CHAPTER 14

Monitoring Carrier Grade NAT Properties

Carrier Grade NAT is a large-scale Network Address Translation (NAT) that provides translation of millions of private IPv4 addresses to public IPv4 addresses. These translations support subscribers and content providers with a bandwidth throughput of at least 10 Gbps full-duplex.

Carrier Grade NAT addresses the IPv4 address completion problem. It employs Network Address and Port Translation (NAPT) to aggregate many private IPv4 addresses into fewer public IPv4 addresses. For example, a single public IPv4 address with a pool of 32,000 port numbers supports 320 individual private IP subscribers, assuming that each subscriber requires 100 ports. Carrier Grade NAT also offers a way to implement a graceful transition to IPv6 addresses.

Carrier Grade NAT attributes and instances are configured as a CRS-ADVSVC-PLIM card on Cisco CRS-1 routers. To route internal public addresses to external public addresses, a VPN Routing and Forwarding (VRF) instance is created. Interfaces are created for the VRF at the subscriber-side (private) and the Internet-side (public). The VRF enables static or dynamic routing of protocols on the interfaces.

Cisco Prime Network supports the following instances for Carrier Grade NAT:

- Stateful Address Translation- NAT44 Stateful
- Stateless Address Translation- NAT 64 Stateless (X-LAT)
- IPv6 rapid deployment (6rd)

Each Carrier Grade NAT instance has several attributes listed under them, such as preferred location, address pools, associated interfaces, and statistics. The attributes are grouped under related categories. The categories and attributes are listed below:

Note IPv4 Network Address Translation (NAT44) is not supported for devices running Cisco IOS XR software version 4.0.

The following topics describe how to use Prime Network Vision to view Carrier Grade NAT properties:

User Roles Required to View Carrier Grade NAT Properties

This topic identifies the roles that are required to view Carrier Grade NAT properties in Prime Network Vision. Prime Network determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect elements), authorization is based on the default permission that is assigned to your user account.
- For element-based tasks (tasks that do affect elements), authorization is based on the default permission that is assigned to your account. That is, whether the element is in one of your assigned scopes and whether you meet the minimum security level for that scope.

For more information on user authorization, see the *Cisco Prime Network 3.10 Administrator Guide*.

The following tables identify the tasks that you can perform:

- Table 14-1 identifies the tasks that you can perform if a selected element **is not in** one of your assigned scopes.
- Table 14-2 identifies the tasks that you can perform if a selected element **is in** one of your assigned scopes.

By default, users with the Administrator role have access to all managed elements. To change the Administrator user scope, see the topic on device scopes in the *Cisco Prime Network 3.10 Administrator Guide*.

Table 14-1 Default Permission/Security Level Required for Viewing Carrier Grade NAT Properties - Element Not in User's Scope

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View Carrier Grade NAT properties	—	—	—	—	X
Using CG NAT Configure, Delete, and Show Commands	—	—	—	X	X

Table 14-2 Default Permission/Security Level Required for Viewing Carrier Grade NAT Properties - Element in User's Scope

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View Carrier Grade NAT properties	X	X	X	X	X
Using CG NAT Configure, Delete, and Show Commands	—	—	—	X	X

Viewing Carrier Grade NAT Properties in Logical Inventory

To view Carrier Grade NAT properties in logical inventory:

Step 1 In Prime Network Vision, double-click the Cisco CRS device configured for Carrier Grade NAT.

Step 2 In the inventory window, click **Logical Inventory > Carrier Grade NAT**.

The Carrier Grade NAT properties are displayed in logical inventory as shown in Figure 14-1.

