CHAPTER 6

Operating and Monitoring the Network

Under the Operate tab, Prime NCS (WAN) provides tools to help you monitor your network on a daily basis, as well as perform other day-to-day or ad hoc operations relating to network device inventory and configuration management. The Operate tab contains dashboards, the Device Work Center, and the tools you need for day-to-day monitoring, troubleshooting, maintenance, and operations.

Monitoring Dashlets and Dashboards

Prime NCS (WAN) automatically displays monitoring data in dashboards and dashlets. You can choose one of the following dashboards under **Operate > Monitoring Dashboard** to view summary information:

- Overview—Displays overview information about your network such as device counts, and the top 5 devices by CPU and memory utilization. From the overview dashboard, you can click on device or interface alarms counts to view detailed dashboards and alarms and events in order to help troubleshoot and isolate issues.
- Incidents—Displays a summary of alarms and events for your entire network, for a particular site, or for a particular device. By clicking on an item in the dashboard, you can view details about the alarm or event and troubleshoot the problem.
- Performance—Displays CPU and memory utilization information.
- Detail Dashboards—Displays network health summaries for sites, devices, or interfaces. The detailed dashboards allow you to see congestion in your network and gather detailed site, device, and interface information. For example, you can view detailed dashboards for a particular site to determine which devices have the most alarms, device reachability status for the site, etc.

You can change the information displayed in the dashboards as explained in Common Tasks For Dashboards.

Table 6-1 describes where to find monitoring information in the Prime NCS (WAN) dashboards.

Table 6-1 Finding Monitoring Data

To View this Monitoring Data	Choose this Dashboard
Alarm information	**Operate > Monitoring Dashboard > Incidents**
CPU utilization	**Operate > Monitoring Dashboard > Performance**
Detailed device information	**Operate > Monitoring Dashboard > Detail Dashboards**
Detailed interface information	**Operate > Monitoring Dashboard > Detail Dashboards**

Table 6-1 Finding Monitoring Data

To View this Monitoring Data	Choose this Dashboard
Device reachability status	**Operate > Monitoring Dashboard > Overview**
Event information	**Operate > Monitoring Dashboard > Incidents**
Interface status, availability, and utilization information	**Operate > Monitoring Dashboard > Performance**
Licensing information	**Operate > Monitoring Dashboard > Overview**
Memory utilization	**Operate > Monitoring Dashboard > Performance**
Site information	**Operate > Monitoring Dashboard > Detail Dashboards**
Syslog sender information	**Operate > Monitoring Dashboard > Incidents**
Utilization statistics	**Operate > Monitoring Dashboard > Overview**

Monitoring Jobs

Choose **Tools > Task Manager > Jobs Dashboard** to view the status of jobs and to:

- View all running and completed jobs and corresponding job details
- Filter jobs to view the specific jobs for which you are interested
- View details of the most recently submitted job
- View job execution results
- Modify jobs including deleting, editing, running, canceling, pausing, and resuming jobs

If a job fails, you can get troubleshooting information from the Jobs Dashboard. When you expand a job to view its details, click the History tab, and rest your cursor over the Status field. The results window displays troubleshooting information that can help you determine why the job failed.

Configure Monitoring Settings

You can define how Prime NCS (WAN) monitors the devices and interfaces in your network.

By enabling the Auto Monitoring option, you can have Prime NCS (WAN) monitor the availability, CPU, memory and temperature of all your network devices automatically. By default, Prime NCS (WAN) polls all devices in your network every 15 minutes for device-health data. Most users will want to enable Auto Monitoring.

You may want to avoid enabling Auto Monitoring if you have a very large network or Prime NCS (WAN) deployment, to avoid excessive polling traffic. In this case, you can leave Auto Monitoring disabled, and create one or more device groups containing your business-critical devices only. You may also want to create a version of the default device health monitoring template with a polling frequency appropriate for these devices. When you deploy the default or custom device health monitoring template, you can select to apply it to your business-critical device group only.

You can also enable deduplication, if applicable, for Cisco IOS Netflow and Cisco Prime Assurance. If you have multiple routers and switches that send netflow to the Cisco Prime Assurance server and multiple NAMs that Cisco Prime Assurance retrieves data from, Cisco Prime Assurance could receive the same traffic statistic more than once. You can enable deduplication so that Cisco Prime Assurance doesn't count the same metrics more than once.

Step 1 Choose **Administration > System**, then select **Monitoring Settings**.

Step 2 Check the following options:

- **Auto monitoring** to have Prime NCS (WAN) monitor all devices and interfaces automatically.
- **Enable deduplication** to have Prime NCS (WAN) eliminate redundant data.

What is the Device Work Center?

From **Operate > Device Work Center**, you can view the device inventory and device configuration information. The Device Work Center contains general administrative functions at the top and configuration functions at the bottom as described in Table 6-2.

Table 6-2 Device Work Center Tasks

Task	Description	Location in Operate > Device Work Center
Manage devices	Add, edit, bulk import, and delete devices, and force data collection from devices.	Buttons located at the top of the Device Work Center.
View basic device information and collection status	View basic device information such as reachability status, IP address, device type, and collection status information.	Displayed in the top portion of the Device Work Center. Rest your cursor on the Collection Status cell and click on the icon to view errors related to the inventory collection.
Manage device groups	By default, Prime NCS (WAN) creates dynamic device groups and assigns devices to the appropriate Device Type folder. You can create new device groups that appear under the User Defined folder.	Displayed on the left pane of the Device Work Center. See Using Device Groups for more information about creating and using device groups.
Add devices to sites	After you set up a site profile, you can add devices to the site. **Note** A device can belong to one site only.	**Add to Site** button located at the top of the Device Work Center. See Creating Site Profiles for more information about adding devices to sites.
View device details	View device details such as memory, port, environment, and interface information.	Choose a device in the Device Work Center, then click the **Device Details** tab at the bottom of the screen.
	View device information, status, and associated modules, alarms, neighbors, and interfaces. See Using 360° View for more information.	Rest your cursor on a device IP address and click the icon that appears.
Create and deploy configuration templates	You can create and deploy configuration templates for the selected device. You can also preview the CLI that will be deployed to the device.	Click the **Configuration** tab at the bottom of the Device Work Center.

Table 6-2 Device Work Center Tasks (continued)

Task	Description	Location in Operate > Device Work Center
View device configurations	View archived configurations, schedule configuration rollbacks, and schedule archive collections.	Click the **Configuration Archive** tab at the bottom of the Device Work Center.
View software images	View details about the image on the selected device, the recommended software image for the device, and the latest software image operations for a device.	Click the **Image** tab at the bottom of the Device Work Center.

Configuring Features on a Device

You can create or change the feature configuration for the selected device. The following topics provide more information:

- Application Visibility, page 6-4
- Overview of NAT, page 6-7
- Dynamic Multipoint VPN, page 6-14
- GETVPN, page 6-19
- VPN Components, page 6-25
- Overview of Zones, page 6-34

Application Visibility

The Application Visibility (AV) feature helps in monitoring the traffic sent towards the internet. To configure AV, you need to perform the following:

- Create AV Configuration
- Assign AV policies on interfaces
- Change AV Advanced options

Note The Application Visibility feature is supported on ASR devices from the IOS version 3.5 or later. This feature is not supported on ISR devices. If you make any changes via CLI interface on objects/entities that starts with “EMS_” is unsupported and may cause unexpected behavior.

Configuring AV

The Application Visibility Configuration feature creates the required elements in the device to send the NetFlow messages for Transaction Records and Usage Records. To configure AV, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Choose the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Application Visibility > Configuration**. The AV Configuration page appears.

Step 5 From the AV Configuration page, set the Primary CM IP Address, Secondary CM IP Address, VPN Routing and Forwarding (VRF), and Source IP address.

Step 6 Set the advanced AV parameters. For more information on the Advanced AV parameters, see Changing AV Advanced Options, page 6-6.

Table 6-3 lists the elements on the AV Configuration page.

Table 6-3 Application Visibility Page

Element	Description
Primary CM IP	Enter the IP address of the primary CM.
Secondary CM IP	(Optional) Enter the IP address of the secondary CM.
VRF	The VRF for the primary CM IP, secondary CM IP and source IP. The Global VRF is the default VRF.
Source IP Address	Specifies the IP address for an interface, which will be used as the source for sending FNF messages towards the CM.

Step 7 Click **Save/ Apply** to save the changes in the server.

Managing Interface

To edit the existing AV policy, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Choose the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Application Visibility > Interfaces**.

Step 5 In the Interface page, select one or more interfaces to Enable/Disable AV Records. To enable the AV on the interface, select “Enable”, and then select the record to which you want to send the collector.

a. Usage Records (UR)—Usage Records are records of the different type of applications that run on a specific interface. The operator can use the Usage Records to monitor the bandwidth usage of different applications. The Usage Records can show the application usage over a specific time period, the peak and average usages, and usage for a specific application type. Usage Records perform periodic aggregation of the category information for the interface. (For example, export information for peer-to-peer traffic or email usage).

b. Transaction Records (TR)—A transaction is a set of logical exchanges between endpoints. There is normally one transaction within a flow. The Transaction Record monitors the traffic at transaction levels. These records provide a detailed analysis of the traffic flows. Transaction Records are bound to the input and output directions of the network side interfaces. These Transaction Records allow the system to capture each unidirectional flow once.

Step 6 Click **OK** to deploy the changes to the device.

Changing AV Advanced Options

To change the Application Visibility Advanced options, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Application Visibility > Configuration**. The AV Configuration page appears.

Step 5 In the AV Configuration page, set the new values for the AV configuration.

Step 6 Click on the title area to view the Advanced Options and Record Advanced Options. To customize the value, check the specific attribute check box and set the new value. To use the system default value, uncheck the check box of the specific attribute.

Step 7 Click **Save / Apply** to save the changes in the server.

Table 6-4 lists the elements on the AV Configuration page.

