT in transparent mode eliminates the need for the upstream or downstream routers to perform NAT for their networks. For example, a transparent firewall security appliance is useful between two VRFs so you can establish BGP neighbor relations between the VRFs and the global table. However, NAT per VRF might not be supported. In this case, using NAT in transparent mode is essential.

NAT in transparent mode has the following requirements and limitations:

- When the mapped addresses are not on the same network as the transparent firewall, then on the upstream router, you need to add a static route for the mapped addresses that points to the downstream router (through the security appliance).
- If the real destination address is not directly-connected to the security appliance, then you also need to add a static route on the security appliance for the real destination address that points to the downstream router. Without NAT, traffic from the upstream router to the downstream router does not need any routes on the security appliance because it uses the MAC address table. NAT, however, causes the security appliance to use a route lookup instead of a MAC address lookup, so it needs a static route to the downstream router.
- The **alias** command is not supported.
- Because the transparent firewall does not have any interface IP addresses, you cannot use interface PAT.
- ARP inspection is not supported. Moreover, if for some reason a host on one side of the firewall sends an ARP request to a host on the other side of the firewall, and the initiating host real address is mapped to a different address on the same subnet, then the real address remains visible in the ARP request.

Figure 23-2 shows a typical NAT scenario in transparent mode, with the same network on the inside and outside interfaces. The transparent firewall in this scenario is performing the NAT service so that the upstream router does not have to perform NAT. When the inside host at 10.1.1.27 sends a packet to a web server, the real source address of the packet, 10.1.1.27, is changed to a mapped address, 209.165.201.10. When the server responds, it sends the response to the mapped address, 209.165.201.10, and the security appliance receives the packet because the upstream router includes this mapped network in a static route directed through the security appliance. The security appliance then undoes the translation of the mapped address, 209.165.201.10 back to the real address, 10.1.1.27. Because the real address is directly-connected, the security appliance sends it directly to the host.

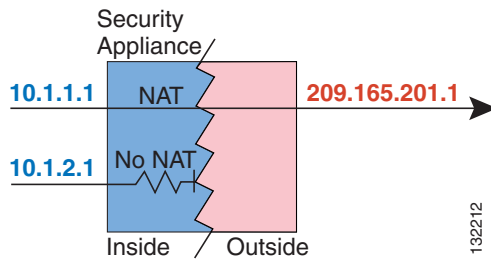
Figure 23-2 NAT Example: Transparent Mode



NAT Control

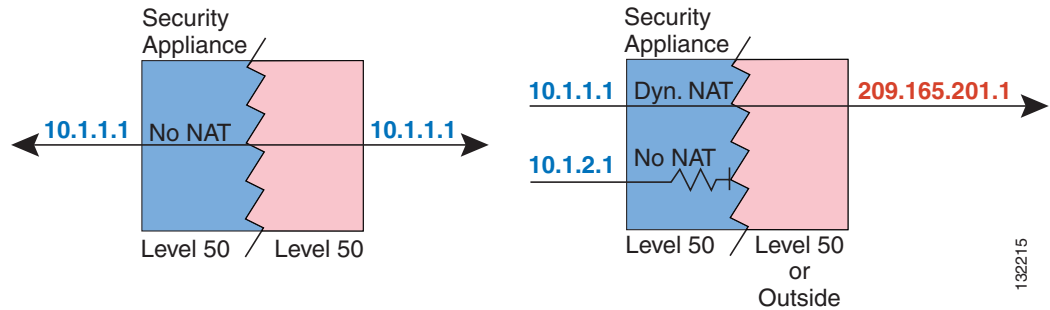
NAT control requires that packets traversing from an inside interface to an outside interface match a NAT rule; for any host on the inside network to access a host on the outside network, you must configure NAT to translate the inside host address, as shown in Figure 23-3.

Figure 23-3 NAT Control and Outbound Traffic



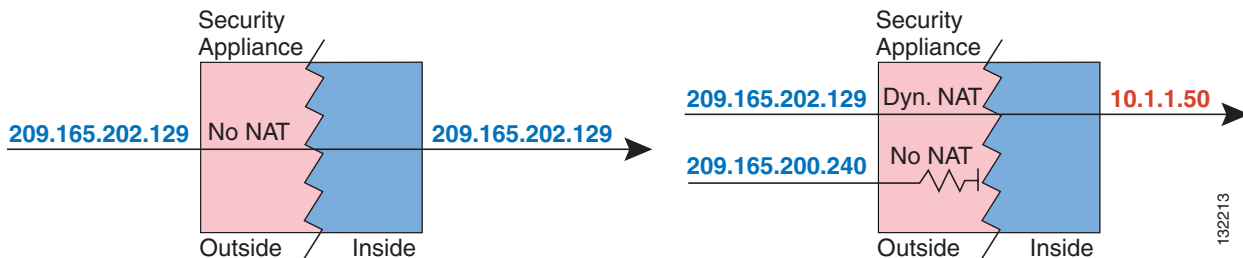
Interfaces at the same security level are not required to use NAT to communicate. However, if you configure dynamic NAT or PAT on a same security interface, then all traffic from the interface to a same security interface or an outside interface must match a NAT rule, as shown in [Figure 23-4](#).

Figure 23-4 NAT Control and Same Security Traffic



Similarly, if you enable outside dynamic NAT or PAT, then all outside traffic must match a NAT rule when it accesses an inside interface (see [Figure 23-5](#)).

Figure 23-5 NAT Control and Inbound Traffic



Static NAT does not cause these restrictions.

By default, NAT control is disabled; therefore, you do not need to perform NAT on any networks unless you want to do so. If you upgraded from an earlier version of software, however, NAT control might be enabled on your system. Even with NAT control disabled, you need to perform NAT on any addresses for which you configure dynamic NAT. See the [“Dynamic NAT Implementation”](#) section on page 23-16 for more information about how dynamic NAT is applied.

If you want the added security of NAT control but do not want to translate inside addresses in some cases, you can apply a NAT exemption or identity NAT rule on those addresses. (See the [“Using NAT Exemption”](#) section on page 23-30 for more information).

To configure NAT control, see the [“Configuring NAT Control”](#) section on page 23-15.



Note

In multiple context mode, the packet classifier might rely on the NAT configuration to assign packets to contexts if you do not enable unique MAC addresses for shared interfaces. See the [“How the Security Appliance Classifies Packets”](#) section on page 9-2 for more information about the relationship between the classifier and NAT.

NAT Types

This section describes the available NAT types, and includes the following topics:

- [Dynamic NAT, page 23-6](#)
- [PAT, page 23-8](#)
- [Static NAT, page 23-8](#)
- [Static PAT, page 23-9](#)
- [Bypassing NAT When NAT Control is Enabled, page 23-10](#)

You can implement address translation as dynamic NAT, Port Address Translation, static NAT, static PAT, or as a mix of these types. You can also configure rules to bypass NAT; for example, to enable NAT control when you do not want to perform NAT.

Dynamic NAT

Dynamic NAT translates a group of real addresses to a pool of mapped addresses that are routable on the destination network. The mapped pool may include fewer addresses than the real group. When a host you want to translate accesses the destination network, the security appliance assigns the host an IP address from the mapped pool. The translation is added only when the real host initiates the connection. The translation is in place only for the duration of the connection, and a given user does not keep the same IP address after the translation times out. Users on the destination network, therefore, cannot initiate a reliable connection to a host that uses dynamic NAT, although the connection is allowed by an access list, and the security appliance rejects any attempt to connect to a real host address directly. See the “[Static NAT](#)” or “[Static PAT](#)” section for information on how to obtain reliable access to hosts.

**Note**

In some cases, a translation is added for a connection, although the session is denied by the security appliance. This condition occurs with an outbound access list, a management-only interface, or a backup interface in which the translation times out normally.

[Figure 23-6](#) shows a remote host attempting to connect to the real address. The connection is denied, because the security appliance only allows returning connections to the mapped address.

Figure 23-6 Remote Host Attempts to Connect to the Real Address

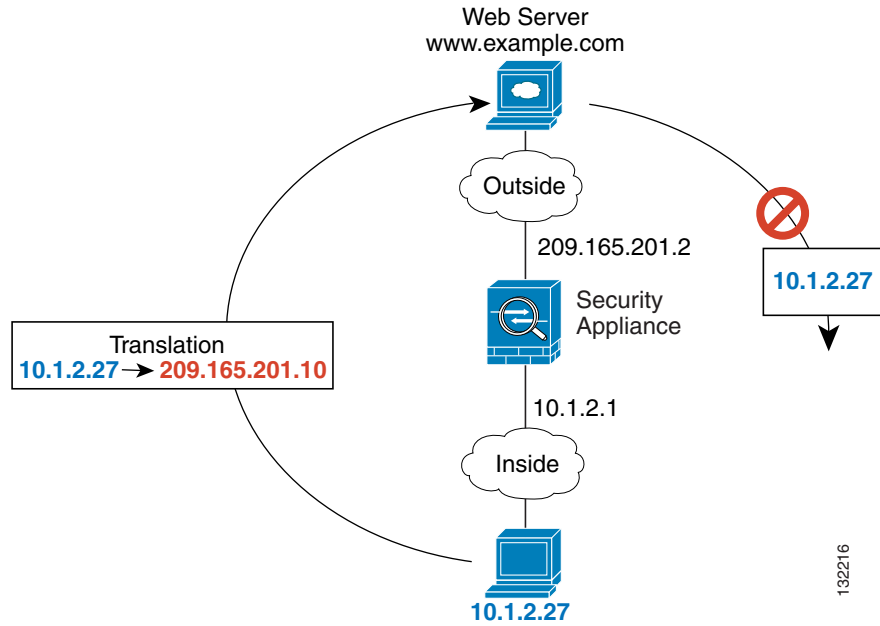
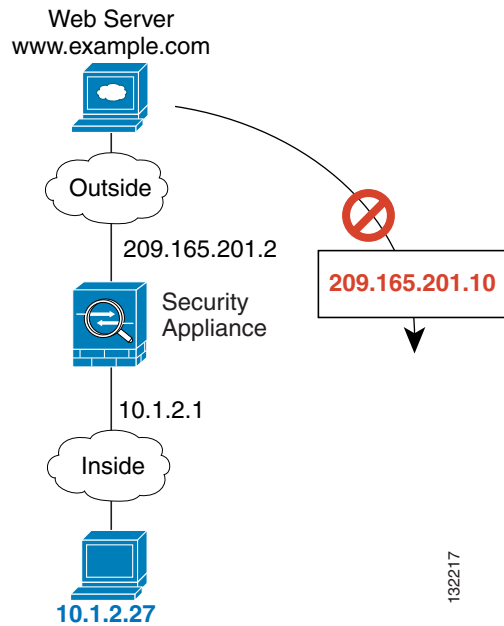


Figure 23-7 shows a remote host attempting to initiate a connection to a mapped address. This address is not currently in the translation table; therefore, the security appliance drops the packet.

