

# Blue Coat® Systems SG™ Appliance

*Configuration and Management Guide*

*Volume 6: Advanced Networking*

*Version SGOS 5.1.x*



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## Chapter 1: About Advanced Networking

*Volume 6: Advanced Networking* discusses networking tasks that are not required in every environment, such as:

- ❑ TCP/IP settings.
- ❑ WAN Optimization, which enables you to optimize environments with application delivery networks (ADNs).
- ❑ Forwarding, which allows you to define the hosts and groups of hosts to which client requests can be redirected.
- ❑ Health Checks, which reports on the health of upstream hosts.

### About This Book

This book discusses the following topics:

- ❑ Chapter 2: "Configuring an Application Delivery Network" on page 11
- ❑ Chapter 3: "Attack Detection" on page 51
- ❑ Chapter 4: "Bandwidth Management" on page 57
- ❑ Chapter 6: "Configuring Failover" on page 87
- ❑ Chapter 7: "Configuring the Upstream Networking Environment" on page 91
- ❑ Chapter 8: "Health Checks" on page 119
- ❑ Chapter 9: "Internet Caching Protocol (ICP) Configuration" on page 127
- ❑ Chapter 10: "Using RIP" on page 133
- ❑ Chapter 11: "Configuring the SG Appliance as a Session Monitor" on page 139
- ❑ Chapter 13: "SOCKS Gateway Configuration" on page 183
- ❑ Chapter 14: "TCP/IP Configuration" on page 191
- ❑ Chapter 15: "Virtual IP Addresses" on page 195
- ❑ Chapter 16: "WCCP Settings" on page 197
- ❑ Appendix A: "Glossary" on page 199
- ❑ Appendix B: "Using Policy to Manage Forwarding" on page 207
- ❑ Appendix C: "Using WCCP" on page 211

### Document Conventions

The following section lists the typographical and Command Line Interface (CLI) syntax conventions used in this manual.

Table 1-1. Document Conventions

Conventions	Definition
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Table 1-1. Document Conventions (Continued)

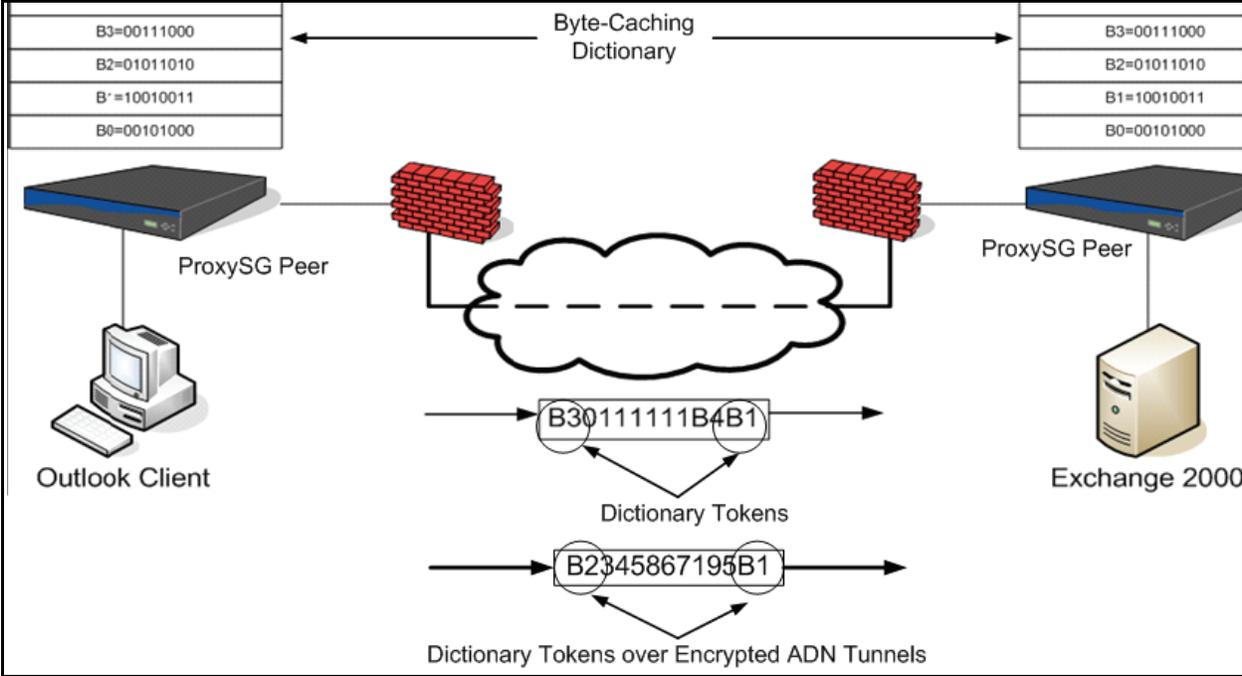
<i>Italics</i>	The first use of a new or Blue Coat-proprietary term.
Courier font	Command line text that appears on your administrator workstation.
<i>Courier Italics</i>	A command line variable that is to be substituted with a literal name or value pertaining to the appropriate facet of your network system.
<b>Courier Boldface</b>	A Blue Coat literal to be entered as shown.
{ }	One of the parameters enclosed within the braces must be supplied
[ ]	An optional parameter or parameters.
	Either the parameter before or after the pipe character can or must be selected, but not both.

# Chapter 2: Configuring an Application Delivery Network

The Blue Coat implementation of an Application Delivery Network (ADN) requires two-sided deployments, with an SG appliance (a *peer*) at each end of the WAN link. It also features:

- ❑ Byte caching. The use of byte caching in an application delivery network reduces the amount of TCP traffic across a WAN by replacing large chunks of repeated data with small tokens representing that data. Working with patterns detected in the WAN traffic, the ADN pair of systems handling the traffic builds a *byte cache* dictionary of small tokens.
- ❑ Acceleration techniques. The use of bandwidth management, compression, protocol optimization, and object caching reduces WAN usage even more.

In such an environment, with only minimal configuration changes, between 30 percent and 90 percent of WAN usage can be eliminated, and WAN performance can be increased from 30 percent to 90 percent. Applications that benefit from ADN optimization include Windows file servers, Web share applications such as WebDAV, CRMs such as Siebel, e-mail, and FTP.



In addition, you can configure the ADN network to provide additional security to internal ADN routing connections and to ADN tunnel connections that carry optimized application data. In a fully secured ADN network, only authenticated and authorized devices are allowed to join the ADN network. All connections between ADN nodes and the ADN manager and connections among the ADN nodes are ensured of message authenticity and privacy protection.

## In this Chapter

The following topics are discussed in this chapter:

- ❑ Section A: "About the Blue Coat Implementation for WAN Optimization" on page 13.
- ❑ Section B: "Basic ADN Setup" on page 19.
- ❑ Section C: "Transparent and Explicit Connection Deployments" on page 21.
- ❑ Section D: "Securing the ADN Network" on page 31.
- ❑ Section E: "ADN Network History, Statistics, and Health Metrics" on page 38.
- ❑ Section F: "Advanced Tunnel Optimization" on page 41.
- ❑ Section G: "Manually Re-Sizing a Byte-Cache Dictionary" on page 44.
- ❑ Section H: "Related CLI Syntax to Configure an ADN Network" on page 47.
- ❑ Section I: "Policy" on page 49.

## Section A: About the Blue Coat Implementation for WAN Optimization

This section provides conceptual information regarding various deployments that employ WAN optimization.

An ADN network is composed of an ADN manager and backup ADN manager, ADN nodes, and a network configuration that matches the environment.

Blue Coat recommends that you review this section for a high-level overview of the Blue Coat ADN implementation.

This section contains discussions on:

- ❑ “Components” , below.
- ❑ “Optimizing the Network” on page 14.
- ❑ “ADN Security” on page 17.

### Components

The components of the Blue Coat ADN implementation are:

- ❑ ADN manager and backup ADN manager to provide routing information and control access to the ADN network.
- ❑ ADN nodes in both branch offices and data centers that can be authenticated (identity verified) and authorized (permitted to join the network).
- ❑ (Optional) An SG Client manager if you have mobile users or users in small branch offices, where it might not be cost-justifiable to deploy an acceleration gateway.

### *ADN Manager and Backup Manager*

The ADN manager keeps track of and advertises the routes of the appliances it knows about. The ADN manager *must* be one of the peers in the ADN optimization network.

---

**Note:** *Peer* refers to any ADN system, *manager* refers to the ADN system that broadcasts route information to all ADN peers and controls peer access to the ADN network, and *node* refers to all non-manager ADN peers. ADN managers can also act as nodes on the network.

---

A backup ADN manager (optional, but recommended) can also be configured. The ADN managers and the registered nodes periodically send keep-alive messages to each other. If a node detects the primary ADN manager is not responding, the node automatically fails over to the back-up ADN manager. The node repeatedly attempts to restore its connection with the primary manager. After the primary ADN manager is responding to the node again, the active routing connection of this node switches back to the primary manager.

If the ADN manager detects a node is not responding, the ADN manager removes the node from the database and notifies all other nodes in the network to do the same.

If both the ADN manager and the backup ADN manager are unavailable, no further routing advertisements are broadcast. In this case, routes already known by the peers continue to be remembered and used.

## Section A: About the Blue Coat Implementation for WAN Optimization

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You also can use the ADN manager and backup manager to authorize which peers are allowed to advertise or retrieve route information to and from the ADN manager, and whether plain connection requests to the ADN manager are accepted.

Connections to the ADN manager and backup manager are made at startup and kept open as long as ADN is enabled. These connections are referred to as routing connections, and are used to advertise configured server subnets and to receive routing table updates from the ADN manager.

---

**Note:** Even if you use a transparent tunnel deployment where ADN nodes do not require routing information, you must configure each ADN node and register it with the ADN manager. If you secure the network (highly recommended), the ADN manager is used to authorize ADN peers before they join the network.

---

Whenever the ADN manager receives a new advertisement from a node that is joining the network, a route update is sent to all the appliances in the ADN optimization network that have already established a routing connection; in addition, the current routing table is updated. The ADN manager and backup manager can each listen on two ports: one accepting the default plain (unsecured) routing connection requests and another accepting secure routing connection requests. The plain listener can be shut down if routing connections from all ADN nodes are secured.

To configure the ADN manager and backup ADN manager, see [Section B: "Basic ADN Setup" on page 19](#).

### ADN Nodes

An ADN node is any SG appliance that is configured for ADN optimization and sends routing information to the ADN manager and backup ADN manager. A node excludes those appliances that are acting as ADN managers and backup ADN managers, although the manager and backup manager can also participate as nodes in the network.

### SG Client Manager

The SG Client typically connects to an SG appliance typically located in a data center. That SG appliance provides the SG Client software to users, and maintains the software and the client configuration on all clients in the ADN network. Only one SG Client Manager can be used in the ADN network.

For information on using the SG Client and SG Manager, see [Chapter 12: "Configuring and Using the SG Client" on page 145](#).

## Optimizing the Network

You must decide on whether the network should use explicit tunnel connections, transparent connections, or a combination of both. Note that ADN peers always intercept incoming transparent connections if ADN is enabled.

- **Transparent:** The branch SG appliance connects to the original server destination address and port. If an upstream proxy is capable of transparent tunneling, the downstream proxy transfers data over the ADN tunnel. The destination port is preserved and is not affected by security being enabled. Skip to ["Transparent Connections"](#) for more information.

## Section A: About the Blue Coat Implementation for WAN Optimization

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- ❑ **Explicit:** The branch SG appliance connection is established to the ADN peer discovered from the routing lookup table. The connection is established to the tunnel listening port by default or, if you are preserving the destination port, to the port number the application specifies. Skip to [“Explicit Connections” on page 16](#) for more information.
- ❑ **Combination:** In some circumstances, some ADN nodes can connect transparently, while other nodes require explicit routing. Skip to [“Combination of Transparent/Explicit Connections” on page 16](#).

### *Transparent Connections*

Transparent connections are used when the network is required to see the original destination IP addresses and ports. This requires that each node be configured as an ADN node and deployed in in-line mode or virtual in-line mode.

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**Note:** Beyond setting up an ADN node in an in-line network and configuring the ADN node to point to the ADN manager and backup manager, no additional effort is required for transparent connections. If you use explicit connections, those connections must be explicitly configured.

---

Transparent connections take advantage of ADN tunnels that maintain layer-4 information from the original application connections. Layer-4 information provides an administrator more granular control of the ADN network and allows the enforcement of network policy.

In a transparent connection deployment, connections are not established to a particular peer in the ADN, as they are in an explicit deployment. An ADN node can establish connections to its peers automatically in the absence of any ADN routing information.

The reject-inbound per interface setting is honored for transparent tunnel interception, while the allow-intercept setting is ignored for transparent tunnel interception.

Internet-bound traffic is automatically accelerated in a transparent deployment if a transparent ADN peer is installed at the internet access point and Internet traffic is routed correctly.

### **Transparent Deployment Load Balancing Scenarios**

In transparent load balancing, routes are not advertised, and configuration of load balancing must be done on each node in the ADN cluster.

If you are using a transparent deployment, you have two options for load balancing.

- ❑ A dedicated SG appliance as a load balancer; that system makes the decision about which node receives which traffic.
- ❑ A WCCP router or other external load balancer, where the individual nodes in the ADN cluster make the informed load balancing decision.

## Explicit Connections

Explicit connections are used when maximum network control and granularity is needed.

Blue Coat supports two explicit connections deployments: explicit or explicit but preserving the destination port. In the latter case, the destination port used is the original destination port from the client's request, such as port 80 for HTTP. The destination port is not affected by the connection setting.

In both explicit deployments, the server subnets that are fronted by each peer must be explicitly configured; the server subnets are then advertised to each ADN node.

To accelerate Internet traffic in an explicit ADN network, set up a specific ADN peer as the Internet gateway. Typically, the Internet gateway is an ADN peer close to the enterprise's Internet access point.

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**Note:** If multiple Internet gateways are available, each peer has its own preferred Internet gateway to route all Internet subnets.

---

When an ADN peer is configured as an Internet gateway, all other ADN peers forward the Internet traffic to this peer. The following logic is used by an ADN peer to determine if the connection is destined to the Internet:

- ❑ If the destination address matches an advertised subnet from any of the ADN peers, the connection is forwarded to that peer over the ADN tunnel.
- ❑ If the destination address matches one of the exempted subnets, the connection is not forwarded over the ADN tunnel.
- ❑ If the destination address does not match an advertised subnet or an exempted subnet, the connection is forwarded to an ADN peer that is designated as an Internet gateway.

## Explicit Deployment Load Balancing Scenarios

If you use explicit network connections, you have two options when configuring load balancing:

- ❑ A server subnet, where the branch SG appliance makes the decision about the node receiving specific traffic for a destination subnet. This is the easiest and more preferred method. For more information, see ["Using a Server Subnet" on page 27](#).
- ❑ An external load balancer, where that system makes the informed decision about which node in the ADN cluster receives specific traffic. For more information, see ["Using an External Load Balancer" on page 28](#).

## Combination of Transparent/Explicit Connections

In some circumstances, it is necessary to use explicit connections in addition to the much easier and preferred transparent connection deployment. A transparent network that can advertise explicit routing connections is supported. This configuration is useful:

- ❑ When a small branch office is using the SG Client, which allows SGOS functionality when a SG appliance is not on site.
- ❑ If some nodes are not in an in-line configuration or are incapable of initiating transparent connections.

## Section A: About the Blue Coat Implementation for WAN Optimization

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By default, if an ADN node is advertising routes, explicit connections are made. If no explicit routes are found and there is an upstream proxy in the path capable of transparent tunneling, the connection is intercepted. This preference is configurable.

### Choosing Which Traffic to Optimize

When you configure proxy services to manage TCP traffic through the ADN network, you can set various attributes that can optimize the traffic for the network. A specific attribute, **use ADN**, allows you to disable ADN for a given service.

For information on using proxy services, including the services available, refer to *Volume 3: Proxies and Proxy Services*.

## ADN Security

ADN networks can and should be secured. You can limit access by:

- ❑ Authenticating and authorizing the ADN nodes that are allowed on the network and prevent unauthorized nodes from participating.
- ❑ Securing ADN connections.

### Authenticating and Authorizing ADN Nodes

By default, authentication and authorization are disabled.

#### ADN Node Authentication

Secure ADN requires an appliance certificate for each ADN peer, including the ADN manager and backup manager for identification. You can provide your own device appliance certificates or obtain Blue Coat-issued appliance certificates from the Blue Coat CA server. For the most secure environment, Blue Coat-issued appliance certificates are recommended.

To enable secure ADN, you must enable the appliance authentication profile for the ADN network to use before configuring any other security parameters.

In secure ADN mode, full mutual authentication can be supported between the ADN manager and the ADN nodes and among ADN communicating peers. If authorization is enabled on the ADN manager, the peer proxy is authorized through an approval mechanism by the ADN manager before joining the network. For more information on managing appliance certificates, see [Chapter 5: "Authenticating an SG Appliance"](#).

#### ADN Node Authorization

Authorization occurs when the ADN manager gives approval for the device to join the network.

If the profile, authentication, and authorization are configured on each peer, and the **Pending Peers** option is enabled on both the ADN manager and the backup ADN manager (if one is configured), the following behavior takes place automatically:

- ❑ When an ADN node comes up, it contacts the ADN manager for routing information.
- ❑ The ADN manager extracts the device ID from the connecting ADN node's appliance certificate and looks for the device ID in its approved list of ADN nodes.
  - If the device is on the approved list, a `REQUEST-APPROVED` response is sent, followed by the route information, and the node joins the network.

## Section A: About the Blue Coat Implementation for WAN Optimization

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- If the device is not on the approved list, the ADN manager adds the connecting node's device ID to a pending-peers list and sends a `REQUEST-PENDING` response. After the peer is moved to the **Approved** list by the administrator, a `REQUEST-APPROVED` response is sent, followed by the route information, and the node joins the network.
- If the **Pending Peers** option is not enabled and a peer is not on the approved list, the ADN manager sends a `REQUEST-DENIED` response and closes the connection. The connecting node closes the connection and updates its connection status.
- If a peer is deleted from the approved list, the ADN manager broadcasts a `REJECT-PEER` to all nodes to delete this node and terminate any existing ADN connections to it. No new connections are routed through the deleted ADN node.

For information on configuring authentication and authorization on each ADN node, see [“Configuring ADN Security Settings” on page 31](#).

### Securing ADN Connections

By default, ADN routing and tunnel connection requests are unauthenticated and all ADN protocol messaging and compressed application data are transferred in plaintext. For maximum security, you can configure the ADN network to secure ADN routing and tunnel connections using standard SSL protocol, which provides authentication, message privacy, and message authenticity security services, regardless of the application traffic that is being accelerated or tunneled.

In secure ADN mode, you can specify that the ADN manager and tunnel use secure mode to listen for routing and tunnel requests.

When secure ADN is enabled, any existing plain outbound connections are dynamically secured by activating SSL according to the `secure-outbound` setting.

For information on optimizing and securing ADN tunnels, see [Section D: "Securing the ADN Network" on page 31](#) and [Section F: "Advanced Tunnel Optimization" on page 41](#).

## Section B: Basic ADN Setup

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### Section B: Basic ADN Setup

Basic ADN setup includes:

- ❑ Configuring each node in an in-line deployment; if you are configuring an explicit deployment, you do not need to configure the network in an in-line deployment.
- ❑ Plugging each node in.
- ❑ Enabling the ADN manager and backup manager on each node, starting with the ADN manager and backup manager themselves.

If you are using a transparent connection deployment without load balancing, ADN configuration is complete at this point.

If you are using an explicit connection deployment, a transparent connection deployment with load balancing, or if you are securing the ADN network (highly recommended), after finishing this section you must continue with:

- ❑ “Explicit Load Balancing” on page 27, for explicit deployment.
- ❑ “Transparent Load Balancing” on page 22, for transparent deployment.
- ❑ Section D: “Securing the ADN Network” on page 31.

### Defining the ADN Manager

When an SG appliance connects to the primary ADN manager, subnet information is sent to the manager, including:

- ❑ Peer ID: The serial number of the device. This is a globally unique identifier for the peer SG appliance that is used as a key to select the dictionary of tokens to use.
- ❑ Data IP Address and Port: The destination IP address and port number that a branch proxy should use when establishing an explicit (non preserve-dest-port) tunnel connection.
- ❑ Server Subnet Advertisements: The list of server subnets the SG appliance contains are sent to the ADN manager.

The first step in configuring an ADN network is to define the primary ADN manager. Blue Coat also recommends deploying a backup ADN manager to prevent loss of routing information should the primary ADN manager become unavailable for any reason. The ADN manager and backup ADN manager *must* be configured on each peer that is joining the ADN network.

**To enable ADN optimization and define the primary/backup ADN managers:**

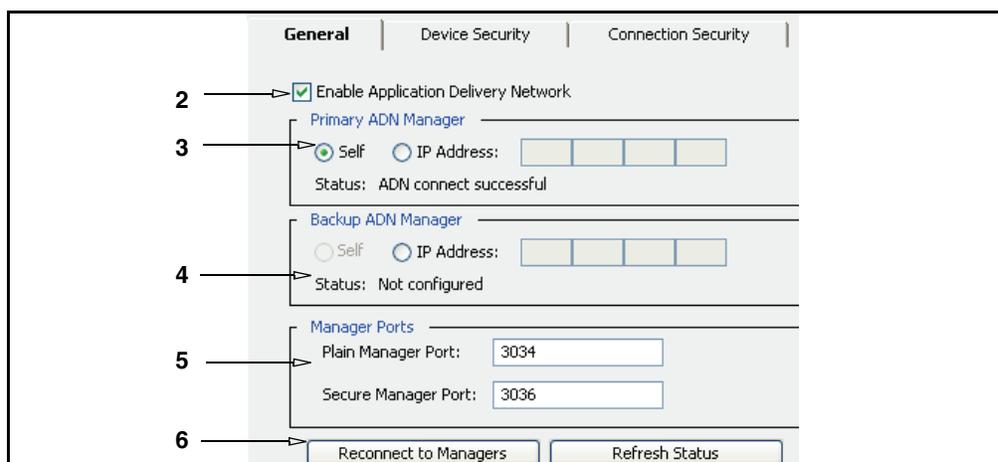
---

**Note:** Fill in all fields on this pane before clicking **Apply**.

---

1. Select **Configuration > App. Delivery Network > General**.

Section B: Basic ADN Setup



2. Select **Enable Application Delivery Network**.
3. **Primary ADN Manager**: Enter the IP address of the primary ADN manager. This can be the SG appliance itself or any peer on the ADN optimization network.
4. **Backup ADN Manager** (Optional but highly recommended): Enter the IP address of the backup ADN manager or select the **Self** radio button if this SG appliance is the backup manager.
5. **Manager Ports**: The ports are set to 3034 (for plain routing connections) and port 3036 (for secure routing connections).
6. Click **Reconnect to Managers** to connect to the ADN manager and backup ADN manager, if one is configured.

---

**Note:** You cannot select this option until you select the primary ADN manager and apply the changes. The ADN manager does not exist until the changes are applied.

---

7. Select **Apply** to commit the changes to the SG appliance.

## Section C: Transparent and Explicit Connection Deployments

If you are configuring a transparent connection deployment without load balancing, remember that ADN peers always intercept incoming transparent connections if ADN is enabled. No special configuration is required after basic ADN configuration is completed unless you use transparent connection load balancing or if you need to configure a combined (explicit and transparent) connection network.

The basic steps for configuring a combined transparent/explicit deployment or a pure explicit deployment are:

- ❑ Connect the nodes in in-line mode or virtual in-line mode only for those nodes that are using transparent connections.
- ❑ (Optional) Secure the ADN network:
  - Configure the ADN nodes for ADN authentication and authorization for maximum security (see [“Configuring ADN Security Settings”](#) on page 31). The settings on each system should be identical.
  - Configure secure tunnels (see [Section F: “Advanced Tunnel Optimization”](#) on page 41).
- ❑ (Optional) Configure the load balancing parameters for each node to be used in load balancing (see [“Explicit Load Balancing”](#) on page 27 or [“Transparent Load Balancing”](#) on page 22).

To configure transparent connections, including transparent connection load balancing, continue with the next section.

To configure explicit connections, including explicit connection load balancing, see [“Configuring an Explicit Deployment”](#) on page 24.

To configure a combined connection deployment, skip to [“Configuring a Combined \(Transparent and Explicit\) Deployment”](#) on page 30 .

### Configuring a Transparent Deployment

After you have completed basic ADN configuration, transparent connections are made automatically. No further configuration is required, unless you need to configure transparent load balancing.

#### *Transparent Deployment Notes*

- ❑ The first proxy in the chain that supports transparent tunnels and is on the same ADN network intercepts ADN transparent tunnel connections.
- ❑ In transparent load balancing, routes are not advertised, and configuration of load balancing must be done on each node in the ADN cluster.
- ❑ Transparent load balancing relies on connection forwarding clusters for proper operation. All nodes in an ADN load balancing group must be part of the same connection forwarding cluster.
- ❑ If connection forwarding is not set up correctly, load balancing will fail. For information on connection forwarding, see [Section D: “TCP Connection Forwarding”](#) on page 111.

## Transparent Load Balancing

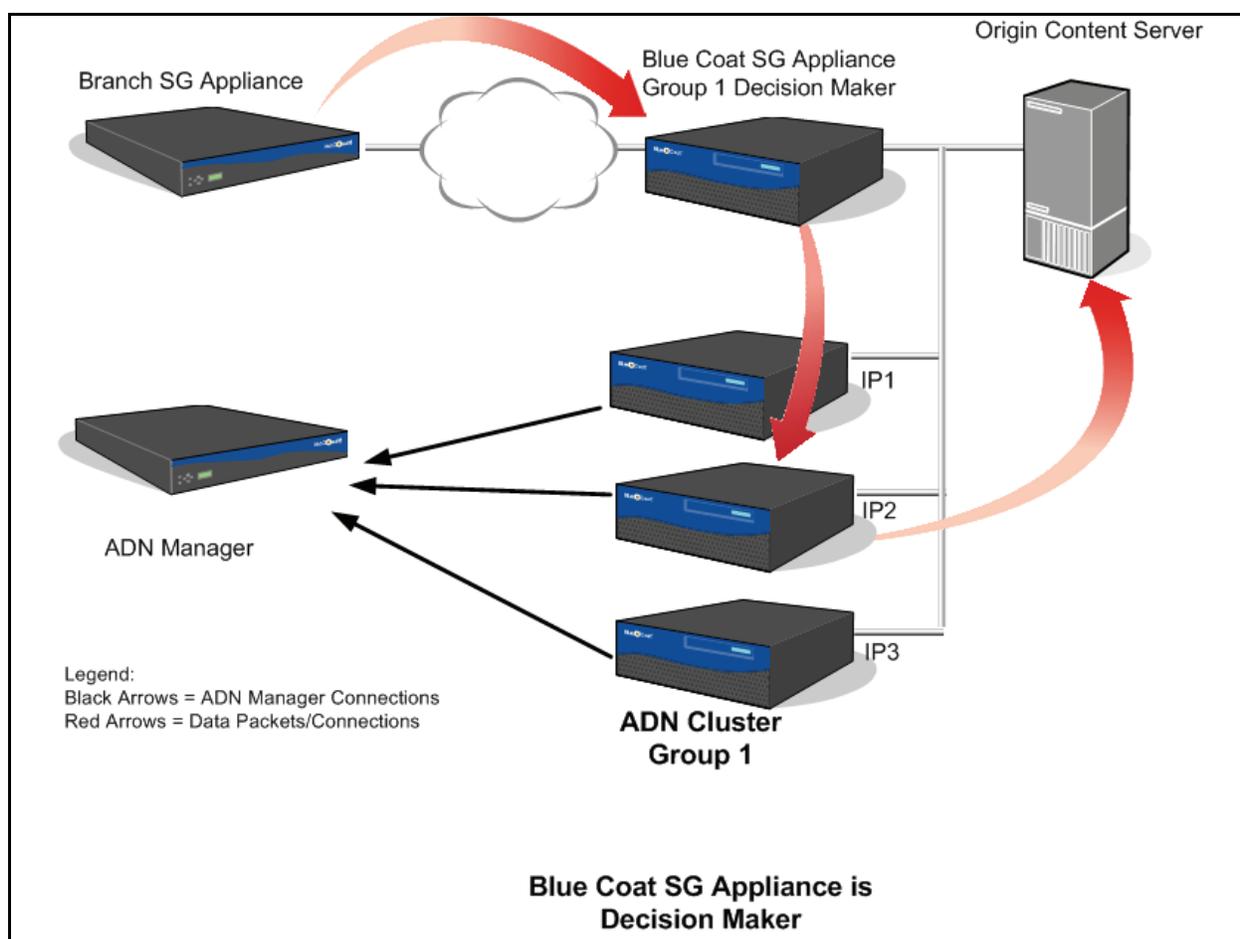
In transparent load balancing, routes are not advertised, and configuration of load balancing must be done on each node in the ADN cluster.

If you are using a transparent deployment, you have two options for load balancing.

- ❑ A dedicated SG appliance as a load balancer; that system makes the informed decision about which node receives which traffic.
- ❑ A WCCP router or other external load balancer, where the individual nodes in the ADN cluster make the informed load balancing decision.

### Using the Blue Coat Appliance as a Load Balancer

When a Blue Coat appliance is used as the external load balancer, it makes the decisions about which traffic is directed to which node.



To configure transparent load balancing with a dedicated Blue Coat appliance as the decision maker:

- ❑ Deploy the load-balancing SG appliance in-line so that it can transparently intercept all traffic.
- ❑ Enable load balancing on all nodes by going to **Configuration > App. Delivery Network > Tunneling > Load Balancing**, and selecting the **Enable Load Balancing** checkbox.

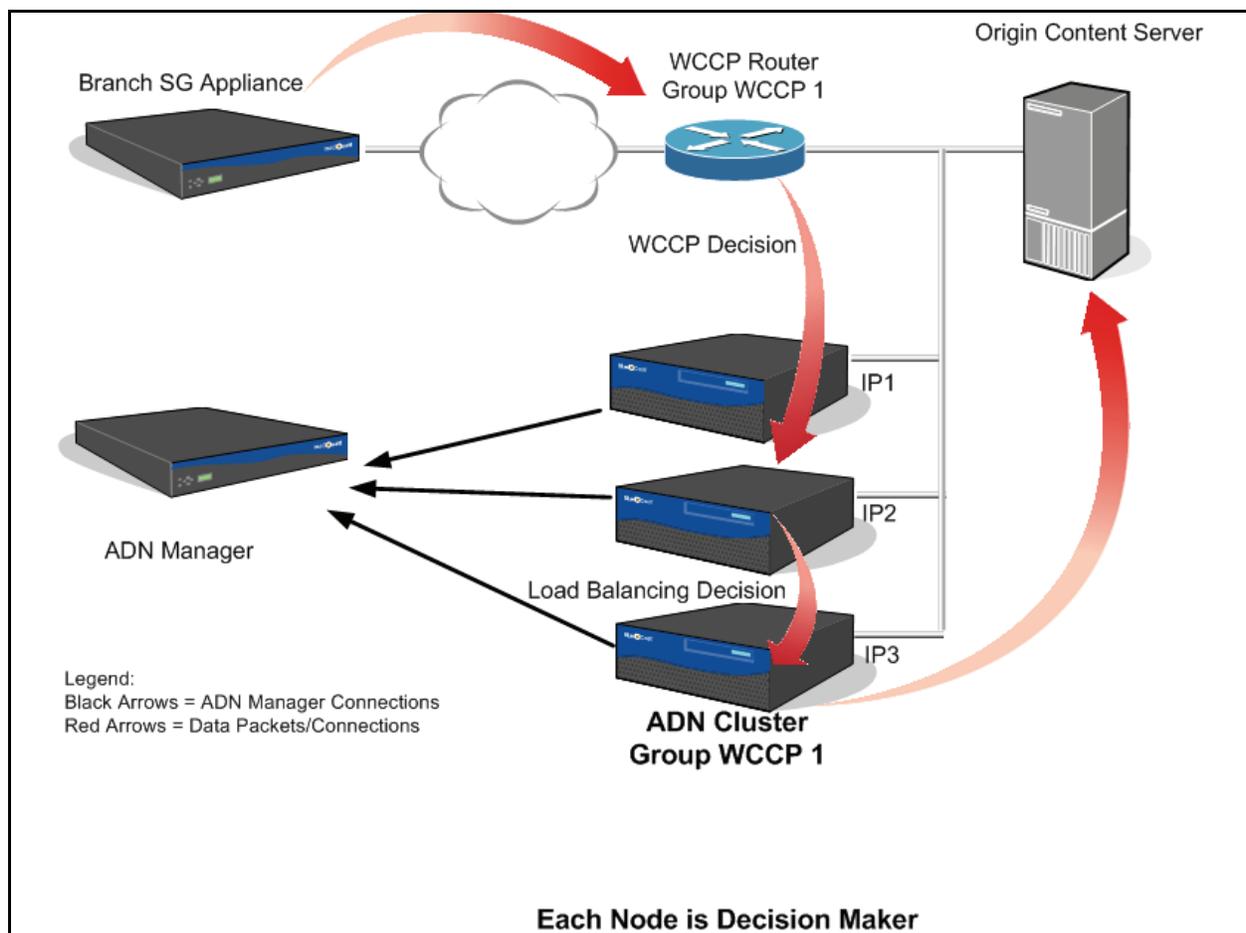
## Section C: Transparent and Explicit Connection Deployments

- ❑ (Optional) Configure each box in the cluster with the same load-balancing group name.
- ❑ On the Blue Coat appliance that's acting as the dedicated load balancer, select **Act as load balancer only** through the **Configuration App.Delivery Network > Tunneling > Load Balancing** tab.
- ❑ Put all ADN nodes into a connection forwarding cluster. For more information, see [Section D: "TCP Connection Forwarding" on page 111](#).

**Note:** No special configuration is required for client IP spoofing beyond standard configuration, which is to enable reflect-client-ip on the branch SG appliance and to set the concentrator SG appliance to allow client-ip spoofing under ADN tunneling.

### Using a WCCP Router or L4 Switch as a Load Balancer

Using a WCCP router or L4 switch as a transparent load balancer is similar to using an SG appliance as a transparent load balancer, except that WCCP router or L4 switch must be configured on each system in the cluster. In this scenario, the router or switch cannot guarantee ADN peer affinity because the router cannot use the peer ID as input for its hash. Because of this, the ADN nodes make the actual informed routing decisions.



## Section C: Transparent and Explicit Connection Deployments

---

To configure transparent load balancing with the nodes in the ADN cluster as the decision makers:

- ❑ Enable load balancing on all nodes by going to **Configuration > App. Delivery Network > Tunneling > Load Balancing**, and selecting the **Enable Load Balancing** checkbox.
- ❑ (Optional) Set the same group name on all of the nodes in the cluster.
- ❑ Put all ADN nodes into a forwarding connection cluster. For more information, see [Section D: "TCP Connection Forwarding" on page 111](#).
- ❑ Configure WCCP settings on all nodes. For more information, see [Chapter 16: "WCCP Settings" on page 197](#).
- ❑ Configure WCCP router settings. Review the vendor's documentation for information.

---

**Note:** Note: If client IP spoofing is desired, you must configure WCCP so that both traffic from the Branch Appliance to the Origin Content Server and traffic from the Origin Content Server to the Branch Appliance is redirected through WCCP. This requires configuring WCCP on multiple interfaces on your router, or configuring "in/out" rules. If specific ports are desired (rather than all ports), you must configure both source-port and destination-port rules in two different service groups.

---

## Configuring an Explicit Deployment

Complete the following steps to configure an explicit deployment:

- ❑ Configure server subnets on each peer and enable an Internet gateway (see ["Managing Server Subnets and Enabling an Internet Gateway"](#)).
- ❑ (Optional) Preserve the destination port (see ["Preserving the Destination Port" on page 26](#)).
- ❑ Configure explicit load balancing (see ["Explicit Load Balancing" on page 27](#))

## Managing Server Subnets and Enabling an Internet Gateway

The server subnets you create here are advertised by this peer upon joining the explicit ADN network. You can also enable the peer as an Internet gateway. In addition, subnets not intended to go over ADN tunnels or to be routed to Internet gateways can be configured as exempt subnets.

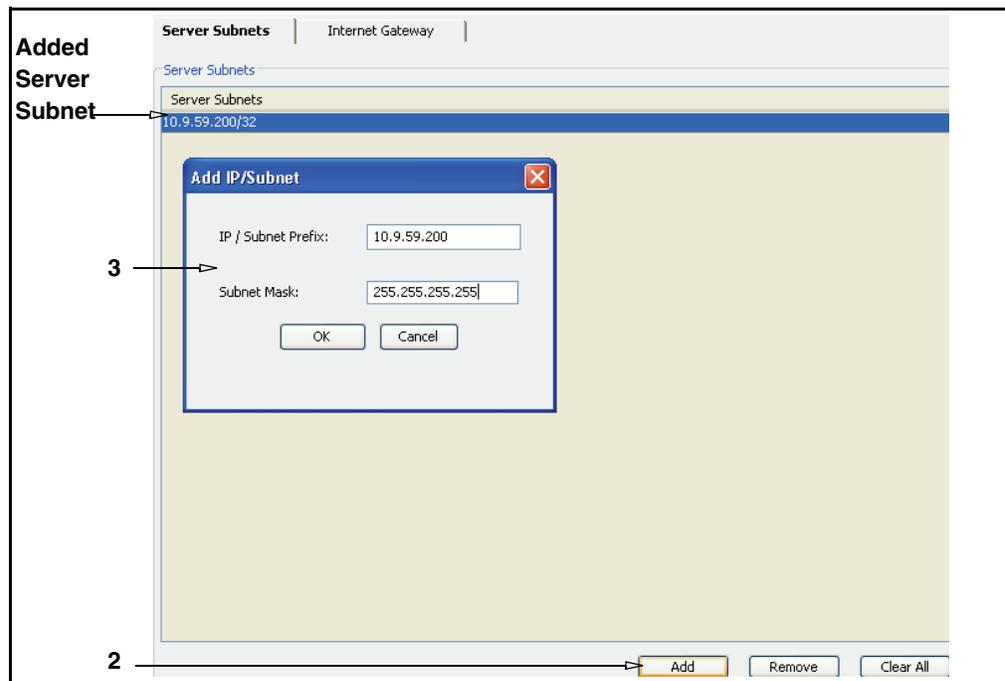
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**Note:** You can also configure the exempt subnet capability through policy that allows you to disable ADN tunnel for specific connections. For more information, refer to *Volume 11: Content Policy Language Guide*.

---

**To create server subnets for this peer:**

1. Select **Configuration > App. Delivery Network > Routing**.

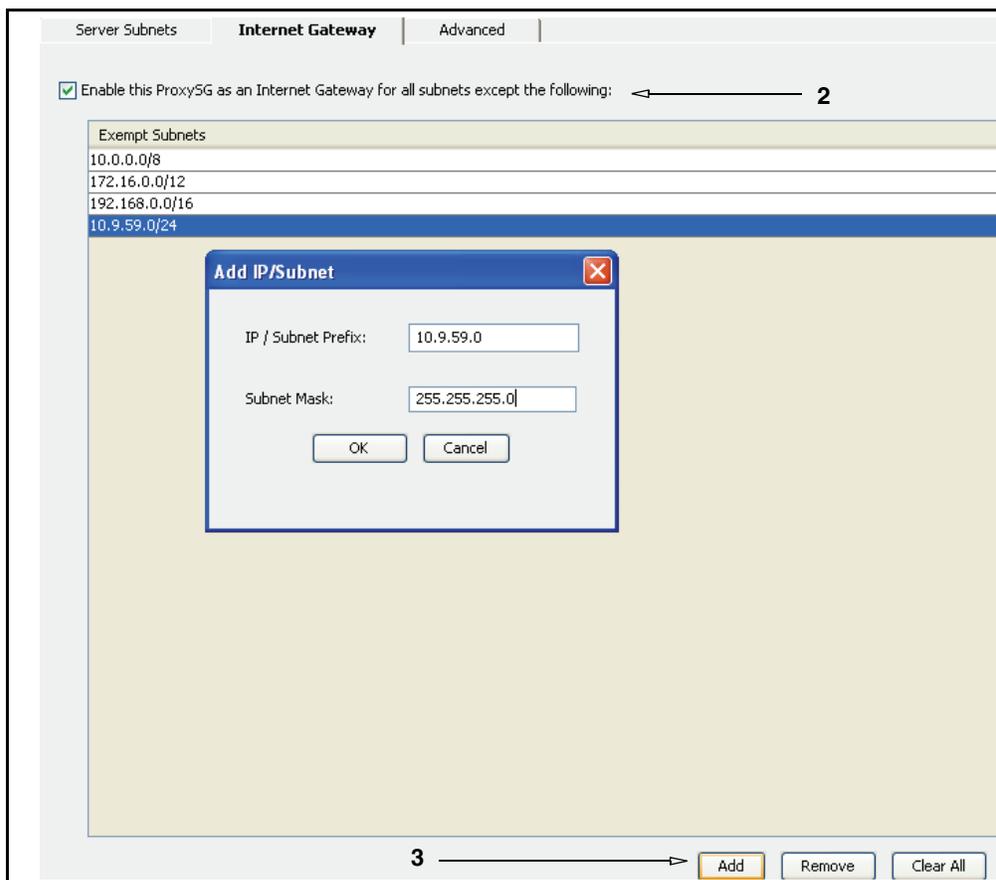


2. Click **Add**.
3. Add the IP/Subnet route to be advertised by the ADN manager; click **OK**.
4. (Optional) Repeat for additional routes.
5. Select **Apply** to commit the changes to the SG appliance.

**To enable this peer as an Internet gateway:**

1. Select **Configuration > App. Delivery Network > Routing > Internet Gateway**.

## Section C: Transparent and Explicit Connection Deployments



2. Select the **Enable this ProxySG as an Internet Gateway for all subnets except the following** checkbox.
3. Click **Add**.
4. Add the IP/Subnet that must not be routed to Internet gateway(s); click **OK**.
5. (Optional) Repeat for additional subnets.
6. Select **Apply** to commit the changes to the SG appliance.

### *Preserving the Destination Port*

Complete the following procedure.

#### **To preserve the destination port:**

1. Select **Configuration > App. Delivery Network > Tunneling > Connection**.

## Section C: Transparent and Explicit Connection Deployments

Connection	Network	Load Balancing	Proxy Processing
<b>Inbound</b>			
Plain Tunnel Port: <input type="text" value="3035"/>			
Secure Tunnel Port: <input type="text" value="3037"/>			
<b>Outbound</b>			
<input type="checkbox"/> Connect using ADN transparent tunneling when possible			
<input checked="" type="checkbox"/> When a route is available, preserve the destination TCP port number when connecting to the ADN peer			

2. Select the checkbox for **When a route is available, preserve the destination TCP port number when connecting to the ADN peer**.

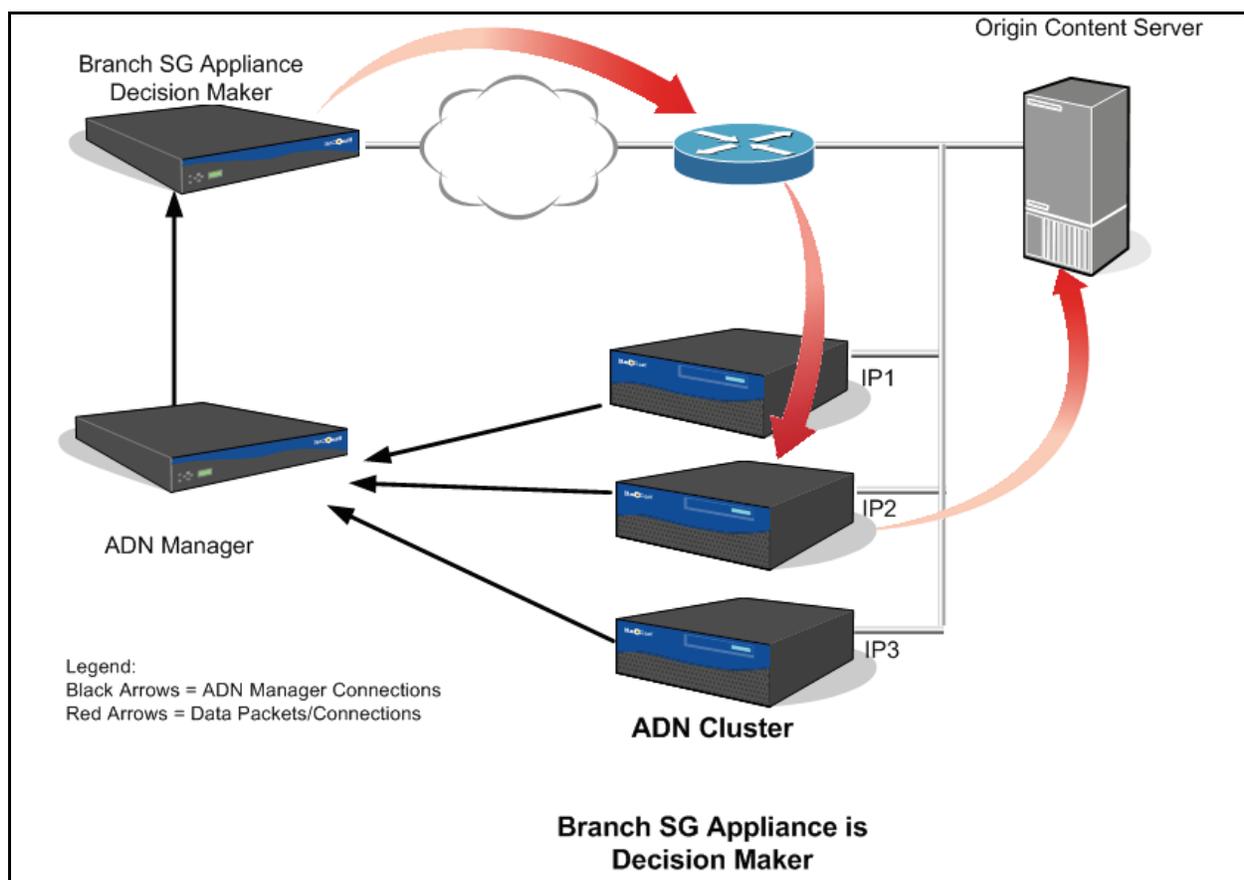
### *Explicit Load Balancing*

Of the two explicit load balancing types, server subnet or external load balancer, the server subnet is the preferred and easiest to use. While the server subnets must be configured, no additional load balancing settings must be made, and the ADN nodes explicitly advertise their own IP addresses.

#### **Using a Server Subnet**

If you use an explicit deployment, or if you just want to load balance traffic destined to a specific subnet, configure the subnet as a server subnet on each ADN node within that group.

To forward the connection destined to the load balanced subnet, each ADN node selects the preferred node from the list of all peers fronting that subnet. This is done by ranking the list of all nodes fronting a given subnet from highest to lowest. The node with the highest rank is chosen to route the client traffic for that subnet.

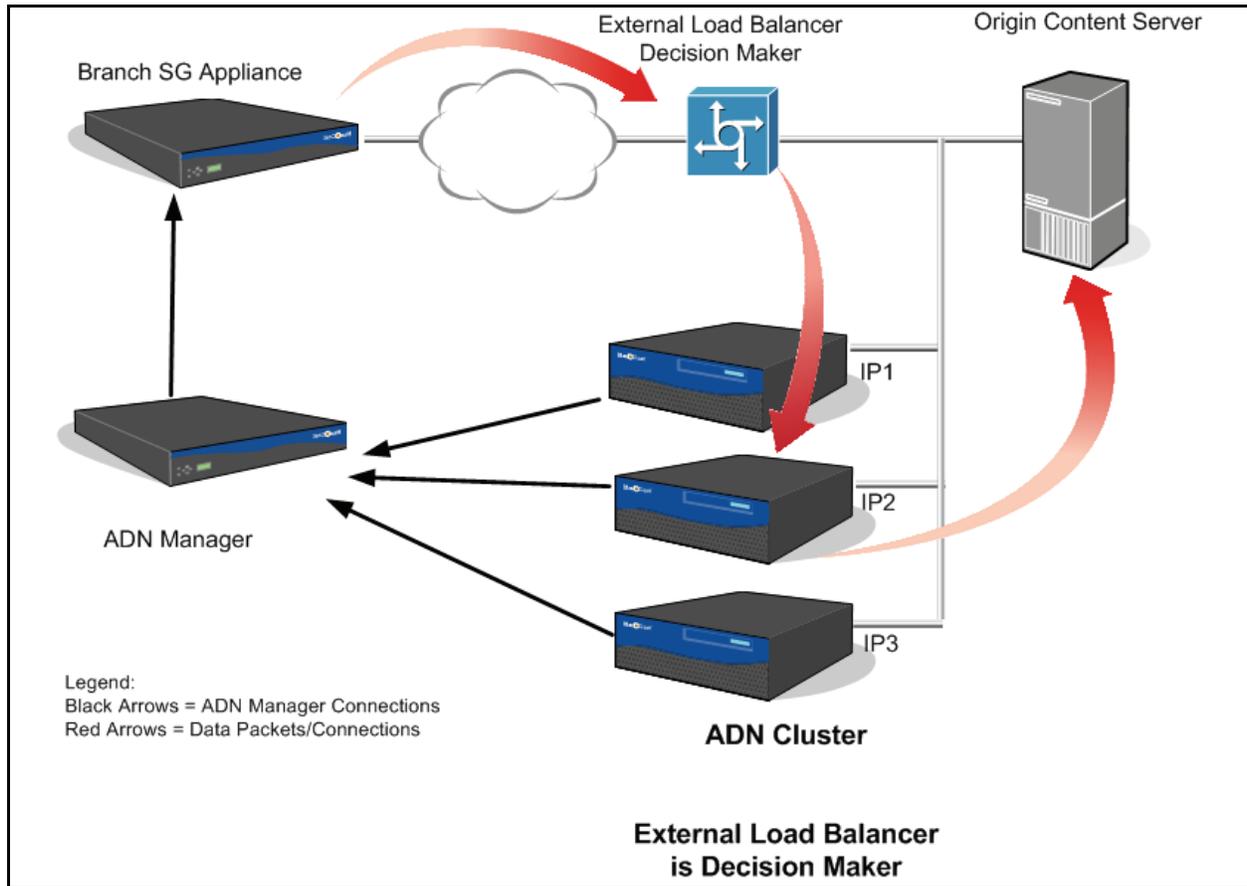


### Using an External Load Balancer

If you use explicit deployments, you can rely upon an external load-balancer fronting a group of ADN nodes. The load balancer is configured to distribute the load among the nodes that it fronts using client/IP address affinity.

The external load balancer provides more control than the server subnet, but it requires more configuration. For example, you must create an external VIP address on the **Configuration > App. Delivery Network > Tunneling > Load Balancing** tab on each system in the ADN cluster; the VIP address is explicitly advertised by the ADN manager.

Both server subnet and external load balancer use a cluster of ADN nodes for load balancing. The cluster is formed by ADN nodes that are configured to the same ADN manager and are advertising the same server subnets.



Whether you are using server subnets or an external load balancer, you must configure server subnets. If you are using an external load balancer, you must also configure the external load balancer with a VIP address and put the address in the **Load Balancing** tab. Continue with the next procedures to configure explicit load balancing.

### Explicit Load Balancing Procedures

If you want to use either the server subnet load balancing deployment or the external load balancing deployment, you must configure server subnets. If you are using the external load balancing deployment, you must also configure the external load balancer with a VIP address.