Figure 14-1 Carrier Grade NAT in Logical Inventory

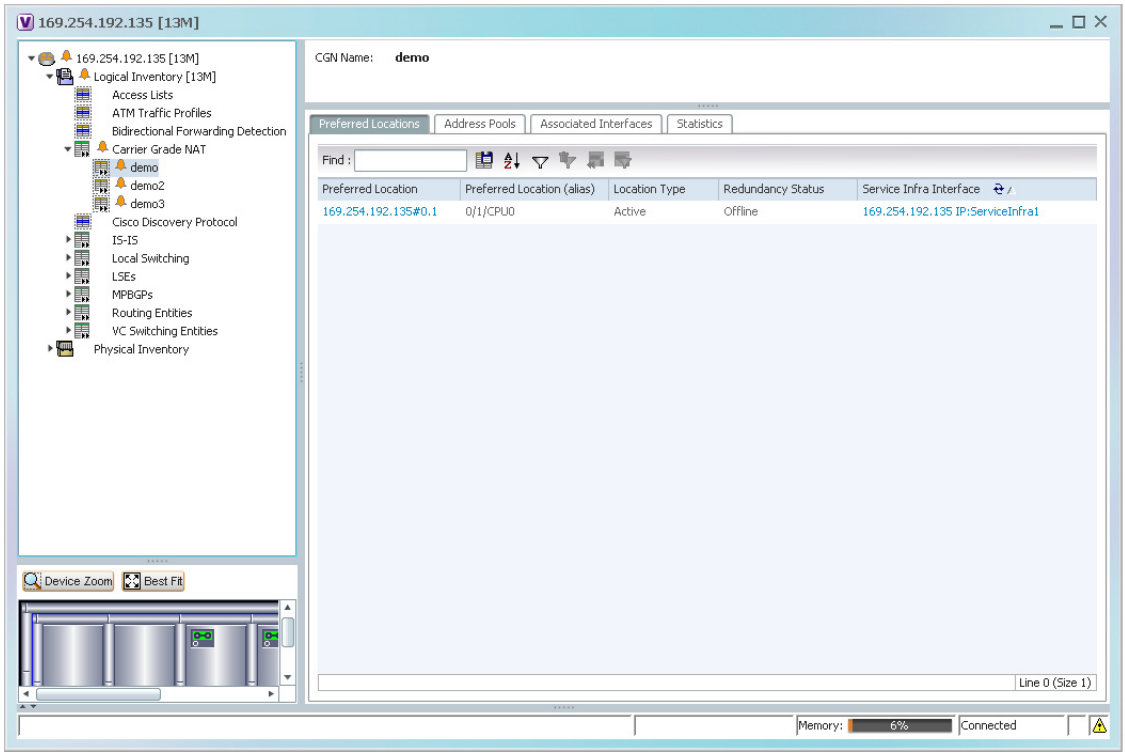


Table 14-3 describes the Carrier Grade NAT properties that are displayed.

Table 14-3 Carrier Grade NAT Properties in Logical Inventory

Field	Description
CGN Name	Name of the Carrier Grade NAT service.
Preferred Location Tab	
Preferred Location	Hyperlinked entry to the card in physical inventory.
Preferred Location (alias)	Location of module in clear text.
Location Type	Configured type of location: Active or Standby.
Redundancy Status	Redundancy state: Online or Offline. If the field is empty, it means the data was not collected from the device.
Service Infra Interface	Hyperlinked entry to the routing entity in logical inventory. For more information about routing entities in logical inventory, see Viewing Routing Entities, page 19-32.

Table 14-3 Carrier Grade NAT Properties in Logical Inventory (continued)

Field	Description
Address Pools Tab	
Inside VRF	Hyperlinked entry to the inside VRF in logical inventory. For more information about VRF properties in logical inventory, see Viewing VRF Properties, page 19-27.
Address Family	Type of IP address in this pool: IPv4 or IPv6.
Outside VRF	Hyperlinked entry to the outside VRF in logical inventory. For more information about VRF properties in logical inventory, see Viewing VRF Properties, page 19-27.
Address Pool	Range of IP addresses that can be used for the service instance. If an end address is not specified, the entire range of 255 addresses is used for the address pool.
Associated Interfaces Tab	
Interface	Hyperlinked entry to the associated entry in logical inventory: • For SVI service interfaces, hyperlinked entry to the routing entity in logical inventory. • For SVI service applications, hyperlinked entry to the VRF entity in logical inventory.
Service Types Tab	
Service Type Name	Name of the Carrier Grade NAT service.
Service Type	Type of Carrier Grade NAT service: 6RD, XLAT, or NAT44.
Statistics Tab	
Statistics Name	Name of the statistic. For statistic names and descriptions, see Table 14-4.
Statistics Value	Value of the statistic.

You can also display pool utilization by right-clicking a VNE and choosing **Commands > Show > Pool Utilization.**

Table 14-4 Carrier Grade NAT Statistics in Logical Inventory

Statistic Name	Description
Inside to outside drops port limit exceeded	Number of packets dropped because the port limit has been exceeded. The value is calculated from the time Carrier Grade NAT was configured and running on the card.
Inside to outside drops resource depletion	Number of packets that are dropped because no ports are available. The value is calculated from the time Carrier Grade NAT was configured and running on the card.
Inside to outside drops limit system reached	Number of packets that are dropped because the system limit has been exceeded. The value is calculated from the time Carrier Grade NAT was configured and running on the card.
Inside to outside forward rate	Number of packets forwarded from the inside to the outside in the last one second.
Outside to inside forward rate	Number of packets forwarded from the outside to the inside in the last one second.
Translations create rate	Number of translation entries created in the last one second.
Translations delete rate	Number of translation entries deleted in the last one second.