Figure 23-7 Remote Host Attempts to Initiate a Connection to a Mapped Address



Note

For the duration of the translation, a remote host can initiate a connection to the translated host if an access list allows it. Because the address is unpredictable, a connection to the host is unlikely. Nevertheless, in this case, you can rely on the security of the access list.

Dynamic NAT has these disadvantages:

- If the mapped pool has fewer addresses than the real group, you could run out of addresses if the amount of traffic is more than expected.
Use PAT if this event occurs often, because PAT provides over 64,000 translations using ports of a single address.
- You have to use a large number of routable addresses in the mapped pool; if the destination network requires registered addresses, such as the Internet, you might encounter a shortage of usable addresses.

The advantage of dynamic NAT is that some protocols cannot use PAT. PAT does not work with the following:

- IP protocols that do not have a port to overload, such as GRE version 0.
- Some multimedia applications that have a data stream on one port, the control path on another port, and are not open standard.

See the [“When to Use Application Protocol Inspection” section on page 22-2](#) for more information about NAT and PAT support.

PAT

PAT translates multiple real addresses to a single mapped IP address. Specifically, the security appliance translates the real address and source port (real socket) to the mapped address and a unique port above 1024 (mapped socket). Each connection requires a separate translation, because the source port differs for each connection. For example, 10.1.1.1:1025 requires a separate translation from 10.1.1.1:1026.

After the connection expires, the port translation also expires after 30 seconds of inactivity. The timeout is not configurable. Users on the destination network cannot reliably initiate a connection to a host that uses PAT (even if the connection is allowed by an access list). Not only can you not predict the real or mapped port number of the host, but the security appliance does not create a translation at all unless the translated host is the initiator. See the following [“Static NAT”](#) or [“Static PAT”](#) sections for reliable access to hosts.

PAT lets you use a single mapped address, thus conserving routable addresses. You can even use the security appliance interface IP address as the PAT address. PAT does not work with some multimedia applications that have a data stream that is different from the control path. See the [“When to Use Application Protocol Inspection” section on page 22-2](#) for more information about NAT and PAT support.



Note

For the duration of the translation, a remote host can initiate a connection to the translated host if an access list allows it. Because the port address (both real and mapped) is unpredictable, a connection to the host is unlikely. Nevertheless, in this case, you can rely on the security of the access list. However, policy PAT does not support time-based ACLs.

Static NAT

Static NAT creates a fixed translation of real address(es) to mapped address(es). With dynamic NAT and PAT, each host uses a different address or port for each subsequent translation. Because the mapped address is the same for each consecutive connection with static NAT, and a persistent translation rule exists, static NAT allows hosts on the destination network to initiate traffic to a translated host (if an access list exists that allows it).

The main difference between dynamic NAT and a range of addresses for static NAT is that static NAT allows a remote host to initiate a connection to a translated host (if an access list exists that allows it), while dynamic NAT does not. You also need an equal number of mapped addresses as real addresses with static NAT.

Static PAT

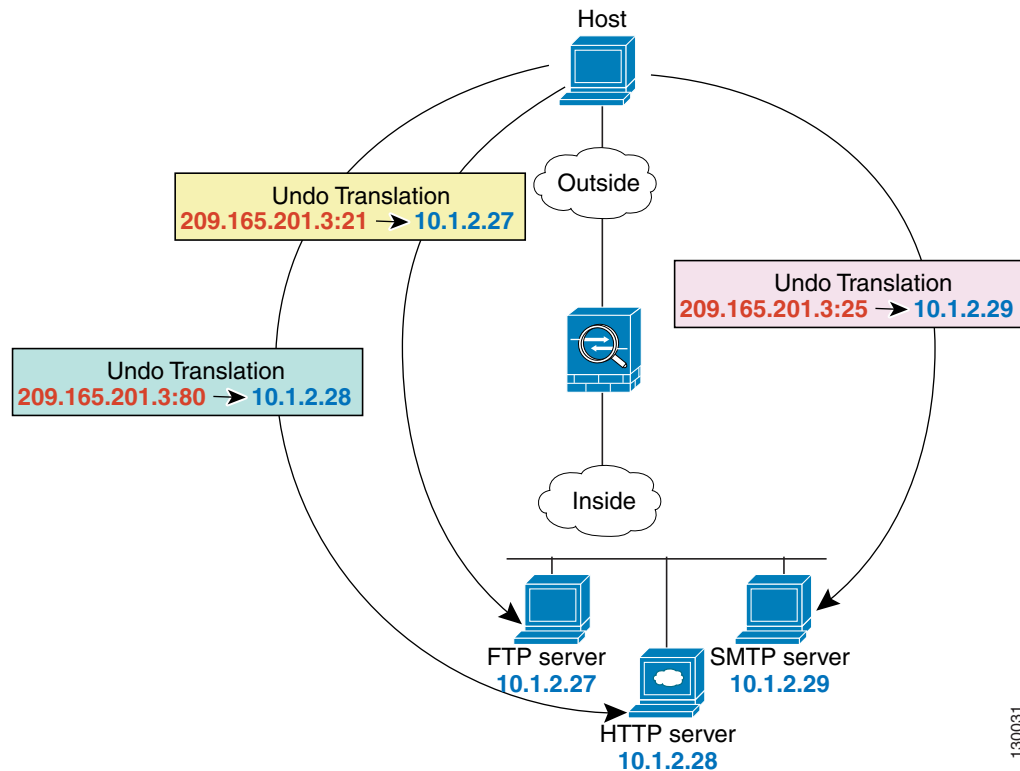
Static PAT is the same as static NAT, except that it lets you specify the protocol (TCP or UDP) and port for the real and mapped addresses.

This feature lets you identify the same mapped address across many different static statements, provided the port is different for each statement. You cannot use the same mapped address for multiple static NAT statements.

For applications that require inspection for secondary channels (for example, FTP and VoIP), the security appliance automatically translates the secondary ports.

For example, if you want to provide a single address for remote users to access FTP, HTTP, and SMTP, but these are all actually different servers on the real network, you can specify static PAT statements for each server that uses the same mapped IP address, but different ports (see [Figure 23-8](#)).

Figure 23-8 Static PAT



You can also use static PAT to translate a well-known port to a non-standard port or vice versa. For example, if inside web servers use port 8080, you can allow outside users to connect to port 80, and then undo translation to the original port 8080. Similarly, to provide extra security, you can tell web users to connect to non-standard port 6785, and then undo translation to port 80.

Bypassing NAT When NAT Control is Enabled

If you enable NAT control, then inside hosts must match a NAT rule when accessing outside hosts. If you do not want to perform NAT for some hosts, then you can bypass NAT for those hosts or you can disable NAT control. You might want to bypass NAT, for example, if you are using an application that does not support NAT. See the [“When to Use Application Protocol Inspection”](#) section on page 22-2 for information about inspection engines that do not support NAT.

You can configure traffic to bypass NAT using one of three methods. All methods achieve compatibility with inspection engines. However, each method offers slightly different capabilities, as follows:

- **Identity NAT**—When you configure identity NAT (which is similar to dynamic NAT), you do not limit translation for a host on specific interfaces; you must use identity NAT for connections through all interfaces. Therefore, you cannot choose to perform normal translation on real addresses when you access interface A, but use identity NAT when accessing interface B. Regular dynamic NAT, on the other hand, lets you specify a particular interface on which to translate the addresses. Make sure that the real addresses for which you use identity NAT are routable on all networks that are available according to your access lists.

For identity NAT, even though the mapped address is the same as the real address, you cannot initiate a connection from the outside to the inside (even if the interface access list allows it). Use static identity NAT or NAT exemption for this functionality.

- **Static identity NAT**—Static identity NAT lets you specify the interface on which you want to allow the real addresses to appear, so you can use identity NAT when you access interface A, and use regular translation when you access interface B. Static identity NAT also lets you use policy NAT, which identifies the real and destination addresses when determining the real addresses to translate (see the [“Policy NAT”](#) section on page 23-10 for more information about policy NAT). For example, you can use static identity NAT for an inside address when it accesses the outside interface and the destination is server A, but use a normal translation when accessing the outside server B.
- **NAT exemption**—NAT exemption allows both translated and remote hosts to initiate connections. Like identity NAT, you do not limit translation for a host on specific interfaces; you must use NAT exemption for connections through all interfaces. However, NAT exemption does let you specify the real and destination addresses when determining the real addresses to translate (similar to policy NAT), so you have greater control using NAT exemption. However unlike policy NAT, NAT exemption does not consider the ports in the access list. NAT exemption also does not let you configure connection limits such as maximum TCP connections.

Policy NAT

Policy NAT lets you identify real addresses for address translation by specifying the source and destination addresses. You can also optionally specify the source and destination ports. Regular NAT can only consider the source addresses, and not the destination. For example, with policy NAT, you can translate the real address to mapped address A when it accesses server A, but translate the real address to mapped address B when it accesses server B.

For applications that require application inspection for secondary channels (for example, FTP and VoIP), the policy specified in the policy NAT rule should include the secondary ports. When the ports cannot be predicted, the policy should specify only the IP addresses for the secondary channel. With this configuration, the security appliance translates the secondary ports.

[Figure 23-9](#) shows a host on the 10.1.2.0/24 network accessing two different servers. When the host accesses the server at 209.165.201.11, the real address is translated to 209.165.202.129. When the host accesses the server at 209.165.200.225, the real address is translated to 209.165.202.130. Consequently, the host appears to be on the same network as the servers, which can help with routing.