#### To configure server subnets:

1. Go to Select **Configuration > App. Delivery Network > Routing**.
2. Click **Add**.
3. Add the IP/Subnet route to be advertised by the ADN manager; click **OK**.
4. (Optional) Repeat for additional routes.

For detailed information about configuring server subnets, see [“Managing Server Subnets and Enabling an Internet Gateway”](#) on page 24.

## Section C: Transparent and Explicit Connection Deployments

**To configure VIP addresses:**

1. Select **Configuration > App. Delivery Network > Tunneling > Load Balancing**.
2. Enter the VIP address of the external load balancer.

---

**Note:** The VIP address is added from the **Load Balancing** tab of the App Delivery Network menu, not the **Advanced** tab of the Network menu.

---

3. Select **Apply** to commit the changes to the SG appliance.

The address must be entered on each ADN node in the cluster.

## Configuring a Combined (Transparent and Explicit) Deployment

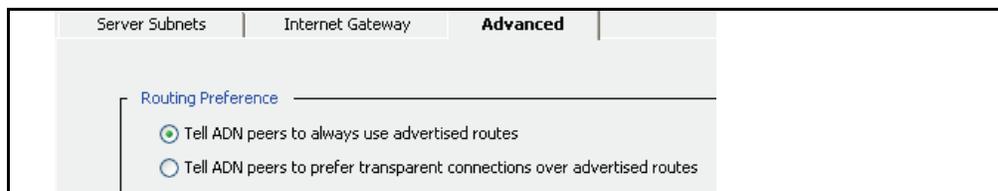
If you set up a transparent ADN network with no explicit connections, no additional configuration is required for transparent tunnel connections to work unless you want to configure load balancing. To configure transparent load balancing, skip to [“Setting Device Security” on page 31](#).

If you set up a combined ADN network with both explicit and transparent connections, you must:

- ❑ Configure the explicit routes you need (see [“Managing Server Subnets and Enabling an Internet Gateway” on page 24](#)).
- ❑ Configure the routing preference for each ADN node to tell ADN peers to prefer transparent connections (see [“To configure the routing preference:”](#)). The default is to always use advertised, explicit, routes.
- ❑ Set the manager listening mode to **Plain read-only** mode if SG Clients are in the network (see [“To configure ADN manager and tunnel listening mode and ports:” on page 34](#)).
- ❑ Configure transparent or explicit load balancing, if necessary. For more information, see [“Transparent Load Balancing” on page 22](#) or [“Explicit Load Balancing” on page 27](#).

**To configure the routing preference:**

1. Select **Configuration > App. Delivery Network > Routing > Advanced**.



2. Select the **Tell ADN peers to prefer transparent connections over advertised routes** radio button.

## Section D: Securing the ADN Network

Depending on your environment, you might need to secure your ADN network to provide the following services:

- ❑ **Host validation:** Securing the ADN network allows you to be sure that the ADN peers are talking to the right devices and that the peer is authorized to join the ADN network.
- ❑ **Privacy:** Privacy can be an issue, especially for tunnels that carry application data. You can configure the ADN network to secure ADN routing and tunnel connections using standard SSL protocol. SSL tunnels provide authentication, message privacy, and message authenticity security services, regardless of the application traffic that is being accelerated or tunneled.
- ❑ **Message authenticity:** Ensure that messages sent over ADN connections are not altered. Messages include the route information sent over the routing connections and compressed application data sent over the tunnel connections.

Secure ADN implementation includes:

- ❑ Device authentication, managed through the device authentication profile.
- ❑ Securing the device, including device authentication profile selection and device ID-based peer authorization.
- ❑ Securing the connections, both inbound and outbound connection security control.
- ❑ Configuring the SSL proxy.

---

**Note:** If you only want secure routing connections to the ADN manager, an SSL license is not required. Secure tunnel connections for applications such as CIFS, MAPI, TCP Tunnel, HTTP, or HTTPS/SSL, are dependent upon an SSL license.

---

## Configuring ADN Security Settings

For information on setting device security, continue with the next section. For information on setting connection security, continue with [“Securing Connections” on page 33](#).

### *Setting Device Security*

For maximum security, configure the ADN network for both device authentication and device authorization. Device authentication must be configured first.

---

**Note:** If the device being configured for authentication has Internet access, acquisition of the SG appliance certificate is automatic. If you use your own appliance certificates and profile, or if the affected device does not have Internet access, manual device authentication is required.

---

For information on configuring device authentication, see [Chapter 5: “Authenticating an SG Appliance” on page 77](#).

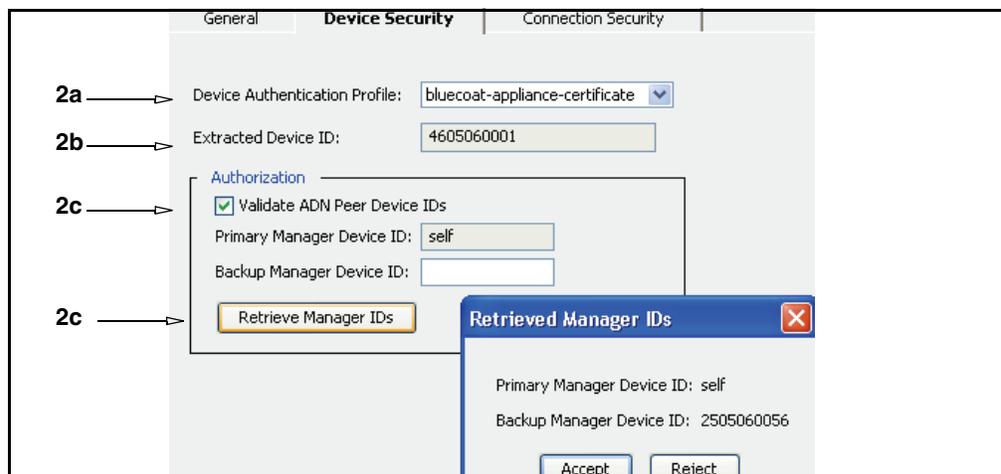
After the device authentication has been set up, point the ADN manager and ADN backup manager to the profile that is being used for authentication. Then enable authorization for maximum security.

## Section D: Securing the ADN Network

**Note:** You cannot enable device authorization before configuring the ADN manager and backup ADN manager. You can, however, configure the ADN manager and backup ADN manager and then, without pressing **Apply**, enable device authorization. Then press **Apply** to save both tabs.

### To set device security:

1. Select **Configuration > App. Delivery Network > General > Device Security**.



2. Configure the **Device Security** settings:
  - a. **Device Authentication Profile:** From the drop-down list, select the profile that you previously associated with the device authentication keyring. Note that only devices using the same profile are authenticated.
  - b. **Extracted Device ID:** The device ID that was extracted based on the selected profile is automatically displayed.

**Note:** The device ID is only used for security. The peer ID is the serial number.

- c. To enable authorization, select the **Validate ADN Peer Device IDs** checkbox.
  - If the primary or backup ADN manager is **Self**, the device ID is automatically displayed.
  - If the primary or backup ADN manager is a different system, click the **Retrieve Manager IDs** button to see the device ID. Click **Accept** to add the Manager device ID to the Authorization field.

**Note:** Authorization of devices is not complete until the devices have been approved to be part of the network. For more information on approving devices, see [“ADN Node Authorization” on page 17](#).

3. Select **Apply** to commit the changes to the SG appliance.

## Securing Connections

Use the Connection Security tab to set:

- Manager and Tunnel Listening Mode.
- Secure Outbound Connections.

### Listening Mode Options

In secure ADN mode, you can specify that the ADN manager and tunnel use secure mode to listen for routing and tunnel requests. By default, ADN routing and tunnel connection requests are unauthenticated and all ADN protocol messaging and compressed application data are transferred in plain text.

You must enable the device authentication profile before setting any other security parameters.

After the profile is configured, the following security modes are automatically set:

- Secure-outbound: (Secure Proxies)** Both outbound routing and secure proxy connections are secured. You can also select the radio button to:
  - Not secure ADN connections.
  - Secure only ADN routing connections.
  - Secure all ADN and routing connections.

---

**Note:** The secure-outbound feature is dependent upon an SSL license.

---

- Manager-listening-mode:** (Both) Listen for requests on two ports: plain and secure. If your deployment requires a different ADN manager listening mode, you must explicitly configure it. Other options available are:
  - Secure Only.
  - Plain Only.
  - Plain Read-Only. This mode is recommended if your network uses SG clients.
- Tunnel-listening-mode:** (Both) Listen for requests on two ports: plain and secure. Other options are:
  - Secure Only (Note that tunnel listening mode cannot be set to secure-only if SG Clients exist on the ADN network).
  - Plain Only.

### Secure Outbound Connections

When secure ADN is enabled, any existing plain outbound connections are dynamically secured by activating SSL according to the `secure-outbound` setting. Determine which outbound ADN connections are secured by changing the `secure-outbound` parameter. If you select:

- None:** Neither routing nor tunnel connections are secured. Secure proxy connections bypass ADN connections and go directly to the origin content sever.
- Routing-only:** Only routing connections are secured. Secure proxy connections bypass ADN connections and go directly to the origin content sever.

## Section D: Securing the ADN Network

- ❑ **Secure Proxies:** Routing connections and secure proxy connections are secured.
- ❑ **ALL:** All outbound connections are secured.

**Note:** Securing all outbound ADN connections should be done only if the platform has sufficient capacity to handle the extra overhead.

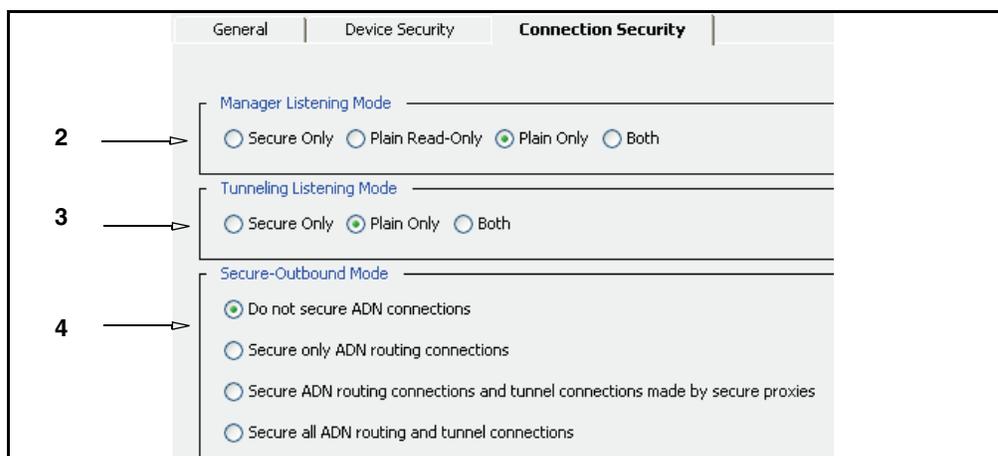
The table below describes secure outbound behavior with various applications.

Table 2-1. Secure Outbound Behavior

Secure-Outbound Setting	Routing Connections	Application Connections		
		CIFS	SSL Proxy Intercept Mode	SSL Proxy Tunnel Mode
None	Plain Text	Plain Text	Bypass ADN	Bypass ADN
Routing-only	Encrypted	Plain Text	Bypass ADN	Bypass ADN
Secure Proxies	Encrypted	Plain Text	Encrypted	Encrypted by application
All	Encrypted	Encrypted	Encrypted	Encrypted by application

### To configure ADN manager and tunnel listening mode and ports:

1. Select **Configuration > App. Delivery Network > General > Connection Security**.



2. To configure manager listening mode and ports:
  - To change the manager listening mode, go to **Configuration > App. Delivery Network > General > Connection Security**. The default is **Plain-only** before the device authentication profile is selected. After the device authentication profile is selected, the manager listening mode switches to **Both** by default.
  - To change the manager listening ports, go to **Configuration > App. Delivery Network > General > General**. The default is plain port 3034 and secure port 3036.

## Section D: Securing the ADN Network

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3. To configure tunnel listening mode and ports:
  - To change the tunnel listening mode, go to **Configuration > App. Delivery Network > General > Connection Security**. The default is **Plain-only** before the device authentication profile is selected. After the device authentication profile is selected, the manager listening mode switches to **Both** by default.
  - To change tunnel listening ports, go to **Configuration > App. Delivery Network > Tunneling > Connection**. The default is plain port 3035 and secure port 3037.  
The tunnel listening port is used only if there are explicit tunnel connections to this ADN node using the non-preserve-dest-port mode.
4. Select **Apply** to commit the changes to the SG appliance.

### *Authorizing Devices to Join the Network*

After a node is configured for authentication (device security) and peer validation is enabled on the ADN manager, the node must be accepted by the ADN manager and the backup ADN manager, if configured, before the device is allowed to join the network (authorization).

- ❑ When an ADN node comes up, it contacts the ADN manager for routing information.
- ❑ If secure-outbound is **None** on the ADN node and the ADN manager's listening mode is not secure-only, the ADN node connects to the plain manager listening port and immediately joins the ADN network.
- ❑ If the ADN node connects to the secure manager listening port, the ADN manager extracts the device ID from connecting ADN node's appliance certificate and looks for the device ID in its approved list of ADN nodes.
  - If the device is on the approved list, a `REQUEST-APPROVED` response is sent, followed by the route information, and the node joins the network.
  - If the device is not on the approved list, the ADN manager adds the connecting node's device ID to the pending-peers list and sends a `REQUEST-PENDING` response. After the peer is moved to the **Approved** list by the administrator, a `REQUEST-APPROVED` response is sent, followed by the route information, and the node joins the network.
  - If the **Pending Peers** option is not enabled and a peer is not on the approved list, the ADN manager sends a `REQUEST-DENIED` response and closes the connection. The connecting node closes the connection and updates its connection status.
  - If a peer is deleted from the approved list, the ADN manager broadcasts a `REJECT-PEER` to all nodes to delete this node and terminate any existing ADN connections to it. No new connections are routed through the deleted ADN node. To have the denied peer rejoin the ADN network, go to **ADN > Config > General > Reconnect to Managers**.

#### **To approve a device to join the network:**

---

**Note:** Device security must be enabled on all ADN peers you want to join the network before you complete this procedure on the ADN manager and backup ADN manager. For more information, see [“Setting Device Security” on page 31](#).

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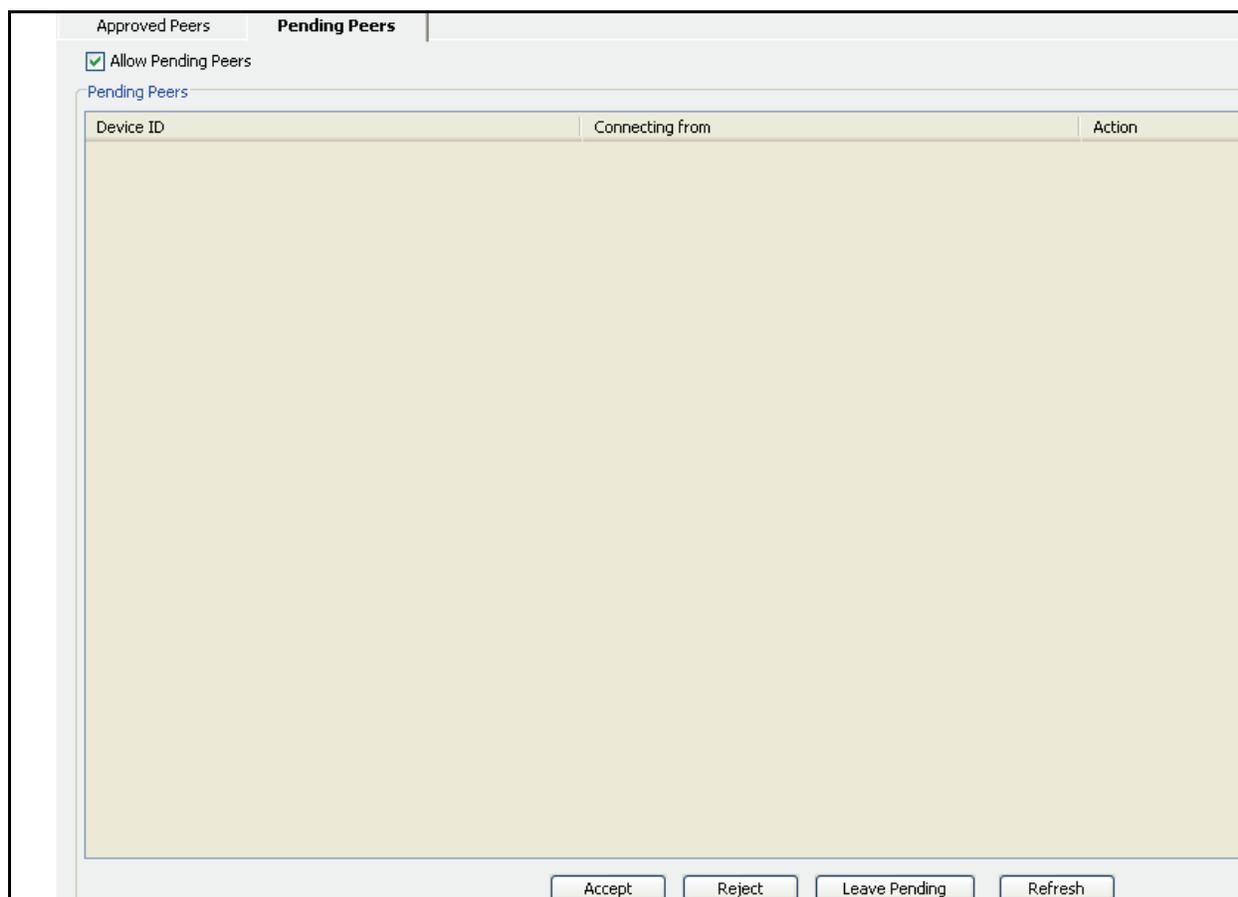
## Section D: Securing the ADN Network

1. Go to **Configuration > App. Delivery Network > Manager > Approved Peers**.
2. To manage peers that you want to be approved to join the network or that have previously been approved to join the network:
  - Add peers to the list by selecting **Add**; a dialog box displays that allows you to enter one or a group of peers by listing one to a line. Click **OK** when through. If the device contacts the ADN manager and is on the approved list, a `REQUEST-APPROVED` response is sent, followed by the route information, and the node joins the network.
  - Remove peers by highlighting the peer or peers and selecting **Remove**. If a peer is deleted from the approved list, the ADN manager broadcasts a `REJECT-PEER` to all nodes to delete this node and terminate any existing ADN connections to it. No new connections are routed through the deleted ADN node.
3. Select **Apply** to commit the changes to the SG appliance.

**To manage devices not yet approved to join the network:**

If a peer is configured to contact the ADN manager on startup but has not been added to the approved list, the ADN manager adds the peer to the list of pending peers if the **Allow Pending Peers** checkbox is selected. The peer moves from the Pending Peers list to the Approved Peers list only through human action.

1. Go to **Configuration > App. Delivery Network > Manager > Pending Peers**.



## Section D: Securing the ADN Network

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2. Select the **Allow Pending Peers** checkbox.
3. To manage pending peers:
  - Highlight a peer and click **Accept** or **Reject**; alternatively, you can select or reject all peers in the list by clicking **Accept All** or **Reject All**. If accepted, the peer moves to the **Approved** list; if not, it is dropped from the **Pending Peers** list.
  - You can also leave peers in the pending list by not selecting them or selecting them and clicking **Leave Pending**.
4. Select **Apply** to commit the changes to the SG appliance.

### Approved/Pending Notes

- Approved lists on the primary and backup ADN managers are not automatically kept in sync. You must approve peers on both the primary and backup ADN managers.

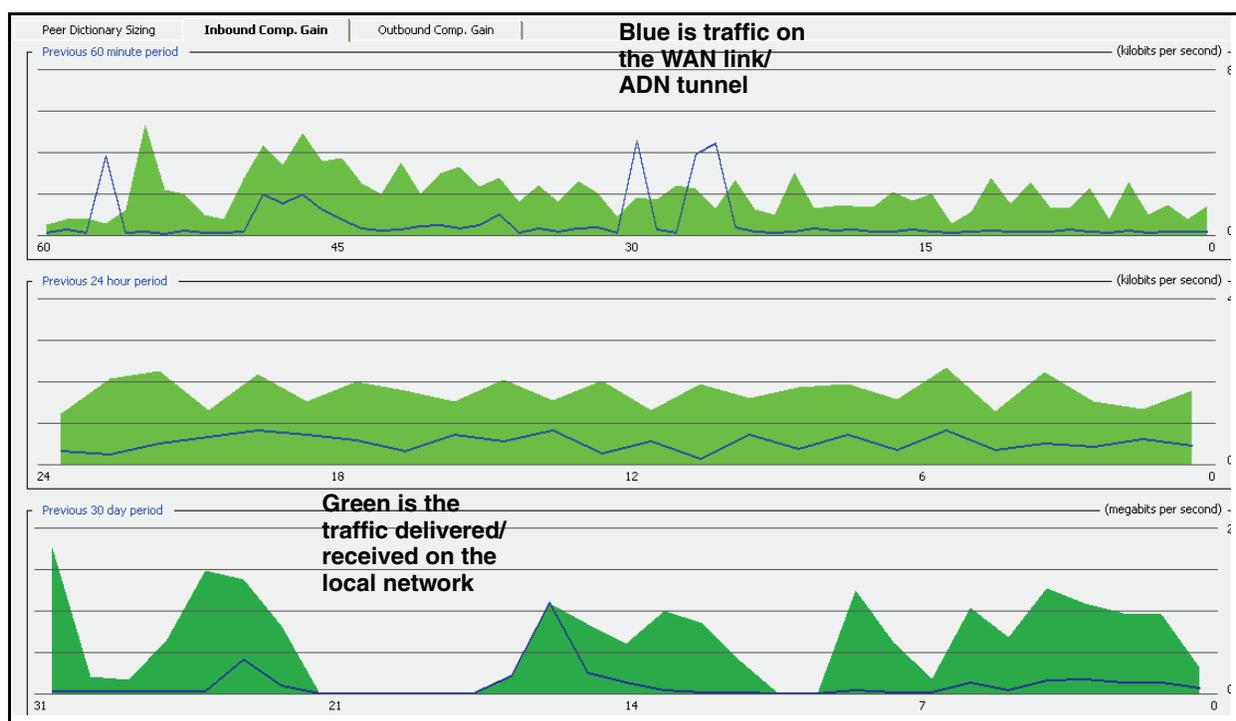
## Section E: ADN Network History, Statistics, and Health Metrics

After ADN optimization has been enabled and is processing, you can review byte caching history and various byte caching statistics.

### Reviewing ADN History

Review the Traffic Mix and Traffic History tabs in **Configuration > Statistics** to be sure that ADN is working. For more information on Traffic Mix and Traffic History, refer to the statistics information in *Volume 10: Managing the Blue Coat SG Appliance*.

To review ADN history, select **Configuration > Statistics > ADN History**.



**Inbound Compression Gain** represents traffic received from another peer. **Outbound Compression Gain** represents the traffic sent to other peers.

The values include both compression and byte-cache gain.

### Reviewing Byte-Caching Statistics

To review byte caching statistics, select **Statistics > Advanced** and select the **ADN** link from the list.

Per connection real time statistics are provided. Each connection has the following details:

- Client IP address/port.
- Server IP address/port.
- Bytes received from the application: The total bytes received from the client/server/application proxy.

## Section E: ADN Network History, Statistics, and Health Metrics

---

- ❑ Bytes sent to the application: The total bytes sent to the client/server/application proxy.
- ❑ Bytes received from the peer SG appliance: The bytes received on the ADN tunnel connection from the peer at the other end of the WAN link. (This is compressed unless byte caching is disabled).
- ❑ Bytes sent to the peer SG appliance: The bytes sent on the ADN tunnel connection to the peer at the other end of the WAN Link. (This is compressed unless byte caching is disabled).
- ❑ Duration: The lifetime of this connection.

### Reviewing ADN Health Metrics

You can see the state of the ADN network, specifically the ADN node, by checking the **Statistics > Health > General** tab.

The status can have the values as shown in the following table. The information is meant for diagnostic and debugging purposes.

## Section E: ADN Network History, Statistics, and Health Metrics

Table 2-2. Connectivity to ADN Routing Manager Health Metric

Status	Message	Description	State
<b>ADN Health Status</b>	Connected	The ADN node is connected to the ADN manager, ready to receive any route/peer updates. If a backup manager exists, this state indicates the node is connected to both Managers.	OK
	Functionality Disabled	ADN functionality is not enabled.	OK
	Not operational	ADN functionality is not operational yet — components are starting up or shutting down.	OK
	Connection Approved	The ADN node has been approved to connect to the ADN manager.	OK
	Connecting	The ADN node is in process of connecting to ADN manager.	OK
	Partially Connected	The ADN node is connected to one ADN manager but not the other.	Warning
	Mismatching Approval Status	The ADN node is approved by the current active ADN manager but is rejected by the backup manager. This warning only exists if a backup ADN manager is configured.	Warning
	Approval Pending	The ADN node is awaiting a decision from the active ADN manager for the node's request to join the ADN network.	Warning
	Disconnected	The ADN node is not connected to the ADN manager and cannot receive route/peer information. If a backup manager is configured, this state indicates the node is disconnected from both manager nodes.	Critical
Connection Denied	The ADN node is rejected by the ADN managers in the node's request to join the ADN network.	Critical	
<b>ADN Manager Status</b>	Not an ADN manager	The ADN node is not an ADN manager.	OK
	No Approvals Pending	All ADN nodes that are requesting to join the network are already on the approved list.	OK
	Approvals Pending	ADN nodes are requesting to join the network. The approvals are made by the administrator.	Warning

## Section F: Advanced Tunnel Optimization

Tunnel connections are between the branch and concentrator proxies and are made on demand. To reduce connection startup latency, tunnel connections are pooled and reused.

If a route is present, proxies that support ADN optimization use an ADN tunnel connection. Data traveling over the tunnel connection is subject to byte caching, compression, and encryption, per the defined policies.

The tunnel connection occurs independently of the ADN optimization options chosen for that connection. These options can be configured for specific services and can also be modified in policy.

---

**Note:** Encryption options cannot be set through policy.

---

Optimization options include byte caching and gzip compression; byte caching and gzip compression can be controlled separately for inbound and outbound traffic on the WAN.

By default, ADN routing and tunnel connection requests are unauthenticated and all ADN protocol messaging and compressed application data are transferred in plaintext. For maximum security, you can configure the ADN network to secure ADN routing and tunnel connections using standard SSL protocol, which provides authentication, message privacy, and message authenticity security services, regardless of the application traffic that is being accelerated or tunneled.

For information on securing the network, see [Section D: "Securing the ADN Network" on page 31](#).

### Setting Advanced Tunneling Parameters

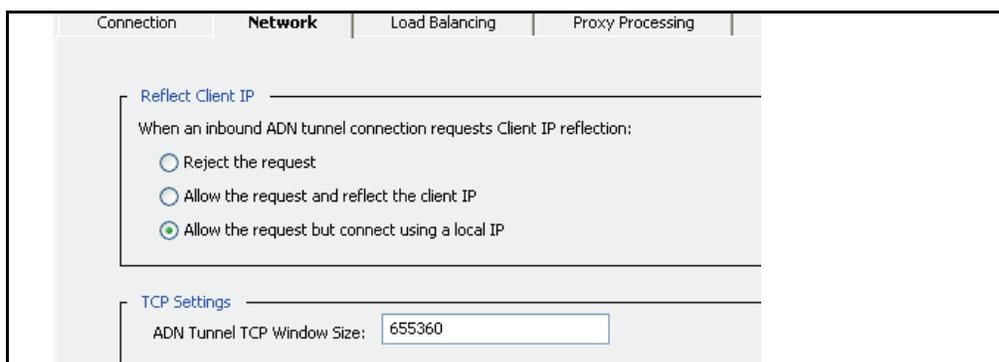
The tunneling parameters you set determine the behavior when you have special environmental needs where the default parameters are not adequate. These parameters generally do not need to be changed. Parameters that can be changed include:

- ❑ Connection Settings (see ["To configure ADN manager and tunnel listening mode and ports:" on page 34](#)).
- ❑ Network Settings (see ["To configure network tunneling settings:"](#) ).
- ❑ Load Balancing Settings (see ["Transparent Load Balancing" on page 22](#) and ["Explicit Load Balancing" on page 27](#)).
- ❑ Proxy Processing Settings (see ["To change parameters for proxy processing:" on page 42](#)).

#### **To configure network tunneling settings:**

1. Select **Configuration > App. Delivery Network > Tunneling > Network**.

## Section F: Advanced Tunnel Optimization



- Determine the behavior of the concentrator proxy when a branch proxy requests client IP reflection (sending the client's IP address instead of the SG appliance IP address to the upstream server).

This setting is based on whether the concentrator was installed in-line. If the concentrator proxy is in-line and can do IP reflection, you can allow client IP address reflection requests from clients. If not, set this option to either **Reject the Request** or **Allow the request but connect using a local IP** to accept the requests but ignore the client IP address and use a local IP address.

- In the **TCP Settings** panel, enter the TCP window size to be used on ADN optimization tunnel connections. This setting only needs to be changed for high bandwidth and high delay environments, such as satellite links. The range is between 8 KB and 4 MB (8192 to 4194304), depending on your bandwidth and the round-trip delay.

---

**Note:** If you know the bandwidth and roundtrip delay, you can compute the value to use as, roughly,  $2 * \text{bandwidth} * \text{delay}$ . For example, if the bandwidth of the link is 8 Mbits/sec and the round-trip delay is 0.75 seconds:

$$\text{window} = 2 * 8 \text{ Mbits/sec} * 0.75 \text{ sec} = 12 \text{ Mbits} = 1.5 \text{ Mbytes}$$

The setting in this example would be 1500000 bytes. This number goes up as either bandwidth or delay increases, and goes down as they decrease.

You can increase the window size based on this calculation but do not decrease the window size if the result is less than 64K.

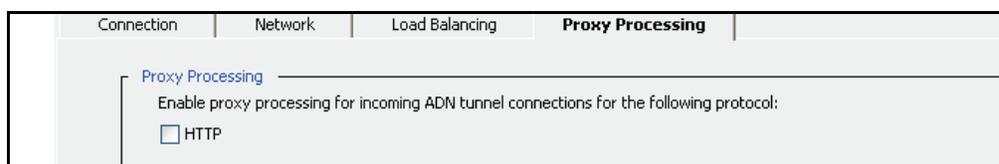
The window-size setting is a maximum value; the normal TCP/IP behaviors adjust downward as necessary. Setting the window size to a lower value might result in an artificially low throughput.

---

- Select **Apply** to commit the changes to the SG appliance.

#### To change parameters for proxy processing:

- Select **Configuration > App. Delivery Network > Tunneling > Proxy Processing**.



Section F: Advanced Tunnel Optimization

---

2. (Optional) If the concentrator is required to perform HTTP proxy processing on requests arriving over an ADN tunnel, select **HTTP**. For most deployments, this is not needed. All proxy processing always happens at the branch proxy; generally speaking, the concentrator proxy just compresses and decompresses bytes and forwards them to and from the server. If this setting is enabled, proxy processing happens at both the branch and concentrator.

---

**Note:** If you enable this setting, do not duplicate any of the policy that exists at the branch, since the branch settings still apply. Depending on the policy involved, doing the processing twice can cause problems (such as doing URL rewrite multiple times) or it might just be unnecessary, taking up valuable resources.

---

3. Select **Apply** to commit the changes to the SG appliance.

## Section G: Manually Re-Sizing a Byte-Cache Dictionary

The size of a byte-cache dictionary is dynamically based on the amount of traffic between two peers. Generally, the dynamic settings are acceptable; you do not need to change the dictionary size. Only if you determine that the algorithm performance does not guarantee a sufficient dictionary size for a specific peer should you manually set the dictionary size.

The byte cache itself, consisting of all data seen on the network, is stored on disk. However, byte caching stores index data in RAM. You cannot change the amount of memory allocated for a peer, but you can manually set the amount of disk space to be set aside. The amount of memory set aside is based on the disk space.

A table of peer rankings and dictionary sizes is created and maintained by the SG appliance. Peers are allocated dictionary space in order starting with the highest ranking peer in the table until each peer has been allocated resources, or maximum available amount of byte cache memory is reached.

---

**Note:** The rank table can track peers that are using SGOS 5.1.3, but these peers cannot dynamically re-size or delete their dictionary.

---

After the maximum available resources are reached, any peers that have not been allocated a dictionary cannot use byte caching. If those peers have existing dictionaries, the tunnels are downgraded to gzip compression only and the existing dictionary is deleted.

A node can re-negotiate a new shared dictionary size with one of its peers, and the dictionaries grow or shrink to their new resource levels. The final shared dictionary sizes between two peers is the minimum dictionary size that each peer tries to negotiate. To guarantee a minimum dictionary size, the value should be set on both peers. (See [“To manually resize byte cache dictionaries from the Statistics tab:” on page 45.](#))

When a peer joins the network, it is added to the peer ranking table. How much dictionary space it is allocated depends:

- ❑ If the maximum amount of resources have already been reached, the new peer can do gzip compression only.
- ❑ If the maximum amount of resources have not been reached:
  - If no history exists for this peer, then the peer negotiates a default dictionary size based on its maximum memory and maximum disk space.
  - If history does exist for the peer and the peer's rank guarantees the peer a dictionary, the peer is allocated a dictionary based on that history.

The peer ranking table is persistent across system reboots; the dictionaries themselves are re-sized upon any of the following conditions:

- ❑ System restart.
- ❑ A full dictionary.
- ❑ If the dictionary size is set manually.

The re-ranking allows potentially unused dictionaries to be identified and removed, freeing resources.

## Section G: Manually Re-Sizing a Byte-Cache Dictionary

You can manually resize an ADN byte-caching dictionary in two places in the Blue Coat appliance Management Console: From the **Statistics > ADN History > Peer Dictionary Sizing** tab, or from the **Configuration > ADN > Byte Caching** tab. You might find the Statistics tab easier to use, since you are not required to know the peer ID. Note, however, that only peers that are online are displayed in the **Statistics** tab. If a peer is offline, **Configuration > ADN > Byte Caching** can be used to configure manual dictionary size for any ADN peer.

To manually resize byte cache dictionaries from the Statistics tab, continue with the next section. To manually resize byte cache dictionaries from the ADN tab, skip to [“To manually resize byte cache dictionaries from the Configuration > App. Delivery Network > Byte Caching tab:”](#) on page 46.

### To manually resize byte cache dictionaries from the Statistics tab:

1. Select **Statistics > ADN History > Peer Dictionary Sizing**.

Peer Dictionary Sizing		Inbound Comp. Gain	Outbound Comp. Gain	Byte Cache Effectiveness				
Rank ▲	Peer ID	Peer IP	Byte Cache Score	Peer Traffic (GB/Day)	Fill Rate (GB/Day)	Recommended Dict Size (GB)	Actual Dict Size (GB)	
1	505060069	10.2.11.199	0	0.0000	0.0000	23.7953	23.7953	
2	505060030	10.254.2.200	0	0.0000	0.0000	23.7953	23.7953	
3	505060007	10.254.10.113	0	0.0000	0.0000	23.7953	23.7953	
4	3405070047	10.254.2.158	0	0.0006	0.0000	0.0005	0.0977 (Peer)	
5	1705060004	10.254.0.70	0	0.0000	0.0000	23.7953	23.7953	
6	2406060150	10.254.5.130	0	0.0000	0.0000	23.7953	23.7953	
7	2406060189	10.90.1.214	1	0.0020	0.0008	0.0116	0.0977 (Peer)	
8	3105060067	192.168.1.254	1	0.0013	0.0001	0.0010	0.0977 (Peer)	
9	1406060077	192.168.0.254	2	0.0045	0.0020	0.0277	0.0977 (Peer)	
10	506060035	10.96.1.220	4	0.0115	0.0067	0.0939	0.0977 (Peer)	
11	3406060044	10.254.3.100	7	0.0177	0.0104	0.1463	0.1455 (Peer)	
12	3105060048	10.254.0.162	15	0.0222	0.0067	0.0935	0.0977 (Peer)	
13	5105060019	10.254.2.163	16	0.0200	0.0037	0.0512	0.0977 (Peer)	
14	3105060047	10.254.3.34	16	0.0882	0.0719	1.0059	1.0059 (Peer)	
15	1406060030	10.254.4.2	17	0.0245	0.0072	0.1010	0.1010	
16	505060004	10.254.5.66	31	0.0335	0.0023	0.0316	0.0977 (Peer)	
17	4105060022	10.254.2.66	42	0.0441	0.0031	0.0429	0.0977 (Peer)	
18	3505060034	10.254.1.174	45	0.0529	0.0089	0.1240	0.1230 (Peer)	
19	707060014	10.254.0.70	66	0.0669	0.0019	0.0265	0.0977 (Peer)	
20	5105060021	10.254.5.40	102	0.1040	0.0043	0.0599	0.0977 (Peer)	

Edit

2. The Peer Dictionary Sizing tab gives you statistics relevant to the byte cache dictionary size of all peers on the network.
  - **Rank:** The value of a peer’s dictionary. Manually-configured peers have a higher rank than dynamically-configured peers.
  - **Peer ID:** The serial number of the device.
  - **Peer IP:** The IP address of the device.
  - **Byte Cache Score:** The score of this peer relative to other peers. Score is based on the value of the dictionary and is used to determine rank.
  - **Peer Traffic (GB/Day):** The average amount of pre-byte-cache traffic per day.
  - **Fill Rate (GB/Day):** The average amount of data put into the dictionary per day over the last week.

## Section G: Manually Re-Sizing a Byte-Cache Dictionary

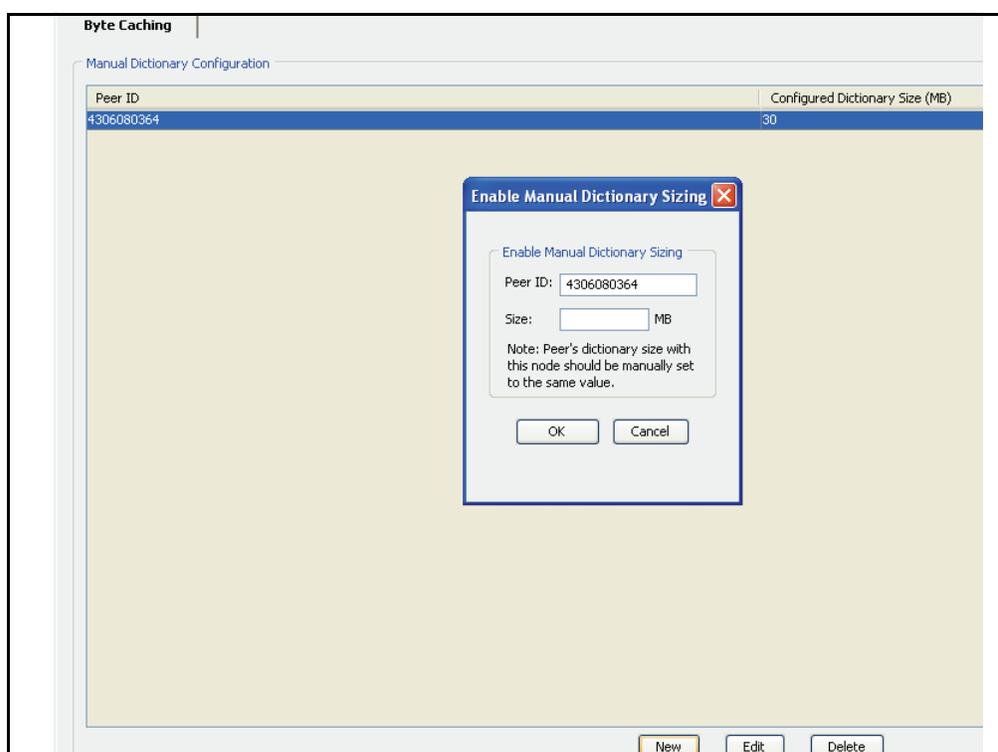
- **Recommended Dict Size (GB):** The dictionary size the Blue Coat appliance recommends, based on the peer traffic over the last week.
- **Actual Dict Size (GB):** The actual size of the dictionary.

Click anywhere on the line of the device whose dictionary you want to re-size. The **Edit Peer** dialog displays.

3. To select a dictionary size for the device, select the **Manual Re-size** radio button and enter the value you want in megabytes.
4. Click **OK** to have the resizing take effect immediately

### To manually resize byte cache dictionaries from the Configuration > App. Delivery Network > Byte Caching tab:

1. Select **Configuration > App. Delivery Network > Byte Caching**.



2. Click **New**. The **Enable Manual Dictionary Sizing** dialog displays.
3. Enter the peer ID (serial number) of the device with whom you are sharing a dictionary.
4. Enter the new value in megabytes.
5. Click **OK**. The peer is added to the manually configured dictionary sizing list and is ranked at the top of the dictionary byte cache table.

Dynamic dictionary sizing is re-enabled through highlighting the peer and selecting **Delete**.

## Section H: Related CLI Syntax to Configure an ADN Network

- ❑ To enter configuration mode:

```
SGOS#(config) adn
SGOS#(config adn)
```

---

**Note:** For detailed information on using these commands, refer to *Volume 12: Command Line Reference*.

---

- ❑ The following subcommands are available:

```
SGOS#(config adn) {enable | disable}
SGOS#(config adn) exit
SGOS#(config adn) byte-cache
    SGOS#(config adn byte-cache) peer-size peer-id {size_in_megabytes |
auto}
    SGOS#(config adn byte-cache) exit
    SGOS#(config adn byte-cache) view
SGOS#(config adn) load-balancing
    SGOS#(config adn load-balancing) {enable | disable}
    SGOS#(config adn load-balancing) exit
    SGOS#(config adn load-balancing) external-vip IP_address
    SGOS#(config adn load-balancing) group group_name
    SGOS#(config adn load-balancing) load-balance-only {enable |
disable}
    SGOS#(config adn load-balancing) no {external-vip | group}
    SGOS#(config adn load-balancing) view
SGOS#(config adn) manager
    SGOS#(config adn manager) backup-manager {IP_address [ID] | self}
    SGOS#(config adn manager) exit
    SGOS#(config adn manager) no {backup-manager | primary-manager}
    SGOS#(config adn manager) port port_number
    SGOS#(config adn manager) primary-manager {IP_address [ID] | self}
    SGOS#(config adn manager) secure-port secure_port_number
    SGOS#(config adn manager) view [approved-peers | backup-manager-id
| pending-peers | primary-manager-id]
    SGOS#(config adn manager) approved-peers
        SGOS#(config adn approved-peers) add peer-device-ID
        SGOS#(config adn approved-peers) exit
        SGOS#(config adn approved-peers) remove peer-device-ID
        SGOS#(config adn approved-peers) view
    SGOS#(config adn manager) pending-peers
        SGOS#(config adn pending-peers) {accept | reject}
        SGOS#(config adn pending-peers) {enable | disable}
        SGOS#(config adn pending-peers) exit
        SGOS#(config adn pending-peers) view
SGOS#(config adn) routing
    SGOS#(config adn routing) exit
    SGOS#(config adn routing) prefer-transparent {enable | disable}
    SGOS#(config adn routing) view
    SGOS#(config adn routing) advertise-internet-gateway
```

## Section H: Related CLI Syntax to Configure an ADN Network

```

SGOS#(config adn routing advertise-internet-gateway) {disable |
enable}
SGOS#(config adn routing advertise-internet-gateway) exempt-
subnet {add {subnet_prefix[/prefix_length]} clear-all | remove
{subnet_prefix[/prefix_length]} | view}
SGOS#(config adn routing advertise-internet-gateway) exit
SGOS#(config adn routing advertise-internet-gateway) view

SGOS#(config adn routing) server-subnets
SGOS#(config adn routing server-subnets) add subnet_prefix [/
prefix length]
SGOS#(config adn routing server-subnets) clear-all
SGOS#(config adn routing server-subnets) remove subnet_prefix [/
prefix length]
SGOS#(config adn routing server-subnets) exit
SGOS#(config adn routing server-subnets) view

SGOS#(config adn) security
SGOS#(config adn security) authorization {enable | disable}
SGOS#(config adn security) device-auth-profile profile_name [no-
authorization]
SGOS#(config adn security) exit
SGOS#(config adn security) manager-listening-mode {plain-only |
plain-read-only | secure-only| both}
SGOS#(config adn security) no device-auth-profile
SGOS#(config adn security) secure-outbound {none | routing-only|
secure-proxies | all}
SGOS#(config adn security) tunnel-listening-mode {plain-only |
secure-only | both}
SGOS#(config adn security) view

SGOS#(config adn) tunnel
SGOS#(config adn tunnel) connect-transparent {enable | disable}
SGOS#(config adn tunnel) exit
SGOS#(config adn tunnel) preserve-dest-port {enable | disable}
SGOS#(config adn tunnel) port port_number
SGOS#(config adn tunnel) proxy-processing http {enable | disable}
SGOS#(config adn tunnel) reflect-client-ip (deny | allow |
use-local-ip)
SGOS#(config adn tunnel) secure-port secure_port_number
SGOS#(config adn tunnel) tcp-window-size window_size
SGOS#(config adn tunnel) view

```

## Section I: Policy

The following gestures can be used for WAN optimization from either the VPM or CPL.

---

**Note:** For more information on using the VPM or CPL to configure policy, refer to *Volume 7: VPM and Advanced Policy* or *Volume 11: Content Policy Language Guide*.

---

- ❑ `adn.server` (yes | no) (Note that this property overrides all other routing and intercept decisions made by ADN based on configuration and routing information.)
- ❑ `adn.server.optimize` (yes | no)
- ❑ `adn.server.optimize.inbound` (yes | no)
- ❑ `adn.server.optimize.outbound` (yes | no)
- ❑ `adn.server.optimize.byte-cache` (yes | no)
- ❑ `adn.server.optimize.inbound.byte-cache` (yes | no)
- ❑ `adn.server.optimize.outbound.byte-cache` (yes | no)
- ❑ `adn.server.optimize.compress` (yes | no)
- ❑ `adn.server.optimize.inbound.compress` (yes | no)
- ❑ `adn.server.optimize.outbound.compress` (yes | no)



## Chapter 3: Attack Detection

The SGOS software can reduce the effects of distributed denial of service (DDoS) attacks and port scanning, two of the most common virus infections.

A DDoS attack occurs when a pool of machines that have been infected with a DDoS-type of virus attack a specific Web site. As the attack progresses, the target host shows decreased responsiveness and often stops responding. Legitimate HTTP traffic is unable to proceed because the infected system is waiting for a response from the target host.

Port scanning involves viruses attempting to self-propagate to other machines by arbitrarily attempting to connect to other hosts on the Internet. If the randomly selected host is unavailable or behind a firewall or does not exist, the infected system continues to wait for a response, thus denying legitimate HTTP traffic.

The SG appliance prevents attacks by limiting the number of simultaneous TCP connections from each client IP address and either does not respond to connection attempts from a client already at this limit or resets the connection. It also limits connections to servers known to be overloaded.

You can configure attack detection for both clients and servers or server groups, such as <http://www.bluecoat.com>. The *client* attack-detection configuration is used to control the behavior of virus-infected machines behind the SG appliance. The *server* attack-detection configuration is used when an administrator knows ahead of time that a virus is set to attack a specific host.

This feature is only available through the CLI. You cannot use the Management Console to enable attack detection.

This section discusses:

- ❑ “Configuring Attack-Detection Mode for the Client” on page 51
- ❑ “Configuring Attack-Detection Mode for a Server or Server Group” on page 55

### Configuring Attack-Detection Mode for the Client

#### To enter attack-detection mode for the client:

From the (config) prompt, enter the following commands:

```
SGOS#(config) attack-detection  
SGOS#(config attack-detection) client
```

The prompt changes to:

```
SGOS#(config client)
```

### Changing Global Settings

The following defaults are global settings, used if a client does not have specific limits set. They do not need to be changed for each IP address/subnet if they already suit your environment:

- ❑ client limits enabled: true
- ❑ client interval: 20 minutes

- ❑ block-action: drop (for each client)
- ❑ connection-limit: 100 (for each client)
- ❑ failure-limit: 50 (for each client)
- ❑ unblock-time: unlimited
- ❑ warning-limit: 10 (for each client)

#### To change the global defaults:

Remember that enable/disable limits and interval affect all clients. The values cannot be changed for individual clients. Other limits can be modified on a per-client basis.

---

**Note:** If you edit an existing client's limits to a smaller value, the new value only applies to new connections to that client. For example, if the old value was 10 simultaneous connections and the new value is 5, existing connections above 5 are not dropped.

---

```

SGOS#(config client) enable-limits | disable-limits
SGOS#(config client) interval minutes
SGOS#(config client) block ip_address [minutes] | unblock ip_address
SGOS#(config client) default block-action drop | send-tcp-rst
SGOS#(config client) default connection-limit
integer_between_1_and_65535
SGOS#(config client) default failure-limit integer_between_1_and_500
SGOS#(config client) default unblock-time minutes_between_10_and_1440
SGOS#(config client) default warning-limit integer_between_1_and_100

```

Table 3-1. Changing Global Defaults

enable-limits   disable-limits		Toggles between enabled and disabled. The default is disabled. This is a global setting and cannot be modified for individual clients.
interval	integer	Indicates the amount of time, in multiples of 10 minutes, that client activity is monitored. The default is 20. This is a global setting and cannot be modified for individual clients.
block   unblock	ip_address [minutes]	Blocks a specific IP address for the number of minutes listed. If the optional minutes argument is omitted, the client is blocked until explicitly unblocked. Unblock releases a specific IP address.
default block- action	drop   send- tcp-rst	Indicates the behavior when clients are at the maximum number of connections or exceed the warning limit: drop the connections that are over the limit or send TCP RST for connections over the limit. The default is drop. This limit can be modified on a per-client basis.
default connection-limit	integer	Indicates the number of simultaneous connections between 1 and 65535. The default is 100. This limit can be modified on a per-client basis.
default failure- limit	integer	Indicates the maximum number of failed requests a client is allowed before the proxy starts issuing warnings. Default is 50. This limit can be modified on a per-client basis.

Table 3-1. Changing Global Defaults (Continued)

default unblock-time	<i>minutes</i>	Indicates the amount of time a client is blocked at the network level when the client-warning-limit is exceeded. Time must be a multiple of 10 minutes, up to a maximum of 1440. By default, the client is blocked until explicitly unblocked. This limit can be modified on a per-client basis.
default warning-limit	<i>integer</i>	Indicates the number of warnings sent to the client before the client is blocked at the network level and the administrator is notified. The default is 10; the maximum is 100. This limit can be modified on a per-client basis.

**To create and edit a client IP address:**

Client attack-detection configuration is used to control the behavior of virus-infected machines behind the SG appliance.

1. Verify the system is in the attack-detection client submode.

```
SGOS#(config) attack-detection
SGOS#(config attack-detection) client
SGOS#(config client)
```

2. Create a client.

```
SGOS#(config client) create client ip_address or ip_and_length
```

3. Move to edit client submode.

```
SGOS#(config client) edit client_ip_address
```

The prompt changes to:

```
SGOS#(config client ip_address)
```

4. Change the client limits as necessary.

```
SGOS#(config client ip_address) block-action drop | send-tcp-rst
SGOS#(config client ip_address) connection-limit
integer_between_1_and_65535
SGOS#(config client ip_address) failure-limit
integer_between_1_and_65535
SGOS#(config client ip_address) unblock-time minutes
SGOS#(config client ip_address) warning-limit
integer_between_1_and_65535
```

Table 3-2. Changing the Client Limits

block-action	drop   send-tcp-rst	Indicates the behavior when the client is at the maximum number of connections: drop the connections that are over the limit or send TCP RST for the connection over the limit. The default is drop.
connection-limit	<i>integer</i>	Indicates the number of simultaneous connections between 1 and 65535. The default is 100.
failure-limit	<i>integer</i>	Indicates the behavior when the specified client is at the maximum number of connections: drop the connections that are over the limit or send TCP RST for the connection over the limit. The default is 50.