Table 6-4 Application Visibility Page

Element	Description
Primary CM IP	Enter the IP address of the primary CM.
Secondary CM IP	(Optional) Enter the IP address of the secondary CM.
VRF	The VRF for the primary CM IP, secondary CM IP and source IP. The Global VRF is the default VRF.
Source IP Address	Specifies the IP address for an interface, which will be used as the source for sending FNF messages towards the CM.
Advance Options	
DSCP Value	(Optional) Check the DSCP value check box to set the exporter DSCP service code point value. The range is from 0 to 63.
TTL	(Optional) Check the TTL check box to set the exporter TTL or hop limit. The range is from 1 to 255.
FNF Template Timeout	
Template Data Timeout	Set the template data timeout value in seconds.
Option Interface Timeout	Set the option interface timeout value in seconds.
Attributes Table Timeout	Set the attributes table timeout value in seconds
Attributes Sampler Timeout	Set the attribute sampler timeout value in seconds.
Option Application Timeout	Set the application timeout in seconds.
VRF Table Timeout	Set the VRF table id timeout value in seconds.
NetFlow Usage Records	

Table 6-4 Application Visibility Page

Element	Description
NetFlow Cache Size	Set the maximum flow entries in the Flow Cache.
NetFlow Exporting Interval	Specify the cache flow timeout.
NetFlow Sampled Transaction Records	
NetFlow Cache Size	Set the maximum flow entries in the Flow Cache.
Transaction Sampling	Specify the cache flow timeout.
NBAR Flow Table Size	Define the maximum allowed sessions.

Overview of NAT

The Network Address Translation (NAT) is the process where a network device, usually a firewall, assigns a public address to a computer (or group of computers) inside a private network. The NAT helps to limit the number of public IP addresses used by an organization or company, for both economy and security purposes.

The NAT feature allows organizations to resolve the problem of IP address depletion when they have existing networks and need to access the Internet. The NAT allows the IP network of an organization to use different IP address space for the outside network. Thus, NAT allows an organization that does not have globally routable addresses to connect to the Internet by translating those addresses into globally routable address space. The NAT also allows a more graceful renumbering strategy for organizations that are changing service providers or voluntarily renumbering into Classless Inter Domain Routing (CIDR) blocks. The NAT is described in RFC 1631.

A router configured with the NAT will have at least one interface to the inside network and one to the outside network. In a typical environment, the NAT is configured at the exit router between a sub domain and a backbone. When a packet leaves the domain, the NAT translates the locally significant source address into a globally unique address. When a packet enters the domain, the NAT translates the globally unique destination address into a local address. If more than one exit point exists, each NAT must have the same translation table. If the NAT cannot allocate an address because it has run out of addresses, it drops the packet and sends an Internet Control Message Protocol (ICMP) host unreachable packet.

For more information on NAT, see
http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_nat/configuration/xe-3s/iadnat-addr-consv.html.

Types of NAT

The NAT operates on a router—Generally connecting only two networks together—and translates your private (inside local) addresses within the internal network, into public (inside global) addresses before any packets are forwarded to another network. This functionality gives you the option to configure the NAT so that it will advertise only a single address for your entire network to the outside world. Doing this effectively hides the internal network from the world, giving you some additional security.

NAT types include:

- Static Address Translation (SAT) —Allows one-to-one mapping between local and global addresses.

- Dynamic Address Translation—Maps unregistered IP addresses to registered IP addresses of out of a pool of registered IP addresses.
- Overloading—A form of dynamic NAT that maps multiple unregistered IP addresses to a single registered IP address (many to one) using different ports. This method is also known as Port Address Translation (PAT). By using PAT (NAT Overload), thousands of users can be connected to the Internet using only one real global IP address.

How to Configure NAT for IP Address Conservation

To configure NAT, perform the following steps:

1. Create the NAT pool (required for Dynamic NAT)
2. Configure the ACL
3. Create the NAT44 rules
4. Assign rules on the interfaces
5. Set up the NAT maximum translation (Optional)

Note The NAT feature is supported on ASR platform from the IOS version 3.5 or later. The NAT feature is supported on ISR platform from the IOS version 12.4(24)T or later. If you make any changes via CLI interface on objects/entities that starts with "EMS_" is unsupported and may cause unexpected behavior.

IP Pools

The IP Pool is a device object that represents IP ranges to be used on the Dynamic NAT. The NAT IP Pools feature allows you to create a new pool that can be used in the Dynamic NAT, change existing the pool, and delete the pool from the device.

Creating, Editing, and Deleting IP Pools

To create, edit, and delete the IP Pools, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **NAT > IP Pools**. The NAT Pools page appears.

Step 5 From this page, click the **Add IP Pool > IP+Prefix** or **IP Range + Prefix** button, and enter the Name, IP Address/Range, Prefix Length, and Description.

Step 6 Click **Ok** to save the configurations.

Table 6-5 lists the elements on the IP Pools page.

Table 6-5 IP Pools Page

Element	Description
Name	Enter the name for the IP Pool. You cannot change the name after creating the pool.
IP Address/Range	Enter a valid IPv4 address. A valid IPv4 address consists of 4 octets separated by a period'.'.
Prefix length	Enter the prefix length.
Description	(Optional) Enter the description for the zone.

Step 7 Click the **Apply** button to deploy the pool to the server data base.

Step 8 To edit the existing IP Pool, in the NAT IP Pools page do the following:

a. Click on the selected IP Pools parameters row, and edit the parameters. or

b. Select the IP Pools, and click the **Edit** button. The selected IP Pools entity opens for editing. You can edit all the parameters except the pool name.

Step 9 Click **Save / Apply** to save the changes in the server.

Step 10 To delete the existing IP Pools, select the IP Pool, and then click the **Delete** button.

Step 11 Click **Ok** on the warning message to delete the IP Pool. The selected IP Pool will be deleted.

NAT44

The NAT44 feature allows the user to create, delete, and change the NAT44 rules.

Creating, Editing, and Deleting NAT44 Rule

This section describes how to create the NAT44 rules.

There are three types of NAT rules:

- Static
- Dynamic
- Dynamic PAT

To create the NAT44 rule, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector left panel, choose **NAT > NAT44**.

Step 5 From the NAT 44 Rule page, click the down arrow icon on the **Add NAT Rule** button.

- Click Static to create Static Rule. For elements on this page, see Table 6-6.
- Click Dynamic to create Dynamic NAT Rule. For elements on this page, see Table 6-7.

- Click Dynamic PAT to create Dynamic PAT Rule. For elements on this page, see Table 6-8.

Table 6-6 lists the elements on the Static Rule page.

Table 6-6 Static Rule Page

Element	Description
Direction	Displays the directions. This release supports only the Inbound to Outbound direction.
VRF	Displays the VRF on which the NAT translation process happens. The default value is default VRF.
Source A	Enter a valid IPv4 address. A valid IPv4 address consists of 4 octets separated by a period '.'. • If the Source A is defined, then the Source B must be defined. • If the Source A is defined, then the Destination A will be **Any** by default.
Destination A	Enter a valid IPv4 address. A valid IPv4 address consists of 4 octets separated by a period'.'. • If the Destination A is defined, then the Destination B must be defined. • If the Destination A is defined, then the Source A will be **Any** by default.
Translation	Displays the static translation type.
Source B	Enter a valid IPv4 address. A valid IPv4 address consists of 4 octets separated by a period '.'. • If the Source B is defined, then the Source A must be defined. • If the Source B is defined, then the Destination B will be **Any** by default.
Destination B	Enter a valid IPv4 address. A valid IPv4 address consists of 4 octets separated by a period '.'. • If the Destination B is defined, then the Destination A must be defined. • If the Destination B is defined, then the Source A and B will be **Any** by default.
Options	Displays the advance options for the Static type. Configure the following: • To ignore the embedded IP addresses (no-Payload), check the Ignore Embedded IP address check box. • To enable port translation, check the Enable Port Translation check box, and then define the following: – TCP or UDP – Original Port – Port Translation

Table 6-7 lists the elements on the Dynamic NAT page.

Table 6-7 Dynamic NAT Page

Element	Description
Direction	Displays the directions. This release supports only the Inbound to Outbound direction.
VRF	Displays the VRF on which the NAT translation process happens. The default value is default VRF.

Table 6-7 Dynamic NAT Page (continued)

Element	Description
Source A	Select the ACL name from the list. • If the Source A is defined, then the Source B must be defined. • If the Source A is defined, then the Destination A will be **Any** by default.
Destination A	Select the ACL name from the list. • If the Destination A is defined, then the Destination B must be defined. • If the Destination A is defined, then the Source A will be **Any** by default.
Translation	Displays the Dynamic NAT translation type.
Source B	Choose the NAT pool from the drop-down list. If the Source B is defined, then the Source A must be defined. If the Source B is defined, then the Destination B will be **Any** by default.
Destination B	Choose the NAT pool from the drop-down list. • If the Destination B is defined, then the Destination A must be defined. • If the Destination B is defined, then the Source A and B will be **Any** by default.
Options	Displays the advance options for the Dynamic type. • To ignore the embedded IP addresses (no-Payload), check the Ignore Embedded IP address check box. • To enable port translation, check the Enable Port Translation check box, and then define the following: – TCP or UDP – Original Port – Port Translation **Note** This option is supported only on the ISR devices.

Table 6-8 lists the elements on the Dynamic PAT page.

Table 6-8 Dynamic PAT Page

Element	Description
Direction	Displays the directions. This release support the Inbound to Outbound directions.
VRF	Displays the VRF on which the NAT translation process happens. The default value is default VRF.
Source A	Select the ACL name from the list.
Destination A	Not defined.
Translation	Displays the Dynamic PAT translation type.
Source B	Select the IP Pool Name from the list.
Destination B	Not defined.

Table 6-8 Dynamic PAT Page

Element	Description
Options	Displays the advance options for the Dynamic PAT. Select the Ignores embedded IP Addresses (no-Payload) options. The options are: **Yes** or **No**. **Note** This option is supported only on the ISR devices.

Step 6 Click:

- **Save** to save and deploy the changes to the device.
- Cancel to exit without saving.