Figure 23-9 Policy NAT with Different Destination Addresses

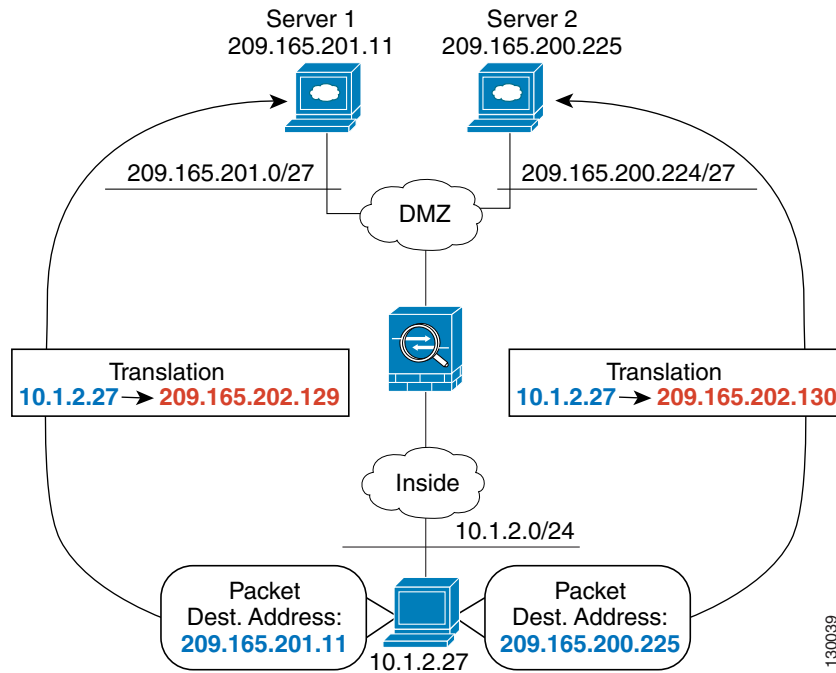
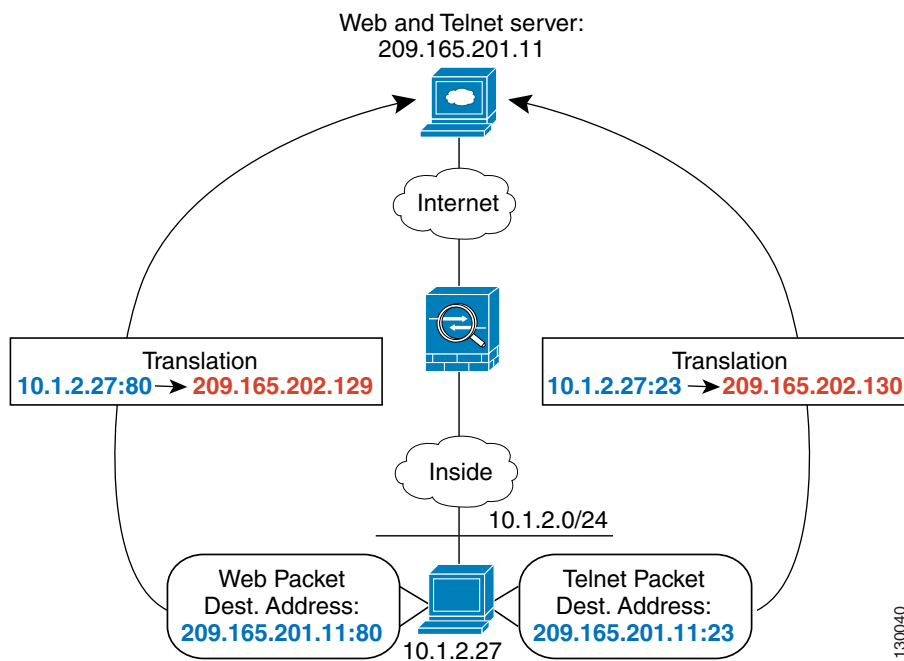


Figure 23-10 shows the use of source and destination ports. The host on the 10.1.2.0/24 network accesses a single host for both web services and Telnet services. When the host accesses the server for web services, the real address is translated to 209.165.202.129. When the host accesses the same server for Telnet services, the real address is translated to 209.165.202.130.

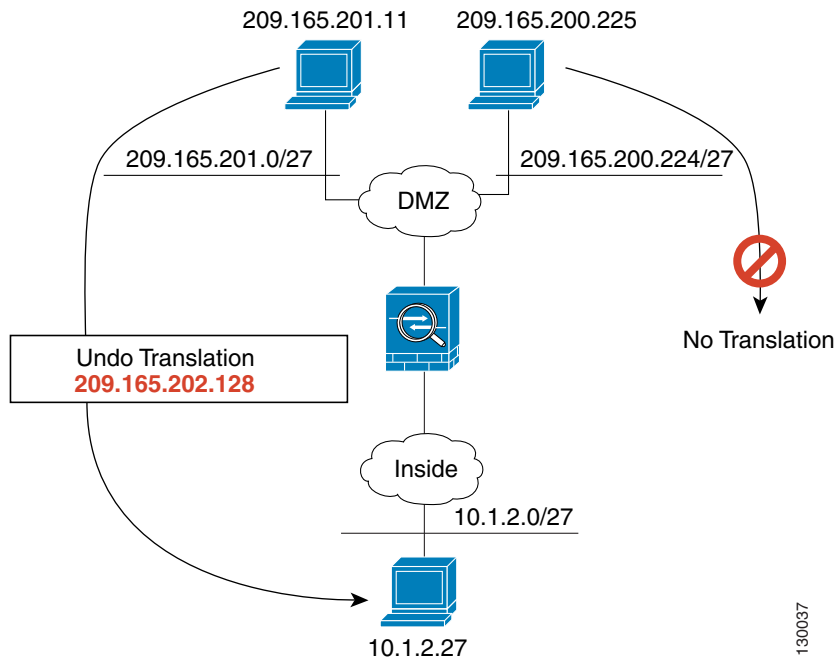
Figure 23-10 Policy NAT with Different Destination Ports



For policy static NAT, both translated and remote hosts can originate traffic. For traffic originated on the translated network, the NAT rule specifies the real addresses and the *destination* addresses, but for traffic originated on the remote network, the rule identifies the real addresses and the *source* addresses of remote hosts who are allowed to connect to the host using this translation.

Figure 23-11 shows a remote host connecting to a translated host. The translated host has a policy static NAT translation that translates the real address only for traffic to and from the 209.165.201.0/27 network. A translation does not exist for the 209.165.200.224/27 network, so the translated host cannot connect to that network, nor can a host on that network connect to the translated host.

Figure 23-11 Policy Static NAT with Destination Address Translation



Note

Policy NAT does not support SQL*Net, but it is supported by regular NAT. See the “[When to Use Application Protocol Inspection](#)” section on page 22-2 for information about NAT support for other protocols.

NAT and Same Security Level Interfaces

NAT is not required between same security level interfaces even if you enable NAT control. You can optionally configure NAT if desired. However, if you configure dynamic NAT when NAT control is enabled, then NAT is required. See the “[NAT Control](#)” section on page 23-4 for more information. Also, when you specify a group of IP address(es) for dynamic NAT or PAT on a same security interface, then you must perform NAT on that group of addresses when they access any lower or same security level interface (even when NAT control is not enabled). Traffic identified for static NAT is not affected.



Note

The security appliance does not support VoIP inspection engines when you configure NAT on same security interfaces. These inspection engines include Skinny, SIP, and H.323. See the “[When to Use Application Protocol Inspection](#)” section on page 22-2 for supported inspection engines.

Order of NAT Rules Used to Match Real Addresses

The security appliance matches real addresses to NAT rules in the following order:

1. NAT exemption—In order, until the first match.
2. Static NAT and Static PAT (regular and policy)—In order, until the first match. Static identity NAT is included in this category.
3. Policy dynamic NAT—In order, until the first match. Overlapping addresses are allowed.
4. Regular dynamic NAT—Best match. Regular identity NAT is included in this category. The order of the NAT rules does not matter; the NAT rule that best matches the real address is used. For example, you can create a general rule to translate all addresses (0.0.0.0) on an interface. If you want to translate a subset of your network (10.1.1.1) to a different address, then you can create a rule to translate only 10.1.1.1. When 10.1.1.1 makes a connection, the specific rule for 10.1.1.1 is used because it matches the real address best. We do not recommend using overlapping rules; they use more memory and can slow the performance of the security appliance.

Mapped Address Guidelines

When you translate the real address to a mapped address, you can use the following mapped addresses:

- Addresses on the same network as the mapped interface.

If you use addresses on the same network as the mapped interface (through which traffic exits the security appliance), the security appliance uses proxy ARP to answer any requests for mapped addresses, and thus intercepts traffic destined for a real address. This solution simplifies routing, because the security appliance does not have to be the gateway for any additional networks. However, this approach does put a limit on the number of available addresses used for translations.

For PAT, you can even use the IP address of the mapped interface.

- Addresses on a unique network.

If you need more addresses than are available on the mapped interface network, you can identify addresses on a different subnet. The security appliance uses proxy ARP to answer any requests for mapped addresses, and thus intercepts traffic destined for a real address. If you use OSPF, and you advertise routes on the mapped interface, then the security appliance advertises the mapped addresses. If the mapped interface is passive (not advertising routes) or you are using static routing, then you need to add a static route on the upstream router that sends traffic destined for the mapped addresses to the security appliance.

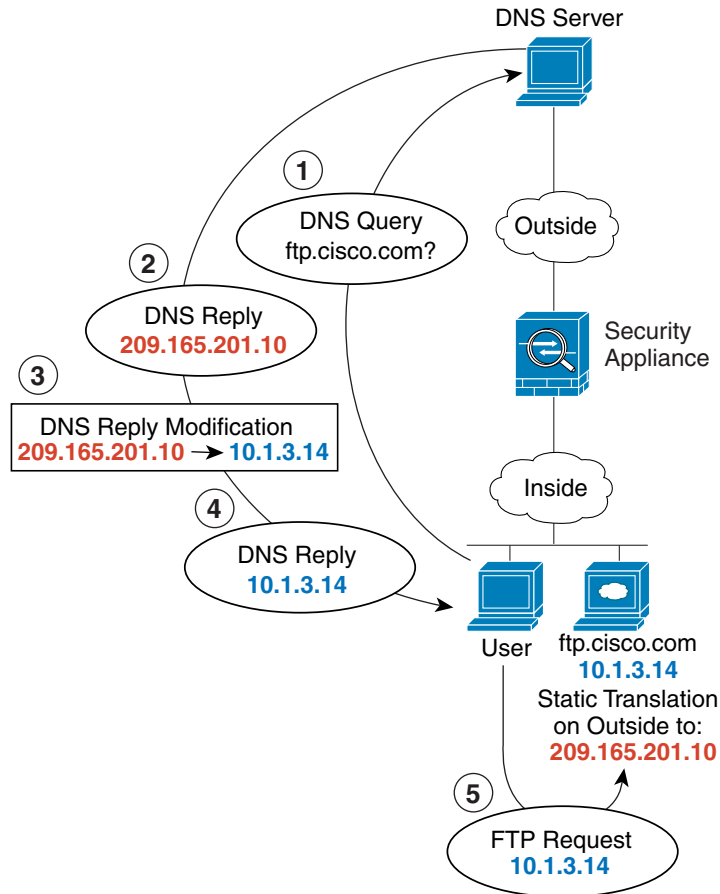
DNS and NAT

You might need to configure the security appliance to modify DNS replies by replacing the address in the reply with an address that matches the NAT configuration. You can configure DNS modification when you configure each translation.