Table 3-2. Changing the Client Limits (Continued)

unlock-time	<i>minutes</i>	Indicates the amount of time a client is locked out at the network level when the client-warning-limit is exceeded. Time must be a multiple of 10 minutes, up to a maximum of 1440. By default, the client is blocked until explicitly unblocked. .
warning-limit	<i>integer</i>	Indicates the number of warnings sent to the client before the client is locked out at the network level and the administrator is notified. The default is 10; the maximum is 100.

**To view the specified client configuration:**

Enter the following command from the edit client submode:

```
SGOS#(config client ip_address) view
Client limits for 10.25.36.47:
Client connection limit:      700
Client failure limit:         50
Client warning limit:         10
Blocked client action:        Drop
Client connection unblock time: unlimited
```

**To view the configuration for all clients:**

1. Exit from the edit client submode:

```
SGOS#(config client ip_address) exit
```

2. Use the following syntax to view the client configuration:

```
view {<Enter> | blocked | connections | statistics}
```

**To view all settings:**

```
SGOS#(config client) view <Enter>
Client limits enabled:          true
Client interval:                20 minutes
Default client limits:
Client connection limit:        100
Client failure limit:           50
Client warning limit:           10
Blocked client action:          Drop
Client connection unblock time: unlimited
Client limits for 10.25.36.47:
Client connection limit:        700
Client failure limit:           50
Client warning limit:           10
Blocked client action:          Drop
Client connection unblock time: unlimited
```

**To view the number of simultaneous connections to the SG appliance:**

```
SGOS#(config client) view connections
Client IP      Connection Count
127.0.0.1      1
10.9.16.112    1
10.2.11.133    1
```

**To view the number of blocked clients:**

```
SGOS#(config client) view blocked
Client                Unblock time
10.11.12.13          2004-07-09 22:03:06+00:00UTC
10.9.44.73           Never
```

**To view client statistics:**

```
SGOS#(config client) view statistics
Client IP             Failure Count      Warning Count
10.9.44.72           1                  0
```

**To disable attack-detection mode for all clients:**

```
SGOS#(config client) disable-limits
```

## Configuring Attack-Detection Mode for a Server or Server Group

Server attack-detection configuration is used when an administrator knows ahead of time that a virus is set to attack a specific host.

You can create, edit, or delete a server. A server must be created before it can be edited. You can treat the server as an individual host or you can add other servers, creating a server group. All servers in the group have the same attack-detection parameters, meaning that if any server in the group gets the maximum number of simultaneous requests, all servers in the group are blocked.

You must create a server group before you can make changes to the configuration.

**To create a server or server group:**

1. At the (config) prompt:

```
SGOS#(config) attack-detection
SGOS#(config attack-detection) server
```

The prompt changes to:

```
SGOS#(config server)
```

2. Create the first host in a server group, using the fully qualified domain name:

```
SGOS#(config server) create hostname
```

**To edit a server or server group:**

At the (config server) prompt:

```
SGOS#(config server) edit hostname
```

The prompt changes to (config server hostname).

```
SGOS#(config server hostname) {add | remove} hostname
```

```
SGOS#(config server hostname) request-limit integer_from_1_to_65535
```

where:

<i>hostname</i>		The name of a previously created server or server group. When adding a hostname to the group, the hostname does not have to be created. The host that was added when creating the group cannot be removed.
add   remove	<i>hostname</i>	Adds or removes a server from this server group.

request-limit	<i>integer</i>	Indicates the number of simultaneous requests allowed from this server or server group. The default is 1000.
---------------	----------------	--

**To view the server or server group configuration:**

```
SGOS#(config server hostname) view
Server limits for hostname:
Request limit:                1500
```

## Chapter 4: Bandwidth Management

Bandwidth management (BWM) allows you to classify, control, and limit the amount of bandwidth used by different classes of network traffic flowing into or out of the SG appliance. Network resource sharing (or link sharing) is accomplished by using a bandwidth-management hierarchy where multiple traffic classes share available bandwidth in a controlled manner.

---

**Note:** The SG appliance does not attempt to reserve any bandwidth on the network links that it is attached to or otherwise guarantee that the available bandwidth on the network can sustain any of the bandwidth limits which have been configured on it. The SG appliance can only shape the various traffic flows passing through it, and prioritize some flows over others according to its configuration.

---

By managing the bandwidth of specified classes of network traffic, you can accomplish the following:

- ❑ Guarantee that certain traffic classes receive a specified minimum amount of available bandwidth.
- ❑ Limit certain traffic classes to a specified maximum amount of bandwidth.
- ❑ Prioritize certain traffic classes to determine which classes have priority over available bandwidth.

### Bandwidth Management Overview

To manage the bandwidth of different types of traffic that flow into, out of, or through the SG appliance, you must do the following:

- ❑ Determine how many bandwidth classes you need and how to configure them to accomplish your bandwidth management goals. This includes determining the structure of one or more bandwidth hierarchies if you want to use priority levels to manage bandwidth.
- ❑ Create and configure bandwidth classes accordingly.
- ❑ Create policy rules using those bandwidth classes to identify and classify the traffic in the SG appliance.
- ❑ Enable bandwidth management.

Bandwidth management configuration consists of two areas:

- ❑ Bandwidth allocation

This is the process of creating and configuring bandwidth classes and placing them into a bandwidth class hierarchy. This process can be done using either the Management Console or the CLI.

- ❑ Flow classification

This is the process of classifying traffic flows into bandwidth management classes using policy rules. Policy rules can classify flows based on any criteria testable by policy. You can create policy rules using either the Visual Policy Manager (VPM), which is accessible through the Management Console, or by composing Content Policy Language (CPL).

---

**Note:** For more information about using VPM to create policy rules, refer to *Volume 7: VPM and Advanced Policy*. For information about composing CPL, refer to *Volume 11: Content Policy Language Guide*.

---

## Allocating Bandwidth

The process of defining bandwidth classes and grouping them into a bandwidth class hierarchy is called *bandwidth allocation*. Bandwidth allocation is based on:

- ❑ the placement of classes in a hierarchy (the parent/child relationships).
- ❑ the priority level of classes in the same hierarchy.
- ❑ the minimum and/or maximum bandwidth setting of each class.

For example deployment scenarios, see “[Bandwidth Allocation and VPM Examples](#)” on page 68.

### Bandwidth Classes

To define a bandwidth class, you create the class, giving it a name meaningful to the purpose for which you are creating it. You can configure the class as you create it or edit it later. The available configuration settings are:

- ❑ Parent: Used to create a bandwidth-management hierarchy.
- ❑ Minimum Bandwidth: Minimum amount of bandwidth guaranteed for traffic in this class.
- ❑ Maximum Bandwidth: Maximum amount of bandwidth allowed for traffic in this class.
- ❑ Priority: Relative priority level among classes in the same hierarchy.

#### Parent Class

A parent class is a class that has children. When you create or configure a bandwidth class, you can specify another class to be its parent (the parent class must already exist). Both classes are now part of the same bandwidth-class hierarchy, and so are subject to the hierarchy rules (see “[Class Hierarchy Rules and Restrictions](#)” on page 60).

#### Minimum Bandwidth

Setting a minimum for a bandwidth class guarantees that class receives at least that amount of bandwidth, if the bandwidth is available. If multiple hierarchies are competing for the same available bandwidth, or if the available bandwidth is not enough to cover the minimum, bandwidth management is not be able to guarantee the minimums defined for each class.

---

**Note:** The SG appliance does not attempt to reserve any bandwidth on the network links that it is attached to or otherwise guarantee that the available bandwidth on the network can be used to satisfy bandwidth class minimums. The SG appliance can only shape the various traffic flows passing through it, and prioritize some flows over others according to its configuration.

---

### *Maximum Bandwidth*

Setting a maximum for a bandwidth class puts a limit on how much bandwidth is available to that class. It does not matter how much bandwidth is available; a class can never receive more bandwidth than its maximum.

To prevent a bandwidth class from using more than its maximum, the SG appliance inserts delays before sending packets associated with that class until the bandwidth used is no more than the specified maximum. This results in queues of packets (one per class) waiting to be sent. These queues allow the SG appliance to use priority settings to determine which packet is sent next. If no maximum bandwidth is set, every packet is sent as soon as it arrives, so no queue is built and nothing can be prioritized.

Unlike minimums and priority levels, the maximum-bandwidth setting can purposely slow down traffic. Unused bandwidth can go to waste with the maximum-bandwidth setting, while the minimum-bandwidth settings and priority levels always distributes any unused bandwidth as long as classes request it. However, priority levels are not meaningful without a maximum somewhere in the hierarchy. If a hierarchy has no maximums, any class in the hierarchy can request and receive any amount of bandwidth regardless of its priority level.

### *Priority*

When sharing excess bandwidth with classes in the same hierarchy, the class with the highest priority gets the first opportunity to use excess bandwidth. When the high-priority class uses all the bandwidth it needs or is allowed, the next class gets to use the bandwidth, if any remains. If two classes in the same hierarchy have the same priority, then excess bandwidth is shared in proportion to their maximum bandwidth setting.

## **Class Hierarchies**

Bandwidth classes can be grouped together to form a class hierarchy. Creating a bandwidth *class* allows you to allocate a certain portion of the available bandwidth to a particular type of traffic. Putting that class into a bandwidth-class *hierarchy* with other bandwidth classes allows you to specify the relationship among various bandwidth classes for sharing available (unused) bandwidth.

The way bandwidth classes are grouped into the bandwidth hierarchy determines how they share available bandwidth among themselves. You create a hierarchy so that a set of traffic classes can share unused bandwidth. The hierarchy starts with a bandwidth class you create to be the top-level parent. Then you can create other bandwidth classes to be the children of the parent class, and those children can have children of their own.

To manage the bandwidth for any of these classes, some parent in the hierarchy must have a maximum bandwidth setting. The classes below that parent can then be configured with minimums and priority levels to determine how unused bandwidth is shared among them. If none of the higher level classes have a maximum bandwidth value set, then bandwidth flows from the parent to the child classes without limit. In that case, minimums and priority levels are meaningless, because all classes get all the bandwidth they need at all times. The bandwidth, in other words, is not being managed.

### *Class Hierarchy Rules and Restrictions*

Certain rules and restrictions must be followed to create a valid BWM class hierarchy:

- ❑ Each traffic flow can only belong to one bandwidth management class.  
You can classify multiple flows into the same bandwidth class, but any given flow is always counted as belonging to a single class. If multiple policy rules match a single flow and attempt to classify it into multiple bandwidth classes, the last classification done by policy applies.
- ❑ When a flow is classified as belonging to a bandwidth class, all packets belonging to that flow are counted against that bandwidth class.
- ❑ If a minimum bandwidth is configured for a parent class, it must be greater than or equal to the sum of the minimum bandwidths of its children.
- ❑ If a maximum bandwidth is configured for a parent class, it must be greater than or equal to the largest maximum bandwidth set on any of its children. It must also be greater than the sum of the minimum bandwidths of all of its children.
- ❑ The minimum bandwidth available to traffic directly classified to a parent class is equal to its assigned minimum bandwidth minus the minimum bandwidths of its children. For example, if a parent class has a minimum bandwidth of 600 kbps and each of its two children have minimums of 300 kbps, the minimum bandwidth available to traffic directly classified into the parent class is 0.

### **Relationship among Minimum, Maximum, and Priority Values**

Maximum values can be used to manage bandwidth for classes whether or not they are placed into a hierarchy. This is not true for minimums and priorities, which can only manage bandwidth for classes that are placed into a hierarchy. Additionally, a hierarchy must have a maximum configured on a high-level parent class for the minimums and priorities to manage bandwidth.

This is because, without a maximum, bandwidth goes to classes without limit and there is no point to setting priorities or minimum guarantees. Bandwidth cannot be managed unless a maximum limit is set somewhere in the hierarchy.

When a hierarchy has a maximum on the top-level parent and minimums, maximums and priorities placed on the classes related to that parent, the following conditions apply:

- ❑ If classes in a hierarchy have minimums, the first thing that happens with available bandwidth is that all the minimum requests are satisfied. If the amount requested is less than the minimum for any class, it receives the entire amount, and its priority level does not matter.  
Even though a minimum is considered to be a guaranteed amount of bandwidth, satisfying minimums is dependent on the parent being able to receive its own maximum, which is not guaranteed.
- ❑ When all of the classes in a hierarchy have had their minimums satisfied, any additional requests for bandwidth must be obtained. When a class requests more than its minimum, it must obtain bandwidth from its parent or one of its siblings. If, however, a class requests more than its maximum, that request is denied—no class with a specified maximum is ever allowed more than that amount.
- ❑ If a class does not have a minimum specified, it must obtain all of the bandwidth it requests from its parents or siblings, and it cannot receive any bandwidth unless all of the minimums specified in the other classes in its hierarchy are satisfied.

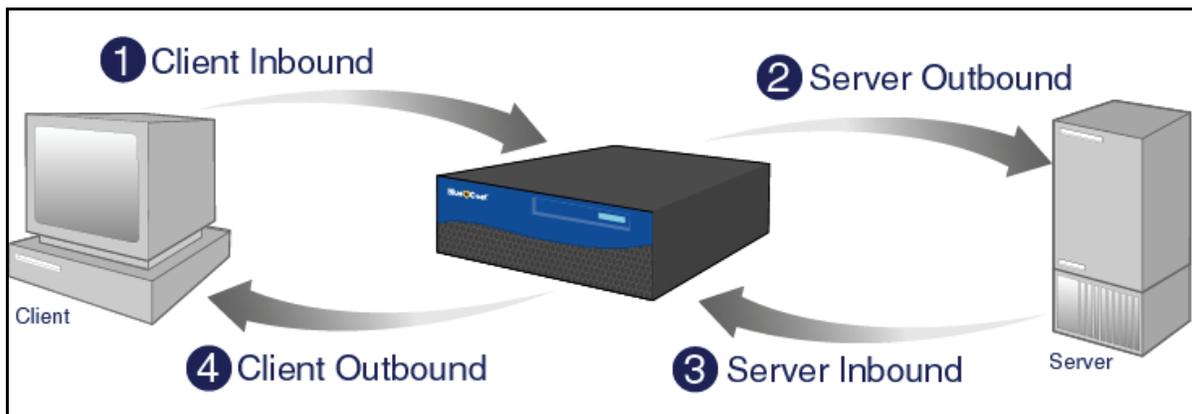
- ❑ Classes obtain bandwidth from their parents or siblings based on their priority levels—the highest priority class gets to obtain what it needs first, until either its entire requested bandwidth is satisfied or until it reaches its maximum. After that, the next highest priority class gets to obtain bandwidth, and this continues until either all the classes have obtained what they can or until the maximum bandwidth available to the parent has been reached. The amount available to the parent can sometimes be less than its maximum, because the parent must also participate in obtaining bandwidth in this way with its own siblings and/or parent if it is not a top-level class.

### Flow Classification

You can classify flows to BWM classes by writing policy rules that specify the bandwidth class that a particular traffic flow belongs to. A typical transaction has four traffic flows:

1. Client inbound—Traffic flowing into the SG appliance from a client (the entity sending a request, such as a client at a remote office linked to the appliance).
2. Server outbound—Traffic flowing out of the SG appliance to a server.
3. Server inbound—Traffic flowing back into the SG appliance from a server (the entity responding to the request).
4. Client outbound—Traffic flowing back out of the SG appliance to a client.

The figure below shows the traffic flows between a client and server through the SG appliance.



Some types of traffic can flow in all four directions. The following example describes different scenarios that you might see with an HTTP request. A client sends a GET to the SG appliance (client inbound). The SG appliance then forwards this GET to a server (server outbound). The server responds to the SG appliance with the appropriate content (server inbound), and then the appliance delivers this content to the client (client outbound).

Policy allows you to configure different classes for each of the four traffic flows. See [“Using Policy to Manage Bandwidth” on page 67](#) for information about classifying traffic flows with policy.

### Configuring Bandwidth Allocation

You can use either the Management Console or the CLI to do the following tasks:

- ❑ Enable or disable bandwidth management.
- ❑ Create and configure bandwidth classes.

- ❑ Delete bandwidth classes.
- ❑ View bandwidth management class configurations.

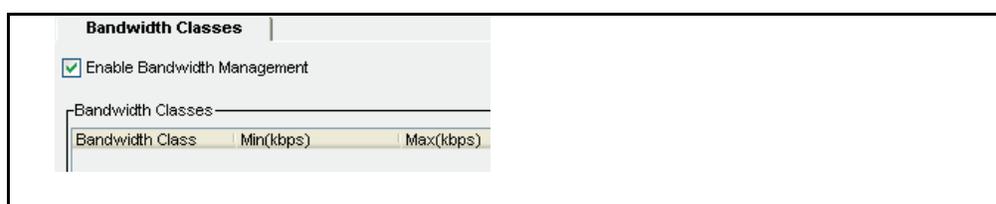
**Note:** If you plan to manage the bandwidth of streaming media protocols (Windows Media, Real Media, or QuickTime), you might want to use the streaming features instead of the bandwidth management features described in this section. For most circumstances, Blue Coat recommends that you use the streaming features to control streaming bandwidth rather than the bandwidth management features. For information about the differences between these two methods, refer to *Volume 4: Web Communication Proxies*.

## Enabling Bandwidth Management

The following procedures explain how to enable or disable bandwidth management.

### To enable bandwidth management:

1. Select **Configuration > Bandwidth Management > BWM Classes > Bandwidth Classes**.



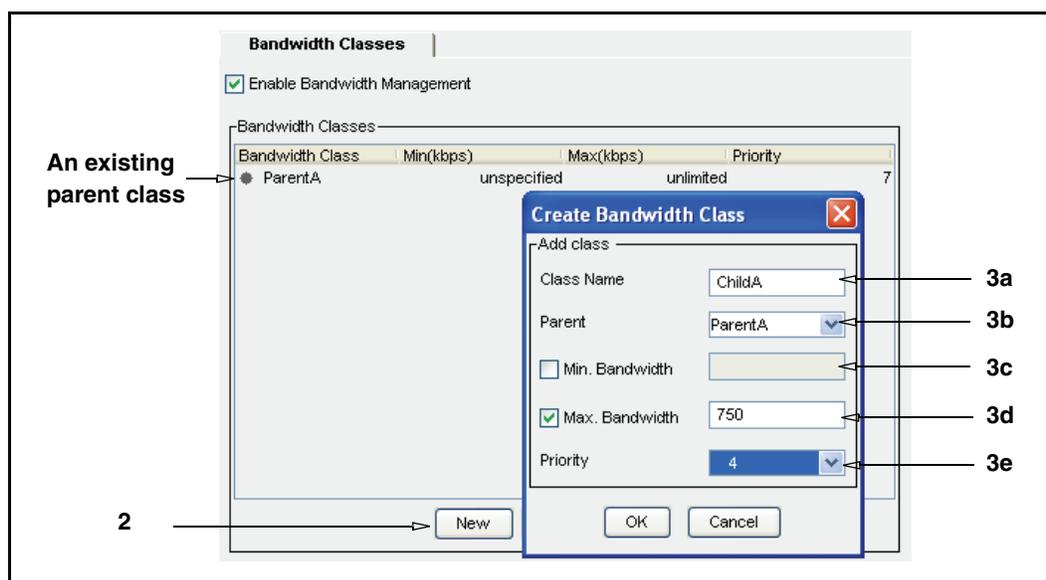
2. Select or deselect **Enable Bandwidth Management**.
3. Select **Apply** to commit the changes to the SG appliance.

## Creating, Editing, and Deleting Bandwidth Classes

The following procedure details how to create bandwidth management class.

### To create a BWM class:

1. Select **Configuration > Bandwidth Management > BWM Classes > Bandwidth Classes**.



2. To create a new BWM class, click **New**.
3. Fill in the fields as appropriate:
  - a. **Class name:** Assign a meaningful name for this class. The name can be up to 64 characters long; spaces are not allowed.
  - b. **Parent:** (Optional) To assign the class as a child of another parent class in the bandwidth class hierarchy, select an existing parent class from the drop-down list.
  - c. **Min. Bandwidth:** (Optional) Select **Min. Bandwidth** and enter a minimum bandwidth value in the field (kilobits per second (kbps)). The default minimum bandwidth setting is *unspecified*, meaning the class is not guaranteed a minimum amount of bandwidth.
  - d. **Max. Bandwidth:** (Optional) Select **Max. Bandwidth** and enter a maximum bandwidth value in the field. The default maximum bandwidth setting is *unlimited*, meaning the class is not limited to a maximum bandwidth value by this setting.
  - e. **Priority:** Select a priority level for this class from the **Priority** drop-down list—**0** is the lowest priority level and **7** is the highest. The default priority is **0**.
4. Click **OK**.
5. Select **Apply** to commit the changes to the SG appliance.

Bandwidth Class	Min(kbps)	Max(kbps)	Priority
ParentA	unspecified	unlimited	7
ChildA	unspecified	750	4

Figure 4-1. A child bandwidth management class added to a parent class.

After you add a child class to a parent class, the parent class is denoted by a folder icon. Double-click the folder to view all of the child classes under that parent.

#### To edit a BWM class:

1. Select **Configuration > Bandwidth Management > BWM Classes > Bandwidth Classes**.
2. Highlight the class and click **Edit**.
3. Edit the fields as appropriate.

#### To delete a BWM class:

**Note:** You cannot delete a class that is referenced by another class or by the currently installed policy. For instance, you cannot delete a class that is the parent of another class or one that is used in an installed policy rule. If you attempt to do so, a message displays explaining why this class cannot be deleted.

1. Select **Configuration > Bandwidth Management > BWM Classes > Bandwidth Classes**.
2. Highlight the class to delete and **Delete**.
3. Click **Yes** to delete the class.
4. Click **Apply**.

## Viewing Bandwidth Management Configurations

You can view the following bandwidth class configurations:

- ❑ Level in the hierarchy (parent/child relationships)
- ❑ Priority level
- ❑ Maximum bandwidth value
- ❑ Minimum bandwidth value

### To view BWM configuration:

1. Select **Configuration > Bandwidth Management > BWM Classes > Bandwidth Classes**.  
On this tab, you can view a class's minimum, maximum and priority value. Top level classes are visible—classes with children have a folder icon on the left.
2. To view the configurations of the child class(es) of a class, double-click the folder icon.  
The child classes become visible. A second double-click closes the folder.

### Related CLI Syntax to Configure Bandwidth Management

- ❑ To enter configuration mode:  
SGOS#(config) **bandwidth-management**
- ❑ The following subcommands are available:  
SGOS#(config bandwidth-management) **enable** | **disable**  
SGOS#(config bandwidth-management) **create** | **delete** *bwm\_class*
- ❑ To enter edit mode:  
SGOS#(config bandwidth-management) **edit** *bwm\_class*
- ❑ The following subcommands are available:  
SGOS#(config bw-class *bwm\_class*) **min-bandwidth** *minimum\_in\_kbps*  
SGOS#(config bw-class *bwm\_class*) **max-bandwidth** *maximum\_in\_kbps*  
SGOS#(config bw-class *bwm\_class*) **priority** *value\_from\_0\_to\_7*  
bandwidth-management *bwm\_class*) **no** {**min-bandwidth** | **max-bandwidth**}  
SGOS#(config bandwidth-management *bwm\_class*) **parent** *parent\_class\_name*  
-or-  
SGOS#(config bandwidth-management *bwm\_class*) **no parent**  
SGOS#(config bandwidth-management *bwm\_class*) **view**

## Bandwidth Management Statistics

The bandwidth management statistics tabs (Current Class Statistics and Total Class Statistics) display the current packet rate and total number of packets served, the current bandwidth rate, and the total number of bytes served and packets dropped.

### Current Class Statistics Tab

The **Current Class Statistics** tab displays the following information for each bandwidth class:

- ❑ **Current Packet Rate:** current packets-per-second (pps) value.
- ❑ **Current Bandwidth:** current bandwidth in kilobits per second (Kbps).

**To view current bandwidth management class statistics:**

1. Select **Statistics > Bandwidth Management > Current Class Statistics**.

The high level bandwidth classes and their statistics are visible.

Bandwidth Class	Current Packet Rate(pps)	Current Bandwidth(kbps)
bridging	0	0
ftp	0	0
http	0	0
im	0	0
streaming	0	0
p2p	0	0
service-info	0	0
socks	0	0
tcp-tunnel	0	0

2. To view the statistics of child bandwidth classes, double-click the folder icon of the parent class.

The child classes become visible. A second double-click closes the folder.

**Total Class Statistics Tab**

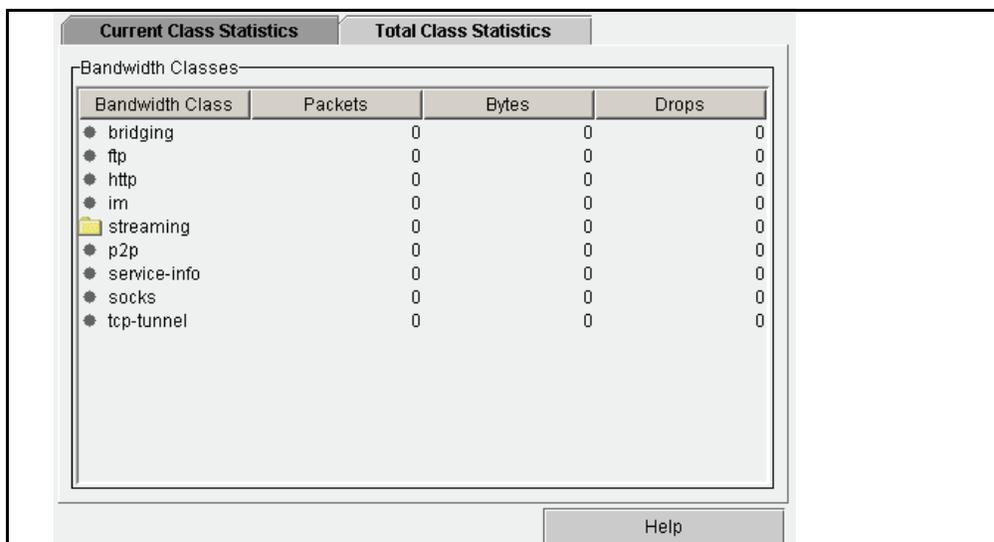
The **Total Class Statistics** tab displays the following information for each bandwidth class:

- Packets:** the total number of packets served.
- Bytes:** the total number of bytes served.
- Drops:** the total number of packets dropped.

**To view total bandwidth management class statistics:**

1. Select **Statistics > Bandwidth Management > Total Class Statistics**.

The high level bandwidth classes and their statistics are visible.



- To view the statistics of child bandwidth classes, double-click the folder icon of the parent class. A second double-click closes the folder.

## Bandwidth Management Statistics in the CLI

### To view bandwidth management statistics:

- To view all bandwidth management statistics, enter the following commands at the prompt:  

```
SGOS#(config) bandwidth-management
SGOS#(config bandwidth-management) view statistics
```
- To view the BWM statistics for a specific class, enter the following command at the (config) command prompt:  

```
SGOS#(config bandwidth-management) view statistics bwm_class
```

### Example

```
SGOS#(config bandwidth-management) view statistics http
Class Name:          http
Parent:              <none>
Minimum Bandwidth:  unspecified
Maximum Bandwidth:  unlimited
Priority:             0
Total Bytes:         0 bytes
Total Packets:       0 pkts
Dropped Packets:    0 pkts
Current Bandwidth:   0 kbps
Current Packet Rate: 0 pps
Queue Length:       0 bytes
```

Parent	The class name of the parent of this class.
Minimum Bandwidth	The maximum bandwidth setting for this class.
Maximum Bandwidth	The minimum bandwidth setting for this class.
Priority	The priority level for this class.

Total Bytes	The total number of bytes served.
Total Packets	The total number of packets served.
Dropped Packets	Total number of packets dropped (packets in the queue that are dropped because the queue length is reached).
Current Bandwidth	Current bandwidth value (in kilobits per second).
Current Packet Rate	Current packets-per-second value.
Queue Length	Maximum length allowed for the queue of packets that lack available bandwidth but are waiting for bandwidth to become available.

#### To clear bandwidth management statistics:

- To clear bandwidth management statistics for all bandwidth management classes, enter the following command at the prompt:  

```
SGOS# clear-statistics bandwidth-management
```
- To clear bandwidth management statistics for a particular class, enter the following command at the prompt:  

```
SGOS# clear-statistics bandwidth-management class bandwidth_class_name
```

## Using Policy to Manage Bandwidth

After creating and configuring bandwidth management classes, create policy rules to classify traffic flows using those classes. Each policy rule can only apply to one of four traffic flow types:

- Client inbound
- Client outbound
- Server inbound
- Server outbound

You can use the same bandwidth management classes in different policy rules; one class can manage bandwidth for several types of flows based on different criteria. However, any given flow is always be counted as belonging to a single class. If multiple policy rules match a flow and try to classify it into multiple bandwidth classes, the last classification done by policy applies.

To manage the bandwidth classes you have created, you can either compose CPL (see “CPL Support for Bandwidth Management” on page 67 below) or you can use VPM (see “VPM Support for Bandwidth Management” on page 68). To see examples of policy using these methods, see “Bandwidth Allocation and VPM Examples” on page 68 or “Policy Examples: CPL” on page 75.

### *CPL Support for Bandwidth Management*

You must use policy to classify traffic flows to different bandwidth classes. Refer to *Volume 11: Content Policy Language Guide* for more information about writing and managing policy.

## CPL Triggers

You can use all of the CPL triggers for BWM classification (refer to *Volume 11: Content Policy Language Guide* for information about using CPL triggers). Basing a bandwidth decision on a trigger means that the decision does not take effect until after the information needed to make that decision becomes available. For example, if you set the CPL to trigger on the MIME type of the HTTP response, then the HTTP headers must be retrieved from the OCS before a classification can occur. The decision to retrieve those headers occurs too late to count any of the request bytes from the client or the bytes in the HTTP response headers. However, the decision affects the bytes in the body of the HTTP response and any bytes sent back to the client.

## Supported CPL

Bandwidth class can be set with policy on each of these four traffic flows:

- ❑ `limit_bandwidth.client.inbound(none | bwm_class)`
- ❑ `limit_bandwidth.client.outbound(none | bwm_class)`
- ❑ `limit_bandwidth.server.inbound(none | bwm_class)`
- ❑ `limit_bandwidth.server.outbound(none | bwm_class)`

If you set policy to `none`, the traffic is unclassified and is not to be bandwidth-managed.

## VPM Support for Bandwidth Management

You can manage bandwidth using VPM in the **Action** column of four policy layers: Web Access, DNS Access, Web Content, and Forwarding Layers. For more information about using VPM to manage bandwidth, refer to *Volume 7: VPM and Advanced Policy*. For examples of bandwidth management scenarios using VPM, see "Bandwidth Allocation and VPM Examples" below.

## Bandwidth Allocation and VPM Examples

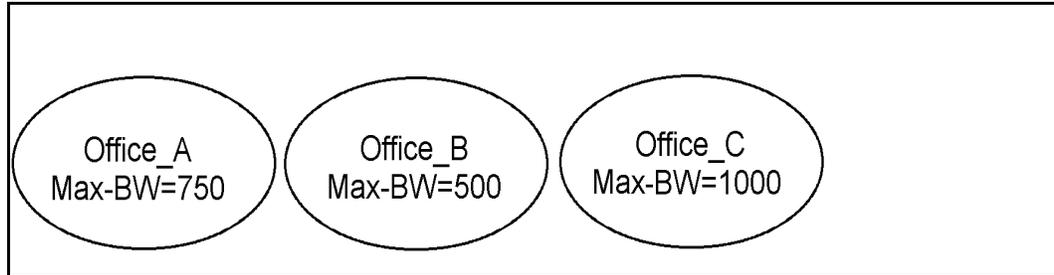
This section illustrates how to use the VPM to allocate bandwidth, arrange hierarchies, and create policy. It describes an example deployment scenario and the tasks an administrator must accomplish to manage the bandwidth for this deployment. For specific instructions about allocating bandwidth, see "[Configuring Bandwidth Allocation](#)" on page 61. For examples of CPL bandwidth management tasks, see "[Policy Examples: CPL](#)" on page 75.

### Task One: Bandwidth Allocation

The administrator is responsible for managing the bandwidth of three branch offices. He was told to ensure that each office uses no more than half of its total link bandwidth for Web and FTP traffic. The total link bandwidth of each office is as follows:

- ❑ Office A: 1.5 Mb
- ❑ Office B: 1 Mb
- ❑ Office C: 2 Mb

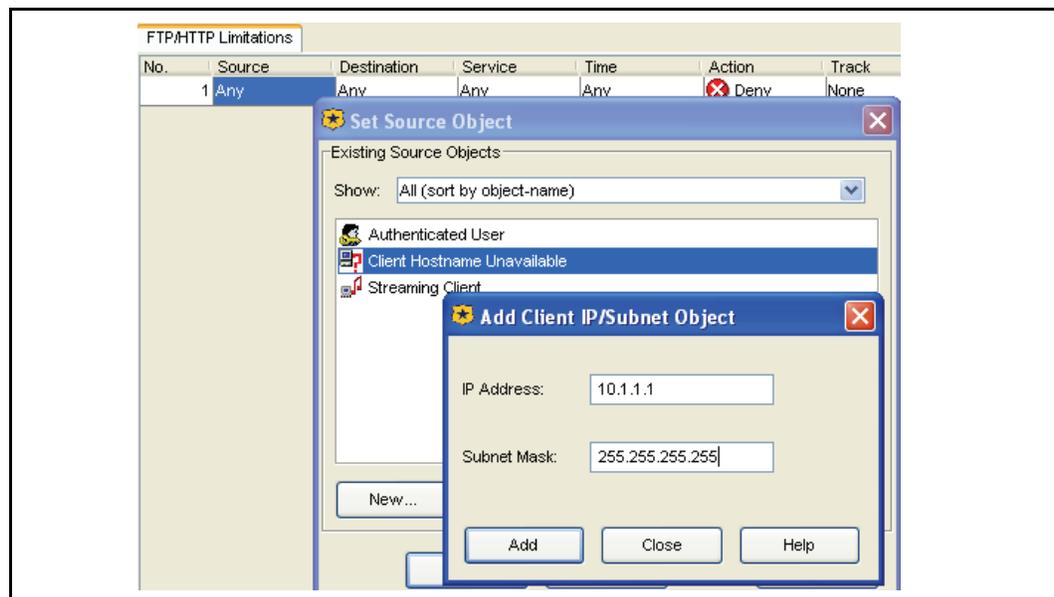
He creates one bandwidth class for each of the three offices and configures the maximum bandwidth to an amount equal to half of the total link bandwidth of each, as shown below. He also creates policy rules for each class, as described below in "Task One: VPM".



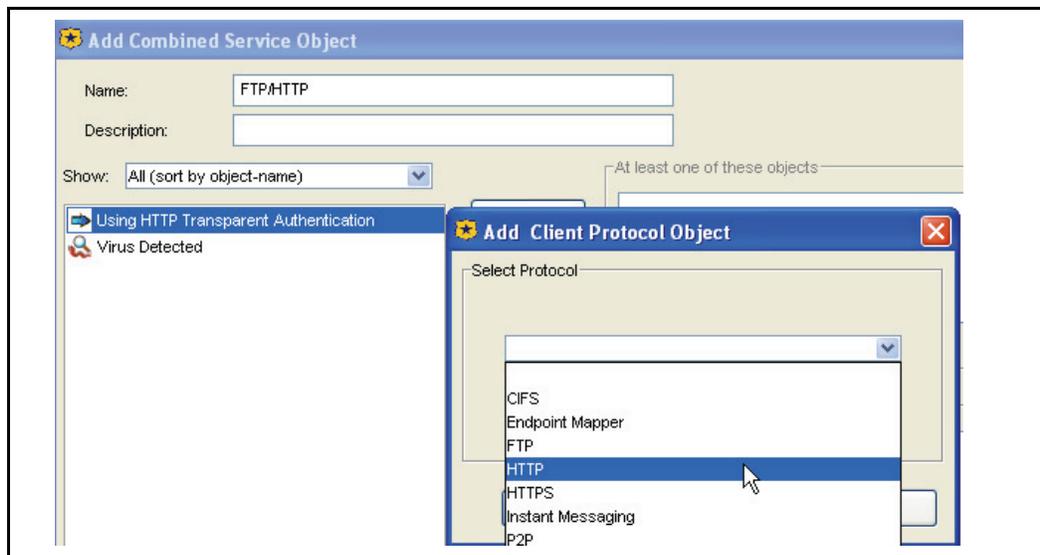
Each of the classes above has a maximum set at an amount equal to half of the total link bandwidth for each office. A hierarchy does not exist in this scenario.

#### Task One: VPM

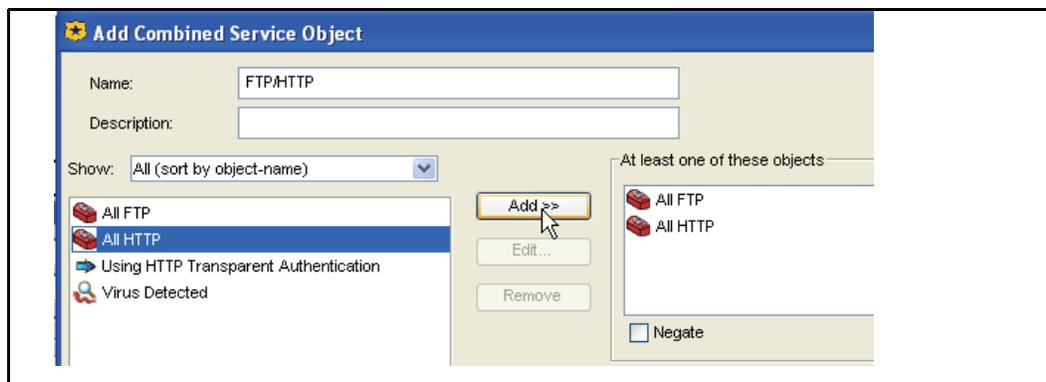
The administrator has created one bandwidth class for each office, setting a maximum bandwidth on each one equal to the half of the total link bandwidth of each. Now he must create policy rules to classify the traffic flows.



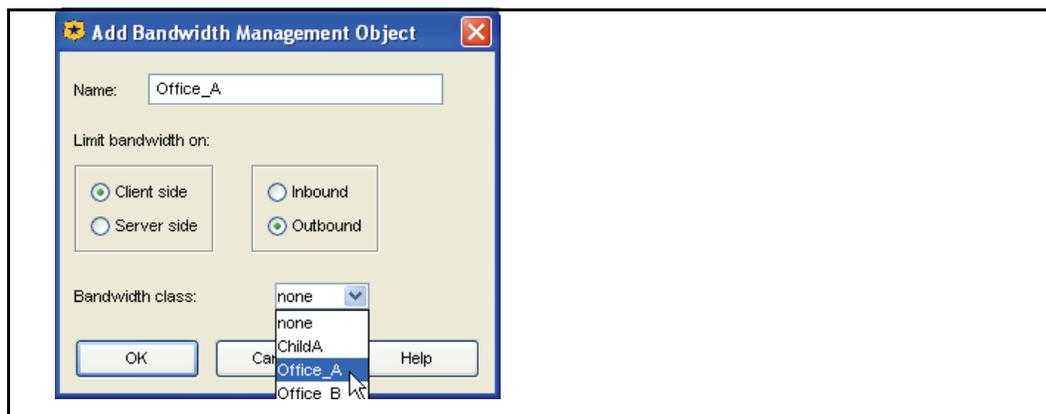
The administrator launches the VPM and creates a new Web Access Layer, naming it **FTP/HTTP Limitations**. He selects the **Client IP Address/Subnet** object in the **Source** column, filling in the IP address and mask of the subnet used by **Office\_A**.



He selects a **Combined Service Object** in the **Service** column, naming it **FTP/HTTP** and adding a **Client Protocol** for FTP and for HTTP.



He adds both protocols to the **At least one of these objects** field.



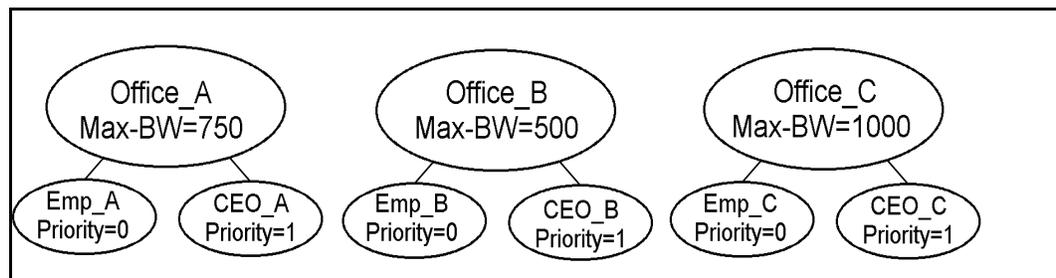
In the **Action** column, he selects **Manage Bandwidth**, naming it **Office\_A** and setting it to manage the bandwidth of **Office\_A** on the **Client side** in the **Outbound** direction.

He adds two more similar rules for the other two offices. He is able to reuse the same **Combined Service Object** in the **Service** column, but must add new objects specific to each office in the **Source** and **Action** columns. The order of the rules does not matter here, because each office, and thus each rule, is distinct because of its IP address/subnet mask configuration.

#### *Task Two: Bandwidth Allocation*

A few days later, the administrator gets a visit from the CEO of his company. She wants him to fix it so that she can visit any of the branch offices without having her own Web and FTP access slowed down unnecessarily.

The administrator creates two more classes for each office: one for the CEO and another for everyone else (employees). He sets the parent class of each new class to the appropriate class that he created in Task One. For example, he creates **Emp\_A** and **CEO\_A** and sets their parent class to **Office\_A**. He also sets a priority level for each class: **0** (the lowest) for employees and **1** for the CEO. He then uses VPM to create additional policy rules for the new classes (see "Task Two: VPM" below). This figure shows the hierarchical relationship among all of the classes.

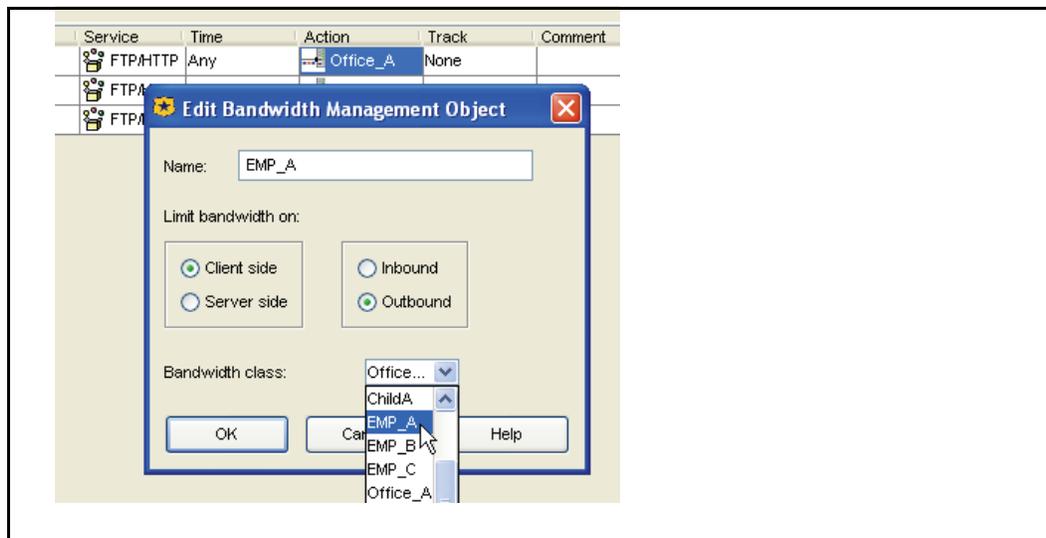


The administrator now has three separate hierarchies. In each one, bandwidth is limited by the configuration of the parent class, and the two child classes are prioritized to determine how they share any unused bandwidth. Because no minimums have been set, the highest priority class has the first opportunity to use all of the available bandwidth; whatever is left then goes to the next priority class.

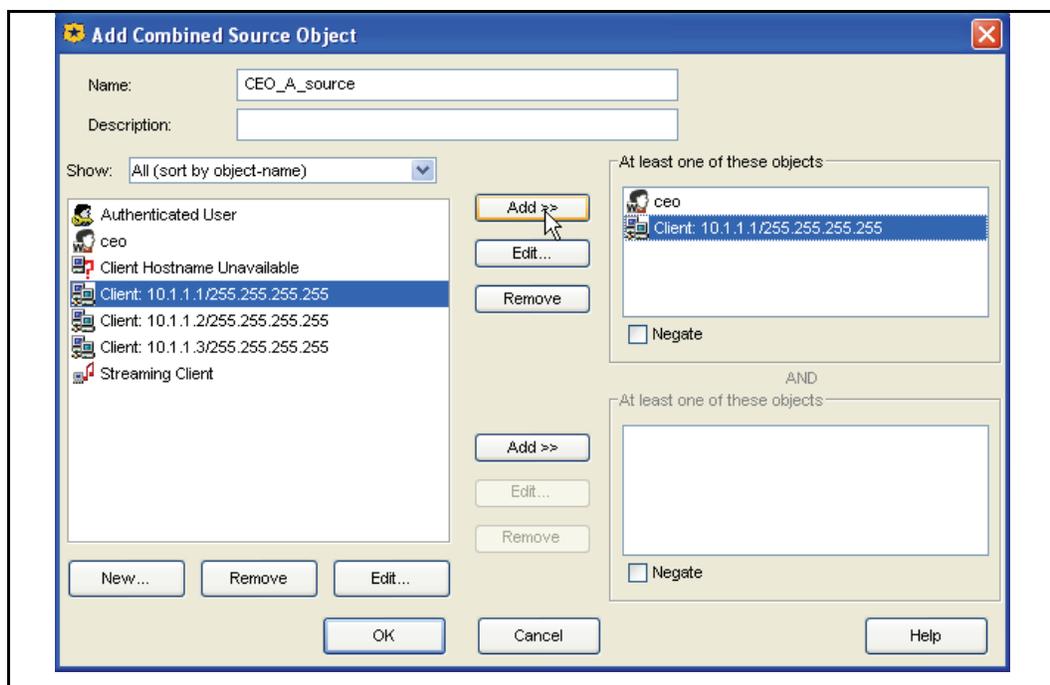
Priority levels are only effective among the classes in the same hierarchy. This means that the priority levels for the **Office\_A** hierarchy do not affect the classes in the **Office\_B** or **Office\_C** hierarchies.

#### *Task Two: VPM*

Because the CEO wants to prioritize FTP and HTTP access among employees and herself, the administrator must create additional bandwidth classes (as described above in "Task Two: Bandwidth Allocation") and write policy rules to classify the traffic for the new classes.



He first edits each of the three VPM rules for the three offices. He edits each the Manage Bandwidth objects, changing the name of the objects to **Emp\_A**, **Emp\_B**, and **Emp\_C** and changes the bandwidth class to the corresponding employee class.



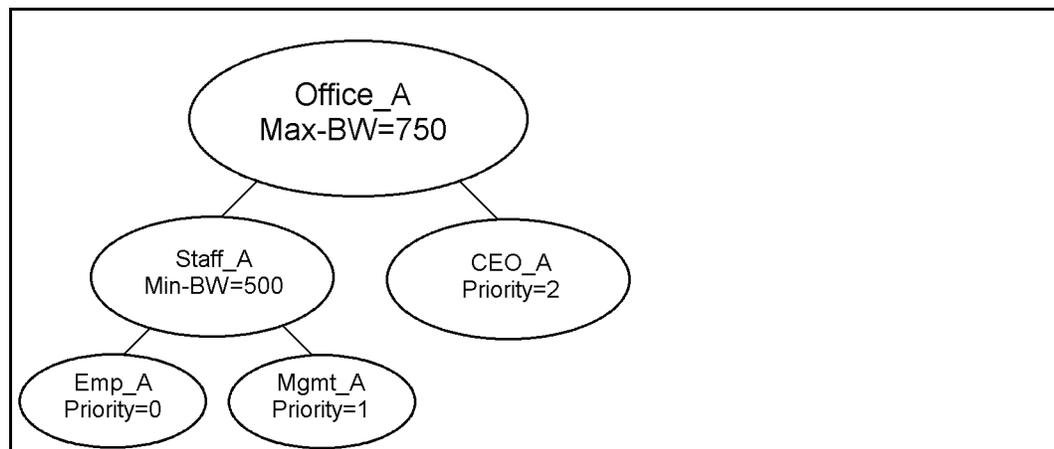
Next, he creates three more rules for the CEO, moving them above the first three rules. For the CEO rules, he selects the same combined **FTP/HTTP** object in the **Service** column; in the **Action** column, he selects a **Manage Bandwidth** object configured for client side/outbound, as before, but this time, he names the objects **CEO\_A**, **CEO\_B**, and **CEO\_C** and selects the corresponding CEO bandwidth class. In the **Source** column, he creates a **Combined Source Object**, naming it for the CEO. He combines the **Client IP/subnet** object already created for each office with a **User** object that he creates for the CEO.

The administrator places all three CEO rules above the employee rules, because the SG appliance looks for the first rule that matches a given situation and ignores the remaining rules. If he had placed the CEO rules below the employee rules, the SG appliance would never get to the CEO rules because the CEO's Web surfing client IP address matches both the CEO rules and the employee rules, and the SG appliance would stop looking after the first match. With the CEO rules placed first, the SG appliance applies the CEO rules to the CEO's Web surfing, and an employee's Web surfing does not trigger the CEO rules and instead skips ahead to the appropriate employee rule.

### *Task Three: Bandwidth Allocation*

It soon becomes apparent that CEO visits are causing problems for the branch offices. At times, she uses all of the available bandwidth, resulting in decreased productivity throughout the office she visits. Also, management has complained that they have been given the same priority for FTP and HTTP traffic as regular employees, and they are requesting that they be given priority over employees for this type of traffic.

First, the administrator creates two new classes for each office. In this example, we look at the classes and configurations for the first office only. He creates a class called **Staff\_A** and sets a minimum bandwidth of 500 kbps on it. He also creates a class called **Mgmt\_A**, setting the priority to 1 and the parent to **Staff\_A**. He edits the class **Emp\_A**, setting the parent to **Staff\_A**. Finally, he edits the class **CEO\_A**, changing the priority to 2. The resulting hierarchy is illustrated below. To see what the administrator did to the policy rules, see ["Task Three: VPM" on page 74](#).



In the example illustrated above, employees and management combined are guaranteed a total of 500 kbps. The CEO's priority level has no effect until that minimum is satisfied. This means that the CEO can only use 250 kbps of bandwidth if the rest of the staff are using a total of 500 kbps. It also means that the CEO can use 750 kbps if no one else is using bandwidth at the time. In fact, any of the classes can use 750 kbps if the other classes use none.

Priority levels kick in after all of the minimums are satisfied. In this example, if the staff requests more than 500 kbps, they can only receive it if the CEO is using less than 250 kbps. Now notice that the minimum setting for the staff is set on the parent class, **Staff\_A**, and not on the child classes, **Emp\_A** or **Mgmt\_A**. This means that the two child classes, representing employees and management, share a minimum of 500 kbps. But they share it based on their priority levels. This means that management has priority over employees. The employees are only guaranteed a minimum if management is using less than 500 kbps.