Step 7 To edit the existing NAT44 rule, in the NAT44 page, do the following:

a. Click on the selected NAT44 rules parameters row, and edit the parameters. or

b. Select the NAT44 rule, and click the **Edit** button. The selected NAT44 rule entity opens for editing. You can edit all the parameters except the pool Name.

Step 8 You can change the Source and Destination according to the creation rules. You can also change the Options selection according to the creation rules.

Step 9 Click **Save/ Apply** to save the changes in the server.

Step 10 To delete the existing NAT44 rules, select the rules, and then click the **Delete** button.

Step 11 Click **Ok** on the warning message to delete the rules. The selected NAT44 rules will be deleted.

Managing Interfaces

A virtual interface is a logical interface configured with generic configuration information for a specific purpose or for configuration common to specific users, plus router-dependent information.

Configuring Interfaces

To assign the interfaces to a specific association, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector left panel, choose **NAT > Interfaces**.

Step 5 In the Interface page, select the interface you want to change and enter the VRF and select the association from the drop-down list.

Table 6-9 lists the elements on the Interfaces page.

Table 6-9 Interfaces Page

Element	Description
Interface Name	Displays the name of the interface.

Table 6-9 Interfaces Page

Element	Description
VRF	Displays the name of the VRF that the interface belongs to.
Status	Displays the status of the interface.
Association	Select the association from the drop-down list. The options are: Inside, Outside, and None.

Step 6 Click:

- **Save/ Apply** to save the changes in the server.
- **Cancel** to exit without saving.

Managing NAT MAX Translation

The Rate Limiting NAT Translation feature provides the ability to limit the maximum number of concurrent NAT operations on a router. In addition, the NAT MAX feature gives more control to the users to use the NAT addresses. The Rate Limiting NAT Translation feature can be used to limit the effects of viruses, worms, and denial-of-service attacks.

The NAT Maximum Translations feature allows you to reset the global translation attribute values.

Setting NAT MAX Translation

To set the MAX Translation, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector left panel, choose **NAT > Max. Translation**.

Step 5 Reset the parameter values as described in Table 6-10.

Table 6-10 lists the elements on the MAX Translation page.

Table 6-10 MAX Translation Page

Element	Description
Maximum number of global translation entries	Configures the maximum number of NAT entries that are allowed. The maximum number of allowed NAT entries is 2147483647. A typical range for a NAT rate limit is from 100 to 300 entries.
Maximum number of translations over all hosts	Configures the maximum number of NAT entries allowed from the all hosts. The maximum number of allowed NAT entries is 2147483647. A typical range for a NAT rate limit is from 100 to 300 entries.
Maximum number of translations over all VRF	Configures the maximum number of NAT entries allowed from all VRFs. The maximum number of allowed NAT entries is 2147483647, although a typical range for a NAT rate limit is 100 to 300 entries.

Table 6-10 MAX Translation Page

Element	Description
Maximum number of translations for ACL	Configures the maximum number of NAT entries allowed from the specified ACL. The maximum number of allowed NAT entries is 214748364. A typical range for a NAT rate limit is 100 to 300 entries.
Maximum number of translations for VRF	Configures the maximum number of NAT entries allowed from the specified VRF(s). The maximum number of allowed NAT entries is 2147483647. A typical range for a NAT rate limit is 100 to 300 entries.
Maximum number of translations for host	Configures the maximum number of NAT entries allowed from the specified Host(s). The maximum number of allowed NAT entries is 214748364. A typical range for a NAT rate limit is 100 to 300 entries.

Step 6 Click:

- **Save / Apply** to save the changes in the server.
- **Cancel** to exit without saving.

Dynamic Multipoint VPN

The DMVPN feature allows users to scale large and small IP Security (IPsec) VPNs by combining generic routing encapsulation (GRE) tunnels, IPsec encryption, and Next Hop Resolution Protocol (NHRP).

A typical VPN connection is a point-to-point IPSec tunnel connecting two routers. DMVPN enables you to create a network with a central hub that connects other remote routers, referred to as spokes using a GRE over IPSec tunnel. IPSec traffic is routed through the hub to the spokes in the network.

See *Dynamic Multipoint IPsec VPNs (Using Multipoint GRE/NHRP to Scale IPsec VPNs)* for more information about DMVPN (requires a CCO login ID).

Configuring DMVPN

Cisco Network Control System allows you to configure your router as a DMVPN hub or DMVPN spoke. You can configure the router in the following ways:

Hub

- Configuring Hub and Spoke Topology, page 6-17

Spoke

- Configuring Fully Mesh Topology, page 6-17

Creating DMVPN Tunnel

You should configure the following parameters to create the DMVPN tunnel:

- Device role and topology type

- Multipoint GRE interface information
- NHRP and tunnel parameters
- Next Hub Server (NHS) Server (Optional)

To create the DMVPN tunnel, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Security > DMVPN**, and click the **Add** button to create the DMVPN.

Step 5 In the Device Role and Topology Type section, select the topology and the device role. The options are: Spoke, Hub, and Dynamic Connection between Spokes.

Step 6 In the Multipoint GRE Interface Information section, select the WAN interface that connects to the Internet from the drop-down list.

Step 7 Enter the IP address of the Tunnel Interface, and Subnet Mask.

Step 8 In the NHRP and Tunnel Parameters section, enter the Network ID, Hold Time, NHRP Authentication String, Tunnel Key, Bandwidth, MTU, Tunnel Throughput Delay, and TCP Maximum Segment Size information.

Step 9 In the Encryption policy field, click the anchored plus button (+) to add the Transform Set Profile.

Step 10 In the Transform Set Profile dialog box, enter the Name and choose the acceptable combination of security protocols and algorithm from the drop-down list to configure the transform set. Enable the IP Compression to enable the IP compression for the transform set. Choose the mode for the transform set. The options are: Tunnel mode or Transport mode.

Step 11 In the NHS Server Information section, enter the IP address for the physical interface of the hub and tunnel and the Fallback Time. If the device supports the cluster then add the next hop server information, such as Cluster ID, Max Connection, Hub IP address, and Priority.

Note The NHS server information is required only for spoke configuration. If you check the Use Cluster for NHS check box, add the information, such as Cluster ID, Max Connection, and Next Hub Server. The template with the NHS cluster configuration will be applied only to the device running Cisco IOS Software version 15.1(2)T or later.

Step 12 In the Routing Information section, choose the routing information. The options are: EIGR, RIPV2, and Other.

Note The routing information is required only for hub configuration.

Step 13 Choose the existing EIGRP number from the drop-down list. or enter an EIGRP number. Use the Other option to configure other protocols.

Table 6-11 lists the elements on the Dynamic Multipoint VPN page.

Table 6-11 DMVPN Page

Element	Field Description
Device Role and Topology Tab	
Spoke radio button	Check the Spoke radio button to configure the router as a Spoke in the topology.
Hub radio button	Check the Hub radio button to configure the router as a Hub in the topology.
Dynamic Connection between Spokes	Check the Create Dynamic Connection between spokes check box to configure the dynamic connection between spokes.
Multipoint GRE Interface Information	
WAN Interface	Choose the WAN interface that connects to the internet from the drop-down list.
Interface IP address	Enter the IP address of the tunnel interface.
Subnet mask	Enter the subnet mask.
NHRP and Tunnel Parameters	
Network ID	Enter the NHRP Network ID. The network ID is globally unique, 32-bit network identifier from a Non Broadcast Multiaccess (NBMA) network. The range is from 1 to 4294967295.
Hold Time	Enter the number of seconds that the Next Hop Resolution Protocol (NHRP). NBMA addresses should be advertised as valid. The default value is 7200 seconds.
Tunnel Key	Enter the Tunnel key. The tunnel key is used to enable a key ID for a particular tunnel interface. The range value is from 0 to 4294967295.
Bandwidth	Enter the intended bandwidth, in kilobytes per second (kbps).
MTU	Enter the MTU size of IP packets that are sent on a particular interface. The default value for Ethernet and the serial interface is 1500. The default value varies depending upon the media type.
Tunnel Throughput Delay	Set a delay value for an interface, in tens of microseconds. Tunnel throughput delay is used to set the delay value for a particular interface.
TCP Maximum segment Size	Enter the TCP maximum segment size in bytes.
IPsec Information	
Encryption policy	Enter the encryption policy. Click the **Add** button to add the transform set profile.
Transform Set Profile	
Integrity Algorithm	Enter the integrity algorithm. The Algorithm used to check the integrity of the payload.
Encryption Algorithm	Enter the encryption algorithm.Algorithm used to encrypt the payload.
Mode	Enter the mode. Indicates the mode to transport the traffic.
IP Compression	Check the IP Compression check box to compress payload.
NHS Server	
Use Cluster For NHS	Check the Use Cluster For NHS check box and add the information, such as Cluster ID, Max Connections, Hub's Physical IP Address, Hub Tunnel IP, and Priority.
Hub Physical Interface	Enter the IP address of the hub’s physical interface.
Hub Tunnel Interlace	Enter the IP address of the hub’s tunnel interface.
Routing Information	
EIGRP	Check the EIGRP routing information check box.

Table 6-11 DMVPN Page (continued)

Element	Field Description
RIPV2	Check the RIPV2 routing information check box.
Other	Check the Other check box to select other routing protocol.
AS Number	Choose the existing EIGRP number from the drop-down list

Step 14 Click **Save** to save the single NHS server entry details and the priority of the server, save the entire group of server, and save the NHS cluster information. when save the NHS cluster information, the NHS server will be auto populated in the non-editable field.

Step 15 Click **OK** to save the configuration to the device.

Step 16 Click **Cancel** to cancel all the changes you have made without sending them to the router.

Configuring Hub and Spoke Topology

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** choose **Security > DMVPN**, and click the **Add** button to create the DMVPN tunnel**.**

Step 5 In the Device Type and Topology section, choose Hub and Spoke as the topology, and select either Hub or Spoke as a device role.

Step 6 Select the WAN interface from the drop-down list, and then configure the Multipoint GRE IP Address and the subnet mask for the tunnel interface.

Step 7 Configure the NHRP and the Tunnel Interface parameters, such as the IP address, NHRP parameters and map, MTU value, Source of the Tunnel, Tunnel Mode, and Tunnel Key.