For example, a DNS server is accessible from the outside interface. A server, ftp.cisco.com, is on the inside interface. You configure the security appliance to statically translate the ftp.cisco.com real address (10.1.3.14) to a mapped address (209.165.201.10) that is visible on the outside network (see [Figure 23-12](#)). In this case, you want to enable DNS reply modification on this static statement so that inside users who have access to ftp.cisco.com using the real address receive the real address from the DNS server, and not the mapped address.

When an inside host sends a DNS request for the address of ftp.cisco.com, the DNS server replies with the mapped address (209.165.201.10). The security appliance refers to the static statement for the inside server and translates the address inside the DNS reply to 10.1.3.14. If you do not enable DNS reply modification, then the inside host attempts to send traffic to 209.165.201.10 instead of accessing ftp.cisco.com directly.

Figure 23-12 DNS Reply Modification



130021

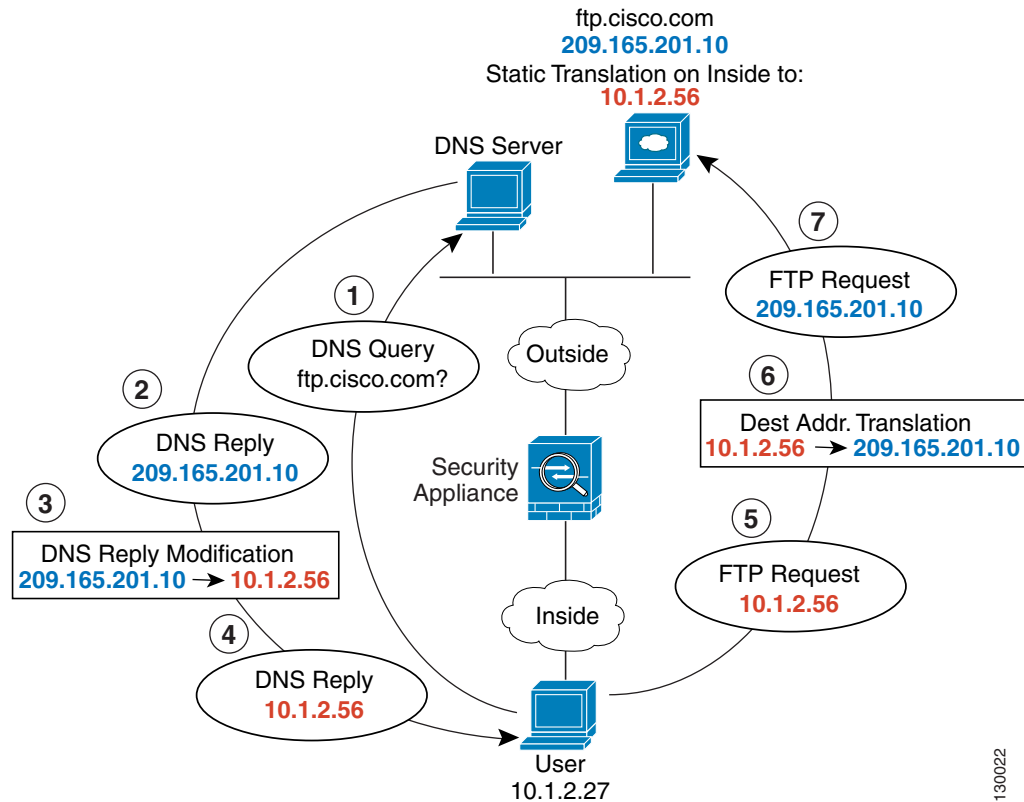


Note

If a user on a different network (for example, DMZ) also requests the IP address for ftp.cisco.com from the outside DNS server, then the IP address in the DNS reply is also modified for this user, even though the user is not on the Inside interface referenced by the static rule.

Figure 23-13 shows a web server and DNS server on the outside. The security appliance has a static translation for the outside server. In this case, when an inside user requests the address for ftp.cisco.com from the DNS server, the DNS server responds with the real address, 209.165.20.10. Because you want inside users to use the mapped address for ftp.cisco.com (10.1.2.56) you need to configure DNS reply modification for the static translation.

Figure 23-13 DNS Reply Modification Using Outside NAT



Configuring NAT Control

NAT control requires that packets traversing from an inside interface to an outside interface match a NAT rule. See the “NAT Control” section on page 23-4 for more information.

To enable NAT control, on the Configuration > Firewall > NAT Rules pane, check **Enable traffic through the firewall without address translation**.

Using Dynamic NAT

This section describes how to configure dynamic NAT, including dynamic NAT and PAT, dynamic policy NAT and PAT, and identity NAT.

Policy NAT lets you identify real addresses for address translation by specifying the source and destination addresses. You can also optionally specify the source and destination ports. Regular NAT can only consider the source addresses, and not the destination. See the “[Policy NAT](#)” section on page 23-10 for more information.

This section includes the following topics:

- [Dynamic NAT Implementation](#), page 23-16
- [Managing Global Pools](#), page 23-21
- [Configuring Dynamic NAT, PAT, or Identity NAT](#), page 23-22
- [Configuring Dynamic Policy NAT or PAT](#), page 23-24

Dynamic NAT Implementation

This section describes how dynamic NAT is implemented, and includes the following topics:

- [Real Addresses and Global Pools Paired Using a Pool ID](#), page 23-17
- [NAT Rules on Different Interfaces with the Same Global Pools](#), page 23-17
- [Global Pools on Different Interfaces with the Same Pool ID](#), page 23-18
- [Multiple NAT Rules with Different Global Pools on the Same Interface](#), page 23-18
- [Multiple Addresses in the Same Global Pool](#), page 23-19
- [Outside NAT](#), page 23-20
- [Real Addresses in a NAT Rule Must be Translated on All Lower or Same Security Interfaces](#), page 23-21

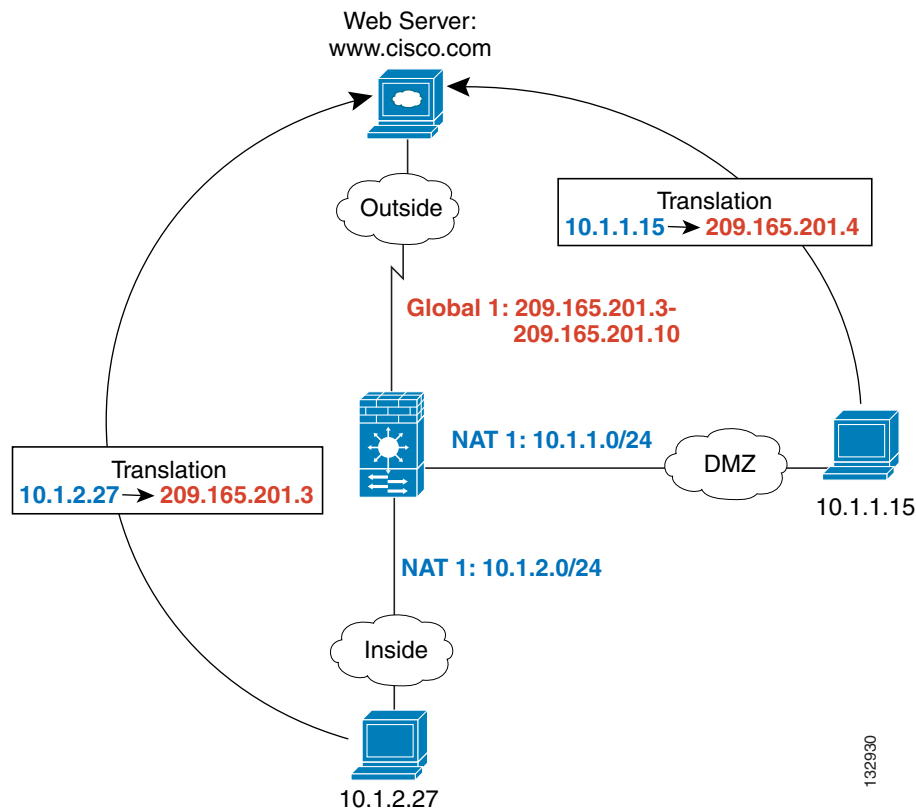
Real Addresses and Global Pools Paired Using a Pool ID

In a dynamic NAT rule, you specify real addresses and then pair them with a global pool of addresses to which the real addresses are mapped when they exit another interface (in the case of PAT, this is one address, and in the case of identity NAT, this is the same as the real address). Each global pool is assigned a pool ID.

NAT Rules on Different Interfaces with the Same Global Pools

You can create a NAT rule for each interface using the same global address pool. For example, you can configure NAT rules for Inside and DMZ interfaces, both using global pool 1 on the outside interface. Traffic from the Inside interface and the DMZ interface share a mapped pool or a PAT address when exiting the Outside interface (see Figure 23-14).