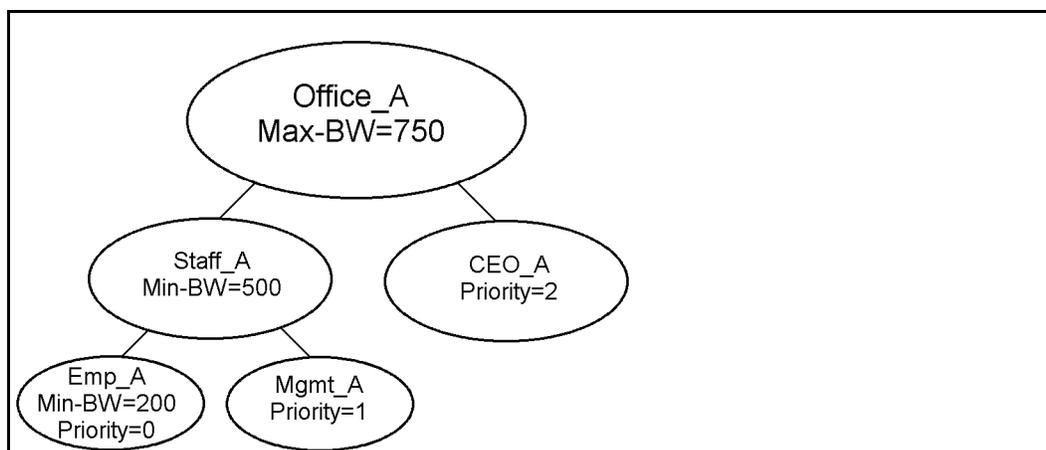
*Task Three: VPM*

The administrator has added additional classes for each office and edited the existing employee classes, as described above in "Task Three: Bandwidth Allocation". One of the new classes he added for each office is a parent class that does not have traffic classified to it; it was created to provide a minimum amount of bandwidth to its child classes. Not every class in the hierarchy has to have a traffic flow. This means that he needs to add just three more rules for the three new management classes. For the management rules, he selects the same combined **FTP/HTTP** object in the **Service** column; in the **Action** column, he selects a **Manage Bandwidth** object configured for client side/outbound with the bandwidth class one of the management classes (**Mgmt\_A**, **Mgmt\_B**, or **Mgmt\_C**). In the **Source** column, he creates a **Combined Source Object** containing the subnet object for the office and the **Group** object for management.

The management rules must go above the employee rules, although it does not matter where they are placed in relation to the CEO rules. This would not be true if the CEO was part of the same group as management, however. If that were true, the CEO rules would still need to go on top.

*Task Four: Bandwidth Allocation*

The administrator decided later that he needed to guarantee employees some bandwidth. He configures a minimum for the class **Emp\_A**, as illustrated below.



He decides to leave the minimum on the parent class **Staff\_A** and not to set a minimum for the class **Mgmt\_A**. This is okay, because the minimum of the parent class is available to its children if the parent class does not use all of it, and the only way that the CEO can get more than 250 kbps is if the employees and management combined use less than 500.

This last change does not require additional changes to policy; the administrator has added a minimum to a class that he has already classified for traffic using policy.

In the above scenario, the class called **Staff\_A** does not have traffic configured for it—it was created to guarantee bandwidth minimums for its child classes. However, if it were configured for traffic, it would have a practical minimum of 300 kbps. The practical minimum of a parent class is equal to its assigned minimum bandwidth minus the minimums of its children. In that case, if the parent class **Staff\_A** used 300 kbps and the child class **Emp\_A** used 200 kbps, the child class **Mgmt\_A** would not receive any bandwidth unless the class **CEO\_A** was using less than 250 kbps. Under those circumstances, the administrator probably also needs to create a minimum for management.

*Task Five: Bandwidth Allocation*

The CEO makes another request, this time for the main office, the one the administrator himself works from. This office uses the content filtering feature of the SG appliance to control the types of Web sites that employees are allowed to view. Although the office uses content filtering, access to sports sites is not restricted because the CEO is a big fan.

The administrator creates a bandwidth management class called **Sports** with a maximum bandwidth of 500 kbps and launches VPM to create policy for this class as described below.

*Task Five: VPM*

To classify traffic for the **Sports** class, the administrator opens VPM, creates a Web Access Layer, and sets the **Destination** column to the **Category** object that includes sports viewing (content filtering is already set up in VPM). He sets the **Action** column to the **Manage Bandwidth** object, selecting **Server side/Inbound** and the **Sports** bandwidth class he created. After installing the policy and verifying that bandwidth management is enabled, he is finished.

## Policy Examples: CPL

The examples below are complete in themselves. The administrator uses CLI to create and configure bandwidth management classes and writes CPL to classify traffic flow for these classes. These examples do not make use of a bandwidth class hierarchy. For examples of hierarchies, see [“Bandwidth Allocation and VPM Examples” on page 68](#).

*Example One: CPL*

In this example, the administrator of a college is asked to prevent college students from downloading MP3 files during peak hours, while still allowing the music department to download MP3 files at any time. The CPL triggers used are authentication and/or source subnet and MIME type. The action taken is to limit the total amount of bandwidth consumed by students to 40 kbps.

CLI commands:

```
SGOS#(config) bandwidth-management
SGOS#(config bandwidth-management) create mp3
SGOS#(config bandwidth-management) edit mp3
SGOS#(config bw-class mp3) max-bandwidth 40
```

CPL:

```
define condition student_mp3_weekday
  client_address=student_subnet response_header.Content-Type="audio/
mpeg" \
  weekday=1..5 hour=9..16
end condition

<proxy>
  condition=student_mp3_weekday limit_bandwidth.server.inbound(mp3)
```

*Example Two: CPL*

In this example, an administrator must restrict the amount of bandwidth used by HTTP POST requests for file uploads from clients to 2 Mbps. The CPL trigger used is request method, and the action taken is to throttle (limit) the amount of bandwidth used by client side posts by limiting inbound client side flows.

CLI:

```
SGOS#(config) bandwidth-management
bandwidth-management) create http_post
SGOS#(config bandwidth-management) edit http_post
SGOS#(config bw-class http_post) max-bandwidth 2000
```

CPL:

```
define condition http_posts
    http.method=POST
end condition

<proxy>
    condition=http_posts limit_bandwidth.client.inbound(http_post)
```

### *Example Three: CPL*

In this example, the administrator of a remote site wants to limit the amount of bandwidth used to pre-populate the content from headquarters to 50 kbps during work hours. The CPL triggers used are current-time and pre-population transactions. The action taken is to limit the total amount of bandwidth consumed by pre-pop flows.

CLI:

```
SGOS#(config) bandwidth-management
SGOS#(config bandwidth-management) create pre-pop
SGOS#(config bandwidth-management) edit pre-pop
SGOS#(config bw-class pre-pop) max-bandwidth 50
```

CPL:

```
define condition prepop_weekday
    content_management=yes weekday=1..5 hour=9..16
end condition

<proxy>
    condition=prepop_weekday limit_bandwidth.server.inbound(pre-pop)
```

## Chapter 5: Authenticating an SG Appliance

This chapter discusses device authentication, which is a mechanism that allows devices to verify each others' identity; devices that are authenticated can be configured to trust only other authenticated devices.

---

**Note:** SG appliance authentication is always used in association with other SGOS features. For example, you can use appliance authentication with the ADN implementation of secure tunnels. The secure tunnels feature uses authentication, the process of verifying a device's identity, with authorization, the process of verifying the permissions that a device has. For information on secure tunnels and appliance authentication, see [Section D: "Securing the ADN Network" on page 31](#).

---

### Introduction

Device authentication is important in several situations:

- ❑ Securing the network. Devices that are authenticated have exchanged certification information, verified each others' identity and know which devices are trusted.
- ❑ Securing protocols. Many protocols require authentication at each end of the connection before they are considered secure.

This chapter discusses the following topics:

- ❑ "SG Appliance Overview".
- ❑ "Appliance Certificates and Device Authentication Profiles" on page 78.
- ❑ "Creating an Authentication Profile" on page 83.
- ❑ "Related CLI Syntax to Manage Device Authentication" on page 85.
- ❑ "Obtaining a Non Blue Coat Appliance Certificate" on page 83.
- ❑ "Related CLI Syntax to Manage Device Authentication" on page 85.

### SG Appliance Overview

The Blue Coat implementation allows devices to be authenticated without sending passwords over the network. Instead, a device is authenticated through certificates and profiles that reference the certificates. Both the profile and the referenced certificate are required for device authentication.

- ❑ Certificates: Certificates contain information about a specific device. Blue Coat runs an Internet-accessible Certificate Authority (CA) for the purpose of issuing appliance certificates to SGOS devices. You can also create your own appliance certificates.
- ❑ Profiles: A profile is a collection of information used for device-to-device authentication, including if the device has a certificate and if the certificates of other devices should be verified. The built-in profile is called *bluecoat-appliance-certificate* and references the appliance certificate on your SG appliance; you can create additional profiles.

---

**Note:** Authenticating the SG appliance and authenticating the SG appliance server name are two different procedures that require two different certificates. For information on authenticating server names, refer to *Volume 5: Securing the Blue Coat SG Appliance*.

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## Appliance Certificates and Device Authentication Profiles

In the Blue Coat implementation of device authentication, both an appliance certificate and a device authentication profile that references the appliance certificate keyring are required for device authentication to be successful. Each device to be authenticated must have an appliance certificate and a profile that references that certificate.

Note that device authentication does not take effect unless the profile is enabled; for example, if you use WAN optimization, you enable the profile on the **Configuration > App. Delivery Network > General > Device Security** tab.

### About SG Appliance Certificates

SG appliances come with a cryptographic key that allows the system to be authenticated as an SG appliance when an *appliance certificate* is obtained.

An appliance certificate is an X.509 certificate that contains the hardware serial number of a specific SG device as the CommonName (CN) in the subject field. This certificate then can be used to authenticate the SG appliance whose hardware serial number is listed in the certificate. Information from the presented certificate is extracted and used as the *device ID*.

Blue Coat runs an Internet-accessible CA for the purpose of issuing appliance certificates. The root certificate for the Blue Coat CA is automatically trusted by SGOS for device authentication. These Blue Coat-signed certificates contain no authorization information and are valid for five years.

You can provide your own device authentication certificates for the SG appliances on your network if you prefer not to use the Blue Coat CA.

### About Device Authentication Profiles

A device authentication profile contains the information related to device authentication:

- ❑ The name of the keyring that contains the private key and certificate this device uses to authenticate itself. The default is `appliance-key`. (For information on private and public keys, refer to *Volume 5: Securing the Blue Coat SG Appliance*.)
- ❑ The name of the CA Certificate List (CCL) that contains the names of certificates of CAs trusted by this profile. If another device offers a valid certificate signed by an authority in this list, the certificate is accepted. The default is `appliance-ccl`.
- ❑ Verification of the peer certificate.

When the SG appliance is participating in device authentication as an SSL client, the peer certificate verification option controls whether the server certificate is validated against the CCL. If verification is disabled, the CCL is ignored.

When the SG appliance is participating in device authentication as an SSL server, the peer certificate verification option controls whether to require a client certificate. If verification is disabled, no client certificate is obtained during the SSL handshake. The default is `verify-peer-certificate enabled`.

- ❑ Specification of how the device ID authorization data is extracted from the certificate. The default is `$(subject.CN)`.
- ❑ SSL cipher settings. The default is AES256-SHA.

Each Blue Coat appliance has an automatically-constructed profile called **bluecoat-appliance-certificate** that can be used for device-to-device authentication. This profile cannot be deleted or edited.

If you cannot use the built-in profile because, for example, you require a different cipher suite or you are using your own appliance certificates, you must create a different profile, and have that profile reference the keyring that contains your certificate.

---

**Note:** If you do not want to use peer verification, you can use the built-in **passive-attack-detection-only** profile in place of the **bluecoat-appliance-certificate** profile.

This profile uses a self-signed certificate and disables the `verify-peer` option, so that no authentication is done on the endpoints of the connection. The traffic is encrypted, but is vulnerable to active attacks.

This profile can be used only when there is no threat of an active man-in-the-middle attack. Like the **bluecoat-appliance certificate** profile, the **passive-attack-detection-only** profile cannot be edited or deleted.

---

If you create your own profile, it must contain the same kind of information that is contained in the Blue Coat profile. To create your own profile, skip to [“Creating an Authentication Profile” on page 83](#).

## Obtaining an SG Appliance Certificate

In many cases, if you have Internet connectivity, an appliance certificate is automatically fetched by the SG appliance, and no human intervention is required. In other cases, if the Internet connection is delayed or if you do not have Internet access, you might have to manually initiate the process of obtaining an appliance certificate.

How you obtain an appliance certificate depends upon your environment:

- ❑ If the device to be authenticated has Internet connectivity and can reach the Blue Coat CA server, continue with [“Automatically Obtaining an Appliance Certificate” on page 80](#).
- ❑ If the device to be authenticated cannot reach the Blue Coat CA server, you must acquire the certificate manually; continue with [“Manually Obtaining an Appliance Certificate” on page 80](#).

After the certificate is obtained, you must configure the device to use the profile you choose to use. For information on configuring the device to use the profile, see [Chapter 2: “Configuring an Application Delivery Network”](#).

If you are configuring device authorization as well as authentication, configure device authentication before authorization. For more information on device authorization, see [Chapter 2: “Configuring an Application Delivery Network”](#).

**Important:** Only the following SG platforms support appliance certificates:

- ❑ SG200 (manufactured after August 1, 2006)
- ❑ SG510
- ❑ SG810
- ❑ SG8100

If you attempt to obtain an appliance certificate for other platforms (through **Configuration > SSL > Appliance Certificates > Request appliance certificate**), the request fails with the following error message:

- ❑ **Request failed: Signing server reported error: No such serial number** *serial number*.

If you receive this message, you cannot use Blue Coat appliance certificates, but you can create your own appliance certificates for use in a secure network. For more information, see [“Obtaining a Non Blue Coat Appliance Certificate”](#) on page 83.

---

## Automatically Obtaining an Appliance Certificate

The appliance attempts to get the certificate completely automatically (with no user intervention) if it can connect to the Blue Coat CA server at boot time or within about five minutes of being booted. If the appliance does not have a certificate (for example, it had one until you did a `restore-defaults factory-defaults` command) it attempts to get one on every boot. Once the appliance gets a certificate, that certificate is used until another `restore-defaults factory-defaults` command is issued.

If Internet connectivity is established more than five minutes after the system is booted, you might need to complete the following steps.

**To automatically obtain an appliance certificate:**

1. Select **Configuration > SSL > Appliance Certificates > Request Certificate**.
2. Click **Request appliance certificate**.

The Blue Coat CA server does validation checks and signs the certificate. The certificate is automatically placed in the `appliance-key` keyring. Note that the `appliance-key` keyring cannot be backed up. The keyring is re-created if it is missing at boot time.

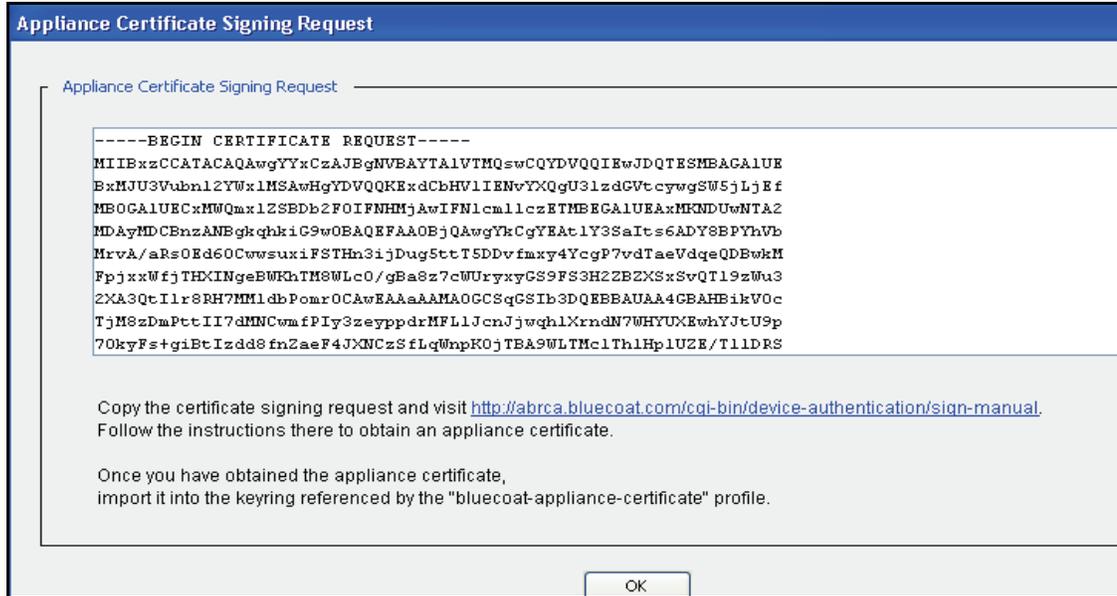
## Manually Obtaining an Appliance Certificate

Complete the following steps to obtain an appliance certificate manually. The overview of the procedure is to:

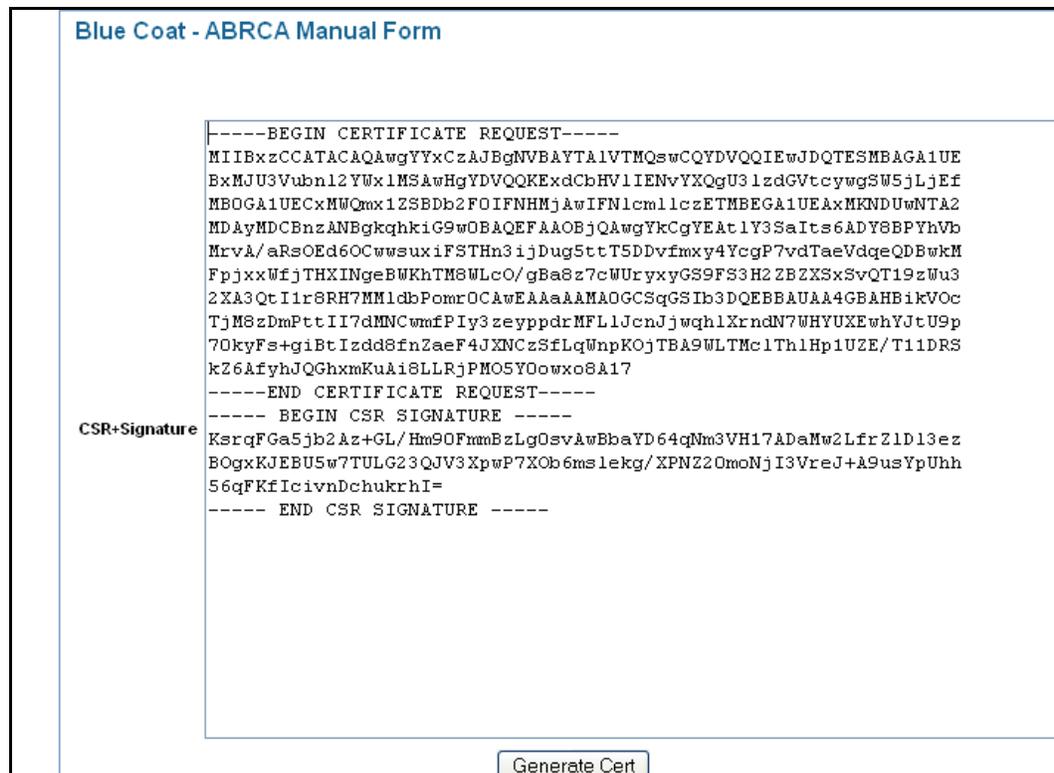
- ❑ Generate a appliance certificate signing request and send it to the Blue Coat CA server for verification and signature.
- ❑ Import the signed certificate into the SG appliance.

**To generate a CSR:**

1. Select **Configuration > SSL > Appliance Certificates > Request Certificate**.
2. Select **Create CSR**.



3. Copy the certificate request, including the certificate request signature. Be sure to include the "Begin Certificate" and "End Certificate" statements, as well as the "Begin CSR Signature" and "End CSR Signature" statements.
4. Click **OK**.
5. Go to the Blue Coat CA Server Website at <https://abrca.bluecoat.com/sign-manual/index.html>.



6. Paste the CSR and signature into the CSR panel.

7. Click **Generate Cert.**

The signed certificate displays, and can be pasted into the appliance-key keyring.

```
-----BEGIN CERTIFICATE-----
MIIF/jCCBOagAwIBAgICAMowDQYJKoZIhvcNAQEFBQAwbYxCzAJBgNVBAYTA1VT
MRMwEQYDVQQIEWpDYWxpZm9ybmlhMRlWEAYDVQQHEw1TdW5ueXZhbGUxIDAeBgNV
BAoTF0JsdWUgQ29hdCBTeXN0ZW1zLCBjb2F0LmNvbTAeFw0wNzAxMjkyMDM5NDdaFw0xMjAx
MjkyMDM5NDdaMIGGMQswCQYDVQQGEwJVUzELMAkGA1UECBMCQ0ExEjAQBgNVBACt
CVN1bm55dmFsZTEgMB4GA1UEChMXQmx1ZSBDb2F0IFN5c3RlbnXMsIEluYy4xHZAAd
BgNVBAsTFkJsdlWUgQ29hdCBTRzIwM0BTRzJpZXMxZzEzARBgNVBAMTCjA1MDUwNjAw
OTIwgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMBUmCuKSSd+D5kJQiWu3OG
DNLcVf7SYKK5+SBCJU2iKwP5+EfiQ5JsScWJghtIo94EhdSC2zvBPQqWbZAJXN74
k/yM4w9ufjfo+G7xPYcMrGmwVBGnXbEhQkagc1FH2orINNY8SVDYVL1V4dRM+0at
YpeiBmSxipmRSMZL4kqtAgMBAAGjggLGMIIcwjAJBgNVHRMEAjAAMAsGA1UdDwQE
AwIE8DBOBgNVHsUERzBFBggrBgEFBQcDAQYIKWYBBQUHAWIGCCsGAQUFBwMEBgsr
BgEEAFElAQECAQYLKwYBBAHxJQEBAGIGCysGAQQB8SUBAQIDMB0GA1UdDgQWBBSF
NqC2ubTI7OT5j+KqCPGLSD07DzCB6wYDVR0jBIHjMIHggBSwEYwq1N6G1ZhpCxn
OTIu8fNe1aGBvKSBUtCBtjELMAkGA1UEBhMCVVMxEzARBgNVBAGTCkNhbg1mb3Ju
aWExEjAQBgNVBACtCVN1bm55dmFsZTEgMB4GA1UEChMXQmx1ZSBDb2F0IFN5c3Rl
bnXMsIEluYy4xGTAXBgNVBAsTEEJsdWUgQ29hdCwgQUJSQ0ExGzAZBgNVBAMTEmFi
cmNhLmJsdWVjb2F0LmNvbTEkMCIGCSqGSIb3DQEJARYVc3lzYWRtaW5AYmx1ZWNv
YXQuY29tgGkAhmhBUPEEb60wgZ8GCCsGAQUFBwEBBIBGSMIGPMEkGCCsGAQUFBzAB
hj1odHRwczovL2FicmNhLmJsdWVjb2F0LmNvbS9jZ2ktYmluL2Rldm1jZS1hdXR0
ZW50aWNhdGlvbi9vY3NwMEIGCCsGAQUFBzAChjZodHRwOi8vYWJyY2EuYmx1ZWNv
YXQuY29tL2Rldm1jZS1hdXR0ZW50aWNhdGlvbi9jYS5jZ2kwSAYDVR0fBEEwPzA9
oDugOYY3aHR0cDovL2FicmNhLmJsdWVjb2F0LmNvbS9kZXZpY2UtYXV0aGVudG1j
YXRpb24vQ1JMLmNybDBfBgNVHSAEWDBMWFGCisGAQQB8SUBAQEwRjBEBggrBgEF
BQcCARY4aHR0cDovL2FicmNhLmJsdWVjb2F0LmNvbS9kZXZpY2UtYXV0aGVudG1j
YXRpb24vcnBhLm0bWwwDQYJKoZIhvcNAQEFBQADggEBACIhQ7Vu6aGJBpxP255X
d2/Qw7NiVsnqOlAy913QZlieFfVATJnCeSrH+M9B/2XtnRxVT0/ZWrf4GbsdYqTF
hc9jR/IwKu6kZq32Dqo8qFU5OzbAEzT2oebB5QgwuJtHcJHggp9PS9uS27qAnGQK
OeB2bYcjWtMvTvr50iDOV69BEQz+VXos8QiZmRHLVnebQSjl3bi1w3VjBw31tCmc
clgz0S1N9ZmJdRU/PlWdNVqD40LqcMZQ53HqcdWNEzN2uvigIb//rM7XazK7xIaq
r23/+BsZlYKAeVMq3PEmxaA2zLzO+jf79a8ZvIKrFz7nNuTN7NhFL/V6pWNE1o9A
rbs=
-----END CERTIFICATE-----
```

**To import a certificate onto the SG appliance:**

1. Copy the certificate to your clipboard. Be sure to include the “Begin Certificate” and “End Certificate” statements.
2. Select **Configuration > SSL > Keyrings**.
3. Select the keyring that is used for device authentication. The keyring used by the **bluecoat-appliance-certificate** profile is the `appliance-key` keyring.
4. Click **Edit/View** in the **Keyrings** tab.

5. In the **Certificate** panel, click **Import**.
6. Paste the certificate you copied into the dialog box. Click **OK**.  
The certificate should display in the SSL Certificates Pane, associated with the keyring you selected earlier.

## Obtaining a Non Blue Coat Appliance Certificate

If you run your own certificate signing authority for device authentication, complete the following steps:

1. Create a keyring for the appliance's certificate. For information on creating a keyring, refer to *Volume 5: Securing the Blue Coat SG Appliance*.
2. Generate the certificate signing request and get it signed. For information on creating a CSR, refer to *Volume 5: Securing the Blue Coat SG Appliance*.

---

**Note:** You cannot put a Blue Coat appliance certificate into a keyring you create yourself.

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3. Create a CA certificate list. For information on creating a CCL, refer to *Volume 5: Securing the Blue Coat SG Appliance*
  - a. Import the CA's root certificate.
  - b. Add the certificate to the CCL.
4. Create a device authentication profile. (To create a profile, see "[Appliance Certificates and Device Authentication Profiles](#)" on page 78.)
5. Associate the profile with the keyring and CCL. The keyring and CCL must already exist.

Adjust other parameters, including authorization data extractor (if the certificate is to be used for authorization), as needed.

Configure each application that uses device authentication to reference the newly created profile, and set up its whitelist. To associate the device with the profile, see [Chapter 2: "Configuring an Application Delivery Network"](#).

## Creating an Authentication Profile

An authentication profile only needs to be created if you cannot use the built-in **bluecoat-appliance-certificate** profile without modification; note that the **bluecoat-appliance-certificate** profile cannot be deleted or edited.

Additional profiles with different settings can be created; for example, if you require a different cipher setting than what the **bluecoat-appliance-certificate** profile uses, you can create a profile with the different cipher suite.

**To create a new authentication profile:**

1. Select **Configuration > SSL > Device Authentication > Profiles**.
2. Click **New**.

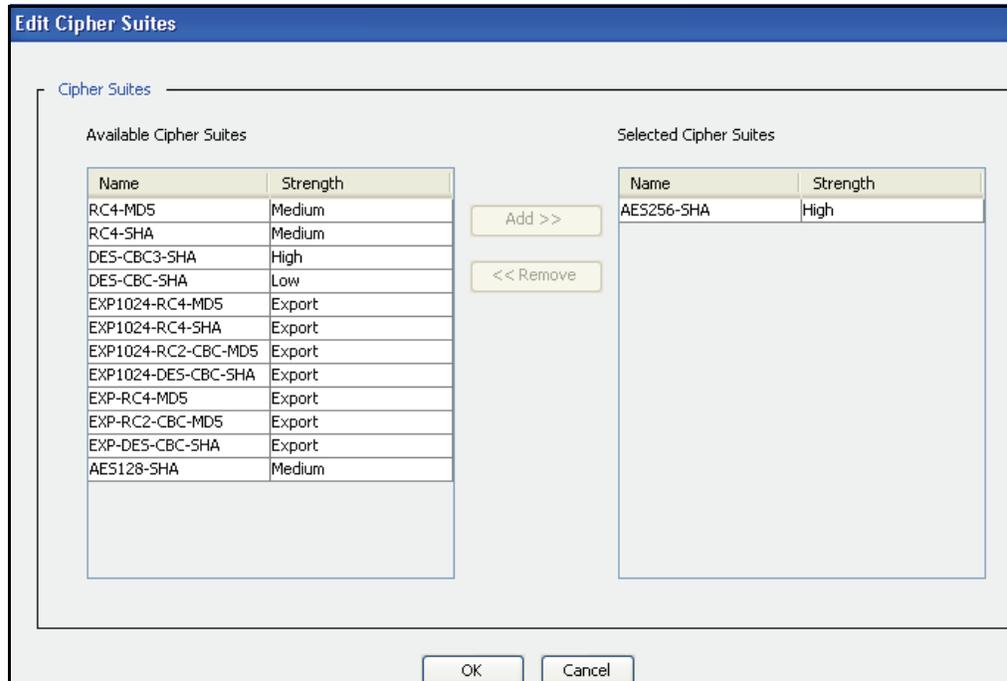
3. **Name:** Give the profile a meaningful name. The only valid characters are alphanumeric, the underscore, and hyphen, and the first character must be a letter.
4. **Keyring:** From the drop-down list, select the keyring you want to use for device authentication.

---

**Note:** You must create a new keyring for device authentication if you do not use the `appliance-key` keyring. The keyrings shipped with the Blue Coat SG are dedicated to other purposes. For information on creating a new keyring, refer to *Volume 5: Securing the Blue Coat SG Appliance*.

---

5. **CCL:** From the drop-down list, select the CA Certificate List you want to use.
6. **Device ID extractor:** The field describes how device ID information is extracted from a presented certificate. The string contains references to the attributes of the subject or issuer in the form `$(subject.attr[.n])` or `$(issuer.attr[.n])`, where `attr` is the short-form name of the attribute and `n` is the ordinal instance of that attribute, counting from 1 when the subject is in LDAP (RFC 2253) order. If `n` is omitted, it is assumed to be 1.  
  
The default is `$(subject.CN)`; many other subject attributes are recognized, among them `OU`, `O`, `L`, `ST`, `C`, and `DC`.
7. **Verify peer:** This setting determines whether peer certificates are verified against the CCL or whether client certificates are required.
8. **Selected cipher suites:** If you want to use a different cipher suite, click **Edit cipher suites**.



9. Select the cipher suite or suites you want to use. Click **Add** to add the cipher suite to the list of selected cipher suites. Cipher suites that you do not want to use should be removed from the selected list.
10. Click **OK** when done.
11. Select **Apply** to commit the changes to the SG appliance.

## Related CLI Syntax to Manage Device Authentication

- ❑ To enter configuration mode:
 

```
SGOS#(config) ssl
```
- ❑ The following device-authentication commands are available:
 

```
SGOS#(config ssl) create device-authentication-profile profile_name
keyring_ID
SGOS#(config ssl) edit device-authentication-profile test
  SGOS#(config device-auth test) cipher-suite cipher-suite
  SGOS#(config device-auth test) ccl ccl_name
  SGOS#(config device-auth test) device-id device_ID
  SGOS#(config device-auth test) exit
  SGOS#(config device-auth test) keyring-id keyring_ID
  SGOS#(config device-auth test) verify-peer [enable | disable]
  SGOS#(config device-auth test) view
SGOS#(config ssl) request-appliance-certificate
SGOS#(config ssl) view appliance-certificate-request
SGOS#(config ssl) view device-authentication-profile
```



## Chapter 6: Configuring Failover

Using IP address failover, you can create a redundant network for any explicit proxy configuration. If you require transparent proxy configuration, you can create software bridges to use failover. For information on creating software bridges, refer to *Volume 2: Getting Started*.

---

**Note:** If you use the Pass-Through adapter for transparent proxy, you must create a software bridge rather than configuring failover. For information on using the Pass-Through adapter, refer to *Volume 2: Getting Started*.

---

Using a pool of IP addresses to provide redundancy and load balancing, Blue Coat migrates these IP addresses among a group of machines.

This section discusses:

- ❑ “About Failover” .
- ❑ “Configuring Failover” on page 88.

### About Failover

Failover allows a second machine to take over if a first machine fails, providing redundancy to the network through a master/slave relationship. In normal operations, the master (the machine whose IP address matches the group name) owns the address. The master sends keepalive messages (*advertisements*) to the slaves. If the slaves do not receive advertisements at the specified interval, the slave with the highest configured priority takes over for the master. When the master comes back online, the master takes over from the slave again.

The Blue Coat failover implementation resembles the Virtual Router Redundancy Protocol (VRRP) with the following exceptions:

- ❑ A configurable IP multicast address is the destination of the advertisements.
- ❑ The advertisement interval is included in protocol messages and is learned by the slaves.
- ❑ A virtual router identifier (VRID) is not used.
- ❑ Virtual MAC addresses are not used.
- ❑ MD5 is used for authentication at the application level.

Masters are elected, based on the following factors:

- ❑ If the failover mechanism is configured for a physical IP address, the machine owning the physical address have the highest priority. This is not configurable.
- ❑ If a machine is configured as a master using a virtual IP address, the master has a priority that is higher than the slaves.

When a slave takes over because the master fails, an event is logged in the event log. No e-mail notification is sent.

## Configuring Failover

Before you begin, ensure that software bridges already exist. For information on configuring bridges, refer to *Volume 2: Getting Started*.

You also must decide which machine is the master and which machines are the slaves, and whether you want to configure explicit proxy or transparent proxy network.

When configuring the group, the master and all the systems in the group must have exactly the same failover configuration except for priority, which is used to determine the rank of the slave machines. If no priority is set, a default priority of 100 is used. If two appliances have equal priority, the one with the highest physical address ranks higher.

---

**Note:** Configuring failover on an Application Data Network (ADN) is similar to configuring failover on other appliances, with the exception that you add a server subnet on multiple boxes instead of just one.

---

### To configure failover:

1. Select **Configuration > Network > Advanced > Failover**.
2. Click **New**.

The screenshot shows the 'Add Failover Group' dialog box with the following configuration:

- 3f** points to the  **enabled** checkbox.
- 3a** points to the  **New IP** radio button.
- 3b** points to the **Multicast Address** field, which contains the values 224, 1, 2, and 3.
- 3c** points to the **Relative Priority** field, which contains the value 254 and is marked as **Master**.
- 3d** points to the **Advertisement Interval** field, which contains the value 40.
- 3e** points to the **Group Secret** field, which contains six asterisks (\*\*\*\*\*).

The **OK** button is highlighted with a mouse cursor.

3. Fill in the fields as appropriate:
  - a. Create a group using either a new IP address or an existing IP address. If the group has already been created, you cannot change the new IP address without deleting the group and starting over.
  - b. **Multicast address** refers to a Class D IP address that is used for multicast. It is not a virtual IP address.

---

**Note:** Class D IP addresses (224 to 239) are reserved for multicast. A Class D IP address has a first bit value of 1, second bit value of 1, third bit value of 1, and fourth bit value of 0. The other 28 bits identify the group of computers that receive the multicast message.

---

- c. **Relative Priority** refers to a range from 1-255 that is assigned to systems in the group. 255 is reserved for the system whose failover group ID equals the real IP address. (Optional) **Master** identifies the system with the highest priority (the priority value is greyed out).
  - d. (Optional) **Advertisement Interval** refers to the length of time between advertisements sent by the group master. The default is 40 seconds. If the group master fails, the slave with the highest priority takes over (after approximately three times the interval value). The failover time of the group is controlled by setting this value.
  - e. (Optional, but recommended) **Group Secret** refers to a password shared only with the group.
  - f. Select **enabled**.
  - g. Click **OK**.
4. Select **Apply** to commit the changes to the SG appliance.

#### *Related CLI Syntax to Configure Failover*

- ❑ To enter configuration mode:

```
SGOS#(config) failover
```

- ❑ The following subcommands are available:

```
SGOS#(config failover) create group_address
```

```
SGOS#(config failover) edit group_address
```

```
SGOS#(config failover group_address) multicast-address  
multicast_address
```

```
SGOS#(config failover group_address) master
```

```
SGOS#(config failover group_address) priority number
```

```
SGOS#(config failover group_address) interval seconds
```

```
SGOS#(config failover group_address) secret secret
```

```
-or-
```

```
SGOS#(config failover group_address) encrypted-secret encrypted_secret
```

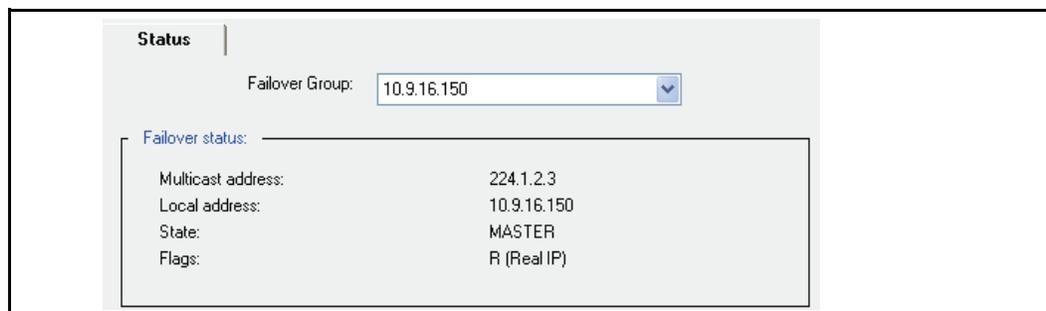
```
SGOS#(config failover group_address) enable
```

## Viewing Failover Statistics

At any time, you can view statistics for any failover group you have configured on your system.

#### **To view failover status:**

1. Select **Statistics > System > Failover**.



2. From the drop-down list, select the group to view.

The information displayed includes the multicast address, the local address, the state, and any flags, where **V** indicates the group name is a virtual IP address, **R** indicates the group name is a physical IP address, and **M** indicates this machine can be configured to be the master if it is available.

## Chapter 7: Configuring the Upstream Networking Environment

To fill requests, the SG appliance must interact not only with the local network, but with the upstream network environment. To control upstream interaction, various options are supported, such as forwarding, SOCKS gateways, ICP (Internet Caching Protocol), and WCCP (Web Cache Control Protocol).

- ❑ The SG appliance forwarding system—Allows you to define the hosts and groups of hosts to which client requests can be redirected. Those hosts can be servers or proxies, including additional appliances. Rules to redirect requests are set up in policy.
- ❑ SOCKS gateways—SOCKS servers provide application level firewall protection for an enterprise. The SOCKS protocol provides a generic way to proxy HTTP and other protocols. For information on configuring SOCKS gateways, see [Chapter 13: "SOCKS Gateway Configuration"](#) on page 183.
- ❑ ICP—Internet Caching Protocol (ICP) is a service to handle ICP queries from other caching devices looking for cached data. The devices that can access this service can be controlled. ICP can also be used by the SG appliance to locate cached data in other systems. For information on configuring ICP, see [Chapter 9: "Internet Caching Protocol \(ICP\) Configuration"](#) on page 127.
- ❑ WCCP—WCCP is a Cisco®-developed protocol that allows you to establish redirection of the traffic that flows through routers.

This chapter contains the following topics:

- ❑ [Section A: "Understanding Forwarding"](#) on page 92
- ❑ [Section B: "Configuring Forwarding through the CLI"](#) on page 94
- ❑ [Section C: "Using Forwarding Directives to Create an Installable List"](#) on page 104
- ❑ [Section D: "TCP Connection Forwarding"](#) on page 111

---

**Note:** Forwarding (TCP Connection Forwarding excluded) is configured through the CLI or through installable lists using directives. The CLI and the directives have been designed to be as similar as possible; the functionality is identical.

---

## Section A: Understanding Forwarding

The SG appliance forwarding system allows you to represent what the upstream network looks like to the appliance at the level of the Web addresses (URLs). Forwarding is not concerned with the packet addressing associated with networking equipment, such as switches, routers, and hubs. *Forwarding* allows you to send Web requests to something other than the IP address specified in the URL and organize how the Web traffic flows around the network.

The SG appliance forwarding system encompasses the use of forwarding, upstream SOCKS gateways, load balancing, host affinity, health checks, and ICP. The SG appliance forwarding system determines the upstream address a request is sent to and is fundamentally tied in with all of the protocol agents, including HTTP, HTTPS, streaming, and FTP, and the network configuration. The combination of forwarding with the policy engine allows extremely flexible configuration and traffic management.

---

**Note:** The SG appliance forwarding system is available for HTTP, HTTPS, FTP, Windows Media, RTSP, Telnet, and TCP tunnels.

---

### *Understanding Load Balancing*

Load balancing is a way to share traffic requests among multiple upstream systems or multiple IP addresses on a single host. Technologies used include round robin, which selects the next system in the list, or least-connections, which selects the system with the least number of connections among the selected group.

You can configure load balancing several ways:

- ❑ For individual hosts: If a host is DNS-resolved to multiple IP addresses, then that host's load balancing *method* (round-robin, least connections, or none) is applied to those IP addresses. The method is either explicitly set for that host or taken from the configurable global default settings.
- ❑ For groups, two load balancing choices are available:
  - Apply a load-balancing method to a group. The hashing option must be specifically disabled (it is enabled by default) before you can apply the load balancing method to a group. Without using a hash, all the IP addresses of all the members of the group are gathered together, and the group's method is applied across that entire set of IP addresses.
  - Use a hash. If you use a hash, load balancing is a two-step process:
    - Step one: Apply a hash, either to the domain name or the full URL. This hash value is used to select one member of the group.
    - Step two: The selected host is treated just as an individual host is treated; the only difference is that the load-balancing method configured for the group is used for the selected host.

For more information, see [“Configuring Load Balancing” on page 99](#).

## Understanding Host Affinity

Host affinity is the attempt to direct multiple connections by a single user to the same group member. For example, a Web site uses *shopping carts* to allow customers to purchase items. The site might use load balancing with a group of Web servers working in parallel, but only one server in the group has *state* on a single user. If the user connections are sent to a different server, the server has no previous state on the user and might start over.

Host affinity forces the user's connections to return to the same server until the user is idle for a configurable period of time. After a configurable period of inactivity, the host affinity times out and the fact that multiple connections belong to a single user is lost.

Host affinity allows you to use any of the following options:

- ❑ Use the client IP address to determine which group member was last used. When the same client IP sends another request, the connection is made to that recorded group member.
- ❑ Place a cookie in the response to the client. When further requests are sent from the client with the cookie, the data in the cookie is used to determine which group member the client last used. The connection is made to that recorded group member.
- ❑ For HTTPS, extract the SSL session ID name from the connection information. The session ID is used in place of a cookie to determine which group member was last used. The connection is made to that recorded group member.

For more information on host affinity, see [“Configuring Host Affinity” on page 100](#).

## Using Load Balancing and Host Affinity Together

By default, if you use load balancing, each connection is treated independently. That connection is made to whichever member of the load-balancing group that the load-balancing algorithm selects. The load balancing responsibility is to spread the connections around as much as possible so the load is shared among group members.

If host affinity is configured, it is checked first to see if the request comes from a known client. If this is a first connection, the load-balancing algorithm selects the group member to target. The result of the load balancing is recorded by host affinity in its tables for use if that client connects again.

Host affinity does not make a connection to a host that health checks report is down; instead, if host affinity breaks, the load-balancing algorithm selects a group member that is healthy, and affinity is re-established on that working group member.

For information on configuring host affinity, see [“Configuring Host Affinity” on page 100](#); for information on configuring load balancing, see [“Configuring Load Balancing” on page 99](#).

## Section B: Configuring Forwarding through the CLI

Forwarding is configured through the CLI or through installable lists using directives. The CLI and the directives have been designed to be as similar as possible; the functionality is identical. To use installable lists to configure forwarding, see [Section C: "Using Forwarding Directives to Create an Installable List" on page 104](#).

High level steps to configure forwarding are:

- ❑ Create the forwarding hosts and groups, including parameters such as protocol agent and port
- ❑ Edit these hosts and groups; you can create settings that override the global defaults
- ❑ Create Load Balancing and Host Affinity values

### Creating Forwarding Hosts and Groups

You can create a maximum of 32 groups, and each group can contain a maximum of 512 hosts. You can create 512 individual hosts that do not belong to any group. (You might want to create individual hosts as a way of managing traffic inside an enterprise, for example.)

The only required entries under the `create` command (for a host) are the `host_alias`, `hostname`, a protocol, and a port number. The port number can be defined explicitly (such as `http=8080`), or it can take on the default port value of the protocol, if one exists (such as `http`, and the default port value of 80 is entered automatically).

---

**Note:** The host/group aliases cannot be CPL keywords, such as `no`, `default`, or `forward`.

---

To create a host group, you must also include the `group=group_name` option. If this is the first mention of the group, `group_name`, then that group is automatically created with this host as its first member. Do not use this command when creating an independent host.

Because the functionality of the CLI and the directives is so similar, detailed instructions are provided only for the CLI. For the list of available directives, see ["Using Forwarding Directives to Create an Installable List" on page 104](#).

#### To create the host or group:

1. At the `(config)` command prompt, create a forwarding host:

```
SGOS#(config) forwarding
SGOS#(config forwarding) create host_alias hostname [default-schemes]
[http[=port | =no]] [https[=port | =no]] [ftp[=port | =no]] [mms[=port
| =no]] [rtsp[=port | =no]] [tcp=port] [telnet[=port | =no]] [ssl-
verify-server[=yes | =no]] [group=group_name] [server | proxy] [load-
balance={no | round-robin | least-connections}] [host-affinity={no |
client-ip-address | accelerator-cookie}] [host-affinity-ssl={no |
client-ip-address | accelerator-cookie | ssl-session-id}]
```

## Section B: Configuring Forwarding through the CLI

Table 7-1. Commands used to Create a Forwarding Host

Command	Suboption	Description
host_alias		This is the alias for use in policy. Define a meaningful name.
host_name		The name of the host domain, such <code>www.bluecoat.com</code> , or its IP address.
default-schemes		If you select <code>default-schemes</code> , all protocols, along with their default ports, are used. This directive is only available for proxy hosts.
http https ftp mms rtsp telnet	<code>=port   =no</code>	You must choose at least one protocol where <code>port=1</code> to 65535. If only one protocol is configured, the SG configures the default port for that protocol.  You can use <code>default-schemes</code> and then eliminate protocols by selecting the protocol you do not want; for example, <code>http=no</code> . If you do not want to use the default ports for the protocols, you must also specify them here. HTTPS or Telnet protocols are not allowed if the host is a proxy.
tcp	<code>=port</code>	If you choose to add a TCP protocol, a TCP port must be specified.  TCP protocols are not allowed if the host is a proxy.
ssl-verify-server	<code>=yes   =no</code>	You can set SSL to specify that the SG appliance checks the CA certificate of the upstream server.  The default for <code>ssl-verify-server</code> is <code>yes</code> . To disable this feature, you must specify <code>ssl-verify-server=no</code> in the installable list or CLI.  Note that the CPL property <code>server.certificate.validate</code> , if configured, overrides this setting,
group	<code>=group_name</code>	Group specifies the group to which this host belongs. If this is the first mention of the group <code>group_name</code> then that group is automatically created with this host as its first member.  The SG appliance uses load balancing to evenly distribute forwarding requests to the origin servers or group of proxies. Do not use the <code>group=</code> option when creating independent hosts.
server   proxy		Server specifies to use the relative path for URLs in the HTTP header because the next hop is a Web server, not a proxy server. The default is <code>proxy</code> .
load-balance	<code>no   round-robin   least-connections</code>	Specifies the load-balancing method: round robin or least connections. <code>No</code> disables load balancing.
host-affinity	<code>accelerator-cookie   client-ip-address   no</code>	Specifies which non-SSL host-affinity method to use ( <code>accelerator cookie</code> or <code>client-ip-address</code> ) or you can use <code>no</code> to disable non-SSL host affinity.

## Section B: Configuring Forwarding through the CLI

Table 7-1. Commands used to Create a Forwarding Host (Continued)

Command	Suboption	Description
host-affinity-ssl	accelerator-cookie   client-ip-address   ssl-session-id   no	Specifies which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id) or you can use no to disable SSL host affinity.

2. Repeat [Step 1](#) to create additional forwarding hosts or host groups.
3. Complete the configuration by entering the following commands as necessary:
 

```

SGOS#(config forwarding) download-via-forwarding disable | enable
SGOS#(config forwarding) failure-mode closed | open
SGOS#(config forwarding) integrated-host-timeout minutes
SGOS#(config forwarding) delete {all | group group_name | host
host_alias}
SGOS#(config forwarding) path url
SGOS#(config forwarding) no path
      
```

Table 7-2. Commands used to Configure a Forwarding Host

Command	Suboption	Description
download-via-forwarding	enable   disable	Specifies whether forwarding (and SOCKS gateways) are to be used or ignored when trying to download or upload documents, including installable lists and policy files.
failure-mode	closed   open	Failing open or closed applies to forwarding hosts and groups. Fail Open/Closed applies when the health checks are showing sick for each forwarding target in the applicable fail-over sequence. If no systems are healthy, the SG appliance fails open or closed, depending on the configuration. If closed, the connection attempt simply fails.  If open, an attempt is made to connect without using any forwarding target. Fail open is usually a security risk; fail closed is the default if no setting is specified.  This setting can be overridden by policy, (using the forward.fail_open (yes no) property).
integrated-host-timeout	minutes	An integrated host is an Origin Content Server (OCS) that has been added to the health check list. The host, added through the integrate_new_hosts property, ages out after being idle for the specified time. The default is 60 minutes.
delete	all   group group_name   host host_alias	Deletes all forwarding hosts and groups (delete all) or a specific forwarding group (delete group group_name) or host (delete host host_alias).
path	url	(Optional) Path specifies the download path to use if you download installable lists.
no	path	No clears the network path URL to download forwarding settings.

## Section B: Configuring Forwarding through the CLI

## Editing a Forwarding Host

After you create a forwarding host, you can edit its configuration.

**Note:** If you edit a group, you can only modify its load balancing and host affinity settings. For information on editing a group, see “Editing a Forwarding Group” on page 99.

### To edit the settings of a forwarding host:

1. At the (config) command prompt, enter the following commands to configure the settings of a forwarding host:

```
SGOS#(config) forwarding
SGOS#(config forwarding) edit host_alias
SGOS#(config forwarding host_alias) {ftp | http | https | mms | rtsp |
telnet} [port]
SGOS#(config forwarding host_alias) group group_name
SGOS#(config forwarding host_alias) host hostname
SGOS#(config forwarding host_alias) host-affinity {method
{accelerator-cookie | client-ip-address | default} | ssl-method
{accelerator-cookie | client-ip-address | ssl-session-id | default}
SGOS#(config forwarding host_alias) load-balance method {least-
connections | default | round-robin}
SGOS#(config forwarding host_alias) proxy | server
SGOS#(config forwarding host_alias) ssl-verify-server
SGOS#(config forwarding host_alias) tcp port
```

Table 7-3. Commands Used to Edit a Forwarding Host

Command	Suboption	Description
ftp   http   https   mms   rtsp   telnet	[port]	Adds the protocol and optional port for this host if it was not set previously or changes the port number for the specified protocol if it was. If you do not enter a port number, the default port number is used.  HTTPS or Telnet protocols are not allowed if the host is a proxy.
tcp	port	Changes the port number for the TCP protocol for this host. You must enter a port number if you use the TCP protocol.  TCP protocols are not allowed if the host is a proxy.
group	group_name	Changes the group membership for this host.
host	host_name	Changes this host's name.
host-affinity	method (accelerator-cookie   client-ip-address   default)	Sets which non-SSL host-affinity method to use (accelerator cookie or client-ip-address) or you can use default to specify the global method.
	ssl-method (accelerator-cookie   client-ip-address   ssl-session-id   default}	Sets which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id) or you can use default to specify the global method.