Step 8 Create the transform-set for protecting the data flow between the devices. You can specify up to four transforms: One Authentication Header (AH), one Encapsulating Security Payload (ESP) encryption, one ESP authentication, and one compression. These transforms define the IPSec security protocols and the algorithms.

Step 9 Configure the routing protocol to be used. For elements on this page, see Table 6-11.

Step 10 Click **Save** to save the configuration to the device.

Step 11 Click **Cancel** to close the Create DMVPN Tunnel page without applying the changes to the device.

Configuring Fully Mesh Topology

The dynamic spoke-to-spoke option allows you to configure the DMVPN fully meshed topology. In this topology, you can configure the router as a spoke, capable of establishing a direct IPSec tunnel to other spokes in the network.

To configure the hub and spoke topology, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** click **Security > DMVPN**, and click the **Add** button to create the DMVPN tunnel with fully meshed topology.

Step 5 From the Create DMVPN Tunnel configuration page, select the **Full Mesh** radio button to configure the network type as full mesh topology.

Step 6 Repeat Step 6 through Step 8 from the Configuring Hub and Spoke Topology section. For elements on this page, see Table 6-11.

Step 7 For Fully Mesh spoke topology, in the NHS Server Information section, add the next hub server information, such as the IP Address of Hub's physical interface and the IP address of Hub's tunnel interface.

Step 8 Click **Save** to save the configuration to the device.

Step 9 Click **Cancel** to close the Create DMVPN Tunnel page without applying the changes to the device.

Cluster Configuration

To configure the cluster, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** click **Security > DMVPN** and click the **Add** button to create the DMVPN tunnel**.**

Step 5 From the Create DMVPN Tunnel configuration page, select the **Spoke** radio button to configure the device role as a spoke.

Step 6 Repeat Step 6 through Step 8 from the Configuring Hub and Spoke Topology section. For elements on this page, see Table 6-11.

Note The device must running IOS version of 15.1(2)T or later.

Step 7 Click the **Add Row** button to configure the cluster related information, and add the Cluster-ID and Maximum Connection values.

Step 8 Click the **Expand Row** button (next to the radio button) and click the **Add Row** button to add the NHS server information.

Step 9 Enter the NHS server, the GRE Tunnel IP addresses, and the Priority of this NHS server. Click the **Save** button to save the NHS server entry configuration.

Step 10 Click the **Save** button to save the NHS server group information.

Step 11 Click the **Save** button again to save the NHS group information with the cluster configuration. It will automatically populate the NHS server IP address in the table.

Edit DMVPN

To edit the existing DMVPN tunnel, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** choose **Security > DMVPN**. The available tunnel is displayed.

Step 5 Select the tunnel, and click the **Edit** button. The Edit DMVPN Tunnel page opens.

Step 6 From the Edit DMVPN Tunnel page, you can edit the DMVPN parameters.

For elements on the Edit DMVPN Tunnel page, see Table 6-11.

Step 7 Click **Ok** to send the edited DMVPN tunnel configuration to the device.

Step 8 Click **Cancel** to close the Edit DMVPN Tunnel page without applying the configuration to the device.

Delete DMVPN

To delete the existing DMVPN tunnel, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list to delete the DMVPN tunnel. If the device is not added, click the **Add** button to add the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector left panel appears.

Step 4 From the Feature Selector left panel**,** choose **Security > DMVPN**. The available tunnel is displayed.

Step 5 Select the tunnel, and click the **Delete** button.

Click **Yes** on the warning message to delete the selected tunnel. For elements on the Edit DMVPN Tunnel page, see Table 6-11.

Step 6 Click **No** on the warning message if you do not want to delete the selected tunnel.

Step 7 Click **Cancel** to cancel all the changes you have made without sending them to the router.

GETVPN

A Group Encrypted Transport VPN (GETVPN) deployment has primarily three components: Key Server (KS), Group Member (GM), and Group Domain of Interpretation (GDOI) protocol. GMs encrypt/decrypt the traffic and KS distributes the encryption key to all the group members. The KS decides on one single data encryption key for a given life time. Because all GMs use the same key, any GM can decrypt the traffic encrypted by any other GM. GDOI protocol is used between the GM and KS for group key and group Security Association (SA) management. Minimum one KS is required for a GETVPN deployment.

Unlike traditional IPSec encryption solutions, GETVPN uses the concept of group SA. All members in the GETVPN group can communicate with each other using a common encryption policy and a shared SA. Therefore, there is no need to negotiate IPSec between GMs on a peer-to-peer basis; thereby reducing the resource load on the GM routers.

Group Member

The GM registers with the key server to get the IPSec SA that is necessary to encrypt data traffic within the group. The GM provides the group identification number to the KS to get the respective policy and keys for this group. These keys are refreshed periodically by the KS, and before the current IPSec SAs expire, so that there is no loss of traffic.

Key Server

The KS is responsible for maintaining security policies, authenticating the GMs and providing the session key for encrypting traffic. KS authenticates the individual GMs at the time of registration. Only after successful registration can the GMs participate in group SA.

A GM can register at any time and receive the most current policy and keys. When a GM registers with the KS, the KS verifies the group identification number of the GM. If this identification number is valid, and the GM has provided valid Internet Key Exchange (IKE) credentials, the KS sends the SA policy and the Keys to the group member.

There are two types of keys that the GM will receive from the KS: the Key Encryption Key (KEK) and the Traffic Encryption Key (TEK). The TEK becomes part of the IPSec SA with which the group members within the same group encrypt the data. KEK is used to secure rekey messages between the KS and the GMs.

The KS sends out rekey messages either because of an impending IPSec SA expiration or because the security policy has changed on the KS. Keys can be distributed during re-key using either multicast or unicast transport. Multicast method is more scalable as keys need not be transmitted to each group member individually. Unlike in unicast, KS will not receive acknowledgement from GM about the success of the rekey reception in multicast rekey method. In unicast rekey method, KS will delete a GM from its database if three consecutive rekeys are not acknowledged by that particular GM.

GDOI protocol is used for Group key and group SA management. GDOI uses Internet Security Association Key Management Protocol (ISAKMP) for authenticating the GMs and KSs. All the standard ISAKMP authentication schemes like RSA Signature (certificates) and Pre-shared key can be used for GETVPN.

For more information on GETVPN, See http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6586/ps6635/ps7180/deployment_guide_c07_554713.html.

Configuring GETVPN

The Cisco Network Control System allows you to configure the GETVPN. To configure the GETVPN, you should configure the following:

- Group member
- Key server

Creating GETVPN Group Member

Use the Add GroupMember configuration page to configure the GETVPN group member.

To create the GETVPN group member, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** click **Security > GETVPN-GroupMember**, and click the **Add** button to create the GET VPN group member**.**

Step 5 In the Add GroupMember dialog box, select the General tab, and enter the Group Name and Group Identity. Choose the Registration Interface from the drop-down list.

Step 6 Enter the Primary Key Server and Secondary Key Server IP address. Click the **Add Row** or **Delete** buttons to add or delete the secondary key server IP address. Click on the **Row** or **Field** to edit the secondary key server IP address.

Step 7 Click:

- **Save** to save the configuration.
- **Cancel** to exit without saving your changes.

Step 8 In the Add Group Member dialog box, select the Advanced tab, and choose the Local Exception ACL and Fail Close ACL from the drop-down list.

Step 9 In the Add Group Member dialog box, select the Migration tab, and check the Enable Passive SA check box to enable passive SA. Use this option to turn on the Passive SA mode on this group member.

Table 6-12 lists the elements on the GETVPN GroupMember page.

Table 6-12 GETVPN Group Member Page

Element	Field Description
General	
Group Name	Enter the name of the GETVPN group.
Group Identity	Enter the unique identity for the GETVPN group. This can be a number or an IP address.The range is from 0 to 2147483647.
Registration Interface	Choose the interface from the drop-down list to which the crypto map needs to be associated.
Primary Key Server	Specify the primary key server IP address to which the client connects. The primary key server is responsible for creating and distributing group policies to all group members and periodically synchronizes with the secondary key servers. The server with the highest priority is elected as a primary key server.
Secondary Key Server	Specify the secondary key server IP address to which the group member falls back when the primary key server registration fails. A group member can be configured to register to any available key server from a list of all secondary key servers. The group member configuration determines the registration order. The key server defined first is contacted first, followed by the second defined key server, and so on.
Add Row	Click the **Add Row** button to add the secondary key servers.

Table 6-12 GETVPN Group Member Page

Element	Field Description
Delete	Click the **Delete** button to delete a secondary key server.
Advanced Tab	
Local Exception ACL	Choose an ACL for the traffic that should be excluded from the encryption.
Fail Close ACL	Choose an ACL for the traffic that needs to be sent in clear text until the group member registers with the key server. If the Fail Close feature is configured, all the traffic passing through the group member will be dropped until the group member is registered successfully. Once the group member registers successfully and SAs are downloaded, this feature turns off by itself.
Migration Tab	
Enable Passive SA	Use this option to turn on the Passive SA mode on the group member. The Passive SA mode overrides the receive only SA option on the key server and encrypts all the outbound traffic.

Step 10 Click:

- **Ok** to add the Group member in the table. To display the commands, click **CLI** preview. After the schedule deploy, the configuration is applied on the device.
- **Cancel** to cancel all the changes you have made without sending them to the router.
- **Close** to close the page.

Creating GETVPN Key Server

Use the Add KeyServer configuration page to configure the GETVPN key server.

To create the GETVPN key server, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector left panel**,** click **Security > GETVPN-KeyServer**, and click the **Add** button to create the GETVPN key server**.**

Step 5 In the Add Key Server dialog box, select the General tab, and enter the Group Name, Group Identity, WAN IP address, and Priority of this key server.

Step 6 Enter the Co-operative Key Servers IP address. Click the **Add Row** or **Delete** button to add or delete the Co-operative key server IP address. Click on the **Row** or **Field**, and edit the IP address.