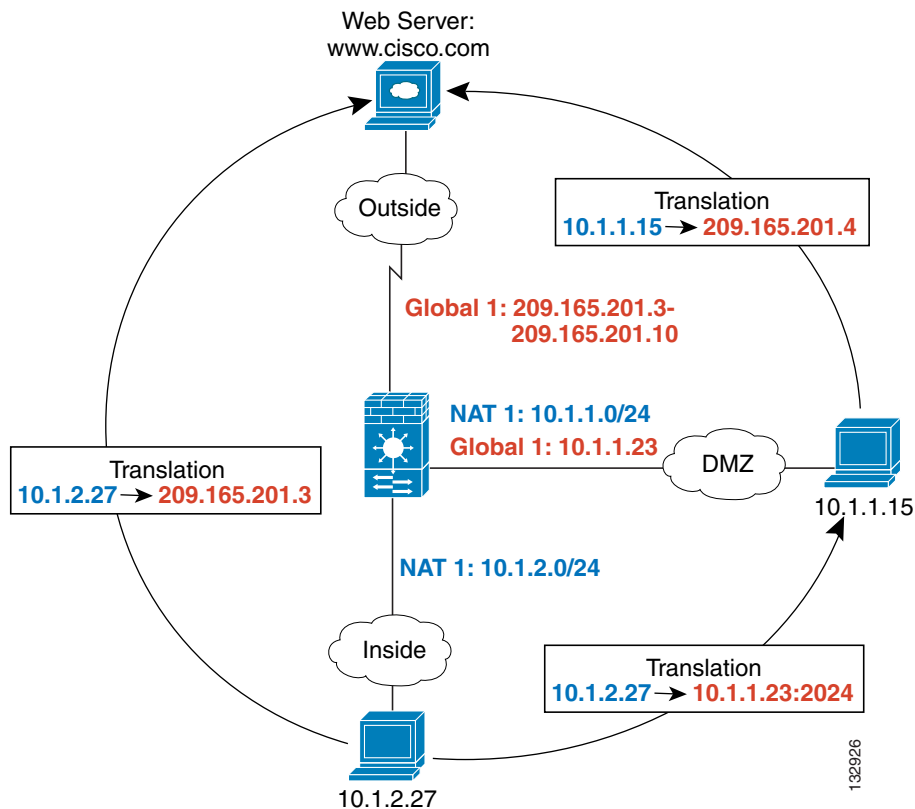
Figure 23-14 NAT Rules on Multiple Interfaces Using the Same Global Pool



Global Pools on Different Interfaces with the Same Pool ID

You can create a global pool for each interface using the same pool ID. If you create a global pool for the Outside and DMZ interfaces on ID 1, then a single NAT rule associated with ID 1 identifies traffic to be translated when going to both the Outside and the DMZ interfaces. Similarly, if you create a NAT rule for the DMZ interface on ID 1, then all global pools on ID 1 are also used for DMZ traffic. (See Figure 23-15).

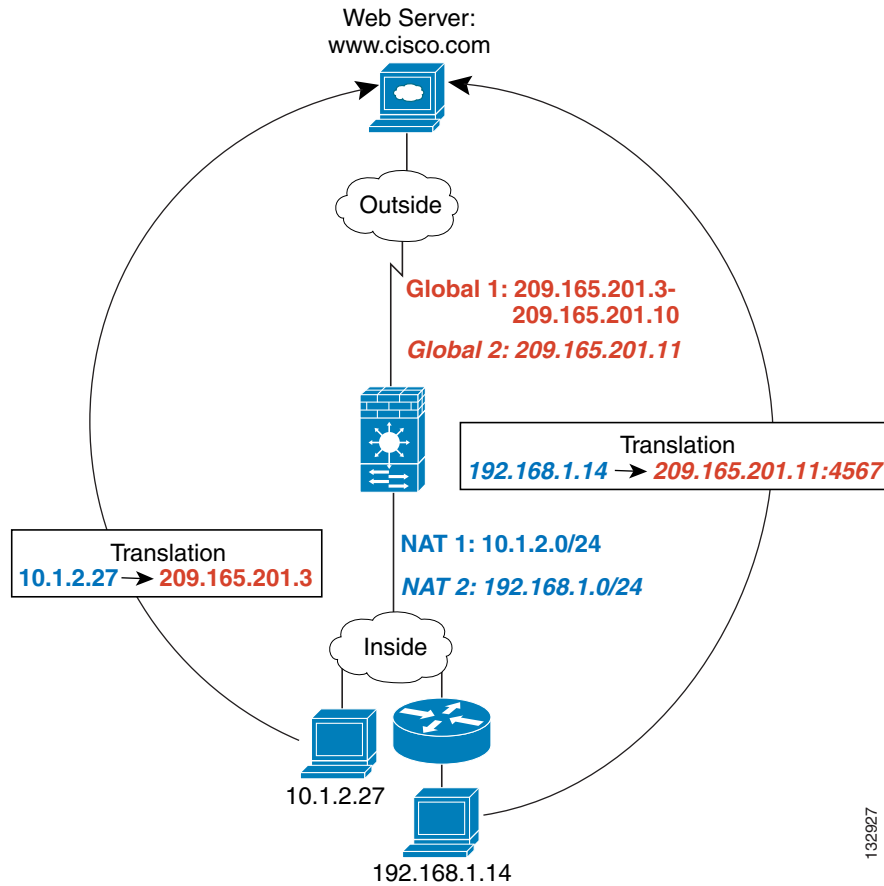
Figure 23-15 NAT Rules and Global Pools using the Same ID on Multiple Interfaces



Multiple NAT Rules with Different Global Pools on the Same Interface

You can identify different sets of real addresses to have different mapped addresses. For example, on the Inside interface, you can have two NAT rules on two different pool IDs. On the Outside interface, you configure two global pools for these two IDs. Then, when traffic from Inside network A exits the Outside interface, the IP addresses are translated to pool 1 addresses; while traffic from Inside network B are translated to pool 2 addresses (see Figure 23-16). If you use policy NAT, you can specify the same real addresses for multiple NAT rules, as long as the destination addresses and ports are unique in each access list.

Figure 23-16 Different NAT IDs

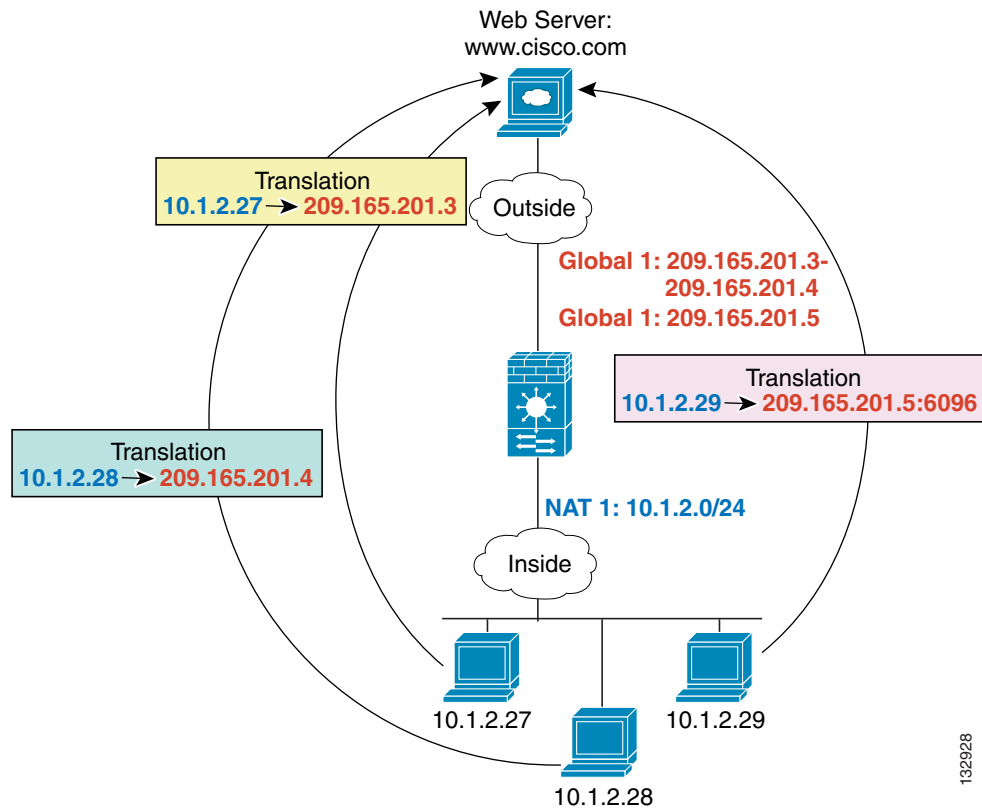


132927

Multiple Addresses in the Same Global Pool

You can have multiple addresses in the same global pool; the security appliance uses the dynamic NAT ranges of addresses first, in the order they are in the configuration, and then uses the PAT single addresses in order. You might want to add both a range of addresses and a PAT address if you need to use dynamic NAT for a particular application, but want to have a backup PAT rule in case all the dynamic NAT addresses are depleted. Similarly, you might want two PAT addresses in the pool if you need more than the approximately 64,000 PAT sessions that a single PAT mapped address supports (see [Figure 23-17](#)).

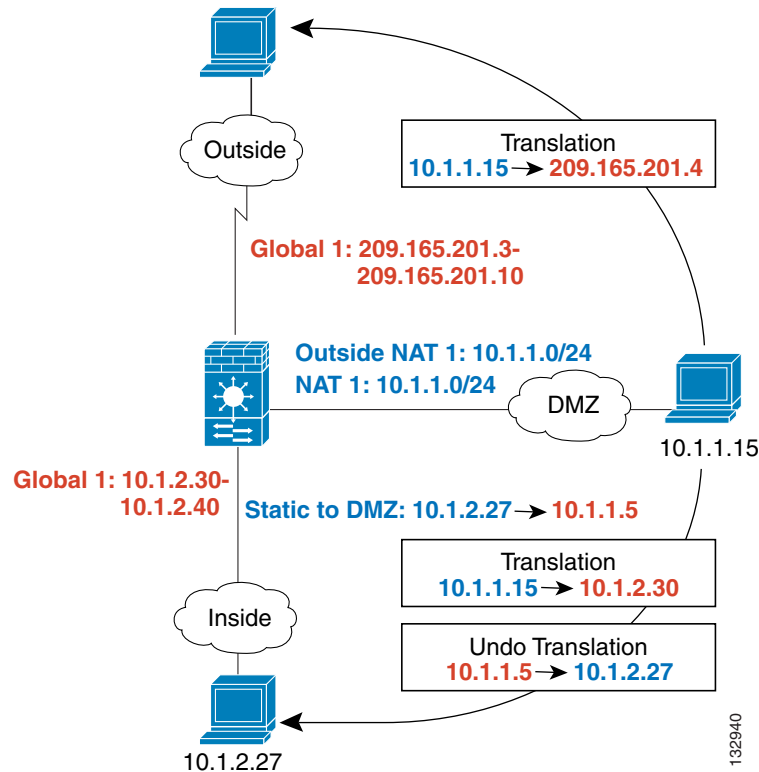
Figure 23-17 NAT and PAT Together



Outside NAT

If a NAT rule translates addresses from an outside interface to an inside interface, then the rule is an outside NAT rule, and you need to specify that it translates inbound traffic. If you also want to translate the same traffic when it accesses a lower security interface (for example, traffic on a DMZ is translated when accessing the Inside and the Outside interfaces), then you can create a second NAT rule using the same NAT ID (see Figure 23-18), but specifying outbound. Note that for outside NAT (DMZ interface to Inside interface), the inside host uses a static rule to allow outside access, so both the source and destination addresses are translated.