## Section B: Configuring Forwarding through the CLI

Table 7-3. Commands Used to Edit a Forwarding Host (Continued)

Command	Suboption	Description
load-balance method	least-connections   round-robin   default	Allows you to select the round-robin method or the least-connections method, or specify default to specify the global method.
proxy		Defines this host as a proxy instead of a server; any HTTPS, Telnet, or TCP port is deleted.
server		Defines this host as a server instead of a proxy.
ssl-verify-server		Sets SSL to specify that the SG appliance checks the CA certificate of the upstream server for this host.

2. (Optional) Enter the following commands to negate or disable settings for this host (only one setting can be negated at a time):

```
SGOS#(config forwarding host_alias) no {ftp | http | https | mms | rtsp
| tcp | telnet}
-or-
SGOS#(config forwarding host_alias) no group
-or-
SGOS#(config forwarding host_alias) no host-affinity (method | ssl-
method}
-or-
SGOS#(config forwarding host_alias) no load-balance method
-or-
SGOS#(config forwarding host_alias) no ssl-verify-server
```

Table 7-4. Commands to Negate Forwarding Host Settings

Command	Suboption	Description
no {ftp   http   https   mms   rtsp   tcp   telnet}		Clears the specified protocol and port from this host.
no group		Removes this host from any and all groups.
no host-affinity	method   ssl-method	Clears the specified method from this host.
no load-balance	method	Clears the method from this host.
no ssl-verify-server		Disables SSL verification for this host.

**Example**

```
SGOS#(config) forwarding
SGOS#(config forwarding) edit testhost
SGOS#(config forwarding testhost) server
ok
SGOS#(config forwarding testhost) no ftp
ok
SGOS#(config forwarding testhost) exit
SGOS#(config forwarding) exit
SGOS#(config)
```

## Section B: Configuring Forwarding through the CLI

## Editing a Forwarding Group

When you edit a group, you can change the load-balance and host-affinity settings.

**To edit a group:**

At the (config) command prompt, enter the following commands to configure the settings of a forwarding host:

```
SGOS#(config) forwarding
SGOS#(config forwarding) edit group_alias
SGOS#(config forwarding group_alias) host-affinity {method
{accelerator-cookie | client-ip-address | default} | ssl-method
{accelerator-cookie | client-ip-address | ssl-session-id | default}
SGOS#(config forwarding group_alias) load-balance hash {domain | no |
url}
SGOS#(config forwarding group_alias) load-balance method {least-
connections | default | round-robin}
```

Table 7-5. Commands to Edit a Forwarding Group

Command	Suboption	Description
host-affinity	method (accelerator-cookie   client-ip-address   default)	Sets which non-SSL host-affinity method to use (accelerator cookie or client-ip-address) or you can use default to specify the global method.
	ssl-method (accelerator-cookie   client-ip-address   ssl-session-id   default)	Sets which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id) or you can use default to specify the global method.
load-balance	hash {domain   default   url}	If you use the hash for load balancing, you can choose to hash the domain or the full URL or you can use default to disable hashing, and the load balancing method applies across a group. Hash is enabled by default.
	method {least-connections   round-robin   default}	If you use method for load balancing, you can select the round-robin method or the least-connections method, or specify default to specify the global method.

## Configuring Load Balancing

Load balancing settings can be configured globally (for all forwarding hosts and groups), or load balancing can be configured to a host or group's private values. These private values override the global default settings. (For an overview of load balancing, see "Understanding Load Balancing" on page 92.)

**To set load balancing global default settings:**

```
SGOS#(config) forwarding
SGOS#(config forwarding) load-balance hash {domain | no | url}
SGOS#(config forwarding) load-balance method {least-connections | no |
round-robin}
```

## Section B: Configuring Forwarding through the CLI

Table 7-6. Commands to Set Load Balancing Global Default Settings

Command	Suboption	Description
hash	{domain   no   url}	If you use the hash for load balancing, you can choose to hash the domain or the full URL or no to disable hashing, and the load balancing method applies across a group. Hash is enabled by default.
method	{least-connections   no   round-robin}	If you use method for load balancing, you can select the round-robin method or the least-connections method, or specify no to disable load balancing.

**Note:** Remember that a group must have a hash setting of **no** in order for the method to apply across the entire group.

**To set load balancing private values:**

```
SGOS#(config) forwarding
SGOS#(config forwarding) load-balance hash {default | domain | no |
url} group_alias
SGOS#(config forwarding) load-balance method {default | least-
connections | no | round-robin} host_or_group_alias
```

Table 7-7. Commands to Set Load Balancing Private Values

Command	Suboption	Description
hash	{default   domain   no   url} group_alias	You can specify a group to apply the load-balancing hash setting to only that group. Hashing is enabled by default.
method	{default   least-connections   no   round-robin} host_or_group_alias	You can specify a host or group to apply the load-balancing method to only that host or group.

**Example**

```
SGOS#(config forwarding) load-balance method least-connections test-
host-name
ok
```

## Configuring Host Affinity

Host affinity settings can be configured globally (for all forwarding hosts and groups), or the settings can be configured for a host or group's private values. These private values override the global default settings. (For an overview of host affinity, see ["Understanding Host Affinity"](#) on page 93.)

The non-SSL host affinity methods are implemented for HTTP only; SSL host affinity methods are implemented for HTTPS only.

## Section B: Configuring Forwarding through the CLI

**To configure global default host affinity settings:**

```

SGOS#(config) forwarding
SGOS#(config forwarding) host-affinity method {accelerator-cookie |
client-ip-address | no}
-or-
SGOS#(config forwarding) host-affinity ssl-method {accelerator-cookie
| client-ip-address | ssl-session-id | no}
SGOS#(config forwarding) host-affinity timeout minutes

```

where:

method	{accelerator-cookie   client-ip-address   no}	Sets which non-SSL host-affinity method to use (accelerator cookie or client-ip-address) or you can use no to disable non-SSL host affinity.
ssl-method	{accelerator-cookie   client-ip-address   ssl-session-id   no}	Sets which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id) or you can use no to disable SSL host affinity.
timeout	minutes	Determines how long a user's IP address, SSL ID, or cookie remains valid.

**To configure host- or group-specific host affinity settings:**

```

SGOS#(config) forwarding
SGOS#(config forwarding) host-affinity method {accelerator-cookie |
client-ip-address | default | no} host_or_group_alias
-or-
SGOS#(config forwarding) host-affinity ssl-method {accelerator-cookie
| client-ip-address | default | no} host_or_group_alias

```

Table 7-8. Commands to Configure Host- or Group-Specific Host Affinity Settings

Command	Suboptions	Description
method	{accelerator-cookie   client-ip-address   default   no} <i>host_or_group_alias</i>	You can choose which non-SSL host-affinity method to use (accelerator cookie or client-ip-address) for a specific host or group, or you can use no to disable non-SSL host affinity for a specific host or group. You can also apply the global non-SSL host-affinity method to a specific host or group.
ssl_method	{accelerator-cookie   client-ip-address   default   no   ssl-session-id} <i>host_or_group_alias</i>	You can choose which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id) for a specific host or group, or you can use no to disable SSL host affinity for a specific host or group. You can also apply the global SSL host-affinity method to a specific host or group (use the default command).

## Section B: Configuring Forwarding through the CLI

**Example**

```

SGOS#(config forwarding) host-affinity method client-ip-address
ok
SGOS#(config forwarding) host-affinity ssl-method no test-group-name
ok
SGOS#(config forwarding) host-affinity timeout 45
ok

```

**Creating a Default Sequence**

The default sequence defines the order in which forwarding hosts are used in case of failover and which host to use first (only one default sequence is allowed). If you create a default sequence, forwarding is applied, by default, to all requests. All members must be pre-existing hosts and groups, and no member can be in the group more than once.

---

**Note:** Creating a default sequence through the CLI is a legacy feature. Creating a default sequence can be done much more efficiently through policy—VPM or CPL—than it can through the CLI. The default sequence (if present) is applied only if no applicable forwarding gesture is in policy.

For information on using VPM, refer to *Volume 7: VPM and Advanced Policy*; for information on using CPL, refer to *Volume 11: Content Policy Language Guide*. For information on using forwarding with policy, see [Appendix B: "Using Policy to Manage Forwarding" on page 207](#).

---

A default failover sequence (and any sequence specified in policy) works by allowing healthy hosts to take over for an unhealthy host (one that is failing its DNS Resolution or its health check). The sequence specifies the order of failover, with the second host taking over for the first host, the third taking over for the second, and so on.

---

**Note:** In normal circumstances, only the first member of the sequence is ever used.

---

If all hosts are unhealthy, the operation fails either open or closed, depending upon your settings.

This configuration is generally created and managed through policy. If no forwarding policy applies, you can create a default sequence through the CLI. This single default sequence consists of a single default host (or group) plus one or more hosts to use if the preceding ones are unhealthy.

**To create a default sequence:**

From the (config) prompt, enter the following commands:

```

SGOS#(config forwarding) sequence add alias_name
SGOS#(config forwarding) sequence clear
SGOS#(config forwarding) sequence demote alias_name
SGOS#(config forwarding) sequence promote alias_name
SGOS#(config forwarding) sequence remove alias_name

```

Table 7-9. Commands to Create a Default Sequence

Command	Suboptions	Description
add	alias_name	Adds an alias to the end of the default failover sequence.

## Section B: Configuring Forwarding through the CLI

Table 7-9. Commands to Create a Default Sequence (Continued)

Command	Suboptions	Description
clear		Clears the default failover sequence.
demote	<i>alias_name</i>	Moves an alias one place towards the end of the default failover sequence.
promote	<i>alias_name</i>	Moves an alias one place towards the start of the default failover sequence.
remove	<i>alias_name</i>	Removes an alias from the default failover sequence.

**Example**

```
SGOS#(config forwarding) sequence clear
ok
```

---

**Note:** Any host or group in the default sequence is considered in use by policy. As a result, if you try to delete a host or group while it is in the default sequence, you receive an error message. You must remove the host/group from the sequence first, then delete.

---

## Section C: Using Forwarding Directives to Create an Installable List

## Section C: Using Forwarding Directives to Create an Installable List

You can use either directives or the CLI `#inline forwarding` command to create and configure forwarding hosts. To use the CLI to configure forwarding hosts, see [Section A: "Understanding Forwarding" on page 92](#).

The forwarding configuration includes directives that:

- ❑ Create the forwarding hosts and groups
- ❑ Provide load balancing and host affinity

Table 7-10. Forwarding Directives

Directive	Meaning	See
<code>fwd_fail</code>	Determines whether the forwarding host should fail open or fail closed if an operation does not succeed. Fail open is a security risk.	<a href="#">"Setting Fail Open/Closed and Host Timeout Values" on page 106.</a>
<code>fwd_host</code>	Create a forwarding host and set configuration parameters for it, including protocols and ports.	<a href="#">"Creating Forwarding Host and Group Directives" on page 104.</a>
<code>host_affinity</code>	The attempt to direct multiple connections by a single user to the same group member.	<a href="#">"Configuring Host Affinity Directives" on page 107.</a>
<code>integrated_host_timeout</code>	An origin content server that has been added to the health check list is called an integrated host. The host ages out after being idle for the specified time.	<a href="#">"Setting Fail Open/Closed and Host Timeout Values" on page 106.</a>
<code>load_balance</code>	The attempt to manage the load among forwarding hosts in a group, or among multiple IP addresses of a host.	<a href="#">"Configuring Load Balancing Directives" on page 107.</a>
<code>sequence alias_list</code>	where <code>alias_list</code> is a space separated list of one or more forwarding host and group aliases.	<a href="#">"Creating a Default Sequence" on page 108.</a>

### Creating Forwarding Host and Group Directives

You can add directives into the forwarding installable list that allows you to create and delete the forwarding host and associate protocols and ports with the host.

You can create a maximum of 32 groups, and each group can contain a maximum of 512 hosts. You can create 512 individual hosts that do not belong to any group.

To create a forwarding host, choose the protocols you want to use, or optionally add the forwarding host to a group, enter the following into your installable list. Create a `fwd_host` directive for each forwarding host you want to create.

```
fwd_host host_alias hostname [default-schemes] [http[=port | =no]]
[https[=port | =no]] [ftp[=port | =no]] [mms[=port | =no]] [rtsp[=port
| =no]] [tcp=port] [telnet[=port | =no]] [ssl-verify-server[=yes |
=no]] [group=group_name] [server | proxy] [load-balance={no | round-
robin | least-connections}] [host-affinity={no | client-ip-address |
accelerator-cookie}] [host-affinity-ssl={no | client-ip-address |
accelerator-cookie | ssl-session-id}]
```

## Section C: Using Forwarding Directives to Create an Installable List

Table 7-11. Commands to Create Forwarding Host and Group Directives

<code>host_alias</code>		This is the alias for use in policy. Define a name meaningful to you.
<code>host_name</code>		The name of the host domain, such <code>www.bluecoat.com</code> , or its IP address.
<code>default-schemes</code>		If you use <code>default-schemes</code> in the directive, all protocols, along with their default ports are selected. This directive is only available for proxy hosts.
<code>http</code> <code>https</code> <code>ftp</code> <code>mms</code> <code>rtsp</code> <code>telnet</code>	<code>=port</code>   <code>=no</code>	No protocol is selected by default if the forwarding host is a server. You must choose at least one protocol where <code>port=0</code> to 65535. If only one protocol is configured, the SG configures the default port for that protocol.  You can use <code>default-schemes</code> and then eliminate protocols by selecting the protocol you do not want; for example, <code>http=no</code> . If you do not want to use the default ports for the protocols, you must also specify them here.  HTTPS protocols are not allowed if the host is a proxy.
<code>tcp</code>	<code>=port</code>	If you choose to add a TCP protocol, a TCP port must be specified.  TCP protocols are not allowed if the host is a proxy.
<code>ssl-verify-server</code>	<code>=yes</code>   <code>=no</code>	Sets SSL to specify that the SG appliance checks the CA certificate of the upstream server.  The default for <code>ssl-verify-server</code> is <code>yes</code> . To disable this feature, you must specify <code>ssl-verify-server=no</code> in the installable list or CLI. In other words, you can configure <code>ssl-verify-server=yes</code> in three ways: do nothing ( <code>yes</code> is the default), specify <code>ssl-verify-server</code> , or specify <code>ssl-verify-server=yes</code> .
<code>group</code>	<code>=group_name</code>	Specifies the group (or server farm or group of proxies) to which this host belongs. If this is the first mention of the group <code>group_name</code> then that group is automatically created with this host as its first member.  The SG appliance uses load balancing to evenly distribute forwarding requests to the origin servers or group of proxies. Do not use the <code>group=</code> option when creating independent hosts.
<code>server</code>   <code>proxy</code>		<code>server</code> specifies to use the relative path for URLs in the HTTP header because the next hop is a Web server, not a proxy server. The default is <code>proxy</code> .

## Section C: Using Forwarding Directives to Create an Installable List

Table 7-11. Commands to Create Forwarding Host and Group Directives (Continued)

load-balance	=no   =round-robin   =least-connections	Specifies either the least-connections or round-robin method of load balancing. Select <code>no</code> to disable load balancing for this forwarding host or host group.  If these settings are not specified for a particular host or host group, then the global default settings are used. To configure the settings for a specific host or host group, use the <code>edit host_alias</code> or <code>edit group_alias</code> commands (see “Editing a Forwarding Host” on page 97 or “Editing a Forwarding Host” on page 97).
host-affinity	=no   =client-ip- address   =accelerator-cookie	Specifies non-SSL host affinity via either a client IP address or an accelerator cookie. Select <code>no</code> to disable non-SSL host affinity for this forwarding host or host group.  If these settings are not specified for a particular host or host group, then the global default settings are used. To configure the settings for a specific host or host group, use the <code>edit host_alias</code> or <code>edit group_alias</code> commands (see “Editing a Forwarding Host” on page 97 or “Editing a Forwarding Group” on page 99).
host-affinity-ssl	=no   =client-ip- address   =accelerator-cookie   =ssl-session-id	Specifies SSL host affinity via a client IP address, an accelerator cookie, or an SSL session ID. Select <code>no</code> to disable SSL host affinity for this forwarding host or host group.  If these settings are not specified for a particular host or host group, then the global default settings are used. To configure the settings for a specific host or host group, use the <code>edit host_alias</code> or <code>edit group_alias</code> commands (see “Editing a Forwarding Host” on page 97 or “Editing a Forwarding Group” on page 99).

**Example**

```
fwd_host www.bluecoat1.com 10.25.36.48 default-schemes ssl-verify-  
server=no group=bluecoat
```

**Setting Fail Open/Closed and Host Timeout Values**

Using directives, you can determine if the forwarding host fails open or closed, if an operation does not succeed, and the interval it takes for integrated hosts to be aged out.

An integrated host is an Origin Content Server (OCS) that has been added to the health check list. If the policy property `integrate_new_hosts` applies to a forwarding request, the SG appliance makes a note of each OCS and starts health checking to help future accesses to those systems. If the host is idle for the interval you specify, it is aged out. Sixty minutes is the default.

The syntax is:

```
fwd_fail {open | closed}  
integrated_host_timeout minutes
```

## Section C: Using Forwarding Directives to Create an Installable List

Table 7-12. Commands to Set Fail Open/Closed and Host Timeout Values

<code> fwd_fail </code>	<code> {open   closed} </code>	Determines whether the forwarding host should fail open or fail closed if an operation does not succeed. Fail open is a security risk, and fail closed is the default if no setting is specified.  This setting can be overridden by policy, (using the <code>forward.fail_open (yes no)</code> property).
<code>integrated_host_timeout</code>	<code>minutes</code>	An OCS that has been added to the health check list is called an integrated host. The host ages out after being idle for the specified time.

*Examples*

```
 fwd_fail open
integrated_host_timeout 90
```

**Configuring Load Balancing Directives**

Load balancing shares the load among a set of IP addresses, whether a group or a host with multiple IPs.

The syntax is:

```
load_balance hash {domain | no | url} [group_alias]
load_balance method {least-connections | round-robin | no}
[host_or_group_alias]
```

Table 7-13. Load Balancing Directives

Command	Suboptions	Description
<code>hash</code>	<code>{domain   no   url}</code> <code>[group_alias]</code>	If you use the hash for load balancing, you can hash the domain or the full URL, or you can enter <code>no</code> to disable hashing and the load-balancing method applies across a group. If you do not specify a group, the settings apply as the default for all groups.
<code>method</code>	<code>{least-connections   no   round-robin}</code> <code>[host_or_group_alias]</code>	If you use method for load balancing, you can select the <code>least-connections</code> method or the <code>round-robin</code> method, or you can specify <code>no</code> to disable load balancing (hashing still occurs if it is set). If you do not specify a host or group, the settings apply as the default for all hosts or groups.

*Example*

```
load_balance method least_connections
```

**Configuring Host Affinity Directives**

Host affinity is the attempt to direct multiple connections by a single user to the same group member.

The syntax is:

```
host_affinity method {accelerator-cookie | client-ip-address | no}
[host_or_group_alias]
host_affinity ssl_method {accelerator-cookie | client-ip-address | no
| ssl-session-id} [host_or_group_alias] host_affinity timeout seconds
```

## Section C: Using Forwarding Directives to Create an Installable List

Table 7-14. Commands to Configure Host Affinity Directives

Command	Suboption	Description
method	{accelerator-cookie   client-ip-address   no} [host_or_group_alias]	Determines which non-SSL host-affinity method to use (accelerator cookie or client-ip-address), or you can use no to disable non-SSL host affinity. If you do not specify a host or group, the settings apply as the default for all hosts or groups.
ssl_method	{accelerator-cookie   client-ip-address   no   ssl-session-id} [host_or_group_alias]	Determines which SSL host-affinity method to use (accelerator cookie, client-ip-address, or ssl-session-id), or you can use no to disable SSL host affinity. If you do not specify a host or group, the settings apply as the default for all hosts or groups.
timeout	minutes	Determines how long a user's IP address, SSL ID, or cookie remains valid.

*Example*

```
host_affinity ssl_method 10.25.36.48
host_affinity timeout 5
```

**Creating a Default Sequence**

A default sequence defines the order in which forwarding hosts are used. Only one default sequence is allowed. All members must be pre-existing hosts and groups, and no member can be in the group more than once.

---

**Note:** The default sequence is completely overridden by policy.

---

A default failover sequence works by allowing healthy hosts to take over for an unhealthy host (one that is failing its DNS Resolution or its health check). The sequence specifies the order of failover, with the second host taking over for the first host, the third taking over for the second, and so on).

If all hosts are unhealthy, the operation fails either open or closed, depending upon your settings.

This configuration is generally created and managed through policy. If no forwarding policy applies, you can create a default sequence through the CLI. This single default sequence consists of a single default host (or group) plus one or more hosts to use if the preceding ones are unhealthy.

The syntax is:

```
sequence alias_list alias_list
```

where *alias\_list* is a space-separated list of one or more forwarding host and group aliases.

*Example*

```
sequence bluecoat
```

## Section C: Using Forwarding Directives to Create an Installable List

---

### Creating a Forwarding Installable List

You can create and install the forwarding installable list using one of the following methods:

- ❑ Text Editor, which allows you to enter the installable list of directives (or copy and paste the contents of an already-created file) directly onto the appliance.
- ❑ A local file, created on your system; the SG appliance can browse to the file and install it.
- ❑ A remote URL, where you placed an already-created file on an FTP or HTTP server to be downloaded to the SG appliance.
- ❑ CLI `inline` command.

When the Forwarding Installable List is installed, it updates the forwarding directives on the SG appliance. The directives remain in effect until they are overwritten by another installable list; the list can be modified or overwritten using CLI commands.

---

**Note:** During the time that a forwarding installable list is being compiled and installed, forwarding is not available. Any transactions that come into the SG appliance during this time are not forwarded properly and are denied.

---

Installation of forwarding installable lists should be done outside peak traffic times.

#### To create a forwarding installable list:

1. Select **Configuration > Forwarding > Forwarding Hosts**.
2. From the drop-down list, select the method to use to install the forwarding installable list; click **Install**.

---

**Note:** A message is written to the event log when you install a list through the SGOS software.

---

- **Remote URL:**

Enter the fully-qualified URL, including the filename, where the installable list is located. To view the file before installing it, click **View**. Click **Install**. Examine the installation status that displays; click **OK**.

- **Local File:**

Click **Browse** to display the Local File Browse window. Browse for the installable list file on the local system. Open it and click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.

- **Text Editor:**

The current configuration is displayed in installable list format. You can customize it or delete it and create your own. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.

---

**Note:** The Management Console text editor is a way to enter an installable list for forwarding. It is not a way to enter CLI commands. The directives are understood only by the installable list parser for forwarding.

---

## Section C: Using Forwarding Directives to Create an Installable List

---

### 3. Click **Apply**.

---

**Note:** You can create forward settings using the CLI `#inline forwarding` command. You can use any of the forwarding directives, but host affinity and load balancing are mutually exclusive.

For more information on using inline commands, refer to *Volume 12: Command Line Reference*: “Chapter 2: Standard and Privileged Commands”.

---

### To delete forwarding settings on the SG appliance:

From the `(config)` prompt, enter the following commands to delete a host, a group, or all hosts and groups from the forwarding configuration:

```
SGOS#(config) forwarding
SGOS#(config forwarding) delete {all | group group_name | host
host_alias}
```

---

**Note:** Any host or group in the default sequence is considered in use by policy. As a result, if you try to delete a host or group while it is in the default sequence, you receive an error message. You must remove the host/group from the sequence first, then delete.

---

## Section D: TCP Connection Forwarding

This section describes how to configure the SG appliance to join peer clusters that process requests in asymmetrically routed networks.

### About Asymmetric Routing Environments

It is common in larger enterprises to have multiple SG appliances residing on different network segments; for example, the enterprise receives Internet connectivity from more than one ISP. If IP spoofing is enabled, connection errors can occur because the SG appliance terminates client connections and makes a new outbound connection (with the source IP address of the client) to the server. The response might not return to the originating SG appliance, as illustrated in the following diagram.

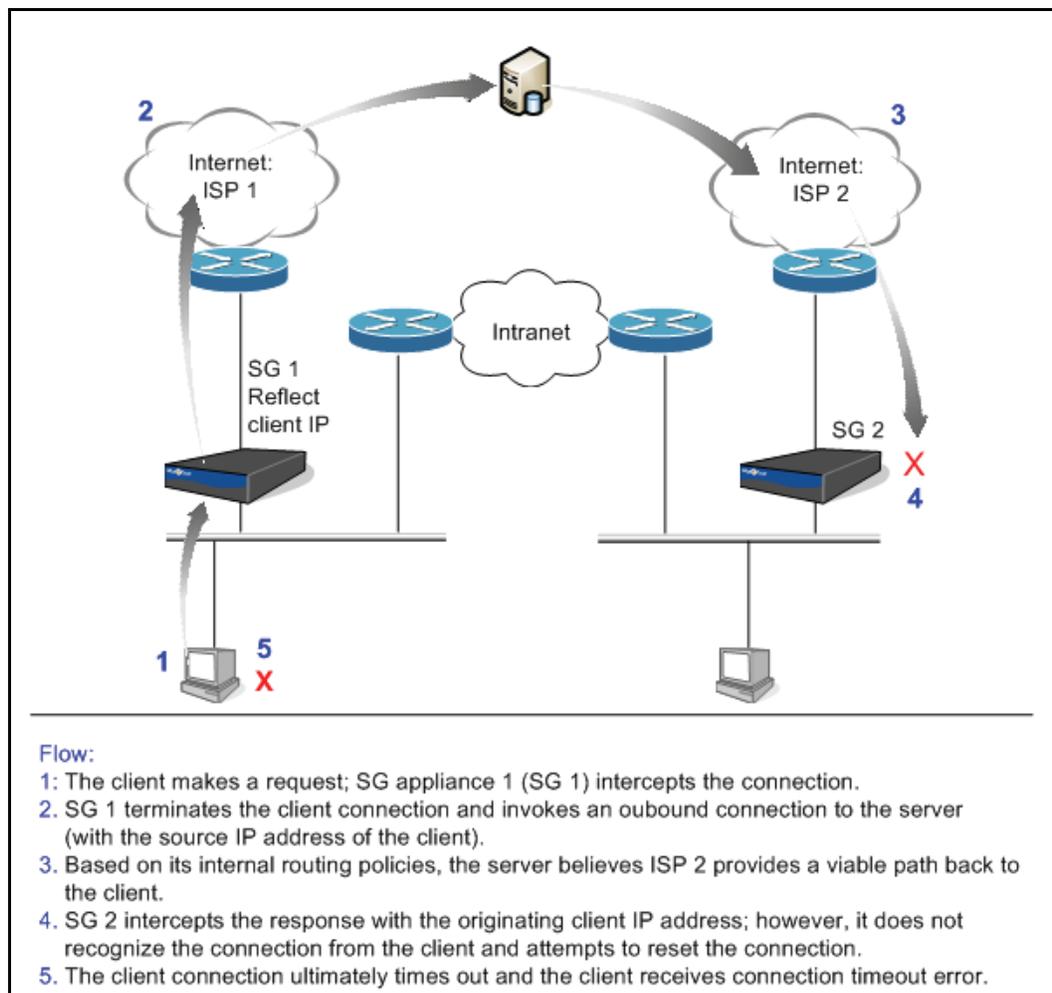


Figure 7-1. Multiple SG appliances in an asymmetric routing environment

### The TCP Connection Forwarding Solution

Enabling TCP Connection Forwarding is a critical component of the following solutions:

- “About Bidirectional Asymmetric Routing” on page 112.

## Section D: TCP Connection Forwarding

- “About Dynamic Load Balancing” on page 113.
- “About ADN Transparent Tunnel Load Balancing” on page 113.

### About Bidirectional Asymmetric Routing

To solve the asymmetric routing problem, at least one SG appliance on each network segment must be configured to perform the functionality of an L4 switch. These selected appliances form a cluster. With this peering relationship, the connection responses are able to be routed to the network segment where the originating client resides.

In the 5.1.4.x release, cluster membership is manual; that is, SG appliances must be added to a cluster by enabling connection forwarding and adding a list of other peers in the cluster. After a peer joins a cluster, it begins sending and receiving TCP connections, and notifies the other peers about its connection requests.

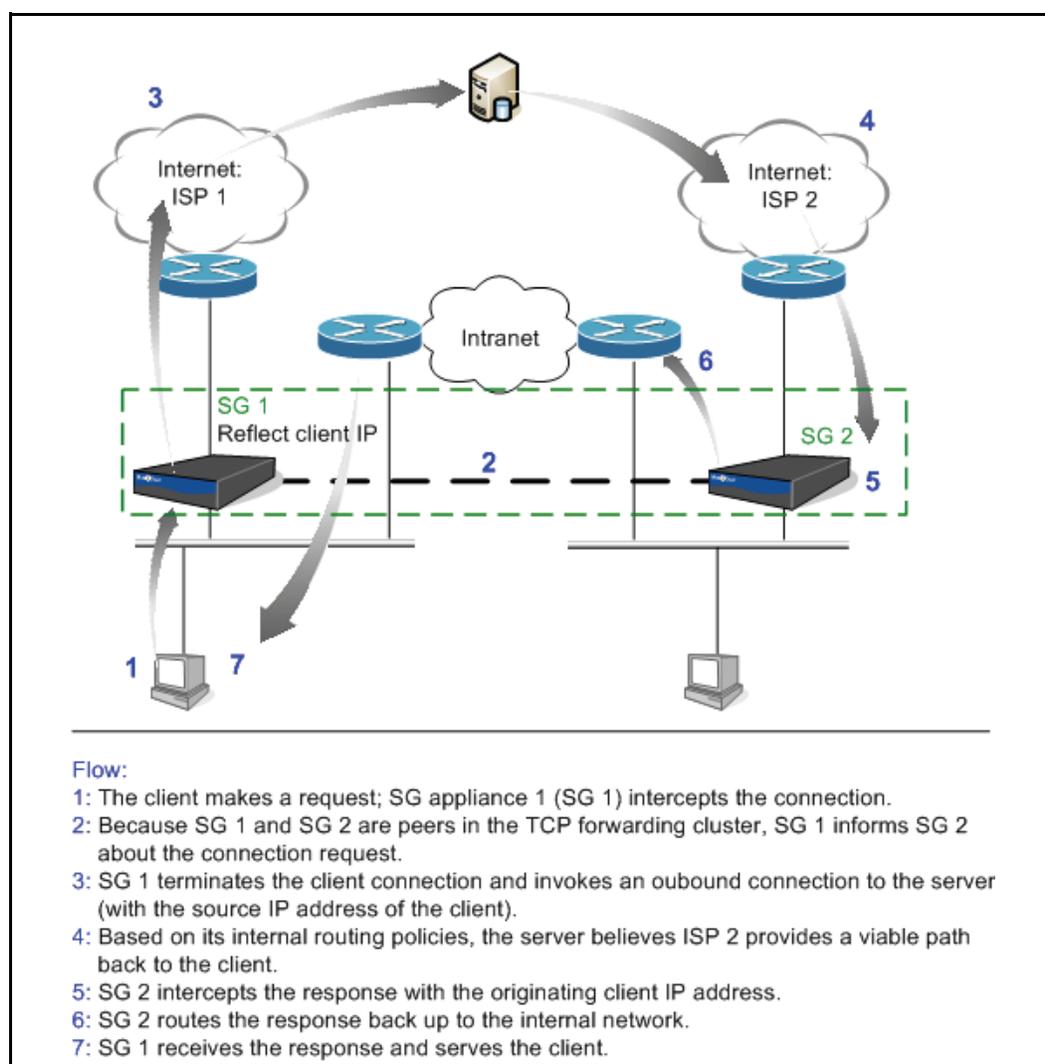


Figure 7-2. SG appliances share TCP connection information

### About Dynamic Load Balancing

In a deployment where one SG appliance receives all of the traffic originating from clients and servers from an external routing device and distributes connections to other SG appliances, TCP connection forwarding enables all of the appliances to share connection information (for each new connection) and the in-line SG appliance routes the request back to the originating appliance, thus lightening the load on the inline appliance.

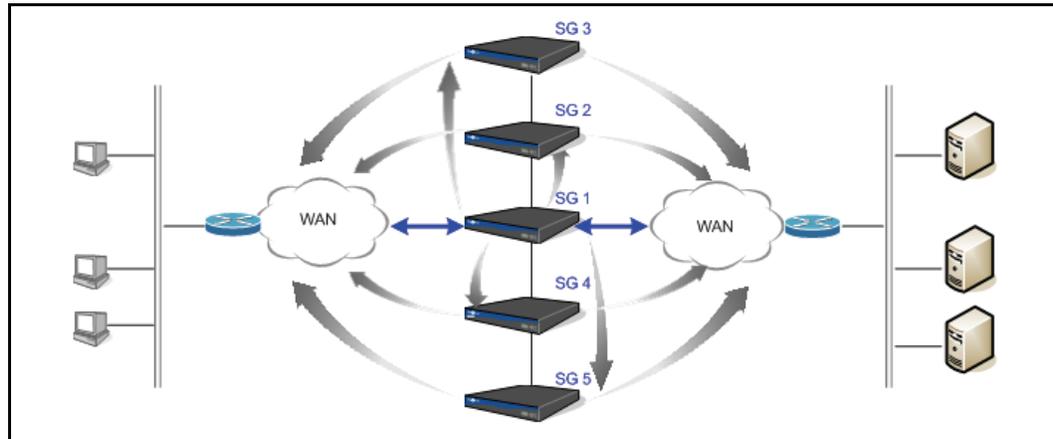


Figure 7-3. An SG appliance serving inline as a load balancer

In the above network topography, SG appliance **SG 1** is deployed inline to receive all traffic (by way of a switch) originating from the clients to the servers and servers to the clients and serves as a load balancer to the other four SG appliances. Appliances **2** through **5** also have independent connectivity to the clients and the servers. When all appliances belong to the same peering cluster and have connection forwarding enabled, appliance **SG 1** knows which of the other appliances made a specific connection and routes the response to that appliance.

In this deployment, a TCP acknowledgement is sent and retransmitted, if required, to ensure the information gets there, but each new connection message is not explicitly acknowledged. However, if the SG appliance receives packets for a connection that is unrecognized, the appliance retains those packets for a short time before deciding whether to forward or drop them, which allows time for a new connection message from a peer to arrive.

While adding more peers to a cluster increases the connection synchronization traffic, the added processing power all but negates that increase. You can have multiple peer clusters, and if you are cognoscente of traffic patterns to and from each cluster, you can create an effective cluster strategy. The only limitation is that an SG appliance can only be a peer in one cluster.

The Blue Coat load balancing solution is discussed in greater detail in earlier sections of this chapter.

### About ADN Transparent Tunnel Load Balancing

TCP connection forwarding is a critical component of the Blue Coat ADN transparent tunnel load balancing deployment. Achieving efficient load balancing is difficult when ADN transparent tunneling is employed and an external load balancer is distributing requests to multiple SG appliances.

## Section D: TCP Connection Forwarding

A user-noticeable performance degradation occurs if the router, switch, or load balancer sends traffic to an SG appliance that has not been servicing a particular client long enough to build up substantial byte caching dictionary, thus the compression ratio is low. When the SG appliances connected to the routing device belong to the same peer cluster and connection forwarding is enabled, the ADN managers on each appliance know which of their peers has the best byte caching dictionary with the client and forwards the request. This is illustrated in the following diagram.

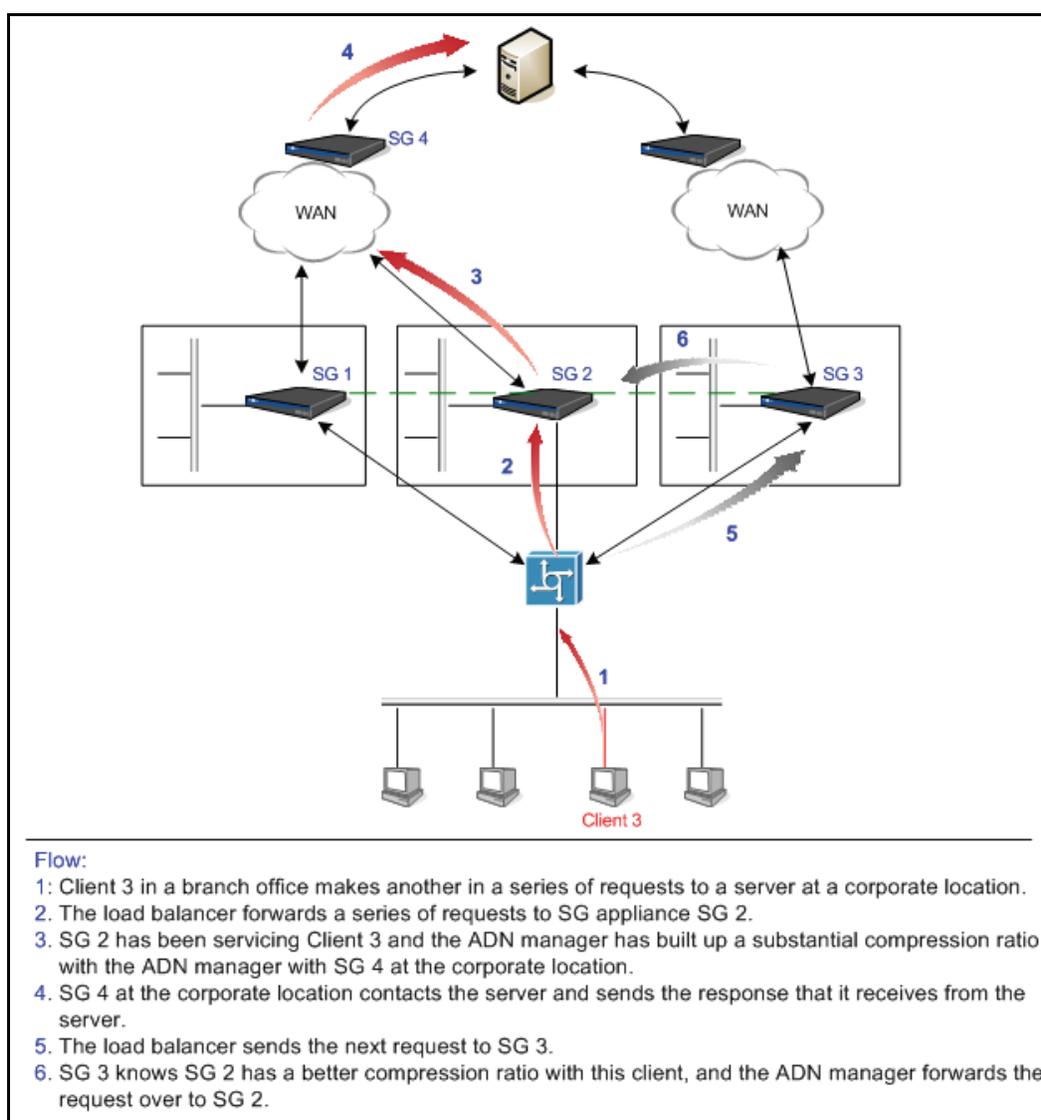


Figure 7-4. ADN Transparent Tunnel load balancing with Connection Forwarding enabled

Load balancing is based on the IP address of the remote ADN peer. This assures that all the traffic from a particular ADN peer to the local ADN cluster always goes to a specific local SG appliance, thus eliminating the inefficiency of keeping dictionaries for that remote peer on more than one local SG appliance.

The Blue Coat ADN solution is discussed in greater detail in [Chapter 2: "Configuring an Application Delivery Network"](#) on page 11.

## TCP Configuration Forwarding Deployment Notes

When configuring your network for TCP connection forwarding, consider the following:

- ❑ Peers can be added to clusters at any time without affecting the performance of the other peers. An SG appliance that joins a peer cluster immediately contacts every other peer in the cluster. Likewise, a peer can leave a cluster at anytime. This might be a manual drop or a forced drop because of a hardware or software failure. If this happens, the other peers in the cluster continue to process connection forwarding requests.
- ❑ Connections between peers are not encrypted and not authenticated. If you do not assign the correct local IP address on an SG appliance with multiple IP addresses, traffic sent peer to peer might be routed through the Internet, not the intranet, exposing your company-sensitive data.
- ❑ The peering port—the connection between SG appliance connection forwarding peers—cannot be configured with bypass services. This means an SG appliance cannot be deployed in transparent mode between two SG appliances that are peers.
- ❑ SG does not enforce a maximum number of appliances a peer cluster supports, but currently the deployment is designed to function with up to 20 SG appliances.
- ❑ Because TCP connection forwarding must function across different network segments, employing multicasting, even among SG appliance peers on the same network, is not supported.
- ❑ There might be a slight overall performance impact from enabling TCP connection forwarding, especially in deployments where traffic is largely already being routed to the correct SG appliance. If a substantial amount of traffic requires forwarding, the performance hit is equitable to processing the same amount of bridging traffic.

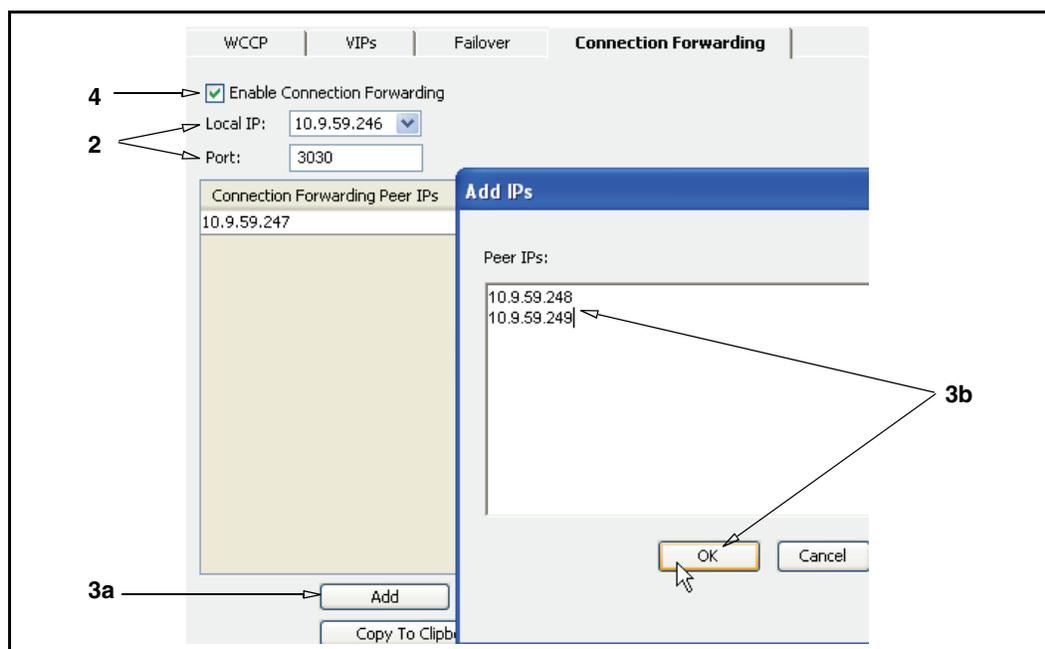
## Configuring TCP Connection Forwarding

As described in the previous concept sections, enabling TCP connection forwarding provides one component to a larger deployment solution. After you have deployed Blue Coat appliances into the network topography that best fits your enterprise requirements, enable TCP connection forwarding on each Blue Coat appliance that is to belong to the peering cluster, and add the IP address of the other peers. The peer lists on *all* of the cluster members must be the same, and an SG appliance cannot have a different local peer IP address than what is listed in another peers list. A peer list can contain only one local IP address.

### To enable TCP Connection Forwarding:

1. Select **Configuration > Network > Advanced > Connection Forwarding**.

## Section D: TCP Connection Forwarding



2. From the **Local IP** drop-down list, select the IP address that is routing traffic to this SG appliance.

Specify the port number (the default is **3030**) that the SG appliance uses to communicate with all peers, which includes listening and sending out connection forwarding cluster control messages to all peers in the group. *All* peers in the group must use the same port number (when connection forwarding is enabled, you cannot change the port number).

3. Add the cluster peers:
  - a. Click **Add**.
  - b. In the **Peer IPs** field, enter the IP addresses of the other peers in the cluster that this SG appliance is to communicate connection requests with.; click **OK**.
4. Select **Enable Connection Forwarding**.
5. Click **Apply**.

This SG appliance joins the peer cluster and immediately begins communicating with its peers.

### Copying Peers to Another SG Appliance in the Cluster

If you have a larger cluster that contains several peer IP addresses, select all of the IP addresses in the **Connection Forwarding Peer IPs** list and click **Copy To Clipboard**; this action includes the local IP address of the peer you are copying from, and it will be correctly added as a remote peer IP address on the next appliance. When you configure connection forwarding on the next appliance, click **Paste From Clipboard** to paste the list of peers, and click **Apply**. Whichever peer IP address is the new appliance's local IP address is pulled out of the list and used as the local IP address on the new appliance. If a local IP address is not found or if more than one local IP address is found, the paste fails with an error.

## Section D: TCP Connection Forwarding

---

### Removing a Peer

A network change or other event might require you to remove a peer from the cluster. Highlight a peer IP address and click **Remove**. The peer connection is terminated and all connections associated with the peer are removed from the local system.

---

**Note:** A CLI command is available that allows you to disable a peer, which terminates the communication with other peers, but does not remove the peer from the cluster. See the next section.

---

### Related CLI Syntax to Configure TCP Connection Forwarding

- ❑ To enter configuration mode:  
SGOS# (config) **connection-forwarding**
- ❑ The following subcommands are available:  
SGOS# (config connection forwarding) **add ip\_address**  
SGOS# (config connection forwarding) **port number**  
SGOS# (config connection forwarding) [**enable | disable**]  
SGOS# (config connection forwarding) [**clear | remove ip\_address**]  
SGOS# (config connection forwarding) [**view | exit**]
- ❑ The following configuration and statistics commands are available:  
SGOS# **show connection-forwarding configuration**  
SGOS# **show connection-forwarding statistics**



## Chapter 8: Health Checks

This chapter discusses health checks for services and hosts and describes how to configure the SG appliance.

### About General Health Checks

The SG appliance can perform health checks on a forwarding host or external server that is providing a service. The supported server types are HTTP, HTTPS, ICAP, Websense (off-box), and SOCKS gateways, Layer-3, and Layer 4 forwarding hosts.

When a health check reports a target as sick, this allows a much quicker failure for a connection attempt than might otherwise occur. The health check also drives the fail-over mechanisms in the forwarding groups, external service groups, and forwarding policy sequences.

Based on the health check type, the SG appliance periodically verifies the health status, and thus the availability, of the host. The time interval between checks is configurable. If the health check is successful, the appliance considers the host available. If the initial health check is not successful for a host, the SG appliance retries, using the number of consecutive successes or failures meet the configured thresholds to trigger a change of health check state.

If the health check is not successful for every server in a domain, stale content might be served, depending on the SG configuration.

The following table describes the types of health checks.

Table 8-1. Health Check Types

Health Check Type	Description
HTTP	Use this type to confirm that the host can fulfill a content request over HTTP by the SG appliance. The appliance accepts only a 200 OK as a healthy response.
Criterion for success	The SG appliance fetches the object.
Criterion for failure	The SG appliance cannot fetch the object.
HTTPS	Use this type to confirm that the host can fulfill a content request over HTTPS by the SG appliance. The appliance accepts only a 200 OK as a healthy response.
Criterion for success	The SG appliance fetches the object.
Criterion for failure	The SG appliance cannot fetch the object.
Layer-3 health check	Use this type to confirm the basic connection between the SG appliance and the origin server. The server must recognize ICMP echoing. The SG appliance sends a ping (three Internet Control Message Protocol [ICMP] echo requests) to the host.
Criterion for success	The SG appliance receives at least one ICMP echo reply.
Criterion for failure	The SG appliance does not receive a single ICMP echo reply.

Table 8-1. Health Check Types (Continued)

Health Check Type	Description
Layer-4 health check	Use this type to confirm that the SG appliance can connect to the host HTTP and FTP ports. The SG appliance attempts to establish a TCP connection to an HTTP port or FTP port on the host.
Criterion for success	The SG appliance establishes the connection to the defined port (of any type), then closes it. For global forwarding checks, the first defined port in the forwarding host port list is used for the attempt (except for SOCKS gateways, in which the SOCKS port is used).
Criterion for failure	The SG appliance cannot establish the connection.
ICAP health check and Websense 4 off-box	Requests are not sent to <i>sick</i> services. If a health check determines the service is healthy, requests resume.

## Configuring Service-Specific Health Checks

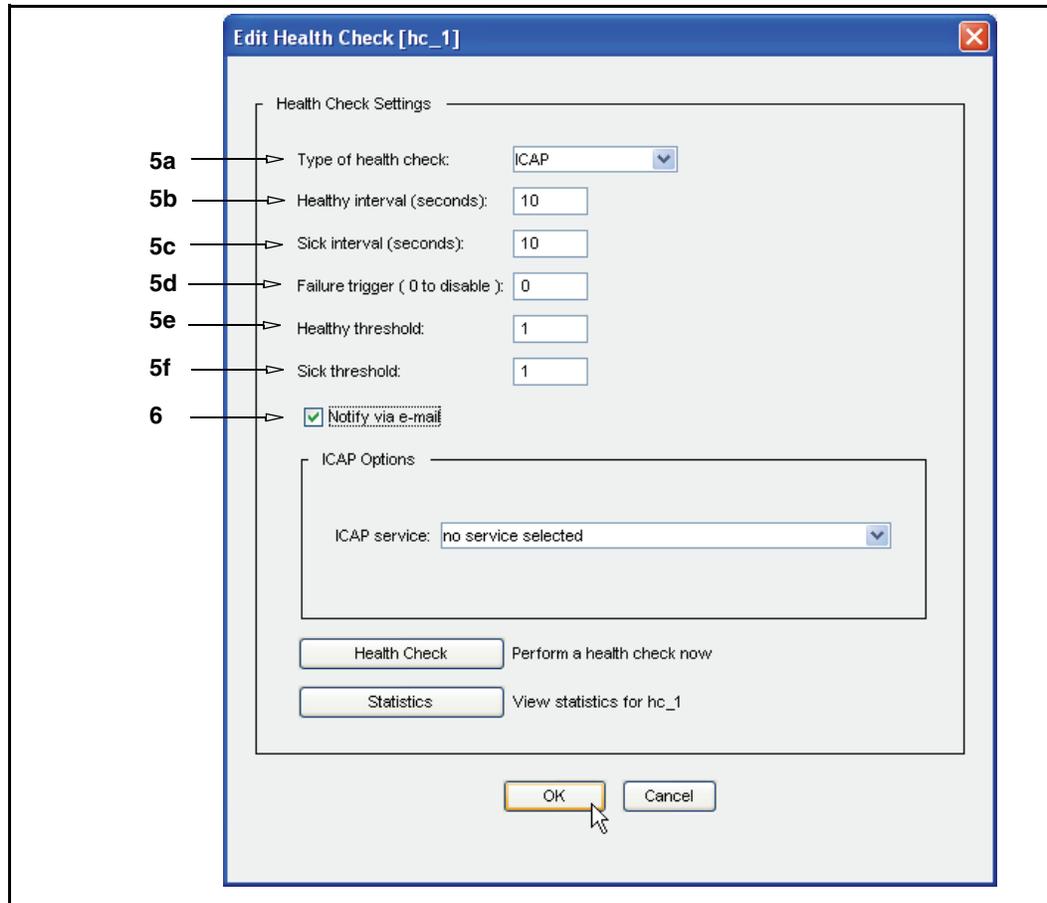
This section describes how to create a health check service for a specific host (for example, an ICAP server). A failed health check results in administrator notification; however, no action is taken to control any traffic.