Step 7 In the Add KeyServer dialog box, select the Rekey tab, and choose the Distribution method from the drop-down list. Enter the information, such as Multicast IP Address, KEK Lifetime, TEK Lifetime, Retransmit Key, RSA Key for Rekey Encryption, and Rekey Encryption Method.

Step 8 In the Add KeyServer dialog box, select the GETVPN Traffic tab, and enter the Traffic to be encrypted, Encryption Policy, and Anti Replay.

Table 6-13 lists the elements on the GETVPN KeyServer page.

Table 6-13 GETVPN Key Server Page

Element	Field Description
General	
Group Name	Enter the name of the GETVPN group.
Group Identity	Enter the unique identity for the GETVPN group.This can be a number or an IP address.The range is from 0 to 2147483647.
WAN IP Address	Enter the WAN IP address which is the IP address of the interface to which this key server will be associated.
Co-operative Key Server	Specify the Co-operative key server IP address to which the group member falls back when the primary key server registration fails. A Group member can be configured to register to any available key server from a list of all secondary key servers. Group member configuration determines the registration order. The key server defined first is contacted first, followed by the second defined key server, and so on.
Add Row	Click the **Add Row** button to add the Co-operative key server.
Delete Row	Click the **Delete Row** button to delete the Co-operative key server.
Rekey	
Distribution Method radio button	Choose the distribution method. The distribution method is used to send the rekey information from key server to group members. The options are: Unicast or Multicast.
Multicast IP Address	When you choose the distribution method as multicast, specify the multicast address to which the rekey needs to be transmitted.
KEK Lifetime	Enter the KEK lifetime in seconds. The range is from 120 to 86400.
TEK Lifetime	Enter the TEK lifetime in seconds. The range is from 120 to 86400.
Retransmit Key	Enter the frequency and the duration for the rekey retransmission in seconds.
RSA Key for Rekey Encryption	Enter the details of the RSA key that is used to encrypt the rekey information.
Rekey Encryption Method	Choose the encryption algorithm from the drop-down list. The encryption algorithm is used to encrypt the key. • AES-128—Encrypts according to the Advanced Encryption Standard using 128-bit keys. • AES-192—Encrypts according to the Advanced Encryption Standard using 192-bit keys. • AES-256—Encrypts according to the Advanced Encryption Standard using 256-bit keys. • DES—Encrypts according to the Data Encryption Standard using 56-bit keys. • 3DES—Encrypts three times using 56-bit keys. 3DES is more secure than DES, but requires more processing for encryption and decryption. It is less secure than AES. A 3DES license is required to use this option.
GETVPN Traffic	

Table 6-13 GETVPN Key Server Page (continued)

Element	Field Description
Traffic to Encrypt	Choose an ACL from the drop-down list for the traffic that needs to be encrypted between the participants. The access list defines the traffic to be encrypted. Only the traffic which matches the "permit" lines will be encrypted. **Note** Be sure not to encrypt certain traffic that should always be permitted even if the crypto sessions are not up.
Encryption Policy	Choose the transform sets from the drop-down list to be used to encrypt the traffic. Add the transform set from the table which is used to encrypt the traffic between peers.
Anti Replay	Choose the Time-based or Counter-based anti replay option.

Step 9 Click:

- **Ok** to add the Group member in the table. To display the commands, click **CLI** preview. After the schedule deploy, the configuration is applied on the device.
- **Cancel** to cancel all the changes you have made without sending them to the router.

Step 10 Click **Close** to close the page.

Editing GET VPN Group Member or Key Server

To edit the existing GETVPN group member or the GETVPN key server, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel**,** choose **Security > GETVPN-Group Member** or **GETVPN-KeyServer.** The GETVPN-GroupMember or GETVPN-KeyServer summary page opens.

Step 5 From the GETVPN summary page, select the group name and click **Edit**. The Edit GETVPN-GroupMember or GETVPN-Keyserver page appears.

Step 6 From the Edit GETVPN-GroupMember or GETVPN-KeyServer page, you can edit the GETVPN parameters.

For elements on the GETVPN-GroupMember or GETVPN-Keyserver page, see Table 6-12 and Table 6-13.

Step 7 Click:

- **Ok** to save the configurations.
- **Cancel** to cancel all the changes you have made without sending them to the router.

Step 8 Click **Close** to close the page.

Deleting GETVPN Group Member or Key Server

To delete the existing GETVPN group member or the GETVPN key server, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector pane, choose **Security > GETVPN-Group Member** or **GETVPN-KeyServer.** The GETVPN-GroupMember or GETVPN-KeyServer summary page opens.

Step 5 From the GETVPN summary page, select the group name and click **Delete**. For elements on the GETVPN-GroupMember or GETVPN-KeyServer page, see Table 6-12 and Table 6-13.

Step 6 Click:

- **Ok** to save the configurations.
- **Cancel** to cancel all the changes you have made without sending them to the router.

Step 7 Click **Close** to close the page.

VPN Components

The VPN components primarily include the following:

- IKE Policies, page 6-25
- IKE Settings, page 6-28
- IPsec Profile, page 6-29
- Pre-shared Keys, page 6-30
- RSA Keys, page 6-31
- Transform Sets, page 6-33

IKE Policies

The Internet Key Exchange (IKE) is a standard method for arranging secure and authenticated communications. The IKE establishes session keys (and associated cryptographic and networking configuration) between two hosts across the network. The IKE policies will protect the identities of peers during authentication.

The IKE negotiations must be protected; therefore, each IKE negotiation begins by each peer agreeing on a common (shared) IKE policy. This policy states the security parameters that will be used to protect subsequent IKE negotiations. After the two peers agree on a policy, the security parameters of the policy are identified by a security association established at each peer. These security associations are applied to all the subsequent IKE traffic during the negotiation.

When the IKE negotiation begins, IKE looks for an IKE policy that is the same on both the peers. The peer that initiates the negotiation will send all its policies to the remote peer, and the remote peer will try to find a match. The remote peer looks for a match by comparing its own highest priority policy

against the other peer's received policies. The remote peer checks each of its policies in the order of its priority (highest first) until a match is found. A match is made when both the policies from the two peers contain the same encryption, hash, authentication, and Diffie-Hellman (D-H) parameter values, and when the remote peer's policy specifies a lifetime less than or equal to the lifetime in the policy being compared. If the lifetimes are not identical, the shorter lifetime from the remote peer's policy will be used.

Creating, Editing, and Deleting IKE Policies

The IKE Policies feature allows you to create, edit, and delete the IKE policies.

To create, edit, or delete the IKE policies, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > IKE Policies**, and click the **Add Row** button to create the IKE policies**.**

Step 4 In the IKE Policies page, enter the Priority, Authentication, D-H Group, Encryption, Hash, and Lifetime.

Step 5 To edit the IKE policies parameters, click on the **Field** and edit the parameter of that IKE policy.

Step 6 To delete the IKE policies, select the IKE policies from the list, and click the **Delete** button.

Table 6-14 lists the elements on the IKE Policies page.

Table 6-14 IKE Policies Page

Element	Description
IKE Policies	
Priority	Enter the priority value of the IKE proposal. The priority value determines the order of the IKE proposals compared by the two negotiating peers when attempting to find a common security association (SA). If the remote IPsec peer does not support the parameters selected in your first priority policy, the device tries to use the parameters defined in the policy with the next lowest priority number. The range is from 1 to 10000. The lower the number, the higher the priority.
Authentication	Choose the Pre-shared keys or RSA Signatures from the drop-down list. • Pre-SHARE—Authentication will be performed using pre-shared keys. • RSA_SIG— Authentication will be performed using digital signatures.

Table 6-14 IKE Policies Page (continued)

Element	Description
Encryption	Choose the encryption algorithm from the drop-down list. • AES-128—Encrypts according to the Advanced Encryption Standard using 128-bit keys. • AES-192—Encrypts according to the Advanced Encryption Standard using 192-bit keys. • AES-256—Encrypts according to the Advanced Encryption Standard using 256-bit keys. • DES—Encrypts according to the Data Encryption Standard using 56-bit keys. • 3DES—Encrypts three times using 56-bit keys. 3DES is more secure than DES, but requires more processing for encryption and decryption. It is less secure than AES. A 3DES license is required to use this option.
Diffie-Hellman Group	Choose the D-H group algorithm from the drop-down list. The Diffie-Hellman group is used for driving a shared secret between the two IPsec peers without transmitting it to each other. A larger modulus provides higher security but requires more processing time. The two peers must have a matching modulus group. Options are: • 1—Diffie-Hellman Group 1 (768-bit modulus). • 2—Diffie-Hellman Group 2 (1024-bit modulus). • 5—Diffie-Hellman Group 5 (1536-bit modulus, considered good protection for 128-bit keys).
Hash	Choose the hash algorithm used in the IKE proposal from the drop-down list. The hash algorithm creates a message digest, which is used to ensure message integrity. The options are: • SHA (Secure Hash Algorithm)—Produces a 160-bit digest. SHA is more resistant to brute-force attacks than MD5. • MD5 (Message Digest 5)—Produces a 128-bit digest. MD5 uses less processing time than SHA.
Lifetime	The lifetime of the security association (SA), in seconds. When the lifetime is exceeded, the SA expires and must be renegotiated between the two peers. As a general rule, the shorter the lifetime (up to a point), the more secure your IKE negotiations will be. However, with longer lifetimes, future IPsec security associations can be set up more quickly than with shorter lifetimes. The range is from 60 to 86400 seconds. The default value is 86400.

Step 7 Click:

- **Save** to save the configuration.
- **Cancel** to exit without saving your changes.
- **Save** again to generate the CLI commands.

IKE Settings

The IKE Settings feature allows you to globally enable the IKE for your peer router.

Creating IKE Settings

To enable the IKE policies and set the aggressive mode for the IKE, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > IKE Settings**.

Step 4 Check the Enable IKE and Enable Aggressive Mode check box to enable the IKE policies and the aggressive mode.

Step 5 Choose the IKE Identity from the drop-down list.

Step 6 Enter the Dead Peer Detection Keepalive and Dead Peer Detection Retry time in seconds.

Table 6-15 lists the elements on the IKE Settings page.