Figure 23-18 Outside NAT and Inside NAT Combined



Real Addresses in a NAT Rule Must be Translated on All Lower or Same Security Interfaces

When you create a NAT rule for a group of IP addresses, then you must perform NAT on that group of addresses when they access any lower or same security level interface; you must create a global pool with the same pool ID on each interface, or use a static rule. NAT is not required for that group when it accesses a higher security interface. If you create an outside NAT rule, then the NAT requirements preceding come into effect for that group of addresses when they access all higher security interfaces. Traffic identified by a static rule is not affected.

Managing Global Pools

Dynamic NAT uses global pools for translation. For information about how global pools work, see the “[Dynamic NAT Implementation](#)” section on page 23-16.

To manage a global pool, perform the following steps:

- Step 1** From the Configuration > Firewall > Objects > Global Pools pane, click **Add** to add a new pool, or choose a pool and click **Edit**.

You can also manage global pools from the Add/Edit Dynamic NAT Rule dialog box by clicking the **Manage** button.

The Add/Edit Global Address Pool dialog box appears.

- Step 2** For a new pool, from the Interface drop-down list, choose the interface where you want to use the mapped IP addresses.
- Step 3** For a new pool, in the Pool ID field, enter a number between 1 and 2147483647. Do not enter a pool ID that is already in use, or your configuration will be rejected.
- Step 4** In the IP Addresses to Add area, click **Range, Port Address Translation (PAT), or PAT Address Translation (PAT) Using IP Address of the interface**.
- If you specify a range of addresses, the security appliance performs dynamic NAT. If you specify a subnet mask in the Netmask field, the value specifies the subnet mask assigned to the mapped address when it is assigned to a host. If you do not specify a mask, then the default mask for the address class is used.
- Step 5** Click **Add** to add the addresses to the Addresses Pool window.
- Step 6** (Optional) You can add multiple addresses to the global pool. If you want to add a PAT address after you configure a dynamic range, for example, then complete the value for PAT and click **Add** again. See the [“Multiple Addresses in the Same Global Pool”](#) section on page 23-19 for information about using multiple addresses on the same pool ID for an interface.
- Step 7** Click **OK**.
-

Configuring Dynamic NAT, PAT, or Identity NAT

To configure a dynamic NAT, PAT, or identity NAT rule, perform the following steps.

- Step 1** From the Configuration > Firewall > NAT Rules pane, choose **Add > Add Dynamic NAT Rule**. The Add Dynamic NAT Rule dialog box appears.
- Step 2** In the Original area, from the Interface drop-down list, choose the interface that is connected to the hosts with real addresses that you want to translate.
- Step 3** Enter the real addresses in the Source field, or click the ... button to choose an IP address that you already defined in ASDM.
- Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Step 4** To choose a global pool, use one of the following options:
- Choose an already-defined global pool.

If the pool includes a range of addresses, then the security appliance performs dynamic NAT. If the pool includes a single address, then the security appliance performs dynamic PAT. If a pool includes both ranges and single addresses, then the ranges are used in order, and then the PAT addresses are used in order. See the [“Multiple Addresses in the Same Global Pool”](#) section on page 23-19 for more information.

Pools are identified by a pool ID. If multiple global pools on different interfaces share the same pool ID, then they are grouped. If you choose a multi-interface pool ID, then traffic is translated as specified when it accesses any of the interfaces in the pool. For more information about pool IDs, see the [“Dynamic NAT Implementation”](#) section on page 23-16.
 - Create a new global pool or edit an existing pool by clicking **Manage**. See the [“Managing Global Pools”](#) section on page 23-21.
 - Choose identity NAT by choosing global pool 0.

Step 5 (Optional) To enable translation of addresses inside DNS replies, click the **Connection Settings** area open, and check **Translate the DNS replies that match the translation rule**.

If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. Typically, hosts that need to allow access from other interfaces use a static translation, so this option is more likely to be used with a static rule. See the “[DNS and NAT](#)” section on page 23-13 for more information.

Step 6 (Optional) To enable connection settings, click the **Connection Settings** area open, and set one or more of the following options:



Note You can also set these values using a security policy rule (see the “[Configuring Connection Settings](#)” section on page 25-6). If you set them in both places, then the security appliance uses the lower limit. For TCP sequence randomization, if it is disabled using either method, then the security appliance disables TCP sequence randomization.

- **Randomize sequence number**—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

- If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.
 - If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.
 - You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.
- **Maximum TCP Connections**—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum UDP Connections**—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum Embryonic Connections**—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.

Step 7 Click **OK**.

Configuring Dynamic Policy NAT or PAT

To configure dynamic policy NAT or PAT, perform the following steps:

- Step 1** From the Configuration > Firewall > NAT Rules pane, choose **Add > Advanced > Add Dynamic Policy NAT Rule**.
- The Add Dynamic Policy NAT Rule dialog box appears.
- Step 2** In the Original area, from the Interface drop-down list, choose the interface that is connected to the hosts with real addresses that you want to translate.
- Step 3** Enter the real addresses in the Source field, or click the ... button to choose an IP address that you already defined in ASDM.
- Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Separate multiple real addresses by a comma.
- Step 4** Enter the destination addresses in the Destination field, or click the ... button to choose an IP address that you already defined in ASDM.
- Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Separate multiple destination addresses by a comma.
- By default, the field shows **any**, which allows any destination address.
- Step 5** To choose a global pool, use one of the following options:
- Choose an already-defined global pool.
If the pool includes a range of addresses, then the security appliance performs dynamic NAT. If the pool includes a single address, then the security appliance performs dynamic PAT. If a pool includes both ranges and single addresses, then the ranges are used in order, and then the PAT addresses are used in order. See the [“Multiple Addresses in the Same Global Pool”](#) section on page 23-19 for more information.
Pools are identified by a pool ID. If multiple global pools on different interfaces share the same pool ID, then they are grouped. If you choose a multi-interface pool ID, then traffic is translated as specified when it accesses any of the interfaces in the pool. For more information about pool IDs, see the [“Dynamic NAT Implementation”](#) section on page 23-16.
 - Create a new global pool or edit an existing pool by clicking **Manage**. See the [“Managing Global Pools”](#) section on page 23-21.
 - Choose identity NAT by choosing global pool 0.
- Step 6** (Optional) Enter a description in the Description field.
- Step 7** (Optional) To enable translation of addresses inside DNS replies, click the **Connection Settings** area open, and check **Translate the DNS replies that match the translation rule**.
- If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. Typically, hosts that need to allow access from other interfaces use a static translation, so this option is more likely to be used with a static rule. See the [“DNS and NAT”](#) section on page 23-13 for more information.

Step 8 (Optional) To enable connection settings, click the **Connection Settings** area open, and set one or more of the following options:



Note You can also set these values using a security policy rule (see the “[Configuring Connection Settings](#)” section on page 25-6). If you set them in both places, then the security appliance uses the lower limit. For TCP sequence randomization, if it is disabled using either method, then the security appliance disables TCP sequence randomization.

- **Randomize sequence number**—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

- If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.
 - If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.
 - You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.
- **Maximum TCP Connections**—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum UDP Connections**—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum Embryonic Connections**—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.

Step 9 Click **OK**.

Using Static NAT

This section describes how to configure a static translation, using regular or policy static NAT, PAT, or identity NAT.

For more information about static NAT, see the “[Static NAT](#)” section on page 23-8.

Policy NAT lets you identify real addresses for address translation by specifying the source and destination addresses. You can also optionally specify the source and destination ports. Regular NAT can only consider the source addresses, and not the destination. See the [“Policy NAT” section on page 23-10](#) for more information.

Static PAT lets you translate the real IP address to a mapped IP address, as well as the real port to a mapped port. You can choose to translate the real port to the same port, which lets you translate only specific types of traffic, or you can take it further by translating to a different port. For applications that require application inspection for secondary channels (for example, FTP and VoIP), the security appliance automatically translates the secondary ports. For more information about static PAT, see the [“Static PAT” section on page 23-9](#).

You cannot use the same real or mapped address in multiple static rules between the same two interfaces unless you use static PAT. Do not use a mapped address in the static rule that is also defined in a global pool for the same mapped interface.

Static identity NAT translates the real IP address to the same IP address.

This section includes the following topics:

- [Configuring Static NAT, PAT, or Identity NAT, page 23-26](#)
- [Configuring Static Policy NAT, PAT, or Identity NAT, page 23-28](#)

Configuring Static NAT, PAT, or Identity NAT

To configure static NAT, PAT, or identity NAT, perform the following steps:

-
- Step 1** From the Configuration > Firewall > NAT Rules pane, choose **Add > Add Static NAT Rule**.
The Add Static NAT Rule dialog box appears.
- Step 2** In the Original area, from the Interface drop-down list, choose the interface that is connected to the hosts with real addresses that you want to translate.
- Step 3** Enter the real addresses in the Source field, or click the ... button to choose an IP address that you already defined in ASDM.
Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Step 4** In the Translated area, from the Interface drop-down list, choose the interface where you want to use the mapped addresses.
- Step 5** Specify the mapped IP address by clicking one of the following:
- **Use IP Address**
Enter the IP address or click the ... button to choose an IP address that you already defined in ASDM.
Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
 - **Use Interface IP Address**
- The real and mapped addresses must have the same subnet mask.



Note For identity NAT, enter the same IP address in the Original and Translated fields.