### To configure health checks:

#### *Part 1: General Tasks*

This part of the procedures is the same for all health check types.

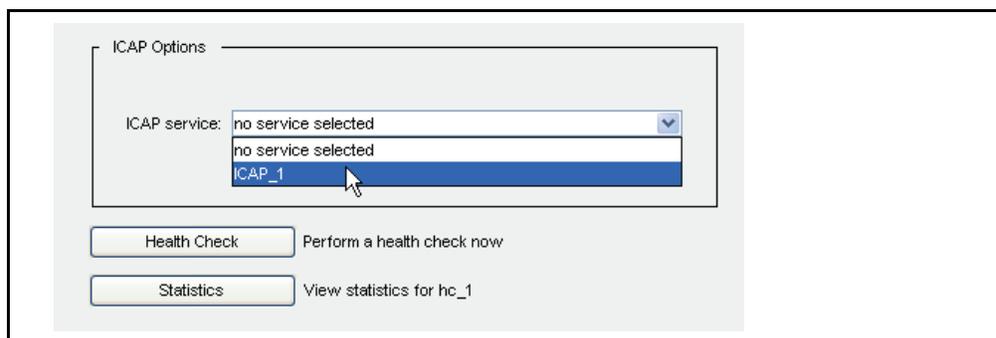
1. Select **Configuration > Health Checks > General**.
2. Click **New**.
3. In the Add Health Check dialog, specify a name for the health check service; click **OK**.
4. In the **Health Check** list, select the newly created service and click **Edit**.



5. Configure options:
  - a. Select the health check type (**HTTP, HTTPS, ICAP, Layer-3, Layer-4, or Websense off-box**).
  - b. Specify the healthy interval, in seconds, between health checks to the server. The default is **10**.
  - c. Specify the sick interval, in seconds, between health checks to the server that has been determined to be sick, or out of service. The default is **10**.
  - d. Specify the failure trigger for the number of failed connections to the server before a health check is triggered. If the external service experiences a connection failure during a connection attempt, the service reports the event to the health checks system. Valid values are 0-65535, where 0 disables the trigger. The default is **0**.
  - e. Specify the healthy threshold for the number of successful health checks before an entry is considered healthy. Valid values are 1-65535. The default is **1**.
  - f. Specify the sick threshold, or the number of failed health checks before an entry is considered sick. Valid values are 1-65535. The default is **1**.
6. Optional: Select the **Notify via email** checkbox to send notification mail when the health of a service changes. Recipients are specified in **Management > Event Logging > Mail**.

## Part 2: Health Check Type Specific Tasks

This part of the procedure configures the health check based upon the type selected in the **ICAP Options** field.



1. Upon selecting the health check type, the **Options** section of the dialog changes to display the appropriate configuration fields. Enter the required information:
  - **HTTP** and **HTTPS**: Enter the URL of the server to be checked.
  - **ICAP**: Select the ICAP service. The ICAP service must already be configured on the SG appliance (refer to *Volume 8: Managing Content*).
  - **Layer-3** and **Layer-4**: Enter the host name; for Layer-4, also enter the port number.
  - **Websense off-box**: Select the Websense service. The Websense service must already be configured on the SG appliance (refer to *Volume 8: Managing Content: Section G: "Configuring Websense Off-box Content Filtering" on page 44*). Enter the URL to be test-categorized, or click **Use default**.
2. Click **OK** to close the Edit Health Check dialog;
3. Select **Apply** to commit the changes to the SG appliance.

## Issuing an Instant Health Check

You can manually issue a health check request.

### To issue a health check:

1. Select **Health Checks>General**.
2. Select a health check name.
3. Click **Edit**.
4. Click **Health Check**.

## Viewing Health Check Statistics

You can display a page that displays all user-created health check statistics, organized by health check service.

### To display health check statistics:

1. Select **Configuration > Health Checks > General**.

## 2. Click **Statistics**.

The Health Check Statistics page appears. For example:

```
ICAP1
State: Functioning properly
Last success: Wed, 23 Nov 2005 20:56:15 GMT
Number of successes: 86
Consec. successes: 86
Last failure: Wed, 23 Nov 2005 20:41:14 GMT
Number of failures: 1
Consec. failures: 0
External failures: 0
Response time: 586 ms
```

## About Global Forwarding and SOCKS Gateway Health Checks

This section describes health checks that can be configured on the SG appliance that apply to all forwarding hosts and SOCKS gateway hosts.

When the SG appliance performs a health check on one or more hosts, it determines whether the host returns a response and is available to fill a content request. A positive health check indicates that there is an end-to-end connection and that the host is healthy and is able to return a response.

With multiple forwarding hosts, health checks are vital to SG efficiency. When hosts respond positively to health checks, the ProxySG forwards requests to those hosts and not to unavailable hosts, which provides quicker content fill requests. With a single forwarding host, health checking is also important to determine whether the host is available.

---

**Note:** When a forwarding host or SOCKS gateway is created, it is automatically registered for health checks. Similarly, when a forwarding host or SOCKS gateway is deleted, it is removed from the health check registry.

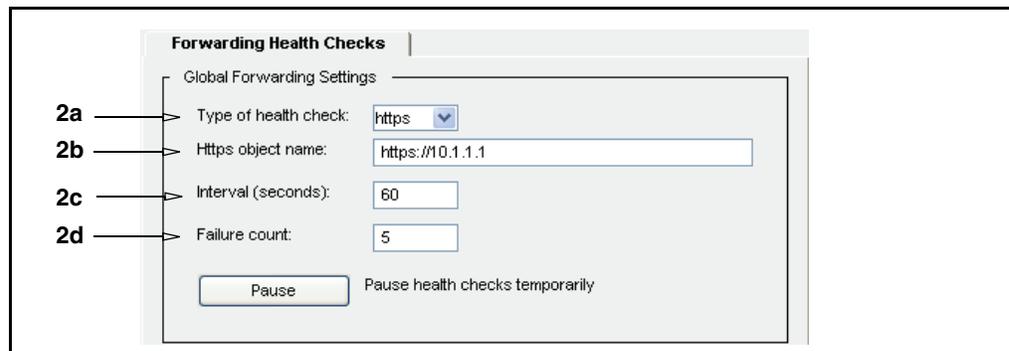
---

## Configuring Global Health Checks

This section describes how to configure the SGOS software to perform global health checks.

### To configure global forwarding or SOCKS gateway health checks:

1. Select **Configuration > Health Checks > Forwarding** or **SOCKS Gateway**.



2. Configure the options:
  - a. Select the health check type:
    - Forwarding—**HTTP, HTTPS, Layer-3**, or **Layer-4**.
    - SOCKS Gateway—**Layer-3** or **Layer-4**.
  - b. (**HTTP/HTTPS** option only) **Object name**—Enter a relative URL (path) to test a server or enter a full URL, (including scheme and hostname) to test a proxy. A full URL scheme must match the HTTP or HTTPS test to be accepted. If the test is performed on a mix of servers and proxies, the health check attempts to make up a full URL out of the path and make a path out of the full URL, as required. For a proxy, enter the full URL of the upstream target. If you have a mixture of servers and proxies, the full URL to work for them and the path of the URL to still be reasonable for the servers.
  - c. Specify the interval, in seconds, between health checks. The default is **60**.
  - d. Specify the failure count, which specifies the number of sequential failures before the host is considered down. The default is **5**.
3. Select **Apply** to commit the changes to the SG appliance.

## Pausing or Resuming Global Health Checking

You can temporarily halt global health checks and resume when ready. This is helpful if the SG appliance must be temporarily taken out of service.

---

**Note:** If the health check is paused, the state remains paused until the resume option is invoked. The paused state remains even after a reboot.

---

### To pause or resume health checking:

1. Select **Configuration > Health Checks > Forwarding** or **SOCKS Gateway**.
2. Click **Pause**.
3. To resume health checks, click **Resume**.

### Related CLI Syntax to Manage Health Checks

- To enter configuration mode:

```
SGOS#(config) health-check  
SGOS#(config health-check)
```

- The following subcommands are available:

```
SGOS#(config health-check) forwarding type {http | https | layer-3 |  
layer-4}  
SGOS#(config health-check) forwarding interval seconds  
SGOS#(config health-check) forwarding failcount count  
SGOS#(config health-check) socks-gateways type {layer-3 | layer-4}  
SGOS#(config health-check) socks-gateways interval seconds  
SGOS#(config) health-check) socks-gateways failcount count  
SGOS#(config) health-check) {forwarding | socks-gateway} {pause |  
resume}  
SGOS#(config health-check) create name  
SGOS#(config health-check) edit name
```

```
SGOS#(config health-check name) type {layer-3 | layer-4 | http | https
| icap | websense-offbox}
SGOS#(config health-check name) type parameter
SGOS#(config) health-check name) perform-health-check
```



## Chapter 9: Internet Caching Protocol (ICP) Configuration

ICP is a communication protocol for caches. It allows a cache (not necessarily a SG appliance) to query other caches for an object, without actually requesting the object. By using ICP, the cache can determine if the object is available from a neighboring cache, and which cache provides the fastest response.

---

**Note:** The SG appliance (assuming ICP is configured) does ICP queries only if no forwarding host or SOCKS gateway is identified as an upstream target. If ICP is used by the appliance, it prompts other cache devices for the item, and upon a positive response re-directs the upstream request to that cache device instead of the content origin server.

---

Only use ICP if you have ICP hosts available or to have the SG appliance support requests from other ICP hosts.

By default, the ICP protocol requires the requesting host to wait up to two seconds for all ICP hosts to respond to the request for an object (the time is configurable).

If the ICP service is configured and running, the service is used if no forwarding or SOCKS gateway target was specified. In other words, the policy rule `icp(yes)` is the default, assuming that the ICP service is available. You can disable ICP with the policy rule `icp(no)` to control ICP queries for requests.

### Configuring ICP

An ICP *hierarchy* is comprised of a group of caches, with defined parent and sibling relationships. A cache parent is one that can return the object if it is in the cache, or request the object from the source on behalf of the requester if the object is not in the cache. A cache sibling is a device that can only return the object if it is in the cache. One cache acting as a parent can also act as a sibling to other cache devices.

- ❑ When an object is not cached, the cache device sends an ICP query to its neighbors (parents and siblings) to see if any of its peers holds the object.
- ❑ Each neighbor that holds the requested object returns an `ICP_HIT` reply.
- ❑ Each neighbor that does not hold the object returns an `ICP_MISS` reply.

Based on the responses, the cache can determine where to request the object: from one of its neighbors or from the source. If an `ICP_HIT` reply is received, the request is sent to the host that returned the first reply. If no `ICP_HIT` reply is received, the request is forwarded to the first parent that replied. If no parents respond or are configured, the request is made directly to the source.

### Using ICP Configuration Directives to Create an Installable List

To configure ICP you must create an installable list and load it on the SG appliance. The ICP protocol contains a number of *directives*, commands used to create a list that can be installed on the SG appliance.

For information on installing the file itself, see [“Creating an ICP Installable List” on page 81](#).

The ICP configuration includes directives that:

- ❑ Name the ICP hosts
  - ❑ Restrict ICP access to only these hosts
- Available directives are listed in [Table 9-1](#).

Table 9-1. ICP Directives

Directive	Meaning	Where used
icp_host	The <code>icp_host</code> directive describes cache peers in the hierarchy. There should be one entry for each SG appliance you want to use.	Names the ICP hosts. See <a href="#">“Naming the IP Hosts”</a> on page 129.
icp_access_domain	The <code>icp_access_domain</code> directive is used to control which ICP queries are accepted. The <code>icp_access_domain</code> directive requires a reverse DNS lookup of each ICP query to validate the IP address.	Restricts access. See <a href="#">“Restricting Access”</a> on page 129.
icp_access_ip	The <code>icp_access_ip</code> directive works like the <code>icp_access_domain</code> command, except that you can specify an IP address and subnet mask rather than a domain.	Restricts access. See <a href="#">“Restricting Access”</a> on page 129.
icp_port	The <code>icp_port</code> directive sets the port the SG appliance uses to listen for ICP requests. The default port is 3130. If you set the port to 0, ICP is disabled.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.
neighbor_timeout	The <code>neighbor_timeout</code> directive sets the number of seconds the SG appliance waits for ICP replies. When the cache device sends an ICP request, it waits for all hosts to reply or for the <code>neighbor_timeout</code> to expire. The default timeout is two seconds.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.
icp_failcount	The <code>icp_failcount</code> directive sets the number of consecutive failures the cache device can receive before considering the ICP host as failed. By default, the ICP failure count is set to 20. Each time a request fails, the failure count is incremented. When a request succeeds, the failure count is reset to zero.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.
http_failcount	The <code>http_failcount</code> directive sets the number of consecutive failures the cache device can receive before considering the HTTP host as failed. By default, the HTTP failure count is set to five. The failure count increments each time a request fails. When a request succeeds, the failure count is reset to zero. When an HTTP host fails, the cache device waits five minutes before attempting to use it again as a forwarding target. If the next request fails, the cache device continues to wait five minutes between attempts until the cache becomes available.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.
host_fail_notify	The <code>host_fail_notify</code> directive tells the cache device to send event notification e-mail when a connect fails persistently.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.
host_recover_notify	The <code>host_recover_notify</code> directive tells the cache device to send event notification e-mail when a failed host recovers.	Connects to other ICP hosts. See <a href="#">“Connecting to Other ICP Hosts”</a> on page 131.

## Naming the IP Hosts

The `icp_host` directive describes peers in the hierarchy. One entry is required for each SG appliance you want to use.

```
icp_host hostname peertype HTTPport ICPport [default | backup |
feeder]
```

Table 9-2. ICP\_host Directive

Command	Suboptions	Description
hostname		The host name of the SG appliance.
peertype	{parent   sibling}	Relationship of the SG appliance to the cache device you are configuring.
HTTPport		TCP port where the SG appliance accepts HTTP requests. The common HTTP port is 80 or 8080.
ICPport		UDP port where the SG appliance accepts ICP requests. The common ICP port is 3130.
default		If specified, designates a SG host parent to be the default ICP parent. If no ICP reply is received, all requests are forwarded to the default parent.
backup		If specified, designates the cache device host parent to be the backup default ICP parent. If the default parent is not available, the cache device uses the backup default parent.
feeder		If specified, designates the SG host sibling as a feeder-type host, using ICP request loops to populate the appliance.

The following are sample `icp_host` directives that can be entered into the ICP configuration:

```
; Define ICP parent and sibling hosts.
icp_host cm1.bluecoat.com parent 8080 3130 default
icp_host cm2.bluecoat.com sibling 8080 3130
icp_host cm3.bluecoat.com sibling 8080 3130
icp_host cm4.bluecoat.com sibling 8080 3130
icp_host cm5.bluecoat.com parent 8080 3130
```

## Restricting Access

You can restrict access to SG appliances acting as caches by other ICP hosts using the `icp_access_domain` and `icp_access_ip` directives. By default, when ICP is configured, all ICP hosts are allowed access. You should deny access to all domains other than the ICP hosts you want to use.

### icp\_access\_domain Directive

The `icp_access_domain` directive defines which hosts can request objects from the Web cache using ICP. The default action is to allow all requests. When you use `icp_access_domain`, each ICP query requires a reverse DNS lookup to validate the IP address. Depending on the number of ICP requests, these lookups can consume SG appliance resources.

```
icp_access_domain {allow | deny} domain
```

Table 9-3. ICP\_Access\_Domain Directive

Directive Option	Description
allow   deny	Allows or denies ICP queries from neighbors that match the domain specification.
domain	The domain to match. All ICP queries from neighbors that match the specified domain are handled by the host. The special domain of <i>all</i> defines the default action when there is no domain match.

The following are sample `icp_access_domain` directives to be entered into the ICP configuration:

```

; allow ICP access to this Blue Coat Systems ProxySG Appliance from
the
; bluecoat.com domain
icp_access_domain allow bluecoat.com
icp_access_domain deny all
; the deny all option should always be specified to deny all other
; domains

```

### icp\_access\_ip Directive

The `icp_access_ip` directive works like the `icp_access_domain` command, except that you can specify an IP address and subnet mask rather than a domain. The following describes the parameters for the `icp_access_ip` command:

```
icp_access_ip {allow | deny} subnet mask
```

Table 9-4. ICAP\_Access\_IP Directive

Directive Option	Description
allow   deny	Allow or deny ICP queries from neighbors that match the address specification.
address/subnet mask	The address and subnet mask to match. All ICP queries that match the specified address are handled by the ICP host. The special address of <code>0.0.0.0</code> defines the default action when there is no address match.

The following are sample `icp_access_ip` directives to be entered into the ICP configuration:

```

; allow ICP access to this Blue Coat Systems ProxySG Appliance from
the local subnet
icp_access_ip allow 192.168.10.0/255.255.255.0
icp_access_ip deny 10.25.36.47
; the deny all option should always be specified to deny all other
domains

```

## Connecting to Other ICP Hosts

In addition to the ICP directives described in the sections above, you can specify the following directives in the ICP configuration:

```
icp_port 0
neighbor_timeout 2
icp_failcount 20
http_failcount 5
host_fail_notify on
host_recover_notify on
```

Table 9-5. Connecting to Other ICP Hosts

Directive	Description
icp_port	The default port is 3130. If you set the port to 0, ICP is disabled.
neighbor_timeout	When the cache device sends an ICP request, it waits for all hosts to reply or for the <code>neighbor_timeout</code> to expire. The default timeout is two seconds.
http_failcount	By default, the HTTP failure count is set to five. The failure count increments each time a request fails. When a request succeeds, the failure count resets to zero. When an HTTP host fails, the cache device waits five minutes before attempting to use it again as a forwarding target.
icp_failcount	By default, the ICP failure count is set to 20. Each time a request fails, the failure count is incremented. When a request succeeds, the failure count is reset to zero.
host_fail_notify	<code>on</code> tells the cache to send event notification e-mail when a connect fails persistently; <code>off</code> disables this setting.
host_recover_notify	<code>on</code> tells the cache to send event notification e-mail when a failed host recovers; <code>off</code> disables this setting.

## Creating an ICP Installable List

You can create the ICP installable list using one of the following methods:

- ❑ Text Editor, which allows you to enter directives (or copy and paste the contents of an already-created file) directly onto the SG appliance.
- ❑ Local file, installed on your system; the SG appliance can browse to the file and install it.
- ❑ A remote URL, where you place an already-created file on an FTP or HTTP server to be downloaded to the SG appliance.
- ❑ The CLI `inline` command.

When the ICP installable list is created and installed, it overwrites any ICP settings on the SG appliance.

### To create an ICP installable list:

1. Select **Configuration > Forwarding > ICP**.
2. From the drop-down list, select the method you want to use to install the ICP configuration; then click **Install**.

- **Remote URL:**  
Enter the fully-qualified URL, including the filename, where the configuration is located. To view the file before installing it, click **View**. Click **Install**. Examine the installation status that displays; click **OK**.
  - **Local File:**  
Click **Browse** to bring up the Local File Browse window. Browse for the file on the local system. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.
  - **Text Editor:**  
The current configuration is displayed in installable list format. You can customize it or delete it and create your own. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.
3. Select **Apply** to commit the changes to the SG appliance.

---

**Note:** You can create ICP settings using the CLI inline commands.

For more information on using inline commands, refer to *Volume 12: Command Line Reference*.

---

## Enabling ICP

Before ICP can be used in the SG environment:

- ICP must be running
- At least one forwarding host must be configured

ICP can be enabled or disabled through the policy rule `icp`. The default is `icp (yes)`. You can disable ICP with the policy rule `icp (no)` to control ICP queries for requests.

## Chapter 10: Using RIP

The Routing Information Protocol (RIP) is designed to select the fastest route to a destination. RIP support is built into the SG appliance, and is configured by creating and installing an RIP configuration text file onto the device.

The Blue Coat RIP implementation also supports advertising default gateways. Default routes added by RIP are treated the same as the static default routes; that is, the default route load balancing schemes apply to the default routes from RIP as well.

This chapter discusses:

- ❑ “Installing RIP Configuration Files” on page 133
- ❑ “Configuring Advertising Default Routes” on page 134
- ❑ “RIP Commands” on page 135
- ❑ “RIP Parameters” on page 136
- ❑ “SG-Specific RIP Parameters” on page 137
- ❑ “Using Passwords with RIP” on page 137

### Installing RIP Configuration Files

No RIP configuration file is shipped with the appliance. For commands that can be entered into the RIP configuration file, see “RIP Commands” on page 135.

After creating an RIP configuration file, install it using one of the following methods:

- ❑ Using the Text Editor, which allows you to enter settings (or copy and paste the contents of an already-created file) directly onto the appliance.
- ❑ Creating a local file on your local system; the SG appliance can browse to the file and install it.
- ❑ Using a remote URL, where you place an already-created file on an FTP or HTTP server to be downloaded to the SG appliance.
- ❑ Using the CLI `inline rip-settings` command, which allows you to paste the RIP settings into the CLI.
- ❑ Using the CLI `rip` commands, which require that you place an already-created file on an FTP or HTTP server and enter the URL into the CLI. You can also enable or disable RIP with these commands.

#### To install an RIP configuration file:

---

**Note:** When entering RIP settings that affect current settings (for example, when switching from `ripv1` to `ripv2`), disable RIP before you change the settings; re-enable RIP when you have finished.

---

1. Select **Configuration > Network > Routing > RIP**.
2. To display the current RIP settings, routes, or source, click one or all of the **View RIP** buttons.

3. In the **Install RIP Setting from** the drop-down list, select the method used to install the routing table; click **Install**.
  - Remote URL:

Enter the fully-qualified URL, including the filename, where the routing table is located. To view the file before installing it, click **View**. Click **Install**. To view the installation results, click **Results**; close the window when you are finished. Click **OK**.
  - Local File:

Click **Browse** to display the Local File Browse window. Browse for the file on the local system. Open it and click **Install**. When the installation is complete, a results window opens. View the results and close the window.
  - Text Editor:

The current configuration is displayed in installable list format. You can customize it or delete it and create your own. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, and click **OK**.
4. Select **Apply** to commit the changes to the SG appliance.
5. Select **Enable RIP**.
6. Click **Apply**.

#### Related CLI Syntax to Configure RIP

```
SGOS#(config) rip {disable | enable}
```

- ❑ To enter a path to a remote URL where you have placed an already-created RIP configuration file, enter the following commands at the (config) command prompt:

```
SGOS#(config) rip path url
SGOS#(config) load rip-settings
```

- ❑ To paste an RIP configuration directly into the CLI, enter the following command at the (config) command prompt:

```
SGOS#(config) inline rip-settings end-of-file_marker
```

## Configuring Advertising Default Routes

Default routes advertisements are treated the same as the static default routes; that is, the default route load balancing schemes also apply to the default routes from RIP.

By default, RIP ignores the default routes advertisement. You can change the default from disable to enable and set the preference group and weight through the CLI only.

#### To enable and configure advertising default gateway routes:

1. At the (config) command prompt:

```
SGOS#(config) rip default-route enable
SGOS#(config) rip default-route group group_number
SGOS#(config) rip default-route weight weight_number
```

Where *group\_number* defaults to 1, and *weight\_number* defaults to 100, the same as the static default route set by the `ip-default-gateway` command.

- (Optional) To view the default advertising routes, enter:

```
SGOS#(config) show rip default-route
RIP default route settings:
Enabled:                               Yes
Preference group:                       3
Weight:                                 30
```

## RIP Commands

You can place any of the commands below into a Routing Information Protocol (RIP) configuration text file. You cannot edit a RIP file through the command line, but you can overwrite a RIP file using the `inline rip-settings` command.

Once the file is complete, place it on an HTTP or FTP server accessible to the SG appliance and download it.

### *net*

```
net Nname[/mask] gateway Gname metric Value {passive | active |
external}
```

Table 10-1. net Commands

Parameters	Description
<i>Nname</i>	Name of the destination network. It can be a symbolic network name, or an Internet address specified in dot notation.
<i>/mask</i>	Optional number between 1 and 32 indicating the netmask associated with <i>Nname</i> .
<i>Gname</i>	Name or address of the gateway to which RIP responses should be forwarded.
<i>Value</i>	The hop count to the destination host or network. A net <i>Nname</i> /32 specification is equivalent to the host <i>Hname</i> command.
passive   active   external	Specifies whether the gateway is treated as passive or active, or whether the gateway is external to the scope of the RIP protocol.

### *host*

```
host Hname gateway Gname metric Value {passive | active | external}
```

Table 10-2. host Commands

Parameters	Description
<i>Hname</i>	Name of the destination network. It can be a symbolic network name, or an Internet address specified in dot notation.
<i>Gname</i>	Name or address of the gateway to which RIP responses should be forwarded. It can be a symbolic network name, or an Internet address specified in dot notation.
<i>Value</i>	The hop count to the destination host or network. A net <i>Nname</i> /32 specification is equivalent to the host <i>Hname</i> command.
passive   active   external	Specifies whether the gateway is treated as passive or active, or whether the gateway is external to the scope of the RIP protocol.

## RIP Parameters

Lines that do not start with `net` or `host` commands *must* consist of one or more of the following parameter settings, separated by commas or blank spaces:

Table 10-3. RIP Parameters

Parameters	Description
<code>if=[0 1 2 3]</code>	Specifies that the other parameters on the line apply to the interface numbered 0,1,2, or 3 in SGOS terms.
<code>passwd=XXX</code>	Specifies an RIPv2 password included on all RIPv2 responses sent and checked on all RIPv2 responses received. The password must not contain any blanks, tab characters, commas or '#' characters.
<code>no_ag</code>	Turns off aggregation of subnets in RIPv1 and RIPv2 responses.
<code>no_super_ag</code>	Turns off aggregation of networks into supernets in RIPv2 responses.
<code>passive</code>	Marks the interface to not be advertised in updates sent through other interfaces, and turns off all RIP and router discovery through the interface.
<code>no_rip</code>	Disables all RIP processing on the specified interface.
<code>no_ripv1_in</code>	Causes RIPv1 received responses to be ignored.
<code>no_ripv2_in</code>	Causes RIPv2 received responses to be ignored.
<code>ripv2_out</code>	Turns off RIPv1 output and causes RIPv2 advertisements to be multicast when possible.
<code>ripv2</code>	Is equivalent to <code>no_ripv1_in</code> and <code>no_ripv1_out</code> . This parameter is set by default.
<code>no_rdisc</code>	Disables the Internet Router Discovery Protocol. This parameter is set by default.
<code>no_solicit</code>	Disables the transmission of Router Discovery Solicitations.
<code>send_solicit</code>	Specifies that Router Discovery solicitations should be sent, even on point-to-point links, which by default only listen to Router Discovery messages.
<code>no_rdisc_adv</code>	Disables the transmission of Router Discovery Advertisements.
<code>rdisc_adv</code>	Specifies that Router Discovery Advertisements should be sent, even on point-to-point links, which by default only listen to Router Discovery messages.
<code>bcast_rdisc</code>	Specifies that Router Discovery packets should be broadcast instead of multicast.
<code>rdisc_pref=N</code>	Sets the preference in Router Discovery Advertisements to the integer N.
<code>rdisc_interval=N</code>	Sets the nominal interval with which Router Discovery Advertisements are transmitted to N seconds and their lifetime to 3*N.
<code>trust_gateway=rname</code>	Causes RIP packets from that router and other routers named in other <code>trust_gateway</code> keywords to be accept, and packets from other routers to be ignored.
<code>redirect_ok</code>	Causes RIP to allow ICMP Redirect messages when the system is acting as a router and forwarding packets. Otherwise, ICMP Redirect messages are overridden.

## SG-Specific RIP Parameters

The following RIP parameters are unique to SG configurations:

Table 10-4. SG-Specific RIP Parameters

Parameters	Description
supply_routing_info -or- advertise_routes	<p>-s option: Supplying this option forces routers to supply routing information whether it is acting as an Internetwork router or not. This is the default if multiple network interfaces are present or if a point-to-point link is in use.</p> <p>-g option: This flag is used on Internetwork routers to offer a route to the `default' destination. This is typically used on a gateway to the Internet, or on a gateway that uses another routing protocol whose routes are not reported to other local routers.</p> <p>-h option: Suppress_extra_host_routes advertise_host_route</p> <p>-m option: Advertise_host_route on multi-homed hosts</p> <p>-A option: Ignore_authentication //</p>
no_supply_routing_info	-q option: opposite of -s.
no_rip_out	Disables the transmission of all RIP packets. This setting is the default.
no_ripv1_out	Disables the transmission of RIPv1 packets.
no_ripv2_out	Disables the transmission of RIPv2 packets.
rip_out	Enables the transmission of RIPv1 packets.
ripv1_out	Enables the transmission of RIPv1 packets.
rdisc	Enables the transmission of Router Discovery Advertisements.
ripv1	Causes RIPv1 packets to be sent.
ripv1_in	Causes RIPv1 received responses to be handled.

## Using Passwords with RIP

The first password specified for an interface is used for output. All passwords pertaining to an interface are accepted on input. For example, with the following settings:

```
if=0 passwd=aaa
if=1 passwd=bbb
passwd=ccc
```

Interface 0 accepts passwords `aaa` and `ccc`, and transmits using password `aaa`. Interface 1 accepts passwords `bbb` and `ccc`, and transmits using password `bbb`. The other interfaces accept and transmit the password `ccc`.



## Chapter 11: Configuring the SG Appliance as a Session Monitor

You can configure the SGOS software to monitor RADIUS accounting messages and to maintain a session table based on the information in these messages. The session table can then be used for logging or authentication.

You can also, optionally, configure multiple appliances to act as a session monitor *cluster*. The session table is then replicated to all members of the cluster.

Once configured and enabled, the session monitor maintains a session table that records which sessions are currently active and the user identity for each session.

### Configuring the Session Monitor

Three steps are required to configure the session monitor:

- ❑ Configure the RADIUS accounting protocol parameters for the session monitor.
- ❑ (Optional) Configure the session monitor cluster.
- ❑ Configure the session monitor parameters.

### Configuring the RADIUS Accounting Protocol Parameters

The configuration commands to create the RADIUS accounting protocol parameters can only be done through the CLI. If you are using session-monitor clustering, the commands must be invoked on each system in an already-existing failover group. (For information on configuring a failover group, see [Chapter 6: "Configuring Failover" on page 87.](#))

**To configure the RADIUS accounting protocol parameters:**

- ❑ To enter configuration mode:  
SGOS#(config) **session-monitor**
- ❑ The following subcommands are available:  
SGOS#(config session-monitor) **radius acct-listen-port** *port\_number*  
SGOS#(config session-monitor) **radius authentication** {**enable** | **disable**}  
SGOS#(config session-monitor) **radius encrypted-shared-secret** *encrypted\_secret*  
SGOS#(config session-monitor) **radius no encrypted-shared-secret**  
SGOS#(config session-monitor) **radius response** {**enable** | **disable**}  
SGOS#(config session-monitor) **radius shared-secret** *plaintext\_secret*

Table 11-1. Session Monitor Accounting Command Descriptions

Command	Option	Description
radius acct-listen-port	<i>port_number</i>	The port number where the SG appliance listens for accounting messages
radius authentication	enable   disable	Enable or disable (the default) the authentication of RADIUS messages using the shared secret. Note that the shared secret must be configured before authentication is enabled.
radius encrypted-shared-secret	<i>encrypted_shared_secret</i>	Specify the shared secret (in encrypted form) used for RADIUS protocol authentication. The secret is decrypted using the configuration-passwords-key.
radius no shared-secret		Clears the shared secret used for RADIUS protocol authentication.
radius response	enable   disable	Enable (the default) or disable generation of RADIUS responses.
radius shared-secret	<i>plaintext_secret</i>	Specify the shared secret used for RADIUS protocol in plaintext.

## Configuring a Session Monitor Cluster

Configuring a session monitor cluster is optional. When a session monitor cluster is enabled, the session table is replicated to all members of the cluster. The cluster members are the SG appliances that are configured as part of the failover group referenced in the session monitor cluster configuration. The failover group must be configured before the session monitor cluster. (For information on configuring a failover group, see [Chapter 6: "Configuring Failover" on page 87.](#))

To replicate the session table to all the members of a failover group, you can use the following commands.

---

**Note:** When using a session monitor cluster, the RADIUS client must be configured to send the RADIUS accounting messages to the failover group's virtual IP address.

---

Proxy traffic can be routed to any of the machines in the cluster.

---

**Note:** Each member of the failover group must be configured with the cluster commands to maintain the session table for RADIUS accounting messages.

---

### To configure session monitor cluster parameters:

```
SGOS#(config) session-monitor
```

- The following subcommands are available:

```
SGOS#(config session-monitor) cluster {enable | disable}
```

```
SGOS#(config session-monitor) cluster group-address IP_address
```

```
SGOS#(config session-monitor) cluster port port_number
```

```
SGOS#(config session-monitor) cluster grace-period seconds
```

```
SGOS#(config session-monitor) cluster synchronization-delay seconds
```

Table 11-2. Session Monitor Cluster Command Descriptions

Command	Option	Description
cluster	enable   disable	Enable or disable (the default) clustering on a failover group. The group address must be set before the cluster can be enabled.
cluster group-address   no group-address	<i>IP_address</i>	Set or clear (the default) the failover group IP address. This must be an existing failover group address.
cluster port	<i>port_number</i>	Set the TCP/IP port for the session replication control. The default is 55555.
cluster synchronization-delay	<i>seconds</i>	Set the maximum time to wait for session table synchronization. The default is zero; the range is from 0 to $2^{31}-1$ seconds. During this time evaluation of <code>\$(session.username)</code> is delayed, so proxy traffic might also be delayed.
cluster grace-period	<i>seconds</i>	Set the time to keep session transactions in memory while waiting for slave logins. This can be set to allow session table synchronization to occur after the synchronization-delay has expired. The default is 30 seconds; the range is 0 to $2^{31}-1$ seconds.

## Configuring the Session Monitor

The session monitor commands set up session monitoring behavior. If using session-monitor clustering, these commands must be invoked on all systems in the failover group.

### To configure the session monitor:

- At the (config) prompt:
 

```
SGOS#(config) session-monitor
SGOS#(config session-monitor) disable | enable
SGOS#(config session-monitor) max-entries integer
SGOS#(config session-monitor) timeout minutes
```

Table 11-3. Session Monitor Configuration Command Descriptions

Command	Option	Description
enable   disable		Enable or disable (the default) session monitoring
max_entries	<i>integer</i>	The maximum number of entries in the session table. The default is 500,000; the range is from 1 to 2,000,000. If the table reaches the maximum, additional START messages are ignored.
timeout	<i>minutes</i>	The amount of time before a session table entry assumes a STOP message has been sent. The default is 120 minutes; the range is from 0 to 65535 minutes. Zero indicates no timeout.

- (Optional) To view the session-monitor configuration, you can either use the `session-monitor view` command or the `config show session-monitor` command.

```
SGOS#(config) show session-monitor
General:
Status: enabled
Entry timeout: 120 minutes
Maximum entries: 500000
Cluster support: enabled
Cluster port: 55555
Cluster group address: 10.9.17.159
Synchronization delay: 0
Synchronization grace period: 30
Accounting protocol: radius
Radius accounting:
Listen ports:
Accounting: 1813
Responses: Enabled
Authentication: Enabled
Shared secret: *****
```

## Creating the CPL

Be aware that the examples below are just part of a comprehensive authentication policy. By themselves, they are not adequate.

---

**Note:** Refer to *Volume 11: Content Policy Language Guide* for details about CPL and how transactions trigger the evaluation of policy file layers.

---

- In this example, the SG appliance is using the session table maintained by the session monitor for authentication.

```
<proxy>
  allow authenticate(session)
```

where `session` is a policy substitution realm that uses `$(session.username)` in building the username. (For information on creating a Policy Substitution realm, refer to *Volume 5: Securing the Blue Coat SG Appliance*.)

## Notes

- The session table is stored entirely in memory. The amount of memory needed is roughly 40MB for 500,000 users.
- The session table is kept in memory. If the system goes down, the contents of the session table are lost. However, if the system is a member of a failover cluster, the current contents of the session table can be obtained from another machine in the cluster. The only situation in which the session table is entirely lost is if all machines in the cluster go down at the same time.
- The session replication protocol replicates session information only; configuration information is not exchanged. That means that each SG appliance must be properly configured for session monitoring.
- The session replication protocol is not secured. The failover group should be on a physically secure network to communicate with each other.

- ❑ The session monitor requires sufficient memory and at least 100Mb-per-second network links among the cluster to manage large numbers of active sessions.
- ❑ The username in the session table is obtained from the Calling-Station-ID attribute in the RADIUS accounting message and can be a maximum of 19 bytes.



## Chapter 12: Configuring and Using the SG Client

The Blue Coat SG Client enables users to benefit from accelerated application delivery directly to their desktops. This allows mobile users or users in small branch offices—where it might not be cost-justifiable to deploy an acceleration gateway—to enjoy improved networked application access.

For more information about the SG Client, see one of the following sections:

- ❑ [“Overview” on page 146](#)
- ❑ [“Software and Hardware Requirements” on page 149](#)
- ❑ [“Understanding ADN Details” on page 149](#)
- ❑ [“Configuring Client Settings” on page 151](#)
- ❑ [“Configuring the Client Manager” on page 156](#)
- ❑ [“Configuring from the Command Line” on page 159](#)
- ❑ [“Making the SG Client Software Available to Users” on page 161](#)
- ❑ [“Using the SG Client” on page 171](#)
- ❑ [“Troubleshooting Tips for Administrators” on page 180](#)
- ❑ [“Licensing” on page 182](#)

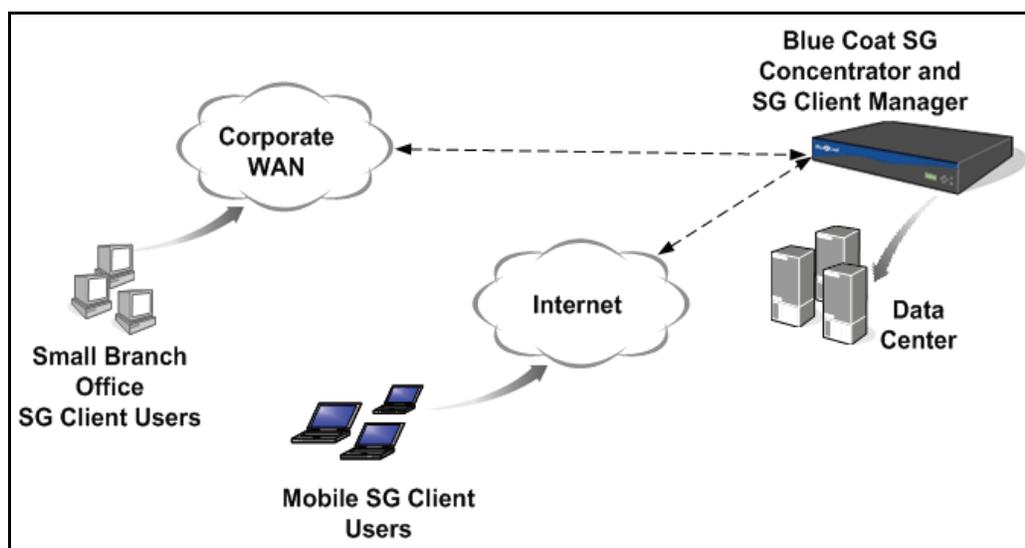
## Overview

Before implementing the SG Client in your enterprise, you should understand the following concepts:

- ❑ “Understanding the Terminology” on page 146
- ❑ “SG Client Features and Benefits” on page 147
- ❑ “Understanding SG Client Deployment” on page 148

### Understanding the Terminology

The following figure illustrates the terminology discussed in this chapter:



The SG Client typically connects to a *concentrator*, which is a Blue Coat SG appliance that is usually located in a data center. The SG Client connection over the Internet is assumed to use Virtual Private Networking (VPN).

The concentrator receives inbound ADN tunnels from the SG Client and serves as a front end for data center resources for which it provides acceleration services.

To use the SG Client, you must configure SG appliances for the following roles:

- ❑ Concentrator
 

An SG appliance, usually located in a data center, that provides access to data center resources, such as file servers.
- ❑ Client Manager
 

This appliance provisions the SG Client software to users, and maintains the software and the client configuration on all clients in the ADN network.

You configure the Client Manager as discussed in “[Configuring the Client Manager](#)” on page 156.

- ADN manager and backup manager (not shown in the preceding figure)

Every ADN network must have an *ADN manager*, which is responsible for publishing the routing table to SG Clients (and to other SG appliances). Although not required, Blue Coat recommends configuring an *ADN backup manager*, which takes over for the ADN manager in the event it becomes unavailable.

---

**Note:** The Client Manager can be *any* appliance in the ADN network, including a concentrator, the ADN manager, or backup manager. For example, the Client Manager could also be the ADN manager but that is not a requirement.

---

To configure an ADN manager and backup manager, see “[Defining the ADN Manager](#)” on page 19.

## SG Client Features and Benefits

The following table discusses features and benefits of the SG Client:

Table 12-1. SG Client Features and Benefits

Feature	Benefit
Common Internet File System (CIFS) acceleration	The SG Client significantly enhances Wide Area Network (WAN) file service delivery, improving user productivity by implementing the following: <ul style="list-style-type: none"> <li>• Client object caching, which enables clients to get previously-obtained data from cache rather than across the WAN.</li> <li>• CIFS protocol optimization, which improves performance by consolidating data forwarded across the WAN.</li> </ul>
Connect from anywhere	The SG Client enables any user to remotely connect to an ADN network.
ADN optimization	Uses gzip compression to improve bandwidth utilization for TCP applications.
Centralized management and distribution	Administrators use a particular SG appliance designated as the <i>Client Manager</i> to download to clients SG Client software and configuration updates.
Load balancing and failover	Enables you to efficiently use your ADN network as a robust infrastructure for clients.
Client statistics	Provides users with real-time performance data.

## Understanding SG Client Deployment

The SG Client software is deployed in two basic steps: the administrator configures the Client Manager to install and configure the client, then the user (or administrator) installs the client. After installation, the client connects to an appliance in the ADN network. The following sections discuss this process in more detail.

### Administrator Configuration Tasks

The administrator configures the following:

1. Sets up an ADN manager, backup manager, and configures the ADN network as discussed elsewhere in this book.
2. Configures an SG appliance as the Client Manager as discussed in [“Configuring the Client Manager” on page 156](#).

The Client Manager must be licensed as discussed in [“Licensing” on page 182](#).

The Client Manager is the location from which users download the SG Client software, software updates, and configuration updates.

3. Sets up the SG Client configuration (such as CIFS and ADN) as discussed in [“Configuring Client Settings” on page 151](#).
4. Provisions the SG Client software to users in one of the ways discussed in this chapter.

For more information, see [“Making the SG Client Software Available to Users” on page 161](#).

### Client Installation Tasks

The SG Client deployment process can be summarized as follows:

1. A user obtains the SG Client software, either from the Client Manager or pre-installed by an administrator some other way.

---

**Note:** Installation methods are discussed in [“Making the SG Client Software Available to Users” on page 161](#).

---

To download the SG Client software from the Client Manager, the user must go to a URL provided by the administrator.

When the user connects to the Client Manager using the URL, the user runs a setup application (`SGClientSetup.exe`) that in turn downloads and starts a Microsoft Installer (`SGClientSetup.msi`).

---

**Note:** To run `SGClientSetup.exe` and `SGClientSetup.msi`, the user must be in the Administrators group on the machine.

---

2. After installing the SG Client software, the user must reboot the machine to use the software.
3. Periodically, the SG Client polls the Client Manager for changes to the SG Client software and configuration.

---

**Note:** Every software or configuration update requires the client to reboot their machine for the update to take effect.

---

## Software and Hardware Requirements

The SG Client currently requires Microsoft Windows XP Professional or Home Edition, Service Pack 2 or later (32-bit version only; the 64-bit operating system is not supported).

---

**Note:** Blue Coat highly recommends users apply all the latest hot fixes available from Microsoft Windows Update.

---

The SG Client requires a machine with:

- ❑ Hard drive with 5MB available for SG Client software installation, up to 40MB for logging, and an additional 1.5GB available space (minimum) for CIFS object caching, 5GB or more available recommended.

The CIFS object cache is stored on the system root volume. If there is 1GB or less available space for the cache, the client will not cache CIFS objects, such as directory listings and file contents.

- ❑ Processor—Minimum, 500 megahertz (MHz) processor, such as the Intel family, AMD family, or compatible processor.

Recommended, 750MHz or faster processor.

- ❑ RAM—256MB minimum, 512MB or more recommended.

## Understanding ADN Details

This section discusses the ADN features supported by the SG Client in this release.

### General ADN Feature Support

The SG Client supports the following ADN features:

- ❑ Gzip compression, which improves bandwidth utilization.
- ❑ CIFS protocol optimization and CIFS caching on the client.
- ❑ Load balancing and failover

The SG Client makes two types of connections in the ADN network: the routing connection and the ADN tunneling connection. The *routing connection* obtains the routing table from the ADN manager or backup manager, and the *tunneling connection* transfers data to the ADN network.

The SG Client first attempts to connect to the primary ADN manager to get routing information; if it is not available, the client attempts to connect to the backup ADN manager. If the backup ADN manager is also not available, the connection goes directly to its destination as a result of *fail open*, which is discussed next.

Assuming there is more than one active SG appliance in the ADN network, the SG Client randomly picks an appliance from the list of appliances in the routing table and iterates through the list until it finds an active appliance.

Randomly choosing an appliance—assuming there is more than one—achieves simple *load balancing*. Iterating through the list of appliances achieves *failover*. If no appliance is active, the connection goes directly to its destination as a result of *fail open*, which is discussed next.

- ❑ Fail open, which means that if all client connections to concentrators fail for any reason, the client opens a connection directly to a destination, such as a CIFS server.

Client connections that do not go through a concentrator are not accelerated and remain unaccelerated as long as the connection is open (that is, until the connection is closed by the application).

After a concentrator becomes available, new connections are accelerated.

## Configuring Plain Connections

To use the SG Client in your ADN network, the ADN manager's listening mode must be configured for **Plain Only**, **Plain Read-Only**, or **Both**, as discussed in "Securing Connections" on page 33.

- ❑ Use the following guidelines to configure the Manager Listening Mode:
  - Choose **Plain Read-Only** if all SG appliances in the ADN network use SGOS version 5.1.4—where all appliances support secure routing, *and* you have chosen to utilize secure routing on those SG appliances.  
  
This setting means that users who connect to the plain port are *not* allowed to advertise routes to the ADN network.
  - Choose either **Plain Only** or **Both** as appropriate if you have some SG appliances that are not using secure routing (for example, SG appliances running SGOS 5.1.3).
- ❑ Use the following guidelines to set Tunnel Listening mode on all SG appliances in the ADN network:
  - Choose **Plain** to enable the SG Client to connect to the appliance in cases where you do *not* secure any ADN connections between SG appliances.
  - Choose **Both** to enable the SG Client to connect to the appliance in cases where you do use secure connections for some or all SG appliances.

---

**Note:** The Secure Outbound Mode options have no impact on the SG Client.

---

## About Internet Gateways

The SG Client ignores Internet Gateway settings; however, if you want to route all SG Client traffic through a concentrator, you can configure the concentrator to publish all addresses as discussed in "Managing Server Subnets and Enabling an Internet Gateway" on page 24.

## Configuring Client Settings

This section discusses how to configure the settings that affect SG Client configuration. Available settings follow:

- ❑ General settings—Software update interval, TCP window size, and maximum percentage of client disk space to allocate for object caching. See “[Configuring General Client Settings](#)” on page 151.
- ❑ CIFS settings—Disabling CIFS or enabling CIFS with options for write-back and directory cache time. See “[Configuring Client CIFS Settings](#)” on page 153.
- ❑ ADN settings—Primary and backup ADN manager IP addresses and port, excluded subnets, and included or excluded ports. See “[Configuring Client ADN Settings](#)” on page 154.

**Important:** Changes you make to the client configuration are sent to clients at the next software update interval. After a configuration change, the user is required to reboot the client machine for the change to take effect.

### Configuring General Client Settings

This section discusses how to configure the following client settings:

- ❑ SG Client software update interval
- ❑ TCP window size

If you know the bandwidth and round-trip delay, the TCP window size you should use is approximately  $2 * \text{bandwidth} * \text{delay}$ . For example, if the bandwidth of the link is 8 Mbits/sec and the round-trip delay is 0.75 seconds:

$$\text{TCP window size} = 2 * 8 \text{ Mbits/sec} * 0.75 \text{ sec} = 12 \text{ Mbits} = 1.5 \text{ Mbytes}$$

The setting in this example would be 1572864 bytes. This number goes up as either bandwidth or delay increases, and goes down as they decrease. Because the bandwidth and delay for SG Client users can vary, Blue Coat recommends you test SG Client performance in a controlled environment before deciding on a TCP window size value to use in production.

- ❑ Maximum percentage of client disk space to use for object caching. Regions of files that are read or written by the client are placed in the cache. Object caching applies to both read and write file activities. Also, the caching process respects file locking.

---

**Note:** In this release, the object cache is not encrypted.

---

You can set the maximum percentage of *total* disk space (as opposed to *available* disk space) the SG Client allocates to the object cache. The SG Client always leaves at least 1GB of available disk space on the client machine’s system root volume.

Following is a summary of how object caching works on the client:

- a. The SG Client starts.
- b. The user requests a cacheable object, such as a file.
- c. The SG Client allocates sufficient disk space on the system root volume to cache the object—up to the limit set by the administrator.

In other words, if the client machine’s system root volume has 100GB of total space and the administrator configures the object cache to use a maximum of 10%, the SG Client allocates up to 10GB for the object cache.

However, if the maximum cache size leaves less than 1GB of available disk space, the cache size is further limited. Continuing this example, if the client has only 9GB of available space, the maximum cache size is 8GB instead of 10GB.

- d. If any single object (such as a file) exceeds the maximum cache size, that object is not cached.

To continue the preceding example, if the maximum size of the object cache is 10GB, and the client requests a file that is 11GB in size, that file is not cached.

- e. If the object cache is full, objects are expired from the cache based on a number of criteria, such as unopened files and oldest objects first.

#### To configure general client settings:

1. Log in to the Management Console as an administrator.
2. In the left pane, click **SG Client > Client Configuration**.
3. In the right pane, click the **General** tab.
4. On the General tab page, enter the following information:

Table 12-2. Configuring General Client Settings

Field	Description
<b>Update interval</b>	Enter the frequency, in minutes, for clients to check the Client Manager for updated SG Client software or configuration updates. Default is 120. Valid values are between 10—432000 (that is, 300 days). Note: Updating SG Client software or configuration requires the client to reboot the machine.
<b>TCP window size</b>	Enter the number of bytes allowed before acknowledgement (the value must be between 8192 and 4194304). Default is 65536.
<b>Maximum percentage of disk space to use for object caching</b>	Maximum percentage of client disk space to use for caching objects, such as CIFS objects. Valid values are 1—90; default is 10. Note: The cache leaves at least 1GB available space on the system root volume. For more information, see <a href="#">“Configuring General Client Settings” on page 151</a> .