Table 6-15 IKE Settings Page

Element	Description
IKE Settings	
Enable IKE	Check the Enable IKE check box to globally enable the IKE. By default, the IKE is enabled. You do not have to enable IKE for individual interfaces, but it can be enabled globally for all the interfaces at the router. If you do not want to use the IKE for your IP Security (IPSec) implementation, you can disable the IKE for all your IPSec peers. If you disable the IKE for one peer, you must disable it for all the IPSec peers.
Enable Aggressive Mode	Check the Enable Aggressive Mode check box to enable the Internet Security Association and Key Management Protocol (ISAKMP) aggressive mode. If you disable the aggressive mode, all aggressive mode requests to the device and all aggressive mode requests made by the device will be blocked.
IKE Identity	Choose the ISAKMP identity from the drop-down list. The options are: IP address, Distinguished Name and HostName. An ISAKMP identity is set whenever you specify pre-shared keys or RSA signature authentication. As a general rule, you should set all peers' identities in the same way, either by IP address or by host name. • IP Address—Sets the ISAKMP identity to the IP address of the interface that is used to communicate to the remote peer during the IKE negotiations. • Distinguished Name—Sets the ISAKMP identity to the distinguished name (DN) of the router certificate. • Host Name—Sets the ISAKMP identity to the host name concatenated with the domain name (for example, myhost.example.com).

Table 6-15 IKE Settings Page (continued)

Element	Description
Dead Peer Detection Keepalive	Enable the gateway to send the DPD messages to the peer. DPD is a keepalives scheme that allows the router to query the liveliness of its Internet Key Exchange (IKE) peer. Specify the number of seconds between DPD messages in the DPD Keepalive field. The range is from 10 to 3600 seconds.
Dead Peer Detection Retry	Specify the number of seconds between retries if the DPD messages fail in the DPD Retry. The range is from 2 to 60 seconds.

Step 7 Click:

- **Save** to save the configuration.
- **Refresh** to refresh the page.

IPsec Profile

The IPsec profiles, also called ISAKMP profiles, enable you to define a set of IKE parameters that you can associate with one or more IPSec tunnels. An IPsec profile applies parameters to an incoming IPSec connection identified uniquely through its concept of match identity criteria. These criteria are based on the IKE identity that is presented by incoming IKE connections and includes IP address, Fully Qualified Domain Name (FQDN), and group (the Virtual Private Network (VPN) remote client grouping).

Creating, Editing, and Deleting IPsec Profile

The IKE Profile feature allows you to create, edit, and delete the IPsec Profile.

To create, edit, or delete the IPsec Profile, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, and then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > IPsec Profile**, and click the **Add Row** button to create the IPsec profile**.**

Step 4 In the IPsec Profile page, enter the information such as Name, Description, Transform Set, and the IPsec SA Lifetime.

Step 5 To edit the IPsec profile parameters, click on the **Field** and edit the parameter of that IPsec profile.

Step 6 To delete the IPsec profile, select the IPsec Profile from the list, and click the **Delete** button.

Table 6-16 lists the elements on the IPsec Profile page.

Table 6-16 IPSec Profile Page

Element	Description
Name	Enter a name for this IPsec profile. When you edit a profile, you cannot edit the name of the IPsec profile.

Table 6-16 IPSec Profile Page

Element	Description
Description	Add a description for the IPsec profile that you are adding or editing.
Transform Sets	Choose the transform sets from the list. Displays the transform sets that are configured on this router. A transform set represents a certain combination of security protocols and algorithms. During the IPSec security association negotiation, the peers agree to use a particular transform set for protecting a particular data flow. A transform describes a particular security protocol with its corresponding algorithms.
IPsec SA Lifetime	Enter the IPSec SA Lifetime to establish a new SA after the set period of time elapses. Enter the time in seconds. The range is from 120 to 86400.

Step 7 Click:

- **Save** to save the configuration.
- **Cancel** to exit without saving your changes.
- **Save** again to generate the CLI commands.

Pre-shared Keys

The Pre-shared Keys feature allows you to share a secret key between two peers and will be used by the IKE during the authentication phase.

Creating, Editing, and Deleting Pre-shared Keys

To create, edit, or delete the pre-shared keys, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, and then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > Pre-Shared Keys**, and click the **Add Row** button to create the pre-shared key**.**

Step 4 In the Pre-Shared Keys page, enter the IP Address, Host Name, Subnet Mask, and Pre-Shared Keys.

Step 5 To edit the pre-shared key parameters, click on the **Field** and edit the parameter of that pre-shared key.

Step 6 To delete the pre-shared key, select the pre-shared key from the list, and click the **Delete** button.

Table 6-17 lists the elements on the Pre-Shared Keys page.

Table 6-17 Pre-Shared Keys Page

Element	Description
IP Address / Host Name	Enter the IP address or the hostname of the remote peer.
Subnet Mask	Enter the subnet mask.

Table 6-17 Pre-Shared Keys Page

Element	Description
Pre-shared Keys	Enter the Pre-shared key and re-enter the key to confirm the pre-shared key.

Step 7 Click:

- **Save** to save the configuration.
- **Cancel** to exit without saving your changes.
- **Save** again to save the configuration and generate the CLI commands.

RSA Keys

An RSA key pair consists of a public key and a private key. When setting up your Public Key Infrastructure (PKI), you must include the public key in the certificate enrollment request. After the certificate is granted, the public key will be included in the certificate so that the peers can use it to encrypt the data that is sent to the router. The private key is kept on the router and used for both to decrypt the data sent by the peers and to digitally sign transactions when negotiating with the peers.

The RSA key pairs contain a key modulus value. The modulus determines the size of the RSA key. The larger the modulus, the more secure the RSA key. However, keys with large modulus values take longer to generate, and encryption and decryption operations take longer with larger keys.

Creating, Importing, Exporting, and Deleting RSA Keys

To create, export, import, or delete the RSA keys, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, and then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > RSAKeys,** and click the **Add Row** button to create the RSA Keys**.**

Step 4 The Add RSA Keys dialog box appears.

Step 5 In the Add RSA Keys dialog box, enter the Label, Modulus, and Type.

Step 6 Check the Make the Key exportable check box to generate the RSA as a exportable key.

Step 7 Click:

- **OK** to save the configuration.
- **Cancel** to exit without saving your changes.

Step 8 To import the RSA key, click the **Import** button. The Import RSA Key dialog box appears.

Step 9 In the Import RSA Key dialog box, enter the label of the RSA key, Key type, and password to decrypt the key. If the key type is general-keys, signature or encryption, copy and paste the public and private key data that was saved. To import usage-key, enter the public and private key data of both the signature and encryption keys.

Step 10 Click:

- **Import** to import the RSA key.
- **Close** to exit without saving your changes.

Step 11 To export the RSA key, select the RSA key from the list and click the **Export** button. The Export RSA Key Pair dialog box appears.

Step 12 In the Export RSA Key Pair dialog box, enter the password to encrypt the RSA key and choose the encryption algorithm from the drop-down list.

Table 6-18 lists the elements on the RSA Keys page.

Table 6-18 RSA Keys Page

Element	Description
RSA Keys	
Label	Enter the name for the key pair.
Modulus	Enter the key modulus value. For a modulus value between 512 and 1024, enter an integer value that is a multiple of 64. If you want a value higher than 1024, you can enter 1536 or 2048. If you enter a value greater than 512, key generation may take a minute or longer. The modulus determines the size of the key. The larger the modulus, the more secure the key, but keys with a large modulus take longer to generate, and encryption/decryption operations take longer with larger keys.
Type	Select the type of the RSA key to be generated. The options are: General Purpose, Usages Keys, Encryption Keys, and Signature Keys.
Make Key Exportable	Check the Make the Key exportable check box to generate the RSA key as a exportable key and save the key in a different location.
Import RSA Key	
Decryption Password	Enter the decryption password.
Key Type	Choose the type of key to be imported from the drop-down list. The options are: General purpose, Usages keys, Encryption Keys, and Signature keys.
PEM-formatted Public Key or Certificate	Enter the PEM-formatted public key or certificate. The public key data generated while exporting the key.
PEM-formatted Encrypted Private Key	Enter the PEM-formatted encrypted private key. The private key data generated while exporting the key.
Export RSA Key	
Encryption Password	Enter the encryption password.
Encryption Algorithm	Select the encryption algorithm.

Step 13 Click:

- **OK** to display the exported keys.
- **Cancel** to exit without saving your changes.

Step 14 To delete the RSA key, select the RSA key from the list, and click the **Delete** button.

Transform Sets

A transform set is an acceptable combination of security protocols, algorithms and other settings to apply to Upset protected traffic. During the IPSec security association negotiation, the peers agree to use a particular transform set when protecting a particular data flow.

Creating, Editing, and Deleting Transform Sets

To create, edit, or delete the transform sets, follow these steps.

Step 1 Choose **Operate > Device Work Center,** then select a device or click **Add** to add a new device, then configure the device. The device details appear on the lower part of the screen.

Step 2 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 3 From the Feature Selector panel**,** click **Security > VPN Components > Transform Sets**, and click the **Add Row** button to create the transform sets**.**

Step 4 In the Transform Sets page, enter the Name and select the acceptable combination of security protocols and algorithm to configure the transform set. Specify the mode for a transform set. The options are: Tunnel mode or Transport mode.

Step 5 To edit the Transform sets parameters, click on the **Field** and edit the parameter of that transform sets.

Step 6 To delete the transform set, select the transform set from the list, and click the **Delete** button.

Table 6-19 lists the elements on the Transform Set page.