Step 6 (Optional) To use static PAT, check **Enable Port Address Translation (PAT)**.

- a. For the Protocol, click **TCP** or **UDP**.
- b. In the Original Port field, enter the real port number.
- c. In the Translated Port field, enter the mapped port number.

Step 7 (Optional) To enable translation of addresses inside DNS replies, click the **Connection Settings** area open, and check **Translate the DNS replies that match the translation rule**.

If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the “[DNS and NAT](#)” section on page 23-13 for more information.

Step 8 (Optional) To enable connection settings, click the **Connection Settings** area open, and set one or more of the following options:



Note You can also set these values using a security policy rule (see the “[Configuring Connection Settings](#)” section on page 25-6). If you set them in both places, then the security appliance uses the lower limit. For TCP sequence randomization, if it is disabled using either method, then the security appliance disables TCP sequence randomization.

- **Randomize sequence number**—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

- If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.
- If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.
- You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

- **Maximum TCP Connections**—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
- **Maximum UDP Connections**—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
- **Maximum Embryonic Connections**—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.

Step 9 Click **OK**.

Configuring Static Policy NAT, PAT, or Identity NAT

To configure static policy NAT, PAT, or identity NAT, perform the following steps:

-
- Step 1** From the Configuration > Firewall > NAT Rules pane, choose **Add > Advanced > Add Static Policy NAT Rule**.
- The Add Static Policy NAT Rule dialog box appears.
- Step 2** In the Original area, from the Interface drop-down list, choose the interface that is connected to the hosts with real addresses that you want to translate.
- Step 3** Enter the real addresses in the Source field, or click the ... button to choose an IP address that you already defined in ASDM.
- Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Step 4** Enter the destination addresses in the Destination field, or click the ... button to choose an IP address that you already defined in ASDM.
- Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
- Separate multiple destination addresses by a comma.
- By default, the field shows **any**, which allows any destination address.
- Step 5** In the Translated area, from the Interface drop-down list, choose the interface where you want to use the mapped addresses.
- Step 6** Specify the mapped IP address by clicking one of the following:
- **Use IP Address**
Enter the IP address or click the ... button to choose an IP address that you already defined in ASDM.
Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
 - **Use Interface IP Address**
- The real and mapped addresses must have the same subnet mask.
- Step 7** (Optional) To use static PAT, check **Enable Port Address Translation (PAT)**.
- a. For the Protocol, click **TCP** or **UDP**.
 - b. In the Original Port field, enter the real port number.
 - c. In the Translated Port field, enter the mapped port number.
- Step 8** (Optional) Enter a description in the Description field.
- Step 9** (Optional) To enable translation of addresses inside DNS replies, click the **Connection Settings** area open, and check **Translate the DNS replies that match the translation rule**.

If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the “DNS and NAT” section on page 23-13 for more information.

Step 10 (Optional) To enable connection settings, click the **Connection Settings** area open, and set one or more of the following options:



Note You can also set these values using a security policy rule (see the “Configuring Connection Settings” section on page 25-6). If you set them in both places, then the security appliance uses the lower limit. For TCP sequence randomization, if it is disabled using either method, then the security appliance disables TCP sequence randomization.

- **Randomize sequence number**—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

- If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.
 - If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.
 - You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.
- **Maximum TCP Connections**—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum UDP Connections**—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - **Maximum Embryonic Connections**—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.

Step 11 Click **OK**.

Using NAT Exemption

NAT exemption exempts addresses from translation and allows both real and remote hosts to originate connections. NAT exemption lets you specify the real and destination addresses when determining the real traffic to exempt (similar to policy NAT), so you have greater control using NAT exemption than dynamic identity NAT. However unlike policy NAT, NAT exemption does not consider the ports. Use static policy identity NAT to consider ports.

For more information about NAT exemption, see the [“Bypassing NAT When NAT Control is Enabled” section on page 23-10](#).

To configure NAT exemption, perform the following steps:

-
- Step 1** From the Configuration > Firewall > NAT Rules pane, choose **Add > Add NAT Exempt Rule**.
The Add NAT Exempt Rule dialog box appears.
 - Step 2** Click **Action: Exempt**.
 - Step 3** In the Original area, from the Interface drop-down list, choose the interface that is connected to the hosts with real addresses that you want to exempt.
 - Step 4** Enter the real addresses in the Source field, or click the ... button to choose an IP address that you already defined in ASDM.

Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.



Note You can later specify addresses that you do not want to exempt. For example, you can specify a subnet to exempt such as 10.1.1.0/24, but if you want to translate 10.1.1.50, then you can create a separate rule for that address that removes the exemption.

Separate multiple real addresses by a comma.

- Step 5** Enter the destination addresses in the Destination field, or click the ... button to choose an IP address that you already defined in ASDM.
Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
Separate multiple destination addresses by a comma.
By default, the field shows **any**, which allows any destination address.
- Step 6** In the NAT Exempt Direction area, choose whether you want to exempt traffic going to lower security interfaces (the default) or to higher security interfaces by clicking the appropriate radio button.
- Step 7** (Optional) Enter a description in the Description field.
- Step 8** Click **OK**.
- Step 9** (Optional) If you do not want to exempt some addresses that were included in your NAT exempt rule, then create another rule to remove the exemption. Right-click the existing NAT Exempt rule, and choose **Insert**.

The Add NAT Exempt Rule dialog box appears.

- a. Click **Action: Do not exempt**.
- b. Complete steps 3 through 8 to complete the rule.

The No Exempt rule is added before the Exempt rule. The order of Exempt and No Exempt rules is important. When the security appliance decides whether to exempt a packet, the security appliance tests the packet against each NAT exempt and No Exempt rule in the order in which the rules are listed. After a match is found, no more rules are checked.

NAT Field Descriptions

This section lists the field descriptions for NAT screens, and includes the following topics:

- [NAT Rules, page 23-31](#)
- [Add/Edit Static NAT Rule, page 23-34](#)
- [Add/Edit Dynamic NAT Rule, page 23-35](#)
- [Manage Global Pool, page 23-37](#)
- [Add/Edit Global Address Pool, page 23-37](#)
- [Add/Edit Static Policy NAT Rule, page 23-38](#)
- [Add/Edit Dynamic Policy NAT Rule, page 23-40](#)
- [Add/Edit NAT Exempt Rule, page 23-41](#)

NAT Rules

Fields

Menu Items:

- Add—Adds a new NAT rule. Choose the type of rule you want to add from the drop-down list.
 - Add Static NAT Rule—Adds a static NAT, static PAT, or static identity NAT rule.
 - Add Dynamic NAT Rule—Adds a dynamic NAT, dynamic PAT, or identity NAT rule.
 - Add NAT Exempt Rule—Adds a NAT exempt rule.
 - Advanced—Adds a policy NAT rule.
 - Add Static Policy NAT Rule—Adds a static policy NAT, static policy PAT, or static policy identity NAT rule.
 - Add Dynamic Policy NAT Rule—Adds a dynamic policy NAT or dynamic policy PAT rule.
 - Insert—Inserts a new rule above the selected rule in the table, of the same type.
 - Insert After—Inserts a new rule below the selected rule in the table, of the same type.
- Edit—Edits a NAT rule.
- Delete—Deletes a NAT rule.
- Move Up—Moves a rule up. Rules are assessed in the order they appear in this table, so the order can matter if you have overlapping rules.
- Move Down—Moves a rule down.
- Cut—Cuts a rule.

- Copy—Copies the parameters of a rule so you can start a new rule with the same parameters using the Paste button.
- Paste—Opens an Add/Edit Rule dialog box with the copied or cut parameters of the rule prefilled. You can then make any modifications and add it to the table. The Paste button adds the rule above the selected rule. The Paste After item, available from the Paste drop-down list, adds the rule after the selected rule.
- Find—Filters the display to show only matching rules. Clicking **Find** opens the Filter field. Click **Find** again to hide the Filter field.
 - Filter drop-down list—Choose the criteria to filter on, either Interface, Original Source, Original Service, Translated Interface, Translated Address, Translated Service, Rule Type, or Query. A rule query is a collection of multiple criteria that you can save and use repeatedly.
 - Condition drop-down list—For Original Source or Translate Address criteria, choose the condition, either **is** or **contains**. All other criteria use the **is** condition.
 - Filter field—For the Interface type, this field becomes a drop-down list so you can choose an interface name. For the Rule type, the drop-down list includes Exempt, Static, and Dynamic. For the Query type, the drop-down list includes all defined rule queries. The Original Source and Translated Address types accept an IP address. You can type one manually, or browse for one by clicking the ... button and launching the Browse Address dialog box. The Translated Service type accepts a many protocol types. You can type one manually, or browse for one by clicking the ... button and launching the Browse Translated Service dialog box.
 - Filter—Runs the filter.
 - Clear—Clears the Filter field.
 - Define Query—Opens the Define Query dialog box so you can manage named rule queries.
- Diagram—Shows the Rule Flow Diagram area under the rule table. This diagram shows the networks, type of traffic, interface name, direction of flow, and action.
- Packet Trace—Opens the Packet Tracer tool with the parameters pre-filled with the characteristics of the selected rule.

NAT Rules table:

You can edit the contents of these columns by double-clicking on a table cell. Double-clicking on a column header sorts the table in ascending alphanumeric order, using the selected column as the sort key. If you right-click a rule, you see all of the options represented by the buttons above, as well as Insert and Insert After items. These items either insert a new rule before the selected rule (Insert) or after the selected rule (Insert After.)

- Real Interface Name—NAT rules are grouped for each source interface, which is connected to the real hosts you want to translate. You can show or hide the NAT rules for an interface by clicking the + or - button.
- #—Indicates the order of evaluation for the rule.
- Type—Displays the translation rule type.
- Original—Displays the real address.
 - Source—Shows the real addresses you want to translate.
 - Destination—The destination network for real addresses, for policy NAT and NAT exemption. For regular NAT, this display is blank.
 - Service—Shows the service you are translating from, for static PAT.
- Translated—Displays the mapped addresses and the associated interfaces.

- Interface—Shows the mapped interface.
- Address—Shows the mapped addresses.
- Service—Shows the service you are translating to, for static PAT.
- Options—Includes the following items:
 - DNS Rewrite—If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the [“DNS and NAT” section on page 23-13](#) for more information. You can check or uncheck this option directly in the table.
 - Maximum TCP Connections—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Maximum Embryonic Connections—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.
 - Maximum UDP Connections—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Randomize sequence number—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.