5. Select **Apply** to commit the changes to the SG appliance.

## Configuring Client CIFS Settings

This section discusses how to configure the following:

- ❑ Enable or disable CIFS acceleration
- ❑ Enable or disable write-back
- ❑ Set the directory cache time

### To configure CIFS settings:

1. Log in to the Management Console as an administrator.
2. In the left pane, click **SG Client > Client Configuration**.
3. In the right pane, click the **CIFS** tab.
4. On the CIFS tab page, enter the following information:

Table 12-3. Configuring Client Settings for CIFS

Item	Description
<b>Enable CIFS acceleration</b> check box	<ul style="list-style-type: none"> <li>• Select the check box to enable CIFS acceleration for clients.</li> <li>• Clear the check box to disable CIFS acceleration. If you clear the check box, the other options on this tab page are unavailable.</li> </ul> <p>For more information about CIFS acceleration, see <a href="#">“SG Client Features and Benefits” on page 147</a>.</p>
<b>Write back</b>	<p>Determines whether or not users can continue sending data to the appliance while the appliance is writing data on the back end.</p> <ul style="list-style-type: none"> <li>• Click <b>Full</b> to enable write-back, which in turn makes the local SG Client proxy appear to the user as a file server; in other words, the local SG Client proxy constantly sends approval to the client and allows the client to send data while the back end takes advantage of the compressed TCP connection.</li> <li>• Click <b>None</b> to disable write-back. Disabling write-back can introduce substantial latency while clients send data to the appliance and wait for acknowledgement before sending more data.</li> </ul> <p>One reason to set this option to <b>None</b> is the risk of data loss if the link from the branch to the core server fails. There is no way to recover queued data if such a link failure occurs.</p>
<b>Directory cache time</b> field	Number of seconds for directory listings to remain in the client’s cache.

5. Select **Apply** to commit the changes to the SG appliance.

## Configuring Client ADN Settings

This section discusses how to configure the following:

- ❑ ADN manager settings:
  - Primary and backup ADN manager IP addresses
  - ADN manager port

- ❑ ADN rules settings:

- Excluded subnets

Adds or removes subnets from the list of subnets not included in ADN tunnels. Assuming SG Clients can connect to an SG appliance that can optimize traffic to the destination address, this is the list of IP addresses and subnets that bypass ADN tunneling on the way to the destination.

- Include and exclude ports

Includes or excludes TCP ports in ADN tunnels. Assuming SG Clients can connect to an SG appliance that can optimize traffic to the destination address, this setting determines ports accelerated (or not accelerated) for clients. You can use either the excluded ports list or included ports list, but not both.

The include and exclude ports list are advanced settings that limit the traffic that is accelerated by the ADN network. Because the ADN manager sets options for both its peers in the ADN network and for SG Clients, you can use the include or exclude ports list to fine-tune the way SG appliances interact with the SG Client.

For example, if you know that SG Client traffic over particular ports is not compressible, you can put those ports in the exclude ports list. Blue Coat strongly recommends you test the include/exclude ports settings in a controlled environment before using them in production because improper settings can have an adverse impact on performance.

### Configuring Client ADN Manager Settings

**To configure client ADN Manager settings:**

1. Log in to the Management Console as an administrator.
2. In the left pane, click **SG Client > Client Configuration**.
3. In the right pane, click the **ADN Manager** tab.
4. On the ADN Manager tab page, enter the following information:

Table 12-4. Configuring Client Settings for ADN Manager

Field	Description
<b>ADN Manager</b>	Enter the primary ADN manager's IP address. The ADN manager tracks and advertises the routes to the appliances it knows about.  The SG Client obtains the routing table from the ADN manager.

Table 12-4. Configuring Client Settings for ADN Manager (Continued)

Field	Description
<b>Backup Manager</b>	Enter the backup ADN manager's IP address. Configuring a backup ADN manager is optional but recommended.  If the ADN manager becomes unavailable for any reason, the backup ADN manager takes over the task of advertising routes to all ADN nodes—including SG Clients.
<b>Port</b>	Enter the ADN managers' plain listen port.

5. Select **Apply** to commit the changes to the SG appliance.

## Configuring Client ADN Rules Settings

### To configure client ADN Manager settings:

1. Log in to the Management Console as an administrator.
2. In the left pane, click **SG Client > Client Configuration**.
3. In the right pane, click the **ADN Rules** tab.
4. On the ADN Rules tab page, in the Excluded Subnets section, do one of the following:

- To add excluded subnets (in other words, to cause SG Client traffic from these subnets to bypass the ADN tunnel), click **Add**.

In the Add IP/Subnet dialog box, enter the following information and click **OK** when you're done:

- **IP / Subnet Prefix** field: Enter either an IP address or an IP address and subnet in Classless Inter-Domain Routing (CIDR) notation (for example, 192.168.0.1/16).
- **Subnet Mask** field: Use this field only if you entered an IP address in the preceding field (in other words, if you used CIDR notation in the preceding field, you do not need to enter a value in this field).
- To remove excluded subnets, click the subnets you want to remove and click **Remove**. You are required to confirm the action.
- To clear all excluded subnets (in other words, to cause SG Client traffic from all IP addresses and subnets to be tunneled), click **Clear all**. You are required to confirm the action.

5. On the ADN Rules tab page, in the Ports section, enter the following information:

Table 12-5. Configuring Included or Excluded Ports

Item	Description
<b>Exclude</b>	Client traffic from specified ports is <i>not</i> routed through the ADN tunnel. All other traffic is accelerated.  Valid values: Comma-separated list of ports and port ranges (no spaces, separated by a dash character).  Example: 22, 88, 443, 993, 995, 1352, 1494, 1677, 3389, 5900

Table 12-5. Configuring Included or Excluded Ports (Continued)

Item	Description
<b>Include</b>	<p>Client traffic from specified ports is routed through the ADN tunnel and therefore accelerated. All other traffic bypasses the tunnel and is therefore not accelerated.</p> <p>Valid values: Comma-separated list of ports and port ranges (no spaces, separated by a dash character).</p> <p>Example: 80, 139, 445, 8080-8088</p>

**Note:** The include and exclude ports lists are advanced settings that limit the traffic that is accelerated by the ADN network. For more information, see [“Configuring Client ADN Rules Settings” on page 155](#).

To cause all traffic to be accelerated by the ADN network, click either option and delete all the ports in the list.

6. Select **Apply** to commit the changes to the SG appliance.

## Configuring the Client Manager

You must configure one SG appliance in your ADN network as the Client Manager, meaning it is responsible for provisioning the SG Client software, software updates, and client configuration to SG Clients. The Client Manager must be licensed as discussed in [“Licensing” on page 182](#).

**Note:** The Client Manager can be a different appliance than the ADN manager or the backup ADN manager. In other words, you can configure the ADN manager or the backup ADN manager as the Client Manager, but it’s not required.

### Setting an Appliance as the Client Manager

#### To set an SG appliance as the Client Manager:

1. Log in to the Management Console as an administrator.
2. In the left pane, click **SG Client > Client Manager**.
3. In the right pane, click the **Client Manager** tab.
4. Select the **Enable Client Manager** checkbox.
5. In the Client Manager section in the right pane, enter or edit the following information:

#### Note:

- Before you can enable an appliance to be the Client Manager, you must configure the ADN manager SG Clients will use. If you enable the Client Manager before you configure an ADN manager for clients, the following error displays when you attempt to apply the change: The ADN primary manager must be set prior to enabling the SG Client Manager. To configure the clients’ ADN manager, see [“Configuring Client ADN Manager Settings” on page 154](#).
- License information displays below the check box. For more information, see [“Licensing” on page 182](#).

Table 12-6. Client Manager Section

Item	Description
<b>Host</b>	<p>Specify the host from which users get the SG Client software, configuration, and updates as one of the following:</p> <ul style="list-style-type: none"> <li>• <b>Use host from initial client request:</b> (<i>Recommended.</i>) Click this option if you want clients to download the SG Client software, configuration, and updates from the host from which the clients originally obtained the software and configuration.</li> <li>• <b>Use host:</b> Click this option only if you want to change the host from which clients download the SG Client software, configuration, and updates. Enter a fully-qualified host name or IP address only; <i>do not</i> preface it with <code>http://</code> or <code>https://</code> or downloads will fail.</li> </ul> <p>In other words, this option enables you to change the host from which currently-installed clients obtain <i>future</i> software and configuration updates. Use caution when selecting this option because if clients are unable to connect to the host you enter in the adjacent field, new installations from the Client Manager and updates to existing installations fail.</p> <p><b>Note:</b> Blue Coat recommends you enter a fully-qualified host name. If you enter either an unqualified host name or IP address and change the IP address later, connections to all currently-connected clients are dropped.</p>
<b>Port field</b>	Enter the port on which the Client Manager listens for requests from clients. Default is 8084.
<b>Keyring list</b>	Click the keyring you want to use when clients connect to the Client Manager.

6. Select **Apply** to commit the changes to the SG appliance.

After you apply the changes, the Client Components section displays a summary of the information you selected, as follows:

Table 12-7. Client Components section

Item	Description
<b>Client setup</b>	<p>Displays the URL from which users will download the SG Client setup application. The setup application (<code>SGClientSetup.exe</code>) downloads the Microsoft Installer (MSI)—named <code>SGClientSetup.msi</code>—to the client.</p> <p>If you want users to install the SG Client software from the Client Manager, provide this URL to them. To install the software this way, the user must have administrative privileges on the client machine.</p>
<b>Client install MSI</b>	<p>Displays the URL from which <code>SGClientSetup.exe</code> downloads <code>SGClientSetup.msi</code>.</p> <p>If you want to install the SG Client software on client machines silently or using Group Policy Objects (GPO), use <code>SGClientSetup.msi</code>.</p>
<b>Client configuration</b>	<p>Displays the URL from which the SG Client installer will download the client configuration file (<code>SGClientConfig.xml</code>).</p>
<b>Client configuration last modified</b>	<p>Displays the most recent date and time <code>SGClientConfig.xml</code> was updated on the Client Manager.</p>

## Uploading the SG Client Software to the Client Manager

This section discusses how to upload updated SG Client software to the Client Manager so it can make the latest SG Client software available to install or to update on client machines.

**Important:** After you update the Client Manager's SG Client software, whenever users connect using the SG Client, they must update their SG Client software. As a result, users must reboot their machines to use the updated software.

### To upload the SG Client software to the Client Manager:

1. If necessary, copy the `SG_Client.car` file to a location that is accessible from the machine on which you're running the Management Console.

That is, if you want to upload the SG Client software from your local file system or from a network share drive (as opposed to uploading it from a remote URL), you must copy the `SG_Client.car` file to an accessible location.

2. Log in to the Management Console as an administrator.
3. In the left pane, click **SG Client > Client Manager**.
4. In the right pane, click the **Client Software** tab.

On the Client Software tab page, the Current SG Client Software section displays information about the SG Client software this Client Manager is currently using.

5. In the Install SG Software section, from the **Install SG Client software from** list, click one of the following:

- **Remote URL:** Upload the `SG_Client.car` file from a location specified by a URL in the following format:

```
https://host:port/sgclient/SGClient_timestamp.car
```

For example,

```
http://mysg.example.com:8004/sgclient/SGClient_timestamp.car
```

Follow the prompts on your screen to complete the upload.

- **Local file:** Upload the SG Client software from a location accessible by the machine on which you're running the Management Console. Follow the prompts on your screen to complete the task.

6. Click **Install**.

You are required to confirm the action. Remember that any software or configuration updates require SG Client users to download the updates the next time they connect to the ADN network. Any configuration or software update requires the user to reboot their machine for the update to take effect.

7. Follow the prompts on your screen to complete the download.

---

**Note:** A compatibility check is performed on the SG Client version you just uploaded. If the upload fails, you must upgrade your SGOS version before you can upload the `SG_Client.car` file.

---

## Configuring from the Command Line

### *Configuring General Client Settings*

#### **To configure general client settings:**

1. At the `#(config)` command prompt, enter `sg-client`.
2. Configure general client settings:

```
#(config sg-client) max-cache-disk-percent percentage
#(config sg-client) software-upgrade-path url
#(config sg-client) tcp-window-size bytes
#(config sg-client) update-interval minutes
#(config sg-client) view
```

### *Configuring CIFS Client Settings*

#### **To configure CIFS client settings:**

1. At the `#(config)` command prompt, enter `sg-client`.
2. At the `#(config sg-client)` prompt, enter `cifs`.
3. Configure CIFS settings:

```
#(config sg-client cifs) directory-cache-time seconds
#(config sg-client cifs) {disable | enable}
#(config sg-client cifs) exit
#(config sg-client cifs) write-back {full | none}
#(config sg-client cifs) view
```

### *Configuring ADN Manager Settings*

#### **To configure ADN manager settings:**

1. At the `#(config)` command prompt, enter `sg-client`.
2. At the `#(config sg-client)` prompt, enter `adn`.
3. Configure ADN manager settings:

```
#(config sg-client adn) primary-manager ip-address
#(config sg-client adn) backup-manager ip-address
#(config sg-client adn) manager-port plain-port
```

### Configuring ADN Rules Settings

#### To configure ADN rules settings:

1. At the # (config) command prompt, enter `sg-client`.
2. At the # (config sg-client) prompt, enter `adn`.
3. Configure ADN manager settings:

```
#(config sg-client adn) port-list {exclude-ports | include-ports}
#(config sg-client adn) {exclude-ports | include-ports} {port-list |
port-range}
#(config sg-client adn) exclude-subnets
    #(config sg-client adn exclude-subnets) {add | remove}
    subnet_prefix[/prefix length]
#(config sg-client adn exclude-subnets) clear
#(config sg-client adn exclude-subnets) exit
#(config sg-client adn exclude-subnets) view
#(config sg-client adn) exit
```

### Setting the Client Manager

#### To configure the Client Manager:

1. At the # (config) command prompt, enter `sg-client`.
2. Enable this appliance as the Client Manager:  
`#(config sg-client) enable`

---

**Note:** Before you can enable an appliance to be the Client Manager, you must configure the ADN manager SG Clients will use. If you enable the Client Manager before you configure an ADN manager for clients, the following error displays: The ADN primary manager must be set prior to enabling the SG Client Manager. To configure the clients' ADN manager, see [“Configuring Client ADN Rules Settings” on page 155](#).

---

3. Configure Client Manager settings:

```
#(config sg-client) client-manager host {from-client-address | <ip-
address | host>}
#(config sg-client) client-manager install-port port
#(config sg-client) client-manager keyring keyring
```

### Loading the Software

```
#(config sg-client) software-upgrade-path path-to-SGClient-car
#(config) load sg-client-software
```

## Making the SG Client Software Available to Users

This section discusses how administrators can make the SG Client software available to users in any of the following ways:

- ❑ Interactive installations started from:
  - A command line on the user's machine
  - The Client Manager

For more information, see [“Setting Up Interactive Installations” on page 161](#)

- ❑ Silent installations

For more information, see [“Setting Up Silent Installations and Uninstallations” on page 165](#)

- ❑ Windows Group Policy Object distribution

For more information, see [“Using Group Policy Object Distribution” on page 170](#)

---

**Note:** For the user to run `SGClientSetup.exe` or `SGClientSetup.msi`, the user must be in the Administrators group on the client machine.

---



---

**Important:** Do not rename `SGClientSetup.msi` because doing so causes future updates to fail.

Do not edit `SGClientConfig.xml` on the client machine because doing so causes unpredictable results in future configuration updates.

---

### Setting Up Interactive Installations

Users can install the SG Client software either by downloading `SGClientSetup.exe` from the Client Manager, or manually by running `SGClientSetup.msi` from a command line, as shown in the following table:

Table 12-8. SG Client Installation Options

Option	Description
Install from Client Manager	<p>Provide users the URL to <code>SGClientSetup.exe</code>, which displays on the Management Console's <b>SG Client &gt; Client Manager, Client Manager</b> tab page.</p> <p><code>SGClientSetup.exe</code> downloads and runs <code>SGClientSetup.msi</code> on the client machine. Users see the installation in progress and have the option of canceling the installation.</p> <p>For more information about this installation method, see <a href="#">“Interactive Installations From the Client Manager” on page 162</a>.</p>

Table 12-8. SG Client Installation Options (Continued)

Option	Description
Install manually	<p>To install the SG Client using <code>SGClientSetup.msi</code>, users must first download it to the client machine, then execute it from the command line as discussed in <a href="#">“Interactive Manual Installations”</a> on page 164.</p> <p>Note: For a complete discussion of <code>SGClientSetup.msi</code> command-line parameters, see <a href="#">“Setting Up Silent Installations and Uninstallations”</a> on page 165.</p>

**Note:** Users who run the SG Client setup application must be in the Administrators group on the client machine.

## Interactive Installations From the Client Manager

To interactively install the SG Client software from the Client Manager, the user must be in the Administrators group on the client machine.

### To enable users to run `SGClientSetup.exe` from the Client Manager:

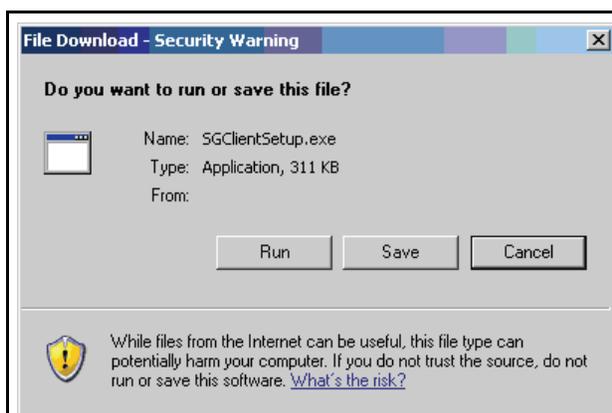
Provide users the URL to `SGClientSetup.exe` on the Client Manager.

The URL displays in the Management Console on the **SG Client > Client Manager, Client Manager** tab page.

### For users to install the SG Client using this method:

1. You provide the URL or location from which the user can access `SGClientSetup.exe`.
2. The user clicks the URL in an e-mail or enters it in the browser’s location field.
3. `SGClientSetup.exe` starts the setup application—`SGClientSetup.msi`—that installs the SG Client software.

The following dialog box displays if you attempt the download using Internet Explorer 6:



4. Click **Run**.

The following dialog box displays if you attempt the download using Internet Explorer 6:



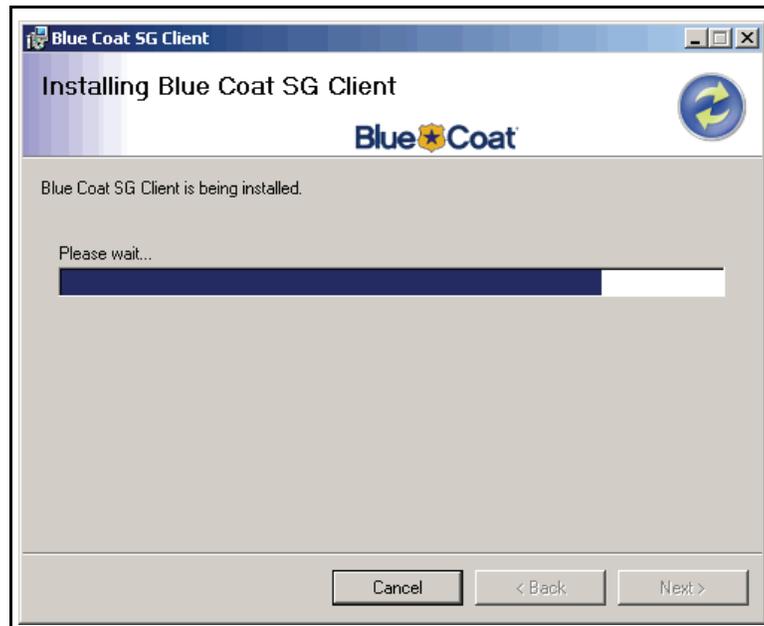
---

**Note:** The preceding dialog box displays because `SGClientSetup.exe` is not signed. This is due to `SGClientSetup.exe` being unique to each Client Manager, which in turn makes signing it by a recognized certificate authority difficult.

---

5. Click **Run**.

The SG Client software installation begins and while it's being downloaded, a progress dialog box similar to the following displays:



When installation is complete, a dialog box with two options displays:

- Click **Now** to reboot your machine immediately.
- Click **Later** to reboot your machine at a later time.

You should choose this option if you have work you need to save before rebooting.

## Interactive Manual Installations

### To enable users to manually install the SG Client software:

Provide a location from which the user can download `SGClientSetup.msi` to the client machine; for example, provide the user the URL to the Client Manager.

---

**Important:** Do not rename `SGClientSetup.msi` because doing so causes future updates to fail.

Do not edit `SGClientConfig.xml` on the client machine because doing so causes unpredictable results in future configuration updates.

---

### For users to install the SG Client using this method:

1. The user downloads `SGClientSetup.msi` to a location on the local file system.
2. The user does either of the following:
  - Clicks **Start > Run**, then enters the command shown in step 3.
  - Opens a DOS command prompt window and changes to the directory to which they downloaded `SGClientSetup.msi`

3. The user enters the following command:

```
path\SGClientSetup.msi BCSI_UPDATEURL=url-to-config.xml
```

where *path* is the absolute file system path to `SGClientSetup.msi` (if necessary), *url-to-config.xml* is the URL to `SGClientConfig.xml` on the Client Manager.

This URL displays in the Management Console in **SG Client > Client Manager, Client Manager** tab page as discussed in [“Configuring the Client Manager” on page 156](#).

For example,

```
SGClientSetup.msi BCSI_UPDATEURL=http://mysg.example.com:8084/  
sgclient/SGClientConfig.xml
```

---

**Note:** Other command-line parameters are available. For a complete list, see [“Setting Up Silent Installations and Uninstallations” on page 165](#).

---

4. The installation proceeds as discussed in steps 4 and following [“Interactive Installations From the Client Manager” on page 162](#).

## Setting Up Silent Installations and Uninstallations

This section discusses how to silently install or uninstall the SG Client.

See one of the following sections:

- “Parameters for Silent Installations” on page 165
- “Command for Silent Uninstallations” on page 167
- “Examples Installations and Uninstallations” on page 167

---

**Important:** Do not rename `SGClientSetup.msi` because doing so causes future updates to fail.

Do not edit `SGClientConfig.xml` on the client machine because doing so causes unpredictable results in future configuration updates.

---

For information about distributing the SG Client software using Group Object Policy, skip this section and see “Using Group Policy Object Distribution” on page 170.

### Parameters for Silent Installations

The following table shows command-line parameters to use with `SGClientSetup.msi` for silent installations. For examples, see “Examples Installations and Uninstallations” on page 167.

#### Silent Installation Usage

```
SGClientSetup.msi [/qr|/qn] BCSI_UPDATEURL=url REINSTALL=ALL
REINSTALLMODE=vamus [AUTOUPDATEDISABLED=0|1]
[AUTOUPDATEPROHIBITED=0|1] [FORCEREBOOT={yes|no} | {y|n}]
[REBOOTTIME=secs] [/l*v logfile]
```

#### Silent Installation Parameters

The following table shows the meanings of the parameters that can be used for silent installations; for examples, see “Examples Installations and Uninstallations” on page 167:

Table 12-9. Parameters for Silent SG Client Installations

Parameter	Argument	Description
/qr /qn		<p>/qr (interactive, default) enables the user to see and interact with the installer, and to cancel the installation.</p> <p>/qn (totally silent) prevents the user from seeing or interacting with the installer, and from canceling the installation.</p> <p>Note: Because this is an <code>msiexec</code> command, other options are available. Enter <code>msiexec</code> at a command prompt for more information about other options.</p>
BCSI_UPDATEURL	url	<p>URL to <code>SGClientConfig.xml</code> on the Client Manager, which you can find as discussed in “Configuring the Client Manager” on page 156, entered in the following format:</p> <pre>https://client-manager-host:client-manager-port/sgclient/SGClientConfig.xml</pre>

Table 12-9. Parameters for Silent SG Client Installations (Continued)

Parameter	Argument	Description
REINSTALL	ALL	Installs all SG Client components, whether they are already installed or not. ALL is the only supported parameter value in this release.
REINSTALLMODE	vamus	Blue Coat recommends using <code>vamus</code> as the parameter value. Because this is an <code>msiexec</code> command, other options are available. For more information, see the description of this parameter at: <a href="http://msdn2.microsoft.com/en-us/library/aa371182.aspx">http://msdn2.microsoft.com/en-us/library/aa371182.aspx</a>
AUTOUPDATEDISABLED	0 1	0 (default) means the SG Client automatically implements software and configuration updates at the frequency the administrator specified for software update interval in <a href="#">“Configuring General Client Settings” on page 151</a> . 1 means the SG Client checks for software and configuration updates and does the following: <ul style="list-style-type: none"> <li>• Implements configuration updates when they are available.</li> <li>• Implements software updates only if the user manually requests an update.</li> </ul> This setting enables you to test the SG Client installation before deploying it in production. In other words, before you deploy the SG Client in your enterprise, you might want to test it in a controlled manner with a small number of users. Doing so keeps clients from requesting updates immediately after installation. (Users can manually update the software and configuration as discussed in <a href="#">“Updating the SG Client Software and Configuration” on page 177</a> . After the user manually updates the software and configuration, the SG Client software checks for updates at the interval you specified in <a href="#">“Configuring General Client Settings” on page 151</a> .)
AUTOUPDATEPROHIBITED	0 1	0 (default) means the SG Client automatically implements software and configuration updates at the interval the administrator specified for software update interval in <a href="#">“Configuring General Client Settings” on page 151</a> . 1 means only the SG Client configuration can be updated (automatically or manually), but the <i>SG Client</i> software <i>cannot</i> be updated. Use this setting if you want to distribute software updates in some way other than the Client Manager. Note: <code>AUTOUPDATEPROHIBITED=1</code> takes precedence over <code>AUTOUPDATEDISABLED=1</code> .

Table 12-9. Parameters for Silent SG Client Installations (Continued)

Parameter	Argument	Description
FORCEREBOOT	yes   no y   n	This setting controls whether or not Now or Later buttons display on the post-installation reboot dialog box. yes or y mean the dialog box displays without buttons. (However, if REBOOTTIME=0, no dialog box displays.) no or n (default) mean a dialog box displays with two options: <b>Now</b> and <b>Later</b> , enabling the user to either reboot immediately, wait for the timer to expire (see the next parameter); or wait until a later time of their choosing.
REBOOTTIME	secs	Number of seconds after the SG Client installation completes before the user's machine is rebooted. A value of 0 means there is no timer; to the user, a value of 0 has slightly different meanings, depending on the value of FORCEREBOOT. For more information, see <a href="#">"Examples Installations and Uninstallations"</a> on page 167. Default is 0.
/l*v	logfile	If you want the installation to be logged, enter the absolute file system path and file name of the log file.

## Command for Silent Uninstallations

To silently uninstall the SG Client software, use the following command:

```
msiexec /q /x {4214C5ED-CCED-4360-90C0-69764F3D0854}
```

**Note:** Users who have administrative privileges on their machines can also uninstall the SG Client using the Windows Control Panel's Add or Remove Programs application as discussed in ["Uninstalling the SG Client Software"](#) on page 179.

## Examples Installations and Uninstallations

This section shows the following examples:

- ["Example Installations"](#) on page 167
- ["Example Uninstallation"](#) on page 169

---

**Important:** Do not rename SGClientSetup.msi because doing so causes future updates to fail.

Do not edit SGClientConfig.xml on the client machine because doing so causes unpredictable results in future configuration updates.

---

### Example Installations

**Example 1:** Automated, interactive installation with manual software updates possible:

```
SGClientSetup.msi /qr BCSI_UPDATEURL=https://mysg.example.com:8084/sgclient/SGClientConfig.xml REINSTALL=ALL REINSTALLMODE=vamus AUTOUPDATEDISABLED=1 FORCEREBOOT=no REBOOTTIME=30
```

The SG Client configuration is downloaded from the Client Manager at <https://mysg.example.com:8084>. The user sees the installation in progress and can cancel it.

AUTOUPDATEDISABLED=1 means that the SG Client does not implement software updates after the initial installation (it will, however, implement configuration updates). This setting enables you to test the SG Client software on a small scale without having to plan for client updates.

(To get software updates manually and thereafter enable automatic updates, click **Check for Updates** on the Advanced tab page in the SG Client dialog box as discussed in “Updating the SG Client Software and Configuration” on page 177.)

The REINSTALL and REINSTALLMODE parameters make sure that all SG Client components install, which is useful in cases where you are recovering from an incomplete or previously-unsuccessful installation.

After the installation is complete, the user has the following options:

- Wait 30 seconds for the machine to reboot
- Click **Later** on the dialog box to defer rebooting until a later time
- Click **Now** on the dialog box to reboot immediately

**Example 2:** Automated, interactive installation with no automatic software updates possible

```
SGClientSetup.msi /qr BCSI_UPDATEURL=https://mysg.example.com:8084/sgclient/SGClientConfig.xml REINSTALL=ALL REINSTALLMODE=vamus AUTOUPDATEPROHIBITED=1 FORCEREBOOT=no REBOOTTIME=30
```

The SG Client configuration is downloaded from the Client Manager at <https://mysg.example.com:8084>. The user sees the installation in progress and can cancel it.

AUTOUPDATEPROHIBITED=1 means the SG Client cannot check for software updates after the initial installation; however, it will check for and implement configuration updates. Use this setting if you want to distribute software updates in some way other than the Client Manager.

The REINSTALL and REINSTALLMODE parameters make sure that all SG Client components install, which is useful in cases where you are recovering from an incomplete or previously-unsuccessful installation.

After the installation is complete, the user has the following options:

- Wait 30 seconds for the machine to reboot
- Click **Later** on the dialog box to defer rebooting until a later time
- Click **Now** on the dialog box to reboot immediately

**Example 3:** Automated, interactive installation

```
SGClientSetup.msi /qr BCSI_UPDATEURL=https://mysg.example.com:8084/  
sgclient/SGClientConfig.xml REINSTALL=ALL REINSTALLMODE=vamus  
FORCEREBOOT=no REBOOTTIME=30
```

The SG Client configuration is downloaded from the Client Manager at <https://mysg.example.com:8084>. The user sees the installation in progress and can cancel it. The `REINSTALL` and `REINSTALLMODE` parameters make sure that all SG Client components install, which is useful in cases where you are recovering from an incomplete or previously-unsuccessful installation.

After the installation is complete, the user has the following options:

- Wait 30 seconds for the machine to reboot
- Click **Later** on the dialog box to defer rebooting until a later time
- Click **Now** on the dialog box to reboot immediately

**Example 4:** Automated, interactive installation without a timer

```
SGClientSetup.msi /qr BCSI_UPDATEURL=https://mysg.example.com:8084/  
sgclient/SGClientConfig.xml REINSTALL=ALL REINSTALLMODE=vamus  
FORCEREBOOT=no REBOOTTIME=0
```

The SG Client configuration is downloaded from the Client Manager at <https://mysg.example.com:8084>. The user sees the installation in progress and can cancel it. The `REINSTALL` and `REINSTALLMODE` parameters make sure that all SG Client components install, which is useful in cases where you are recovering from an incomplete or previously-unsuccessful installation.

After the installation is complete, the user has the following options:

- Click **Later** on the dialog box to defer rebooting until a later time
- Click **Now** on the dialog box to reboot immediately

**Example 5:** Totally silent installation, immediate reboot

```
SGClientSetup.msi /qn BCSI_UPDATEURL=https://mysg.example.com:8084/  
sgclient/SGClientConfig.xml REINSTALL=ALL REINSTALLMODE=vamus  
FORCEREBOOT=yes REBOOTTIME=0
```

The SG Client configuration is downloaded from the Client Manager specified at <https://mysg.example.com:8084>. The user does not see the installation in progress and cannot cancel it. The user's machine is rebooted immediately after the installation is complete. The `REINSTALL` and `REINSTALLMODE` parameters make sure that all SG Client components install, which is useful in cases where you are recovering from an incomplete or previously-unsuccessful installation.

**Example Uninstallation**

```
msiexec /q /x {4214C5ED-CCED-4360-90C0-69764F3D0854}
```

## Using Group Policy Object Distribution

This section discusses how to distribute the SG Client software using Windows Group Policy Object (GPO). Only an experienced Windows administrator should attempt to complete the tasks discussed in this section.

### To distribute the SG Client software using GPO:

1. Get an .msi transform tool, such as the Orca database editor.

Orca is a table-editing tool available in the Windows Installer SDK that can be used to edit your .msi files. You can also use similar tools available from other vendors.

---

**Note:** Blue Coat does not recommend a particular transform tool.

---

For more information about Orca, see:

<http://support.microsoft.com/kb/255905/en-us>

The remainder of this section assumes you use Orca. Consult the documentation provided with the transform tool you're using for vendor-specific instructions.

2. Open `SGClientSetup.msi`.
3. Right-click each of the following SG Client properties and change them as shown in the following table:

Table 12-10. SG ClientSetup Transform Properties

Property	Action	Value
BCSI_UPDATEURL	Add row	URL to <code>SGClientConfig.xml</code> on the Client Manager, which you can find as discussed in “Configuring the Client Manager” on page 156, entered in the following format: <code>https://client-manager-host:client-manager-port/sgclient/SGClientConfig.xml</code>
FORCEREBOOT	Edit value	y

---

**Note:** Do not use any of the other parameters discussed in Table 12-9 on page 165—in particular, `REINSTALL` and `REINSTALLMODE`. Using these parameters will cause installations to fail.

---

4. Generate the transformation.

## Using the SG Client

**Note:** This section is written from the point of view of users, not administrators.

After the SG Client software is installed, it starts automatically when you start your machine. You don't have to do anything to enable it.

The SG Client icon displays as follows in the Windows system tray:

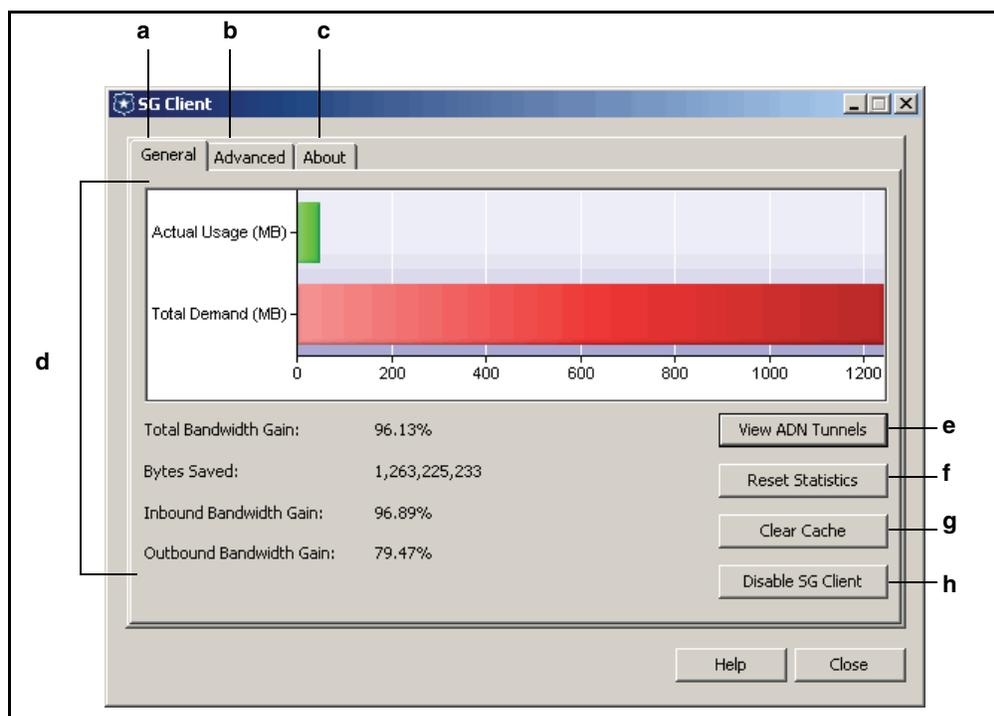


You can access the SG Client software in any of the following ways:

Table 12-11. Accessing the SG Client Software

To perform this action...	...Use these steps
Open the SG Client dialog box	<ul style="list-style-type: none"> <li>• Double-click its icon in the system tray</li> <li>• Right-click or left-click its icon in the system tray, and, from the pop-up menu, click <b>Open</b></li> </ul>
Enable the SG Client	Right-click or left-click its icon in the system tray, and, from the pop-up menu, click <b>Enable SG Client</b> .
Disable the SG Client	<ul style="list-style-type: none"> <li>• Right-click or left-click its icon in the system tray, and, from the pop-up menu, click <b>Disable SG Client</b>.</li> <li>• Open the SG Client, click the <b>General</b> tab, and then click <b>Disable SG Client</b>.</li> </ul>
Hide or display the icon	<p>Hide: Right-click or left-click its icon in the system tray, and, from the pop-up menu, click <b>Hide Tray Icon</b>.</p> <p>To cause the icon to display again, click <b>Start &gt; [All] Programs &gt; Blue Coat &gt; SG Client &gt; SG Client</b>.</p>

When you open the SG Client, its dialog box displays as follows:



For more information about the indicated item, see one of the following sections:

- a. [“Viewing Statistics and ADN Tunnels” on page 172](#)
- b. [“Troubleshooting the SG Client” on page 175](#)
- c. [“Finding Information About The SG Client” on page 177](#)
- d. [“Viewing Statistics and ADN Tunnels” on page 172](#)
- e. [“Troubleshooting the SG Client” on page 175](#)
- f. [“Viewing Statistics and ADN Tunnels” on page 172](#)
- g. [“Troubleshooting the SG Client” on page 175](#)
- h. [“Enabling and Disabling the SG Client” on page 174](#)

## Viewing Statistics and ADN Tunnels

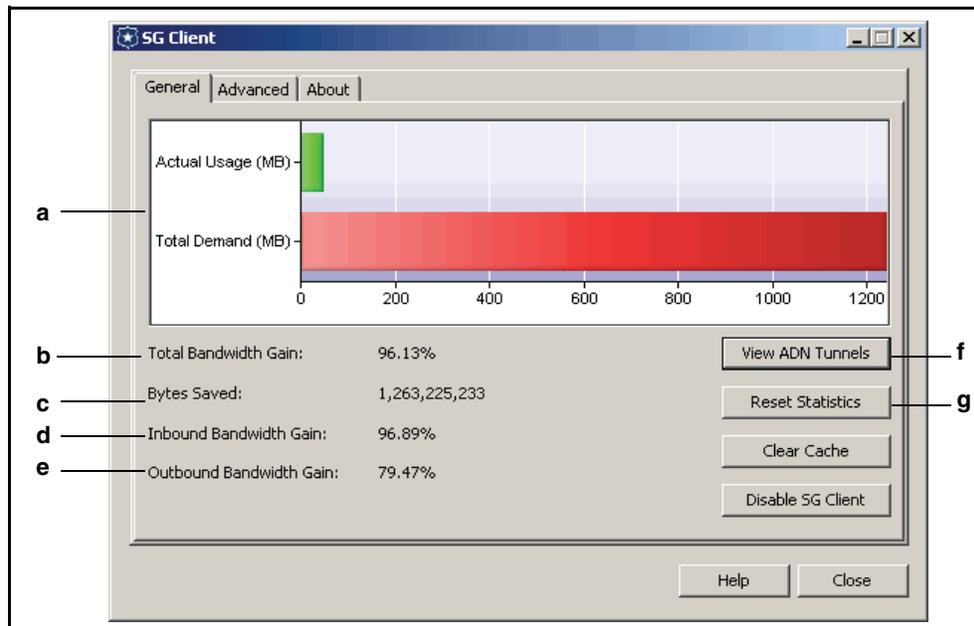
The SG Client displays acceleration statistics, such as total bandwidth gain and bytes saved, and enables you to view current Application Delivery Network (ADN) tunnels. An *ADN tunnel* is a type of network connection that optimizes performance over a Wide Area Network (WAN).

You can use this information to see how the ADN network performs in response to your actions or to troubleshoot problems.

### To view statistics and ADN tunnels:

1. Double-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)  
The SG Client dialog box displays.
2. In the SG Client dialog box, click the **General** tab.

The General tab page displays as follows:



**Note:** If you don't see a bar graph like in the preceding figure, the client might be disabled. Click **Enable SG Client** to enable the client.

You have the following options:

Table 12-12. Viewing ADN Statistics in the SG Client

Item (see preceding figure)	Steps
a	<p>The graph at the top of the tab page displays the following:</p> <ul style="list-style-type: none"> <li>Actual Usage: The sum of bytes data delivered after acceleration, in and out.</li> <li>Total Demand: The estimated number of bytes requested, in and out. In other words, the estimated number of bytes transmitted if you had not installed the SG Client.</li> </ul> <p>The units of measure can be bytes, kilobytes, megabytes, or gigabytes, as appropriate.</p>
b	The total bandwidth gained as a result of using the SG Client.
c	Number of bytes saved by using the SG Client (in other words, the number of bytes that would have been transmitted over the WAN if the SG Client was not installed).
d	The inbound bandwidth gained as a result of using the SG Client.
e	The outbound bandwidth gained as a result of using the SG Client.
f	You typically click <b>View ADN Tunnels</b> when instructed to do so by you network administrator or support organization.
g	To reset all statistics on this page to zero, click <b>Reset Statistics</b> . This does not affect network traffic into or out of your machine.

## Enabling and Disabling the SG Client

You can enable or disable the SG Client in any of the ways discussed in this section.

### Enabling the SG Client

The SG Client is enabled when you boot your machine and remains enabled until you disable it. If you don't know whether or not it's enabled because its icon is hidden, you can use the following procedure to display the icon and make sure it's enabled. Any connections you make after enabling the SG Client are accelerated.

#### To enable the SG Client using its system tray icon:

1. Right-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)
2. From the pop-up menu, click **Enable SG Client.**

#### To enable the SG Client while you have the application open:

1. Double-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)  
The SG Client dialog box displays.
2. Click the **Advanced** tab.
3. On the Advanced tab page, verify the value of Client Status.
4. If Client Status is `Disabled`, click the **General** tab.
5. On the General tab page, click **Enable SG Client.**

### Disabling the SG Client

You can disable the SG Client in the event of network problems or if instructed to do so by your network administrator.

#### To disable the SG Client using its system tray icon:

1. Right-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)
2. From the pop-up menu, click **Disable SG Client.**

#### To disable the SG Client while you have the application open:

1. Double-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)  
The SG Client dialog box displays.
2. Click the **General** tab.
3. On the General tab page, click **Disable SG Client.**

## Troubleshooting the SG Client

This section discusses suggested solutions to problems you might encounter with the SG Client.

### Suggested Solutions to Specific Problems

Problem	Solution
<p><b>Symptom:</b> The SG Client download fails.</p>	
	<p><b>Description:</b> The SG Client installation fails and a dialog box similar to the following displays:</p> 
	<p>Your network administrator or support personnel needs to determine the solution to this problem. To assist the administrator, send them all of the following log files:</p> <ul style="list-style-type: none"> <li>• Setup application log files, named <code>sgclientsetup.log</code> and <code>sgclientsetup2.log</code>. These files are located in your Windows temporary folder, such as: <code>C:\Documents and Settings\username\Local Settings\Temp</code></li> <li>• If it exists, the automatic update log file, named <code>sgautoupdate.log</code> This file is located in the SG Client installation folder, such as <code>C:\Program Files\Blue Coat\SG Client</code>. This file does not exist for new installations.</li> </ul>

Problem	Solution
<b>Symptom:</b> An automatic update fails.	
	<b>Description:</b> An SG Client update fails.
	<p>Try to manually update the client, as follows:</p> <p>Double-click its icon in the system tray.</p> <p>(If the SG Client icon doesn't display in your system tray, click <b>Start &gt; [All] Programs &gt; Blue Coat &gt; SG Client &gt; SG Client.</b>)</p> <p>In the SG Client dialog box, click the <b>Advanced</b> tab.</p> <p>On the Advanced tab page, click <b>Check for Updates.</b></p> <p>If the <b>Check for Updates</b> button is unavailable, the SG Client might be disabled. To enable it, click the <b>General</b> tab and click <b>Enable SG Client.</b></p> <p>If the manual update fails, send the following logs to your administrator.</p> <ul style="list-style-type: none"> <li>• Automatic update log, named <code>sgautoupdate.log</code>, located in the SG Client installation folder, such as <code>C:\Program Files\Blue Coat\SG Client</code>.</li> <li>• SG Client application log, as discussed in <a href="#">“Viewing and Saving the Log” on page 178.</a></li> </ul>
<b>Symptom:</b> You don't have enough available disk space.	
	<b>Description:</b> The SG Client always leaves a minimum of 1GB on your system volume for your use. To free disk space, you can clear the SG Client cache at any time. Clearing the cache might slow performance when you're copying files but otherwise has no effect.
	<p>Make sure the SG Client is enabled as discussed in <a href="#">“Enabling the SG Client” on page 174.</a></p> <p>Double-click its icon in the system tray.</p> <p>(If the SG Client icon doesn't display in your system tray, click <b>Start &gt; [All] Programs &gt; Blue Coat &gt; SG Client &gt; SG Client.</b>)</p> <p>In the SG Client dialog box, click the <b>General</b> tab.</p> <p>On the General tab page, click <b>Clear Cache.</b></p>

## Updating the SG Client Software and Configuration

The SG Client should automatically check for software and/or configuration updates at the interval set by your administrator. However, you can check for updates anytime you want (for example, if network problems have prevented you from checking for updates earlier).

### To update the SG Client software and configuration:

1. Enable the SG Client as discussed in “Enabling the SG Client” on page 174.
2. Double-click the SG Client icon in the system tray.

(If the SG Client icon doesn’t display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)

The SG Client dialog box displays.

3. In the SG Client dialog box, click the **Advanced** tab.
4. On the Advanced tab page, click **Check for Updates.**

A dialog box displays to notify you of the result of the update.

---

**Note:** If any software or configuration updates were applied, you must restart your machine—or disable and then enable the SG Client—for the updates to take effect. For more information, see “Enabling and Disabling the SG Client” on page 174.

---

If errors display instead, see “Troubleshooting the SG Client” on page 175.

## Finding Information About The SG Client

To assist support personnel, it might be necessary for you to find version information about SG Client components as discussed in this section.

### To find information about the SG Client software:

1. Double-click the SG Client icon in the system tray.

(If the SG Client icon doesn’t display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client.**)

The SG Client dialog box displays.

2. In the SG Client dialog box, click the **About** tab.

The version of SG Client software you’re running displays at the top of the About tab page.

3. On the About tab page, do any of the following as instructed by your support personnel:
  - Click **Copy** to copy SG Client version information to the clipboard. You can then e-mail the information to your support personnel.
  - Click **System Info** to display information about your machine.

## SG Client Logging

The SG Client software maintains a diagnostic log that records the following:

- ❑ Client installation (that is, timestamp of the initial installation and any updates, including errors)
- ❑ Activation of the driver and client service components every time those components start
- ❑ Configuration download events (that is, whenever a configuration download is attempted and whether it succeed or failed)
- ❑ Connection information between the client machine and the ADN manager
- ❑ ADN tunnel creation and destruction
- ❑ Activation/deactivation of the trace log, which is discussed in more detail in [“Starting the Trace Log” on page 179](#).
- ❑ Various error conditions (for example, out of memory, out of disk space, and so on)

Log entries include the date and time of each event. The log file is a maximum of 20MB in size, after which the oldest log entries are deleted as new entries are written.

### Viewing and Saving the Log

This section discusses how to view the SG Client log file, copy it to the clipboard, or to save it in a different location.

For information about the more detailed trace log, see [“Starting the Trace Log” on page 179](#).

#### To view and save the SG Client log:

1. Double-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client**.)  
The SG Client dialog box displays.
2. In the SG Client dialog box, click the **Advanced** tab.
3. On the Advanced tab page, click **View Log**.  
The SG Client Log dialog box displays.
4. You have the following options:

Table 12-13. Viewing the SG Client Log

To perform this task...	... Use these steps
To view the log	Click <b>View Log</b> . The log file displays in a dialog box that enables you to read it, to copy it to the clipboard, or to save it.
To copy the log to the clipboard	Click <b>View Log</b> , then click <b>Copy to Clipboard</b> . Follow the directions from your network administrator or technical support to paste the log into an e-mail or an application like Notepad.
To save the log	Click <b>View Log</b> , then click <b>Save Log</b> . Follow the directions from your network administrator to e-mail the log.

5. In the SG Client Log dialog box, click **OK**.

#### *Starting the Trace Log*

The trace log contains more detailed information about your client session than does the client log. The trace log is not readable.

#### **To start the trace log:**

1. Double-click the SG Client icon in the system tray.  
(If the SG Client icon doesn't display in your system tray, click **Start > [All] Programs > Blue Coat > SG Client > SG Client**.)

The SG Client dialog box displays.

2. In the SG Client dialog box, click the **Advanced** tab.
3. On the Advanced tab page, click **Start Trace**.  
A dialog box displays informing you the log was started.
4. At the confirmation dialog box, click **OK**.
5. Repeat the tasks that caused the problem for which you're seeking assistance.
6. After a sufficient length of time has passed, or when instructed to do so by your network administrator or support personnel, click **Stop Trace**.

A dialog box displays informing you the log was stopped.

---

**Note:** Before sending it to anyone, you must stop the trace log.

---

7. At the confirmation dialog box, click **OK**.
8. Click **Open Trace Folder**.
9. Locate the trace log, named `sgdebug.etl`, and e-mail it to your administrator or support.

## *Uninstalling the SG Client Software*

#### **To uninstall the SG Client software:**

1. Log in to your machine as a user who is a member of the Administrators group.  
If you are not in the Administrators group on your machine, contact your network administrator for alternate uninstallation methods.
2. Click **Start > Settings > Control Panel**.
3. In the Control Panel window, double-click **Add or Remove Programs**.
4. Click **Blue Coat SG Client**.
5. Click **Remove**.
6. Follow the prompts on your screen to uninstall the software.

## Troubleshooting Tips for Administrators

For administrators to assist SG Client users with diagnosing errors, you need to be familiar with the topics discussed in this section:

- ❑ “SG Client Logging” on page 180
- ❑ “About Browser Proxies” on page 181
- ❑ “ADN Tunnels” on page 181
- ❑ “Clearing the Object Cache” on page 181
- ❑ “Client Manager Logging” on page 182

### SG Client Logging

The SG Client maintains the following logs in the user’s %TMP% folder:

Table 12-14. SG Client Log Files

File Name	Description
SGClientSetup.log	SGClientSetup.exe log; displays errors related to downloading SGClientConfig.xml or running SGClientSetup.exe.
SGClientSetup2.log	SGClientSetup.msi log; displays errors related to installing the SG Client software.

The SG Client maintains the following logs in the user’s %windir%\system32\sgclient\support folder:

Table 12-15. SG Client Log Files

File Name	Description
sglog.etl	SG Client application log. This file can reach a maximum of 20MB in size, after which the oldest log entries are deleted as new entries are written.
sgdebug.etl	SG Client trace log. This file can reach a maximum of 20MB in size, after which the oldest log entries are deleted as new entries are written.  This log is in a compiled format that is readable only by Blue Coat Engineering.

The SG Client maintains the following log in the SG Client installation folder (for example, C:\Program Files\Blue Coat\SG Client):

Table 12-16. SG Client Log Files

File Name	Description
sgautoupdate.log	Logs software updates but not configuration updates. Configuration update log messages are contained in sglog.etl.

## About Browser Proxies

For users to download SG Client software and configuration updates, you might need to change proxy settings for SSL traffic. If you don't use a proxy for SSL traffic, you can skip this section.

The following options are available:

- ❑ If users can connect directly to the Client Manager, change the browser's proxy settings to exclude the Client Manager from being proxied.
- ❑ Change the proxy settings to allow connections to the Client Manager listen port (by default, 8084). You chose the Client Manager listen port as discussed in "Configuring the Client Manager" on page 156.

This method works for all users—even those who cannot connect directly to the Client Manager.

---

**Note:** The SG Client uses the Internet Explorer proxy settings to download software and configuration updates, so make sure you change Explorer's proxy settings.