Table 6-19 Transform Set Page

Element	Description
Name	Enter the name for the transform set.
ESP Encryption Algorithm	Choose the ESP encryption algorithm from the drop-down list. The algorithm used to encrypt the payload. The options are: • ESP with the 128-bit Advanced Encryption Standard (AES) encryption algorithm. • ESP with the 192-bit AES encryption algorithm. • ESP with the 256-bit AES encryption algorithm • ESP with the 168-bit DES encryption algorithm (3DES or Triple DES). • Null encryption algorithm.
ESP Integrity Algorithm	Choose the integrity algorithm from the drop-down list. The algorithm used to check the integrity of the payload. The options are: • ESP with the MD5 (HMAC variant) authentication algorithm. • ESP with the SHA (HMAC variant) authentication algorithm
AH Integrity	Choose the AH integrity from the drop-down list. The options are: • AH with the MD5 (Message Digest 5) (a Hash-based Message Authentication Code [HMAC] variant) authentication algorithm • AH with the SHA (Secure Hash Algorithm) (an HMAC variant) authentication algorithm.
Compression	Enable or Disable the IP compression with the Lempel-Ziv-Stac (LZS) algorithm.

Table 6-19 Transform Set Page (continued)

Element	Description
Mode	Choose the mode from the drop-down list. The options are: • Transport—Encrypt data only. Transport mode is used when both endpoints support IPsec. Transport mode places the authentication header or encapsulated security payload after the original IP header; thus, only the IP payload is encrypted. This method allows users to apply network services such as quality-of-service (QoS) controls to encrypted packets. • Tunnel—Encrypt data and IP header. Tunnel mode provides stronger protection than transport mode. Because the entire IP packet is encapsulated within AH or ESP, a new IP header is attached, and the entire datagram can be encrypted. Tunnel mode allows network devices such as a router to act as an IPsec proxy for multiple VPN users; tunnel mode should be used in those configurations.

Step 7 Click:

- **Save** to save the configuration.
- **Cancel** to exit without saving your changes.
- **Save** again to save the configuration changes.

Overview of Zones

The Zone Based Firewall (ZBFW) feature allows users to easily manage Cisco IOS unidirectional firewall policy between groups of interfaces known as zones.

A zone is a group of interfaces that have similar functions or features. For example, on a router, Gigabit Ethernet interface 0/0/0 and Gigabit Ethernet interface 0/0/1 may be connected to the local LAN. These two interfaces are similar because they represent the internal network, so they can be grouped into a zone for firewall configurations.

By default, the traffic between interfaces in the same zone is not subjected to any policy. The traffic passes freely. Firewall zones are used for security features.

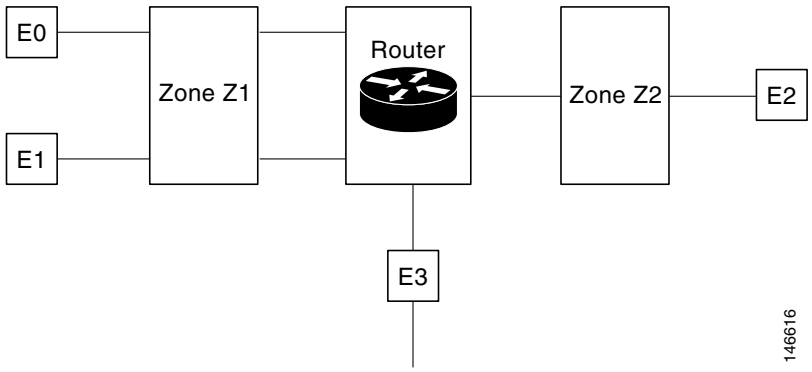
Security Zones

A security zone is a group of interfaces to which a policy can be applied. Grouping interfaces into zones involves the following two procedures:

- Creating a zone so that the interfaces can be attached to it.
- Configuring an interface as a member of a given zone.

By default, the traffic flows among the interfaces that are members of the same zone. When an interface is a member of a security zone, all traffic to and from that interface (except traffic going to the router or initiated by the router) is dropped. To permit the traffic to and from a zone-member interface, you must make that zone part of a zone pair, and then apply a policy to that zone pair. If the policy permits the traffic (through inspect or pass actions), traffic can flow through the interface.

Figure 6-1 Security Zone Diagram



- Interfaces E0 and E1 are members of the security zone Z1.
- Interface E2 is a member of the security zone Z2.
- Interface E3 is not a member of any of the security zone.

In this scenario, the following situations exist:

- Traffic flows freely between the interfaces E0 and E1 because they are members of the same security zone (Z1).
- If no policies are configured, traffic will not flow between interfaces (for example, E0 and E2, E1 and E2, E3 and E1, and E3 and E2).
- Traffic can flow between E0 or E1 and E2 interfaces only when an explicit policy is configured to permit the traffic between the zone Z1 and zone Z2.
- Traffic can never flow between E3 and E0/E1/E2 interfaces because E3 is not a part of any security zone.

The following topics provide more information:

- Managing Applications, page 6-35
- Managing Default Parameters, page 6-36
- Managing Interfaces, page 6-37
- Managing Policy Rules, page 6-37
- Managing Services, page 6-41
- Creating Security Zone, page 6-42

Managing Applications

This feature allows you to assign or un-assign the Transmission Control Protocol (TCP) / User Datagram Protocol (UDP) ports to an application.

Note When you click the **Save** or **Delete** button, the changes are deployed on the device. You cannot review the CLI of the requested operation and also, you cannot remove the operation request from the pending changes queue. If you make any changes in the CLI that starts with the "EMS_" to configure the objects is unsupported and may cause unexpected behavior.

Editing Applications

To assign or un-assign the TCP/UDP ports to an application, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Applications**. The Applications page appears.

Step 5 To assign or unassign the TCP/UDP ports to an application, click on the application and update its TCP/UDP ports value.

a. Assign port(s) by defining one or more ports separated by comma (For example: 1234, 2222 and so on).

b. Assign port(s) by defining the port range (For example: 1111-1118). You can also assign a group of ports or port range.

c. Unassign port(s) by deleting the existing port values.

Table 6-20 lists the elements on the Applications page.

Table 6-20 Applications Page

Element	Description
Application Name	Displays the application name that is driven from the device.
TCP Ports	(Optional) The TCP Port values assigned to the specific application
UDP Ports	(Optional) The UDP Port values assigned to the specific application

Step 6 Click **Save** to save the configurations.

Managing Default Parameters

To change the Default Parameters Map, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Default Parameters Map**.

Step 5 From the Default Parameters Map page, change the parameters map value.

Note You can change the default parameters only on ISR devices.

Step 6 Click **Save** to save the configuration.

Managing Interfaces

A virtual interface is a logical interface configured with generic configuration information for a specific purpose or configured for a common to specific users. The zone member information is acquired from a RADIUS server, and then the dynamically created interface is made as a member of that zone.

Configuring Interfaces

To assign the interfaces to the zone and un-assign the interface from a specific zone, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Interfaces**.

Step 5 In the Interface page, select the interface you want to change and click the down arrow icon. The Zone dialog box appears.

Step 6 In the Zone dialog box, select the new security zone for the interface. If the selected interface is already assigned to a zone, you will get a warning message.

Step 7 Click **Yes** on the warning message if you want to change the assignment of that interface.

Step 8 To un-assign the interface from the specific zone, select the interface and delete the zone information.

Table 6-21 lists the elements on the Interfaces page.

Table 6-21 Interface Page

Element	Description
Interface Name	Displays the interface name.
Zone	The name of the Security-Zone that the interface belongs to.
VRF	The name of the VRF the interface belongs to.

Step 9 Click:

- **Save** to save and apply your changes.
- **Cancel** to exit without saving.

Managing Policy Rules

The policy rule section allows you to create a new firewall policy rule, change the existing policy rule, delete the policy rule, and change the policy rule order. When you create the firewall policy rule, it is up to you to define the location in the policy table.

Creating Policy Rules

To create the policy rules, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Policy Rules**. The Firewall Rules page appears.

Step 5 From the Firewall Rules page, click the **Add Rule** button and enter the information, such as Name, Source Zone, Destination Zone, Source IP address, Destination IP address, Service, and Action. The source zone and the destination zone must be different. To move the rules, click on the down arrow icon on the **Add Rule** button. You can place the rule at the top of the list, bottom of the list or move the rule after or before the selected rule in the list.

Note The name field is optional. If you do not provide the name for the firewall rule, the system generates a name for the firewall rule. You cannot use these formats *rule_<number>* or *EMS_rule_<number>* to create the firewall rule name (For example, *rule_1*). These are system reserved formats.

Step 6 To add the source and the destination IP address, click the **add** icon. The Source/Destination IP address dialog box appears.

a. From the Source/Destination IP address dialog box, check the **Any** check box to set the value to any.

a. Enter the source/ destination IP addresses.

b. Click the **Add** button to add the new IP address and the subnet.

c. Click **Delete** to delete the existing value.

d. Click **Ok** to save the configurations.

e. Click **Cancel** to cancel all the changes you have made without sending them to the router.

Step 7 Set the Service values. To add or remove the Application, click the down arrow icon. The Firewall Service dialog box appears.

a. In the Firewall Service dialog box, check the Application check box to select the application to inspect.

b. To select an ACL Based Application, select either the TCP or UDP or ICMP application.

c. Use the navigation arrow buttons to navigate front and back.

d. Click the **plus +** button to save the configurations.

Step 8 Select the appropriate action. The options are: **Drop**, **Drop and Log**, **Inspect**, **Pass**, and **Pass** and **Log**.

Step 9 If you select the action to inspect, click the **Configure** button in the Advance options column. The Advanced Parameters Configuration dialog box appears.

Step 10 In the Advanced Parameters Configuration dialog box, do the following:

a. To customize the device default value, check the parameter check box and set the new value.

b. To apply the device default value, uncheck the parameter check box.

c. To view the firewall rule default parameters, see "Managing Default Parameters" section on page 6-36.

d. When you rest your cursor on the Advanced Options icon, the configured parameters will be displayed in the quick view window.

Table 6-22 lists the elements on the policy rule page.