If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.

You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

You can check or uncheck this option directly in the table.
- Description (Policy NAT only)—If a description of the rule is available, it is displayed in this column.

Other Areas:

- Enable traffic through the firewall without address translation—Enables or disables NAT control. See the [“NAT Control” section on page 23-4](#) for more information.
- Addresses—Tab that lets you add, edit, delete, or find IP address objects, or network object groups.
- Services—Tab that lets you add, edit, delete, or find services.

- Global Pools—Tab that lets you manage the Global address NAT pools, which are used for dynamic NAT configuration.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Add/Edit Static NAT Rule

Fields

- Original—The real address with its associated interface before network translation is applied.
 - Interface—Selects the security appliance network interface on which the real host or network resides.
 - Source—Specifies the IP address of the host or network to which you would like to apply a rule. Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
 - ...—Lets you select an IP address that you already defined in ASDM.
- Translated—Lets you specify the mapped interface and IP address. The real and mapped addresses must have the same subnet mask.
 - Interface—Sets the interface where you want to use the mapped addresses.
 - IP address—Sets the mapped IP address.
 - ...—Lets you select an IP address that you already defined in ASDM.
 - Use Interface IP address—Sets the mapped IP address to be the interface IP address of the interface you select in the Interface drop-down list.
- Port Address Translation (PAT)—Configures PAT parameters.
 - Enable Port Address Translation (PAT)—Enables static PAT.
 - Protocol—TCP or UDP.
 - Original Port—Enter the port number or name.
 - Translated Port—Enter the port number or name.
- Connection Settings—Lets you configure the DNS Rewrite, Maximum Connections, Embryonic Limit, and Randomize Sequence Number.
 - DNS Rewrite—If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the [“DNS and NAT” section on page 23-13](#) for more information. You can check or uncheck this option directly in the table.

- **Maximum TCP Connections**—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
- **Maximum Embryonic Connections**—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.
- **Maximum UDP Connections**—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
- **Randomize sequence number**—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.

If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.

You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

You can check or uncheck this option directly in the table.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Add/Edit Dynamic NAT Rule

Fields

- **Original**—The real address with its associated interface before network translation is applied.
 - **Interface**—Selects the security appliance network interface on which the real host or network resides.
 - **Source**—Specifies the IP address of the host or network to which you would like to apply a rule.

Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.

- ...—Lets you select an IP address that you already defined in ASDM.
- Translated—Lets you specify the dynamic interface and global address pool.
 - Pool ID—Shows the pool ID for the global pool.
 - Interface—Shows the interfaces associated with the pool ID.
 - Addresses Pool—Shows the addresses in the pool per interface.
 - Manage—Manages the global pools.
- Connection Settings—Lets you configure the DNS Rewrite, Maximum Connections, Embryonic Limit and Randomize Sequence Number.
 - DNS Rewrite—If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the [“DNS and NAT” section on page 23-13](#) for more information. You can check or uncheck this option directly in the table.
 - Maximum TCP Connections—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Maximum Embryonic Connections—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.
 - Maximum UDP Connections—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Randomize sequence number—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.

If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.

You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

You can check or uncheck this option directly in the table.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Manage Global Pool

Fields

- Add—Adds a new global pool.
- Edit—Edits the selected global pool.
- Delete—Deletes the selected global pool.
- Pool ID—Shows the pool ID.
- Interface—Shows the interface name associated with the address pool.
- Addresses Pool—Identifies the addresses in the pool.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Add/Edit Global Address Pool

Fields

- Interface—Specifies the interface name to associate with the new address pool. Select the name in the Interface drop-down list.
- Pool ID—Specifies the ID number that dynamic NAT rules use to reference this address pool. Enter the number in the Pool ID field.
- Range—Select this option to specify that a range of IP addresses be used with the new address pool. If you select this option, specify the following values:
 - Starting IP address—Specifies the starting IP address of the range.
 - Ending IP Address—Specifies the ending IP address of the range.
 - Netmask (optional)—This value identifies the mask of the network on which translated IP addresses are members.

- Port Address Translation (PAT)—Choose this option to specify that an IP address be used for PAT. If you select this option, specify the following value:
 - IP Address—Specifies the PAT address.
 - Netmask (optional)—This value identifies the mask of the network on which translated IP address is a member.
- Port Address Translation (PAT) using IP address of the interface—Select this option to specify that the IP address assigned to the interface selected in the Interface drop-down list be used as the translated address for PAT.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
			Multiple	
Routed	Transparent	Single	Context	System
•	•	•	•	—

Add/Edit Static Policy NAT Rule

- Original—The real address with its associated interface before network translation is applied.
 - Interface—Selects the security appliance network interface on which the real host or network resides.
 - Source—Specifies the IP address of the host or network to which you would like to apply a rule. Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.
 - ...—Lets you select an IP address that you already defined in ASDM.
 - Destination—Specifies the destination addresses. Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0. Separate multiple destination addresses by a comma. By default, the field shows **any**, which allows any destination address.
 - ...—Lets you select an IP address that you already defined in ASDM.
- Translated—Lets you specify the mapped interface and IP address. The real and mapped addresses must have the same subnet mask.
 - Interface—Sets the interface where you want to use the mapped addresses.
 - Use IP address—Sets the mapped IP address.
 - ...—Lets you select an IP address that you already defined in ASDM.
 - Use Interface IP address—Sets the mapped IP address to be the interface IP address of the interface you select in the Interface drop-down list.
- Port Address Translation (PAT)—Configures PAT parameters.
 - Enable Port Address Translation (PAT)—Enables static PAT.

- Protocol—TCP or UDP.
- Original Port—Enter the port number or name.
- Translated Port—Enter the port number or name.
- Description—Sets a description for this rule.
- Connection Settings—Lets you configure the DNS Rewrite, Maximum Connections, Embryonic Limit, and Randomize Sequence Number.
 - DNS Rewrite—If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the [“DNS and NAT” section on page 23-13](#) for more information. You can check or uncheck this option directly in the table.
 - Maximum TCP Connections—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Maximum Embryonic Connections—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.
 - Maximum UDP Connections—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Randomize sequence number—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions. Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session. TCP initial sequence number randomization can be disabled if required. For example:

If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.

If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.

You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

You can check or uncheck this option directly in the table.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Add/Edit Dynamic Policy NAT Rule

- Original—The real address with its associated interface before network translation is applied.
 - Interface—Selects the security appliance network interface on which the real host or network resides.
 - Source—Specifies the IP address of the host or network to which you would like to apply a rule. Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0. Separate multiple real addresses by a comma.
 - ...—Lets you select an IP address that you already defined in ASDM.
 - Destination—Specifies the destination addresses. Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0. Separate multiple destination addresses by a comma. By default, the field shows any, which allows any destination address.
 - ...—Lets you select an IP address that you already defined in ASDM.
- Translated—Lets you specify the dynamic interface and global address pool.
 - Pool ID—Shows the pool ID for the global pool.
 - Interface—Shows the interfaces associated with the pool ID.
 - Addresses Pool—Shows the addresses in the pool per interface.
 - Manage—Manages the global pools.
- Description—Sets a description for this rule.
- Connection Settings—Lets you configure the DNS Rewrite, Maximum Connections, Embryonic Limit and Randomize Sequence Number.
 - DNS Rewrite—If your NAT rule includes the real address of a host that has an entry in a DNS server, and the DNS server is on a different interface from a client, then the client and the DNS server need different addresses for the host; one needs the mapped address and one needs the real address. This option rewrites the address in the DNS reply to the client. The mapped host needs to be on the same interface as either the client or the DNS server. See the [“DNS and NAT” section on page 23-13](#) for more information. You can check or uncheck this option directly in the table.
 - Maximum TCP Connections—Specifies the maximum number of TCP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
 - Maximum Embryonic Connections—Specifies the maximum number of embryonic connections per host up to 65,536. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept

feature. The default is 0, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help to minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server.

- Maximum UDP Connections—Specifies the maximum number of UDP connections, between 0 and 65,535. If this value is set to 0, the number of connections is unlimited.
- Randomize sequence number—With this check box checked (the default), the security appliance randomizes the sequence number of TCP packets. Each TCP connection has two ISNs: one generated by the client and one generated by the server. The security appliance randomizes the ISN of the TCP SYN passing in both the inbound and outbound directions.

Randomizing the ISN of the protected host prevents an attacker from predicting the next ISN for a new connection and potentially hijacking the new session.

TCP initial sequence number randomization can be disabled if required. For example:

If another in-line firewall is also randomizing the initial sequence numbers, there is no need for both firewalls to be performing this action, even though this action does not affect the traffic.

If you use eBGP multi-hop through the security appliance, and the eBGP peers are using MD5. Randomization breaks the MD5 checksum.

You use a WAAS device that requires the security appliance not to randomize the sequence numbers of connections.

You can check or uncheck this option directly in the table.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—

Add/Edit NAT Exempt Rule

Fields

- Action—Sets whether to exempt or not to exempt the addresses.
 - Exempt—Exempts the addresses from NAT.
 - Do not exempt—Removes the exemption for the addresses.
- Original—Specifies the addresses for the NAT exempt rule.
 - Interface—Selects the security appliance network interface on which the real host or network resides.
 - Source—Specifies the real IP address of the host or network.

Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.

Separate multiple real addresses by a comma.

- ...—Lets you select an IP address that you already defined in ASDM.
- Destination—Specifies the destination addresses.

Specify the address and subnet mask using prefix/length notation, such as 10.1.1.0/24. If you enter an IP address without a mask, it is considered to be a host address, even if it ends with a 0.

Separate multiple destination addresses by a comma.

By default, the field shows **any**, which allows any destination address.

- ...—Lets you select an IP address that you already defined in ASDM.
- NAT Exempt Direction—Sets the NAT rule for inbound or outbound traffic.
 - NAT Exempt outbound traffic from interface “*real interface*” to lower security interfaces (default)—Sets the NAT rule for outbound traffic.
 - NAT Exempt inbound traffic from interface “*real interface*” to higher security interfaces—Sets the NAT rule for inbound traffic.
- Description—Sets a description for this rule.

Modes

The following table shows the modes in which this feature is available:

Firewall Mode		Security Context		
Routed	Transparent	Single	Multiple	
			Context	System
•	•	•	•	—