Viewing Carrier Grade NAT Properties in Physical Inventory

To view Carrier Grade NAT properties in physical inventory:

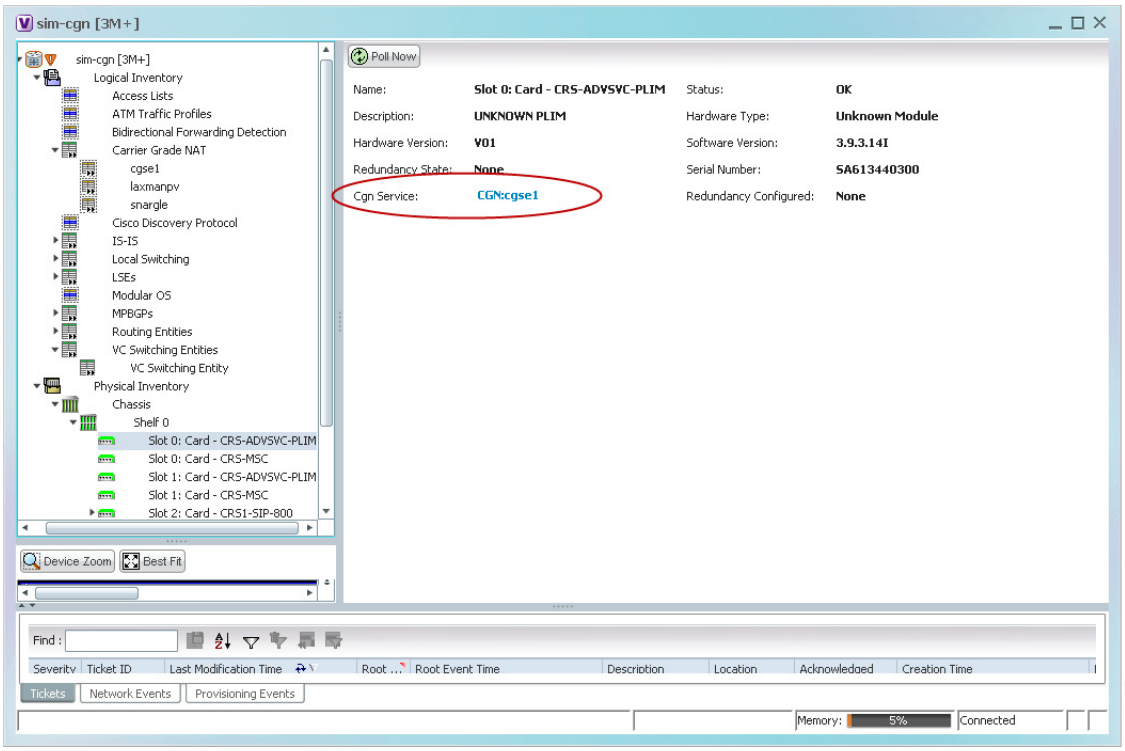
Step 1 In Prime Network Vision, double-click the Cisco CRS device configured for Carrier Grade NAT.

Step 2 To view Carrier Grade NAT properties configured on a specific interface, click **Physical Inventory > *chassis*** > *shelf* > *slot* > *card* > *interface*. See Table 3-11 for a description of the information displayed in the Subinterfaces table.

Step 3 To view Carrier Grade NAT properties configured on a Cisco CRS-CGSE-PLIM card, click **Physical Inventory** > *chassis* > *shelf* > *slot* > *PLIM-card*.

Figure 14-2 shows an example of Carrier Grade NAT properties in physical inventory.

Figure 14-2 Carrier Grade NAT Properties in Physical Inventory



The field CGN Service is displayed, and the entry is hyperlinked to the associated Carrier Grade NAT service in logical inventory.

Using CG NAT Configure, Delete, and Show Commands

The following commands can be launched from the inventory by right-clicking the appropriate node and selecting **Commands.** Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands. To find out if a device supports these commands, see the *Cisco Prime Network 3.10 Supported Cisco VNEs*.

Note You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Table 14-5 Carrier Grade NAT Commands

Command	Inputs Required and Notes
Configure > Add Static Port Forwarding	To configure CG NAT service instance for static port forwarding. Required inputs are: Carrier Grade NAT and CGN instance name, inside VRF name and address, address family (IPv4 or IPv6), protocol (TCP, UDP, ICMP), port number
Configure > Add NAT 64 Forwarding	To configure CG NAT service instance for NAT 64. Required inputs are: CGN instance name, NAT 64 instance name, name of IPv4 or IPv6 service
Configure > Add 6rd Forwarding	To configure CG NAT service instance for 6rd. Required inputs are: CGN instance name, 6rd instance name, name of IPv4 or IPv6 service
Delete > Static Port Forwarding	Click **Execute Now** to remove CG NAT instance.
Show > Pool Utilization	CGN instance name, inside VRF name, start and end address