Table 6-22 Policy Rule Page

Element	Description
Name	(Optional) Enter a name for the policy rule.
Source Zone	Enter the name of the source zone. The source zone specifies the name of the zone from which the traffic is originating.
Destination Zone	Enter the name of the destination zone. The destination zone specifies the name of the router to which the traffic is bound.
Source	Enter the source IP address of the inspected data. The valid parameters are: • Any • IP Address • Subnet
Destination	Enter the destination IP address of the inspected data. The valid parameters are: • Any • IP Address • Subnet
Service	The service of the inspected data. The valid parameters are: • L3/4 Applications, see "Managing Applications" section on page 6-35 • Services "Managing Services" section on page 6-41 • ACL Based application: TCP, UDP, ICMP
Action	Choose the action to perform on the traffic when there is a match on Rule condition. The rule matches when: • The traffic Source IP matches the Source Rule condition. • The traffic Destination IP matches the Destination Rule condition and the traffic inspected Service matches the Service Rule condition. The action options are: • Drop • Drop and Log • Inspect • Pass • Pass and Log
Advance Options	Specify the configuration parameters to set the Firewall Rule Parameter-Map behavior when the Action option is set to Inspect.

Step 11 Click **Save** to apply the rule to the device.

Editing Policy Rule

To edit the existing Policy Rule, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Policy Rules**.

Step 5 In the Firewall Rules page, choose one of the following options:

a. Click on the Rules parameters row and edit the parameters. or

b. Check the check box to select the rule, and then click the **Edit** button. The selected Rule entity opens for edit.

Step 6 Click **Save** to apply the changes in the device.

Deleting the Policy Rule

To delete the existing Policy Rule, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click the **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Policy Rules**.

Step 5 In the Firewall Rules page, check the check box to select the rules, and then click the **Delete** button.

Step 6 Click **Ok** on the warning message to delete the policy rule. The selected policy rule is deleted from the device.

Changing the Firewall Rule Order

The class-default rules always appear at the bottom of the list and their location is fixed. The regular rules cannot be moved beneath the class-default rules.

To change the Policy Rule order, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Policy Rules**.

Step 5 In the Firewall Rules page, to move the rule to a specific row, drag and drop the rule to the new location.

Managing Services

This feature allows you to create, update or delete the service element. You can assign or unassign the TCP/UDP ports to an application.

Creating Services

To create the services, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Services.** The Service page appears.

Step 5 In the Service page, click the **Add Service** button to create a new service.

Step 6 In the Service page, enter the Service Name.

Step 7 To assign Applications, click the down arrow icon. The Applications Object Selector dialog box appears.

a. In the Applications dialog box, check the Applications check box to select the applications from the list (can be multiple selection).

b. Click **OK** to accept the changes or **Cancel** to cancel the changes.

Table 6-23 lists the elements on the Service page.

Table 6-23 Service Page

Element	Description
Service Name	Enter the service name. You cannot change the name after creating the service. Also, you cannot create a service without an application.
Application	Displays the list of applications grouped together in the Service.

Step 8 Click **Save** to apply your changes to the device.

Editing Service

To edit the existing service, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Services**.

Step 5 In the Service page:

a. Click on the Service parameters row and edit the parameters. or

b. Select the service, and click the **Edit** button. The selected Service entity opens for editing. You can add new applications or remove an already selected application.

c. To remove an application from the selected list, rest your cursor on the application name, and click the **X** icon.

Step 6 Click **Save** to save the configuration.

Deleting the Service

To delete the existing service, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Services**.

Step 5 From the Service page, select the service, and then click the **Delete** button.

Step 6 Click **Ok** on the warning message to delete the service. The selected service is deleted.

Creating Security Zone

To create the security zone, follow these steps,

Note The Zone Based Firewall feature is supported on ASR platform from the IOS version 3.5 or later. The Zone Based Firewall feature is supported on ISR platform from the IOS release 12.4(24)T or later.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Zones**, and click the **Add Zone** button to create the security zone.

Step 5 In the security zone page, enter the Zone Name.

Step 6 Select the VRF of the zone.

a. VRF selection will affect the interface that can be assigned to the security zone

b. If the user selects the default VRF option, then the security zone can be assigned only to the interfaces that are not related to any other VRF.

Step 7 To assign the interfaces to the security zone, click the down arrow icon. The Interface Object Selector dialog box appears.

a. In the Interface selector dialog box, check the Interface check box to select the interface from the list (can be multiple selection).

b. Click **Ok** to save the configuration.

c. Click **Cancel** to cancel all the changes you have made without sending them to the router.

Step 8 In the Advance options column, click the **Configure** button. The Advanced Parameters Configuration dialog box appears.

Step 9 In the Advanced Parameters Configuration dialog box, do the following:

a. Check the Alert check box and click the **On** radio button to set the alert.

b. Check the Maximum Detection check box to set the maximum detection.

c. Check the TCP SYN-Flood Rate per Destination check box to set the TCP flood rate.

d. Check the Basic Threat Detection Parameters check box and click the **On** radio button to configure the FW drop threat detection rate, FW inspect threat detection rate, and FW SYN attack threat detection rate.

Step 10 Click:

- **Ok** to save configuration.
- **Cancel** to exit without saving.

Step 11 To edit the existing security zone parameters, select the zone, and click the **Configure** button on the Advance options column. The Advanced Parameters Configuration dialog box appears.

Step 12 In the Advanced Parameters Configuration dialog box, edit the values and click **Save** to save the changes. When you rest your cursor on the Advanced Options icon, the configured parameters will be displayed in the quick view window.

Note By default, the Advanced configurations parameters are disabled.

Table 6-24 lists the elements on the Security Zone page.

Table 6-24 Security Zone Page

Element	Description
Zone Name	Enter the zone name.
VRF	Select the VRF of the zone.
Interface	Displays the list of interfaces assigned to the security zone. When there are more than two interfaces, you can place the mouse on the icon to view full list.
Advance Options	Configure the advanced parameters such as Alert, Maximum Detection, TCP Synchronize-Flood Rate Per Destination, and Basic Threat Detection.
Description	(Optional) Enter the description for the zone.

Step 13 Enter the description for the zone.

Step 14 Click:

- **Save** to save the changes.
- **Cancel** to exit without saving.

Editing Security Zone

To edit the existing security zone, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click the **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector left panel, choose **Zone Based Firewall > Zones**.

Step 5 In the Security Zone page, choose one of the following options:

a. Click on the Zone parameters row, and edit the parameters. or

b. Select the zone, and click the **Edit** button. The selected Zone entity opens for editing.

Step 6 Click the **add** icon to assign the interface to the zone or to un-assign the existing interfaces from the zone You can also change the Description of the zone.

Step 7 Click **Save** to save the configuration.

Deleting the Security Zone

To delete the existing security zone, follow these steps.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click the **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Zones**.

Step 5 In the Security Zone page, select the security zone, and then click the **Delete** button.

Step 6 Click **Ok** on the warning message to delete the security zone. The selected zone is deleted.

Configuring Default-Zone

To configure the default zone, follow these steps.

Note The Default-Zone feature is supported only on ASR platform.

Step 1 Choose **Operate > Device Work Center**.

Step 2 Select the device from the list or click **Add** to create a new device, then configure the device.

Step 3 After selecting the device, click **Configuration**. The Feature Selector panel appears.

Step 4 From the Feature Selector panel, choose **Zone Based Firewall > Zones**.

Step 5 In the Security Zone page, click the **Default Zone** button to enable or disable the default security zone in the device. The device will host all the interfaces that are not related to any zone.

Step 6 Click **OK** to save the configuration.

Using Reports for Monitoring

Prime NCS (WAN) reporting helps you monitor the system and network health as well as troubleshoot problems. Reports can be run immediately or scheduled to run at a time you specify. Once defined, the reports can be saved for future diagnostic use or scheduled to run and report on a regular basis.

Reports are saved in either CSV or PDF format and are either saved to a file on Prime NCS (WAN) for later download or e-mailed to a specific e-mail address.

Choose **Tools > Reports > Report Launch Pad** to view the list of available reports.

Tip Rest your cursor on the information icon next to the report type to view report details.

Creating and Running New Reports

Step 1 Choose **Tools > Reports > Report Launch Pad**.

Step 2 Click **New** next to the report you want to create.

Step 3 Enter report details, then click

- **Save**—To save this report setup without immediately running the report. The report will automatically run at the scheduled time.
- **Save and Run**—To save this report setup and to immediately run the report.
- **Run**—To run the report without saving the report setup.
- **Save and Export**—To save the report and export the results to either CSV or PDF format.
- **Save and Email**—To save the report and e-mail the results.

Viewing Scheduled Reports

To view and manage all currently scheduled reports, choose **Tools > Reports > Scheduled Run Results**.

Viewing Saved Report Templates

When you have created a report that contains all the parameters necessary, you can save that report template.

Step 1 Choose **Tools > Reports > Saved Report Templates**.

Step 2 Choose which saved report template to show by selecting from the following fields:

- Report Category—Choose the appropriate report category from the drop-down list or choose **All**.
- Report Type—Choose the appropriate report type from the drop-down list or choose **All**. The Report Type selections change depending on the selected report category.
- Scheduled—Choose **All**, **Enabled**, **Disabled**, or **Expired** to filter the Saved Report Templates list by scheduled status.

Using Packet Capture for Monitoring and Troubleshooting

Prime NCS (WAN) allows you to run capture traffic in your network to help monitor network usage, gather network statistics, and analyze network problems.

Step 1 Choose **Tools > Packet Capture**, then click **Create**.

Step 2 Specify the required capture session parameters, then click **Create**.

Diagnosing Site Connectivity Issues

You can use the Prime NCS (WAN) dahsboards to monitor your network and locate problematic devices in your network, and then use the Device Workcenter to change the device configuration.

Step 1 Choose **Operate > Detailed Dashboards**, choose the site for which you are experiencing connectivity issues, then click **Go**.

Step 2 View data reported under Device Reachability Status and Top *N* Devices with Most Alarms to determine the source of the issue.

Step 3 Click on the name of the device for which you see the most alarms. This launches the 360-degree view of the device.

Step 4 Click the Alarm Browser icon to view the alarms for that device. Expand the alarm to view details for the alarm.

Step 5 To compare the configuration on the device to a previously known good configuration, choose **Operate > Device Work Center**, then select the device whose configuration you want to change.

Step 6 Click the Configuration Archive tab, expand the arrow to view additional options, then select the configuration type and a configuration against which to compare.

Step 7 Change or rollback the configuration. See Rolling Back Device Configuration Versions for more information.