---

## ADN Tunnels

On the General tab page of the SG Client dialog box, clicking **View ADN Tunnels** displays detailed information about available tunnels, including whether a tunnel is idle or bypassed.

An **Idle** tunnel is one that is not currently being used but for which connection information is preserved to decrease the amount of time required to use that connection later, if necessary.

A **Bypassed** tunnel indicates an error with the connection to the indicated SG appliance.

## Clearing the Object Cache

To free disk space on the user's system root volume, the user can clear the object cache by clicking **Clear Cache** on the SG Client dialog box's General tab page. The object cache is located in the user's %windir%\system32\sgclient\cifs folder, which is a hidden folder.

Clearing the cache affects the performance of file copies, listing directories, and opening files in different applications. Also, clearing the cache while the client is running does *not* delete files that are currently in use.

## Client Manager Logging

The Client Manager logs success or failure events related to users downloading the SG Client software and configuration. Each log should include timestamp, HTTP GET string (including the HTTP return code), and client machine name).

### To get Client Manager logs:

Enter the following URL in your browser's location field:

```
https://host:port/sgclient/log
```

where *host* is the fully-qualified host name or IP address of the Client Manager, and *port* is the SG appliance's listen port.

## Licensing

- ❑ A new SG appliance has a 60-day trial license that permits you to use it with an unlimited number of clients.
- ❑ After the 60-day trial period, you are required to purchase a permanent license to continue using the SG Client.

The license entitles you to support a certain number of clients in your enterprise; however, the license does not limit the number of ADN tunnels to which clients can have access.

Client machines do not require a license to use the SG Client software; only the Client Manager appliance requires a license.

- ❑ You can upgrade your license to larger user counts.

For information about applying a permanent Client Manager license, see the chapter on licensing in *Volume 2: Getting Started*.

## Chapter 13: SOCKS Gateway Configuration

The Blue Coat implementation of SOCKS includes the following:

- ❑ A SOCKS proxy server that supports both SOCKSv4/4a and SOCKSv5, running on the SG appliance.
- ❑ Support for forwarding through SOCKS gateways.

To configure a SOCKS proxy server on the SG appliance, refer to *Volume 3: Proxies and Proxy Services*. To use SOCKS gateways when forwarding, continue with the next section.

---

**Note:** SOCKS gateway aliases cannot be CPL keywords, such as no, default, forward, or socks\_gateways.

---

### Using SOCKS Gateways

SOCKS servers provide application level firewall protection for an enterprise. The SOCKS protocol provides generic way to proxy HTTP.

SOCKS gateways, like ICP and forwarding, can use installable lists for configuration. You can configure the installable list using directives. You can also use the CLI to create a SOCKS gateways configuration.

### Using the CLI to Create SOCKS Gateways Settings

If you prefer, you can use SOCKS gateways CLI commands instead of an installable list to create SOCKS gateways settings. For information about using an installable list, see “Using SOCKS Gateways Configuration Directives With Installable Lists” on page 186.

**To create a SOCKS gateways host:**

1. At the (config) command prompt:

```
SGOS#(config) socks-gateways
SGOS#(config socks-gateways) create gateway_alias gateway_host
SOCKS_port [version {=4 | =5} [user=username password=password]
```

Table 13-1. Commands to Create a SOCKS Gateways Host

Command	Suboptions	Description
gateway_alias		A name, meaningful to you.
gateway_host		The IP address or the host name of the gateway where traffic is directed. The host name must DNS resolve.
SOCKS_port		The port number of the SOCKS gateway.
version	=4   =5	The version that SOCKS gateways can support. (SOCKS v5 is recommended, if you have a choice). If no version is configured, the default is version 4.

Table 13-1. Commands to Create a SOCKS Gateways Host (Continued)

Command	Suboptions	Description
user	= <i>username</i>	(Optional, and only if you use v5) The username of the user on the SOCKS gateway. The username already must exist on the gateway. If you use <code>user=</code> , you must also use <code>password=</code> .
password	= <i>password</i>	(Optional, and only if you use v5) The password of the user on the SOCKS gateway. The password must match the gateway's information. If you use <code>user=</code> , you must also use <code>password=</code> .

- Repeat for each gateway you want to create. The `failure-mode` command applies to all SOCKS gateways configured on the system. The default failure mode can be overridden using policy.
- Complete the configuration by entering the following commands as necessary:

```
SGOS#(config socks-gateways) failure-mode {open | closed}
SGOS#(config socks-gateways) delete {all | gateway gateway_alias}
SGOS#(config socks-gateways) path url
SGOS#(config socks-gateways) no path
```

Table 13-2. Commands to Complete SOCKS Gateways Configuration

failure-mode	open   closed	If the health checks fail, open specifies that the connection be attempted without use of any SOCKS gateway (whether to an origin content server or a forwarding target); closed specifies that the connection be aborted.
delete	all   gateway <i>gateway_alias</i>	Deletes all SOCKS gateways ( <code>delete all</code> ) or a specific SOCKS gateway ( <code>delete gateway gateway_alias</code> ).
path	url	(Optional) Specifies the download path to use if you download SOCKS-gateways settings through directives.
no	path	Clears the network path URL to download SOCKS gateway settings.

- View the results.

```
SGOS#(config socks-gateways) view
SOCKS Gateways: (* = gateway unresolved)
Sec_App1          10.25.36.47 1080 V5
```

## Editing a SOCKS Gateways Host

Once you have created a SOCKS gateways host, you can edit the settings.

### To edit the settings of a SOCKS gateways host:

At the `(config)` command prompt:

```
SGOS#(config) socks-gateways
SGOS#(config socks-gateways) edit gateway_alias
SGOS#(config socks-gateways gateway_alias) host gateway_host
SGOS#(config socks-gateways gateway_alias) no password | user
SGOS#(config socks-gateways gateway_alias) password password
SGOS#(config socks-gateways gateway_alias) port socks_port
SGOS#(config socks-gateways gateway_alias) user username
SGOS#(config socks-gateways gateway_alias) version 4 | 5
```

Table 13-3. Commands to Edit a SOCKS Gateways Host

Commands	Suboptions	Description
host	gateway_host	Changes the host name.
no	password   user	Optional, and only if you use version 5. Deletes the version 5 password or username.
password	password	Optional, and only if you use version 5. Changes the version 5 password.
port	socks_port	Changes the SOCKS port.
user	username	Optional, and only if you use version 5. Changes the version 5 username.
version	4   5	Changes the SOCKS version.

**Example**

```

SGOS#(config) socks-gateways
SGOS#(config socks-gateways) edit testsocks
SGOS#(config socks-gateways testsocks) port 23
ok
SGOS#(config socks-gateways testsocks) version 5
ok
SGOS#(config socks-gateways testsocks) exit
SGOS#(config socks-gateways) exit
SGOS#(config)

```

## Creating a Default Sequence

A default sequence defines the order in which SOCKS gateways hosts are used. Only one default sequence is allowed. All members must be pre-existing hosts, and no member can be in the group more than once.

---

**Note:** The default sequence (if present) is applied only if no applicable forwarding gesture is in policy.

---

A default failover sequence allow healthy hosts to take over for an unhealthy host (one that is failing its DNS Resolution or its health check). The sequence specifies the order of failover, with the second host taking over for the first host, the third taking over for the second, and so on.

If all hosts are unhealthy, the operation fails either open or closed, depending upon your settings.

This configuration is usually created and managed through policy. If no SOCKS-gateways policy applies, you can create a default sequence through the CLI. This single default sequence consists of a single default host (or group) plus one or more hosts to use if the preceding ones are unhealthy.

The syntax is

```
sequence alias_name alias_name
```

where *alias\_name* is a space-separated list of one or more SOCKS gateways.

To create a default failover sequence, enter the following commands from the (config) prompt:

```
SGOS#(config) socks-gateways
SGOS#(config socks-gateways) sequence add gateway-alias
SGOS#(config socks-gateways) sequence promote | demote gateway-alias
SGOS#(config socks-gateways) sequence clear | remove gateway-alias
```

Table 13-4. Commands to Create a Default Failover Sequence

Command	Suboptions	Description
sequence	add	Adds an alias to the end of the default fail-over sequence.
	clear	Clears the default fail-over sequence.
	demote	Demotes an alias one place towards the end of the default fail-over sequence.
	promote	Promotes an alias one place towards the start of the default fail-over sequence.
	remove	Removes an alias from the default fail-over sequence.

## Using SOCKS Gateways Configuration Directives With Installable Lists

To configure a SOCKS gateway you must create an installable list and load it on the SG appliance. Alternately, you can use the CLI to configure SOCKS gateways. To use the CLI, see [“Using the CLI to Create SOCKS Gateways Settings”](#) on page 183.

For information on installing the file itself, see [“Creating a SOCKS Gateway Installable List”](#) on page 188.

The SOCKS gateways configuration includes SOCKS directives that:

- ❑ Names the SOCKS gateway hosts
- ❑ Specifies the SOCKS version
- ❑ (Optional, if using Version 5) Specifies user name and password

Available directives are described in the table below.

Table 13-5. SOCKS Gateway Directives

Directive	Meaning
gateway	Specifies the gateway alias and name, SOCKS port, version supported, usernames and password.
socks_fail	In case connections cannot be made, specifies whether to abort the connection attempt or to connect to the origin content server
sequence	Specifies the order in which hosts should be used for failover.

Syntax for the SOCKS directives are:

```
gateway gateway_alias gateway_host SOCKS_port [version={4 | 5}
[user=username password=password]
socks_fail {open | closed}
sequence gateway_name
```

Table 13-6. SOCKS Directives Syntax

Command	Suboptions	Description
gateway		Configures the SOCKS gateway host.
	gateway_alias	A meaningful name that is used for policy rules.
	gateway_name	The IP address or host name of the gateway where traffic is directed. The host name must DNS resolve.
	SOCKS-port	The port number of the SOCKS gateway.
	version={4   5}	The version that SOCKS gateways can support.
	user=username	(Optional, if you use v5) The username of the user on the SOCKS gateway. It already must exist on the gateway.
	password=password	(Optional, if you use v5) The password of the user on the SOCKS gateway. It must match the gateway's information.
socks_fail	{open   closed}	If health checks fail, <code>socks_gateway.fail_open</code> specifies that the connection be attempted without using a SOCKS gateway (for example, go to the original server or forwarding target); <code>socks_gateway.fail_closed</code> specifies that the connection be aborted. The default is <code>closed</code> . Fail open is a security risk, and fail closed is the default if no setting is specified. This setting can be overridden by policy, (using the <code>forward.fail_open</code> ( <code>yes no</code> ) property).
sequence	gateway_name	Specifies the order in which hosts should be used for failover.

**Example**

```
gateway Sec_App1 10.25.36.47 1022 version=5 user=username
password=password
socks_gateway.fail_open no
```

---

**Important:** The username and password display in plaintext if you use the `show config` command.

---

A default sequence defines the order in which forwarding hosts are used. Only one default sequence is allowed. All members must be pre-existing hosts and groups, and no member can be in the sequence more than once.

---

**Note:** The default sequence (if present) is applied only if no applicable forwarding gesture is in policy.

---

A default failover sequence works by allowing healthy hosts to take over for an unhealthy host (one that is failing its DNS Resolution or its health check). The sequence specifies the order of failover, with the second host taking over for the first host, the third taking over for the second, and so on).

If all hosts are unhealthy, the operation fails either open or closed, depending upon your settings.

This configuration is generally created and managed through policy. If no SOCKS-gateways policy applies, you can create a default sequence through the CLI. This single default sequence consists of a single default host (or group) plus one or more hosts to use if the preceding ones are unhealthy.

The syntax is

```
sequence gateway_name gateway_name
```

where *gateway\_name* is a space-separated list of one or more SOCKS gateway aliases.

#### Example

```
sequence gateway_alias
```

## Creating a SOCKS Gateway Installable List

You can create and install the SOCKS gateway installable list with the following methods:

- ❑ Use the Text Editor, which allows you to enter directives (or copy and paste the contents of an already-created file) directly onto the SG appliance.
- ❑ Create a local file on your local system; the SG appliance can browse to the file and install it.
- ❑ Use a remote URL, where you place an already-created file on an FTP or HTTP server to be downloaded to the SG appliance.

When the SOCKS gateway installable list is created, it overwrites any previous SOCKS gateway configurations on the SG appliance. The installable list remains in effect until it is overwritten by another installable list; it can be modified or overwritten using CLI commands.

---

**Note:** During the time that a forwarding installable list is being compiled and installed, forwarding is not available. Any transactions that come into the SG appliance during this time are not forwarded properly and are denied.

---

Installation of SOCKS gateways installable-list configuration should be done outside peak traffic times.

### To create a SOCKS gateway installable list:

1. Select **Configuration > Forwarding > SOCKS Gateways**.
2. If you use a SOCKS gateway server for the primary or alternate forwarding gateway, you must specify the ID for the Identification (Ident) protocol used by the SOCKS gateway in SOCKS server handshakes. The default is `BLUECOAT SYSTEMS`.
3. From the drop-down list, select the method used to install the SOCKS gateway configuration; click **Install**.
  - **Remote URL:**

Enter the fully-qualified URL, including the filename, where the configuration is located. To view the file before installing it, click **View**. Click **Install**. Examine the installation status that displays; click **OK**.
  - **Local File:**

Click **Browse** to bring up the Local File Browse window. Browse for the file on the local system. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.

- **Text Editor:**

The current configuration is displayed in installable list format. You can customize it or delete it and create your own. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, click **Close**.

4. Select **Apply** to commit the changes to the SG appliance.

*Related CLI Syntax to specify the SOCKS Gateway Machine ID*

```
SGOS#(config) socks-machine-id machine_ID
```

### *Tip for SOCKS Configuration*

By default, SOCKS treats all incoming requests destined to port 80 as HTTP, allowing the usual HTTP policy to be performed on them, including ICAP scanning. If the SOCKS connection is being made to a server on another port, write policy on the SG appliance to match on the server host and port and specify that it is HTTP using SOCKS.



## Chapter 14: TCP/IP Configuration

Use the TCP/IP configuration options to enhance the performance and security of the SG appliance. Except for IP Forwarding (refer to *Volume 3: Proxies and Proxy Services*), these commands are only available through the CLI.

- ❑ RFC-1323: Enabling RFC-1323 support enhances the high-bandwidth and long-delay operation of the SG appliances over very high-speed paths, ideal for satellite environments.
- ❑ TCP NewReno: Enabling TCP NewReno support improves the fast recovery of the appliances.
- ❑ ICMP Broadcast Echo: Disabling the response to these messages can limit security risks and prevent an attacker from creating a distributed denial of service (DDoS) to legitimate traffic.
- ❑ ICMP Timestamp Echo: Disabling the response to these messages can prevent an attacker from being able to reverse engineer some details of your network infrastructure.
- ❑ TCP Window Size: Configures the amount of unacknowledged TCP data that the SG appliance can receive before sending an acknowledgement.
- ❑ PMTU Discovery: Enabling PMTU Discovery prevents packets from being unable to reach their destination because they are too large.

To view the TCP/IP configuration, see [“Viewing the TCP/IP Configuration”](#) on page 194.

This section discusses

- ❑ ["RFC-1323" on page 191](#)
- ❑ ["TCP NewReno" on page 192](#)
- ❑ ["ICMP Broadcast Echo Support" on page 192](#)
- ❑ ["ICMP Timestamp Echo Support" on page 192](#)
- ❑ ["TCP Window Size" on page 193](#)
- ❑ ["PMTU Discovery" on page 193](#)
- ❑ ["TCP Time Wait" on page 193](#)
- ❑ [“TCP Loss Recovery Mode” on page 194](#)
- ❑ ["Viewing the TCP/IP Configuration" on page 194](#)

### RFC-1323

The RFC-1323 TCP/IP option enables the SG appliance to use a set of extensions to TCP designed to provide efficient operation over large bandwidth-delay-product paths and reliable operation over very high-speed paths, including satellite environments. RFC-1323 support can be configured through the CLI and is enabled by default.

**To enable or disable RFC-1323 support:**

At the (config) command prompt, enter the following command:

```
SGOS#(config) tcp-ip rfc-1323 {enable | disable}
```

## TCP NewReno

NewReno is a modification of the Reno algorithm. TCP NewReno improves TCP performance during fast retransmit and fast recovery when multiple packets are dropped from a single window of data. TCP NewReno support is enabled by default.

**To enable or disable TCP NewReno support:**

At the (config) command prompt, enter the following command:

```
SGOS#(config) tcp-ip tcp-newreno {enable | disable}
```

## ICMP Broadcast Echo Support

Disabling the ICMP broadcast echo command can prevent the SG appliance from participating in a Smurf Attack. A Smurf attack is a type of Denial-of-Service (DoS) attack, where the attacker sends an ICMP echo request packet to an IP broadcast address. This is the same type of packet sent in the ping command, but the destination IP is broadcast instead of unicast. If all the hosts on the network send echo reply packets to the ICMP echo request packets that were sent to the broadcast address, the network is jammed with ICMP echo reply packets, making the network unusable. By disabling ICMP broadcast echo response, the SG appliance does not participate in the Smurf Attack.

This setting is disabled by default.

**To enable or disable ICMP broadcast echo support:**

At the (config) command prompt, enter the following command:

```
SGOS#(config) tcp-ip icmp-bcast-echo {enable | disable}
```

For more information on preventing DDoS attacks, see [Chapter 3: "Attack Detection" on page 51](#).

## ICMP Timestamp Echo Support

By disabling the ICMP timestamp echo commands, you can prevent an attacker from being able to reverse engineer some details of your network infrastructure.

For example, disabling the ICMP timestamp echo commands prevents an attack that occurs when the SG appliance responds to an ICMP timestamp request by accurately determining the target's clock state, allowing an attacker to more effectively attack certain time-based pseudo-random number generators (PRNGs) and the authentication systems on which they rely.

This setting is disabled by default.

**To enable or disable ICMP Timestamp echo support:**

At the (config) command prompt, enter the following command:

```
SGOS#(config) tcp-ip icmp-timestamp-echo {enable | disable}
```

## TCP Window Size

Adjusting the TCP window-size regulates the amount of unacknowledged data that the SG appliance receives before sending an acknowledgement.

### To configure the TCP window size:

At the (config) command prompt, enter the following command:

```
SGOS#(config) tcp-ip window-size window_size
```

where *window\_size* indicates the number of bytes allowed before acknowledgement (the value must be between 8192 and 4194304).

## PMTU Discovery

PMTU (Path Maximum Transmission Unit) is a mechanism designed to discover the largest packet size sent that is not fragmented anywhere along the path between two communicating appliances that are not directly attached to the same link.

An SG appliance that is not running PMTU might send packets larger than that allowed by the path, resulting in packet fragmentation at intermediate routers. Packet fragmentation affects performance and can cause packet discards in routers that are temporarily overtaxed.

An SG appliance doing PMTU sets the `Do-Not-Fragment` bit in the IP header when transmitting packets. If fragmentation becomes necessary before the packets arrive at the second SG appliance, a router along the path discards the packets and returns an ICMP `Host Unreachable` error message, with the error condition of `Needs-Fragmentation`, to the original SG appliance. The first SG appliance then reduces the PMTU size and re-transmits the transmissions.

The discovery period temporarily ends when the SG appliance estimates the PMTU is low enough that its packets can be delivered without fragmentation or when the SG appliance stops setting the `Do-Not-Fragment` bit.

Following discovery and rediscovery, the size of the packets that are transferred between the two communicating nodes dynamically adjust to a size allowable by the path, which might contain multiple segments of various types of physical networks.

PMTU is disabled by default.

### To configure PMTU discovery:

At the (config) command prompt:

```
SGOS#(config) tcp-ip pmtu-discovery enable | disable
```

## TCP Time Wait

When a TCP connection is closed (such as when a user enters *quit* for an FTP session), the TCP connection remains in the `TIME_WAIT` state for twice the Maximum Segment Lifetime (MSL) before completely removing the connection control block.

The `TIME_WAIT` state allows an end point (one end of the connection) to remove remnant packets from the old connection, eliminating the situation where packets from a previous connection are accepted as valid packets in a new connection.

The MSL defines how long a packet can remain in transit in the network. The value of MSL is not standardized; the default value is assigned according to the specific implementation.

To change the MSL value, enter the following commands at the (config) command prompt:

```
SGOS#(config) tcp-ip tcp-2msl seconds
```

where *seconds* is the length of time you chose for the 2MSL value. Valid values are 1 to 16380 inclusive.

## TCP Loss Recovery Mode

A new TCP algorithm helps to recover throughput efficiently after packet losses occur and also addresses performance problems due to a single packet loss during a large transfer over long delay pipes. The feature is *enhanced* by default.

**To enable the algorithm:**

```
SGOS#(config) tcp-ip tcp-loss-recovery-mode {enhanced | aggressive}
```

**To disable the algorithm:**

```
SGOS#(config) tcp-ip tcp-loss-recovery-mode {normal}
```

## Viewing the TCP/IP Configuration

To view the TCP/IP configuration:

```
SGOS#(config) show tcp-ip
RFC-1323 support:          enabled
TCP Newreno support:      disabled
IP forwarding:            disabled
ICMP bcast echo response: disabled
ICMP timestamp echo response: disabled
Path MTU Discovery:       disabled
TCP 2MSL timeout:         120 seconds
TCP window size:          65535 bytes
TCP Loss Recovery Mode:   Aggressive
```

## Chapter 15: Virtual IP Addresses

Virtual IP (VIP) addresses are addresses assigned to a system (but not an interface) that are recognized by other systems on the network. Up to 255 VIPs can be configured on each SG appliance. They have several uses:

- ❑ Assign multiple identities to a system on the same or different network, partitioning the box in to separate logical entities for resource sharing or load sharing.
- ❑ Create an HTTPS Console to allow multiple, simultaneous, secure connections to the system.
- ❑ Direct authentication challenges to different realms.
- ❑ Set up failover among multiple SG appliances on the same subnet.

---

**Note:** For information on creating an HTTPS Console, refer to *Volume 3: Proxies and Proxy Services*; for information on using VIPs with authentication realms, refer to *Volume 5: Securing the Blue Coat SG Appliance*; to use VIPs with failover, see [Chapter 6: "Configuring Failover" on page 87](#).

---

### To create a VIP:

1. Select **Configuration > Network > Advanced > VIPs**.
2. Click **New**.
3. Enter the virtual IP address you want to use. It can be any IP address, except a multicast address. (A multicast address is a group address, not an individual IP address.)

---

**Note:** You cannot create a VIP address that is the IP address used by the origin content server. You must assign a different address on the SG appliance, and use DNS or forwarding to point to the origin content server's real IP address.

---

4. Click **OK**.
5. Select **Apply** to commit the changes to the SG appliance.

The VIP address can now be used.

### Related CLI Syntax to manage a VIP

```
SGOS#(config) virtual address ip_address
SGOS#(config) virtual no address ip_address
SGOS#(config) virtual clear
SGOS#(config) show virtual
```



## Chapter 16: WCCP Settings

The SGOS software can be configured to participate in a WCCP (Web Cache Control Protocol) scheme, in which a WCCP-capable router collaborates with a set of WCCP-configured SG appliances to service requests.

---

**Note:** Note: Bridge interfaces cannot be used in WCCP configurations. If the configuration includes bridge interfaces, you will receive the following error if you attempt to load the WCCP configuration file:

Interface 0:0 is member of a bridge.

---

Before you can install the WCCP configuration, you must create a WCCP configuration file for the SG appliance. The appliance does not ship with a default WCCP configuration file.

You can install the WCCP settings in several ways:

- ❑ Text Editor, which allows you to enter settings (or copy and paste the contents of an already-created file) directly onto the appliance.
- ❑ Local file, installed on your system; the SG appliance can browse to the file and install it.
- ❑ A remote URL, where you place an already-created file on an FTP or HTTP server to be downloaded to the SG appliance.
- ❑ Using the CLI inline `wccp-settings` command, which allows you to paste the WCCP settings into the CLI.
- ❑ Using the CLI `wccp` command, which requires that you place an already-created file on an FTP or HTTP server and enter the URL into the CLI.

For more information about WCCP, see [Appendix C: "Using WCCP"](#) on page 211.

### To install WCCP settings:

1. Select **Configuration > Network > Advanced > WCCP**.
2. From the drop-down list, select the method used to install the WCCP settings; click **Install**.
  - Remote URL:  
Enter the fully-qualified URL, including the filename, where the WCCP file is located. To view the file before installing it, click **View**. Click **Install**. View the installation status that displays; click **OK**.
  - Local File:  
Click **Browse** to display the Local File Browse window. Browse for the file on the local system. Open it and click **Install**. When the installation is complete, a results window opens. View the results, close the window, and click **Close**.

- Text Editor:

The current configuration is displayed in installable list format. You can customize it or delete it and create your own. Click **Install**. When the installation is complete, a results window opens. View the results, close the window, and click **Close**.

3. Select **Apply** to commit the changes to the SG appliance.

#### *Related CLI Syntax to Install WCCP Settings*

- To enter WCCP settings directly onto the SG appliance, enter the following commands at the (config) command prompt:

```
SGOS#(config) inline wccp-settings end-of-file_marker
wccp enable
wccp version 2
service-group 9
priority 1
protocol 6
service-flags destination-ip-hash
service-flags ports-defined
ports 80 21 1755 554 80 80 80 80
interface 6
home-router 10.16.18.2
forwarding 12
eof
```

- To enter a path to a remote URL where you have placed an already-created static route table, enter the following commands at the #(config) command prompt:

```
SGOS#(config) wccp path url
```

where *url* is a fully qualified URL, including the filename, where the configuration file is located.

```
SGOS#(config) load wccp-settings
SGOS#(config) wccp enable
```

## Appendix A: Glossary

Term	Description
ADN Optimize Attribute	Controls whether to optimize bandwidth usage when connecting upstream using an ADN tunnel.
Asynchronous Adaptive Refresh (AAR)	This allows the ProxySG to keep cached objects as fresh as possible, thus reducing response times. The AAR algorithm allows HTTP proxy to manage cached objects based on their rate of change and popularity: an object that changes frequently and/or is requested frequently is more eligible for asynchronous refresh compared to an object with a lower rate of change and/or popularity.
Asynchronous Refresh Activity	Refresh activity that does not wait for a request to occur, but that occurs <i>asynchronously</i> from the request.
Attributes (Service)	The service attributes define the parameters, such as explicit or transparent, cipher suite, and certificate verification, that the SG appliance uses for a particular service. .
Authenticate-401 Attribute	All transparent and explicit requests received on the port always use transparent authentication (cookie or IP, depending on the configuration). This is especially useful to force transparent proxy authentication in some proxy-chaining scenarios
authentication	The process of identifying a specific user.
authorization	The permissions given to a specific user.
Bandwidth Gain	A measure of the difference in client-side and server-side Internet traffic expressed in relation to server-side Internet traffic. It is managed in two ways: you can enable or disable bandwidth gain mode or you can select the Bandwidth Gain profile (this also enables bandwidth gain mode)..
Bandwidth Class	A defined unit of bandwidth allocation. An administrator uses bandwidth classes to allocate bandwidth to a particular type of traffic flowing through the SG appliance.
Bandwidth Class Hierarchy	Bandwidth classes can be grouped together in a class hierarchy, which is a tree structure that specifies the relationship among different classes. You create a hierarchy by creating at least one parent class and assigning other classes to be its children.
Bandwidth Policy	The set of rules that you define in the policy layer to identify and classify the traffic in the SG appliance, using the bandwidth classes that you create. You must use policy (through either VPM or CPL) in order to manage bandwidth.
Bypass Lists	The bypass list allows you to exempt IP addresses from being proxied by the SG appliance. The bypass list allows either <All> or a specific IP prefix entry for both the client and server columns. Both UDP and TCP traffic is automatically exempted.

Term	Description
Byte-Range Support	The ability of the ProxySG to respond to byte-range requests (requests with a Range : HTTP header).
Cache-hit	An object that is in the ProxySG and can be retrieved when an end user requests the information.
Cache-miss	An object that can be stored but has never been requested before; it was not in the ProxySG to start, so it must be brought in and stored there as a side effect of processing the end-user's request. If the object is cacheable, it is stored and served the next time it is requested.
Child Class (Bandwidth Gain)	The child of a parent class is dependent upon that parent class for available bandwidth (they share the bandwidth in proportion to their minimum/maximum bandwidth values and priority levels). A child class with siblings (classes with the same parent class) shares bandwidth with those siblings in the same manner.
Client consent certificates	A certificate that indicates acceptance or denial of consent to decrypt an end user's HTTPS request.
Compression	An algorithm that reduces a file's size but does not lose any data. The ability to compress or decompress objects in the cache is based on policies you create. Compression can have a huge performance benefit, and it can be customized based on the needs of your environment: Whether CPU is more expensive (the default assumption), server-side bandwidth is more expensive, or whether client-side bandwidth is more expensive.
Default Proxy Listener	See " <a href="#">Proxy Service (Default)</a> ".
Detect Protocol Attribute	Detects the protocol being used. Protocols that can be detected include: HTTP, P2P (eDonkey, BitTorrent, FastTrack, Gnutella), SSL, and Endpoint Mapper.
Directives	Directives are commands that can be used in installable lists to configure forwarding. See also <i>forwarding Configuration</i> .
Display Filter	The display filter is a drop-down list at the top of the Proxy Services pane that allows you to view the created proxy services by service name or action.
Early Intercept Attribute	Controls whether the proxy responds to client TCP connection requests before connecting to the upstream server. When early intercept is disabled, the proxy delays responding to the client until after it has attempted to contact the server.
Emulated Certificates	Certificates that are presented to the user by ProxySG when intercepting HTTPS requests. Blue Coat emulates the certificate from the server and signs it, copying the subjectName and expiration. The original certificate is used between the ProxySG and the server.
ELFF-compatible format	A log type defined by the W3C that is general enough to be used with any protocol.
Encrypted Log	A log is encrypted using an external certificate associated with a private key. Encrypted logs can only be decrypted by someone with access to the private key. The private key is not accessible to the SG appliance.

Term	Description
explicit proxy	<p>A configuration in which the browser is explicitly configured to communicate with the proxy server for access to content.</p> <p>This is the default for the SG appliance, and requires configuration for both browser and the interface card.</p>
Fail Open/Closed	<p>Failing open or closed applies to forwarding hosts and groups and SOCKS gateways. Fail Open/Closed applies when the health checks are showing sick for each forwarding or SOCKS gateway target in the applicable fail-over sequence. If no systems are healthy, the SG appliance fails open or closed, depending on the configuration. If closed, the connection attempt simply fails.</p> <p>If open, an attempt is made to connect without using any forwarding target (or SOCKS gateway). Fail open is usually a security risk; fail closed is the default if no setting is specified.</p>
Forwarding Configuration	<p>Forwarding can be configured through the CLI or through adding directives to a text file and installing it as an installable list. Each of these methods (the CLI or using directives) is equal. You cannot use the Management Console to configure forwarding.</p>
Forwarding Host	<p>Upstream Web servers or proxies.</p>
forward proxy	<p>A proxy server deployed close to the clients and used to access many servers. A forward proxy can be explicit or transparent.</p>
Freshness	<p>A percentage that reflects the objects in the ProxySG cache that are expected to be fresh; that is, the content of those objects is expected to be identical to that on the OCS (origin content server).</p>
Gateway	<p>A device that serves as entrance and exit into a communications network.</p>
Global Default Settings	<p>You can configure settings for all forwarding hosts and groups. These are called the global defaults. You can also configure private settings for each individual forwarding host or group. Individual settings override the global defaults.</p>
FTP	<p>See Native FTP; Web FTP.</p>
Host Affinity	<p>Host affinity is the attempt to direct multiple connections by a single user to the same group member. Host affinity is closely tied to load balancing behavior; both should be configured if load balancing is important.</p>
Host Affinity Timeout	<p>The host affinity timeout determines how long a user remains idle before the connection is closed. The timeout value checks the user's IP address, SSL ID, or cookie in the host affinity table.</p>
Inbound Traffic (Bandwidth Gain)	<p>Network packets flowing into the SG appliance. Inbound traffic mainly consists of the following:</p> <ul style="list-style-type: none"> <li>• Server inbound: Packets originating at the origin content server (OCS) and sent to the SG appliance to load a Web object.</li> <li>• Client inbound: Packets originating at the client and sent to the SG appliance for Web requests.</li> </ul>

Term	Description
Installable Lists	Installable lists, comprised of directives, can be placed onto the SG appliance in one of several methods: through creating the list through the SG text editor, by placing the list at an accessible URL, or by downloading the directives file from the local system.
Integrated Host Timeout	An integrated host is an Origin Content Server (OCS) that has been added to the health check list. The host, added through the <code>integrate_new_hosts</code> property, ages out of the integrated host table after being idle for the specified time. The default is 60 minutes.
IP Reflection	Determines how the client IP address is presented to the origin server for explicitly proxied requests. All proxy services contain a <code>reflect-ip</code> attribute, which enables or disables sending of client's IP address instead of the SG's IP address.
Issuer keyring	The keyring that is used by the SG appliance to sign emulated certificates. The keyring is configured on the appliance and managed through policy.
Listener	The service that is listening on a specific port. A listener can be identified by any destination IP/subnet and port range. Multiple listeners can be added to each service.
Load Balancing	The ability to share traffic requests among multiple upstream targets. Two methods can be used to balance the load among systems: <code>least-connections</code> or <code>round-robin</code> .
Log Facility	A separate log that contains a single logical file and supports a single log format. It also contains the file's configuration and upload schedule information as well as other configurable information such as how often to rotate (switch to a new log) the logs at the destination, any passwords needed, and the point at which the facility can be uploaded.
Log Format	The type of log that is used: NCSA/Common, SQUID, ELFF, SurfControl, or Websense.  The proprietary log types each have a corresponding pre-defined log format that has been set up to produce exactly that type of log (these logs cannot be edited). In addition, a number of other ELFF type log formats are also pre-defined (im, main, p2p, ssl, streaming). These can be edited, but they start out with a useful set of log fields for logging particular protocols understood by the SG appliance. It is also possible to create new log formats of type ELFF or Custom which can contain any desired combination of log fields.
Log Tail:	The access log tail shows the log entries as they get logged. With high traffic on the SG appliance, not all access log entries are necessarily displayed. However, you can view all access log information after uploading the log.
Maximum Object Size	The maximum object size stored in the ProxySG. All objects retrieved that are greater than the maximum size are delivered to the client but are not stored in the ProxySG.
NCSA common log format	A log type that contains only basic HTTP access information.

Term	Description
Negative Responses	An error response received from the OCS when a page or image is requested. If the ProxySG is configured to cache such negative responses, it returns that response in subsequent requests for that page or image for the specified number of minutes. If it is not configured, which is the default, the ProxySG attempts to retrieve the page or image every time it is requested.
Native FTP	Native FTP involves the client connecting (either explicitly or transparently) using the FTP protocol; the SG appliance then connects upstream through FTP (if necessary).
Outbound Traffic (Bandwidth Gain)	Network packets flowing out of the SG appliance. Outbound traffic mainly consists of the following: <ul style="list-style-type: none"> <li>• Client outbound: Packets sent to the client in response to a Web request.</li> <li>• Server outbound: Packets sent to an OCS or upstream proxy to request a service.</li> </ul>
Origin Content Server (OCS)	
Parent Class (Bandwidth Gain)	A class with at least one child. The parent class must share its bandwidth with its child classes in proportion to the minimum/maximum bandwidth values or priority levels.
PASV	Passive Mode Data Connections. Data connections initiated by an FTP client to an FTP server.
proxy	Caches content, filters traffic, monitors Internet and intranet resource usage, blocks specific Internet and intranet resources for individuals or groups, and enhances the quality of Internet or intranet user experiences.  A proxy can also serve as an intermediary between a Web client and a Web server and can require authentication to allow identity based policy and logging for the client.  The rules used to authenticate a client are based on the policies you create on the SG appliance, which can reference an existing security infrastructure—LDAP, RADIUS, IWA, and the like.
Proxy Service	The proxy service defines the ports, as well as other attributes. that are used by the proxies associated with the service.
Proxy Service (Default)	The default proxy service is a service that intercepts all traffic not otherwise intercepted by other listeners. It only has one listener whose action can be set to bypass or intercept. No new listeners can be added to the default proxy service, and the default listener and service cannot be deleted. Service attributes can be changed.
realms	A realm is a named collection of information about users and groups. The name is referenced in policy to control authentication and authorization of users for access to Blue Coat Systems SG services. Multiple authentication realms can be used on a single SG appliance. Realm services include IWA, LDAP, Local, and RADIUS.
Reflect Client IP Attribute	Enables the sending of the client's IP address instead of the SG's IP address to the upstream server. If you are using an Application Delivery Network (ADN), this setting is enforced on the concentrator proxy through the Configuration>App. Delivery Network>Tunneling tab.

Term	Description
Refresh Bandwidth	The amount of bandwidth used to keep stored objects fresh. By default, the ProxySG is set to manage refresh bandwidth automatically. You can configure refresh bandwidth yourself, although Blue Coat does not recommend this.
reverse proxy	A proxy that acts as a front-end to a small number of pre-defined servers, typically to improve performance. Many clients can use it to access the small number of predefined servers.
rotate logs	When you rotate a log, the old log is no longer appended to the existing log, and a new log is created. All the facility information (headers for passwords, access log type, and so forth), is re-sent at the beginning of the new upload. If you're using Reporter (or anything that doesn't understand the concept of "file," such as streaming) the upload connection is broken and then re-started, and, again, the headers are re-sent.
serial console	A device that allows you to connect to the SG appliance when it is otherwise unreachable, without using the network. It can be used to administer the SG appliance through the CLI. You must use the CLI to use a serial console. Anyone with access to the serial console can change the administrative access controls, so physical security of the serial console is critical.
Server Certificate Categories	The hostname in a server certificate can be categorized by BCWF or another content filtering vendor to fit into categories such as banking, finance, sports.
Sibling Class (Bandwidth Gain)	A bandwidth class with the same parent class as another class.
SOCKS Proxy	A generic way to proxy TCP and UDP protocols. The SG appliance supports both SOCKSv4/4a and SOCKSv5; however, because of increased username and password authentication capabilities and compression support, Blue Coat recommends that you use SOCKS v5..
SmartReporter log type	A proprietary ELFF log type that is compatible with the SmartFilter SmartReporter tool.
Split proxy	Employs co-operative processing at the branch and the core to implement functionality that is not possible in a standalone proxy. Examples of split proxies include : Mapi Proxy SSL Proxy
SQUID-compatible format	A log type that was designed for cache statistics.
SSL	A standard protocol for secure communication over the network. Blue Coat recommends using this protocol to protect sensitive information.
SSL Interception	Decrypting SSL connections.
SSL Proxy	A proxy that can be used for any SSL traffic (HTTPS or not), in either forward or reverse proxy mode.

Term	Description
static routes	A manually-configured route that specifies the transmission path a packet must follow, based on the packet's destination address. A static route specifies a transmission path to another network.
SurfControl log type	A proprietary log type that is compatible with the SurfControl reporter tool. The SurfControl log format includes fully-qualified usernames when an NTLM realm provides authentication. The simple name is used for all other realm types.
Traffic Flow (Bandwidth Gain)	<p>Also referred to as <i>flow</i>. A set of packets belonging to the same TCP/UDP connection that terminate at, originate at, or flow through the SG appliance. A single request from a client involves two separate connections. One of them is from the client to the SG appliance, and the other is from the SG appliance to the OCS. Within each of these connections, traffic flows in two directions—in one direction, packets flow out of the SG appliance (outbound traffic), and in the other direction, packets flow into the SG (inbound traffic). Connections can come from the client or the server. Thus, traffic can be classified into one of four types:</p> <ul style="list-style-type: none"> <li>• Server inbound</li> <li>• Server outbound</li> <li>• Client inbound</li> <li>• Client outbound</li> </ul> <p>These four traffic flows represent each of the four combinations described above. Each flow represents a single direction from a single connection.</p>
transparent proxy	A configuration in which traffic is redirected to the SG appliance without the knowledge of the client browser. No configuration is required on the browser, but network configuration, such as an L4 switch or a WCCP-compliant router, is required.
Variants	Objects that are stored in the cache in various forms: the original form, fetched from the OCS; the transformed (compressed or uncompressed) form (if compression is used). If a required compression variant is not available, then one might be created upon a cache-hit. (Note: policy-based content transformations are not stored in the ProxySG.)
Web FTP	Web FTP is used when a client connects in explicit mode using HTTP and accesses an ftp:// URL. The SG appliance translates the HTTP request into an FTP request for the OCS (if the content is not already cached), and then translates the FTP response with the file contents into an HTTP response for the client.
Websense log type	A proprietary log type that is compatible with the Websense reporter tool.

Term	Description
Wildcard Services	<p>When multiple non-wildcard services are created on a port, all of them must be of the same service type (a wildcard service is one that is listening for that port on all IP addresses). If you have multiple IP addresses and you specify IP addresses for a port service, you cannot specify a different protocol if you define the same port on another IP address. For example, if you define HTTP port 80 on one IP address, you can only use the HTTP protocol on port 80 for other IP addresses.</p> <p>Also note that wildcard services and non-wildcard services cannot both exist at the same time on a given port.</p> <p>For all service types except HTTPS, a specific listener cannot be posted on a port if the same port has a wildcard listener of any service type already present.</p>

## Appendix B: Using Policy to Manage Forwarding

After ICP, forwarding, and the SOCKS gateways are configured, use policy to create and manage forwarding rules. Forwarding, ICP, and SOCKS gateway rules should go in the <Forward> layer of the Forwarding Policy file or the VPM Policy file (if you use the VPM).

The separate <Forward> layer is provided because the URL can undergo URL rewrites before the request is fetched. This rewritten URL is accessed as a *server\_url* and decisions about upstream connections are based on the rewritten URL, requiring a separate layer. All policy commands allowed in the <Forward> layer are described below.

Table B-1. Policy Commands Allowed in the <Forward> Layer

Forwarding	Description
<b>Conditions</b>	
<code>client_address=</code>	Tests the IP address of the client. Can also be used in <Exception> and <Proxy> layers.
<code>client.host=</code>	Tests the hostname of the client (obtained through RDNS). Can also be used in <Admin>, <Proxy>, and <Exception> layers.
<code>client.host.has_name=</code>	Tests the status of the RDNS performed to determine <code>client.host</code> . Can also be used in <Admin>, <Proxy>, and <Exception> layers.
<code>client.protocol=</code>	Tests true if the client transport protocol matches the specification. Can also be used in <Exception> and <Proxy> layers.
<code>date[.utc]=</code>	Tests true if the current time is within the <code>startdate..enddate</code> range, inclusive. Can be used in all layers.
<code>day=</code>	Tests if the day of the month is in the specified range or an exact match. Can be used in all layers.
<code>has_client=</code>	<code>has_client=</code> is used to test whether or not the current transaction has a client. This can be used to guard triggers that depend on client identity.
<code>hour[.utc]=</code>	Tests if the time of day is in the specified range or an exact match. Can be used in all layers.
<code>im.client=</code>	Tests the type of IM client in use. Can also be used in <Proxy>, <Exception>, and <Cache> layers.
<code>im.message.reflected=</code>	Tests whether IM reflection occurred. Can also be used in <Proxy> and <Cache> layers.
<code>minute[.utc]=month[.utc]=</code>	Tests if the minute of the hour is in the specified range or an exact match. Can be used in all layers.

Table B-1. Policy Commands Allowed in the &lt;Forward&gt; Layer (Continued)

Forwarding	Description
<code>proxy.address=</code>	Tests the IP address of the network interface card (NIC) on which the request arrives. Can also be used in <Admin> and <Proxy> layers.
<code>proxy.card=</code>	Tests the ordinal number of the network interface card (NIC) used by a request. Can also be used in <Admin> and <Proxy> layers.
<code>proxy.port=</code>	Tests if the IP port used by a request is within the specified range or an exact match. Can also be used in <Admin> and <Proxy> layers.
<code>server_url[.case_sensitive .no_lookup]=</code>	Tests if a portion of the requested URL exactly matches the specified pattern.
<code>server_url.address=</code>	Tests if the host IP address of the requested URL matches the specified IP address, IP subnet, or subnet definition.
<code>server_url.domain[.case_sensitive .no_lookup]=</code>	Tests if the requested URL, including the domain-suffix portion, matches the specified pattern.
<code>server_url.extension[.case_sensitive]=</code>	Tests if the filename extension at the end of the path matches the specified string.
<code>server_url.host.has_name=</code>	Tests whether the server URL has a resolved DNS hostname.
<code>server_url.host[.exact .substring .prefix .suffix .regex][.no_lookup]=</code>	Tests if the host component of the requested URL matches the IP address or domain name.
<code>server_url.host.is_numeric=</code>	This is true if the URL host was specified as an IP address.
<code>server_url.host.no_name=</code>	This is true if no domain name can be found for the URL host.
<code>server_url.host.regex=</code>	Tests if the specified regular expression matches a substring of the domain name component of the requested URL.
<code>server_url.is_absolute=</code>	Tests whether the server URL is expressed in absolute form.
<code>server_url.path[.exact .substring .prefix .suffix .regex][.case_sensitive]=</code>	Tests if a prefix of the complete path component of the requested URL, as well as any query component, matches the specified string.
<code>server_url.path.regex=</code>	Tests if the regex matches a substring of the path component of the request URL.
<code>server_url.port=</code>	Tests if the port number of the requested URL is within the specified range or an exact match.
<code>server_url.query.regex=</code>	Tests if the regex matches a substring of the query string component of the request URL.
<code>server_url.regex=</code>	Tests if the requested URL matches the specified pattern.
<code>server_url.scheme=</code>	Tests if the scheme of the requested URL matches the specified string.
<code>socks=</code>	This condition is true whenever the session for the current transaction involves SOCKS to the client.

Table B-1. Policy Commands Allowed in the &lt;Forward&gt; Layer (Continued)

Forwarding	Description
<code>socks.version=</code>	Switches between SOCKS 4/4a and 5. Can also be used in <Exception> and <Proxy> layers.
<code>streaming.client=</code>	<code>yes</code>   <code>no</code> . Tests the user agent of a Windows, Real Media, or QuickTime player.
<code>time[.utc]=</code>	Tests if the time of day is in the specified range or an exact match. Can be used in all layers.
<code>tunneled=</code>	<code>yes</code>   <code>no</code> . Tests TCP tunneled requests, HTTP CONNECT requests, and unaccelerated SOCKS requests
<code>weekday[.utc]=</code>	Tests if the day of the week is in the specified range or an exact match. Can be used in all layers.
<code>year[.utc]=</code>	Tests if the year is in the specified range or an exact match. Can be used in all layers.
<b>Properties</b>	
<code>access_server()</code>	Determines whether the client can receive streaming content directly from the OCS. Set to <code>no</code> to serve only cached content.
<code>ftp.transport()</code>	Determines the upstream transport mechanism. This setting is not definitive. It depends on the capabilities of the selected forwarding host.
<code>forward()</code>	Determines forwarding behavior. There is a box-wide configuration setting ( <code>config&gt;forwarding&gt;failure-mode</code> ) for the forward failure mode. The optional specific settings can be used to override the default.
<code>forward.fail_open()</code>	Controls whether the SG appliance terminates or continues to process the request if the specified forwarding host or any designated backup or default cannot be contacted.
<code>http.refresh.recv.timeout()</code>	Sets the socket timeout for receiving bytes from the upstream host when performing refreshes. Can also be used in <Cache> layers.
<code>http.server.connect_attempts()</code>	Sets the number of attempts to connect performed per-address when connecting to the upstream host.
<code>http.server.recv.timeout()</code>	Sets the socket timeout for receiving bytes from the upstream host. Can also be used in <Proxy> layers.
<code>icp()</code>	Determines when to consult ICP. The default is <code>yes</code> if ICP hosts are configured and if no forwarding host or SOCKS gateway is identified as an upstream target.
<code>im.transport()</code>	Sets the type of upstream connection to make for IM traffic.
<code>integrate_new_hosts()</code>	Determines whether to add new host addresses to health checks and load balancing. The default is <code>no</code> . If it is set to <code>yes</code> , any new host addresses encountered during DNS resolution of forwarding hosts are added to health checks and load balancing.

Table B-1. Policy Commands Allowed in the &lt;Forward&gt; Layer (Continued)

Forwarding	Description
reflect_ip()	Determines how the client IP address is presented to the origin server for explicitly proxied requests. Can also be used in <Proxy> layers.
socks_gateway()	The socks_gateway() property determines the gateway and the behavior of the request if the gateway cannot be contacted. There is a box-wide configuration setting for the SOCKS failure mode. The optional specific settings can be used to override the default.
socks_gateway.fail_open()	Controls whether the SG appliance terminates or continues to process the request if the specified SOCKS gateway or any designated backup or default cannot be contacted.
streaming.transport()	Determines the upstream transport mechanism. This setting is not definitive. The ability to use streaming.transport() depends on the capabilities of the selected forwarding host.
trace.request()	Determines whether detailed trace output is generated for the current request. The default value is no, which produces no output
trace.rules()	Determines whether trace output is generated that shows each policy rule that <i>fired</i> . The default value of no suppresses output.
trace.destination()	Used to change the default path to the trace output file. By default, policy evaluation trace output is written to an object in the cache accessible using a console URL of the following form: <code>http://ProxySG_ip_address:8081/Policy/Trace/path</code>
<b>Actions</b>	
notify_email()	Sends an e-mail notification to the list of recipients specified in the Event Log mail configuration. Can be used in all layers.
notify_snmp()	The SNMP trap is sent when the transaction terminates. Can be used in all layers.
log_message	Writes the specified string to the event log.
<b>Definitions</b>	
define server_url.domain condition name	Binds a user-defined label to a set of domain suffix patterns for use in a condition= expression.

## Appendix C: Using WCCP

This appendix discusses how to configure an SG appliance to participate in a Web Cache Communication Protocol (WCCP) scheme, when a WCCP-capable router collaborates with a set of WCCP-configured appliances to service requests. If you are already familiar with WCCP version 2 and want to get your router and SG appliance up and running right away, see the “Quick Start” on page 213.

### Overview

WCCP is a Cisco®-developed protocol that allows you to establish redirection of the traffic that flows through routers.

The main benefits of using WCCP are:

- ❑ **Scalability.** With no reconfiguration overhead, redirected traffic can be automatically distributed to up to 32 appliances.
- ❑ **Redirection safeguards.** If no appliances are available, redirection stops and the router forwards traffic to the original destination address.

WCCP has two versions, version 1 and version 2, both of which are supported by Blue Coat. However, only one protocol version can be active on the SG appliance at a time. The active WCCP protocol set up in the SG configuration must match the version running on the WCCP router.

### Using WCCP and Transparent Redirection

A WCCP-capable router operates in conjunction with the appliances to transparently redirect traffic to a set of caches that participate in the specified WCCP protocol. IP packets are redirected based on fields within each packet. For instance, WCCP version 1 only redirects destination TCP port 80 (default HTTP traffic) IP packets. WCCP version 2 allows you to redirect traffic from other ports and protocols.

Load balancing is achieved through a redirection hash table to determine which SG appliance receives the redirected packet.

### WCCP Version 1

In WCCP version 1, the WCCP-configured home router transparently redirects TCP port 80 packets to a maximum of 32 appliances. (An SG appliance is seen as a cache in WCCP protocol.)

One of the caches participating in the WCCP service group is automatically elected to configure the home router’s redirection tables. This way, caches can be transparently added and removed from the WCCP service group without requiring operator intervention. WCCP version 1 supports only a single service group.

Each applicable client IP packet received by the home router is transparently redirected to a cache. An SG appliance from the group is selected to define the home router’s redirection hash table for all caches. All caches periodically communicate with the home router to verify WCCP protocol synchronization and SG availability within the service group. In return, the home router responds to each cache with information as to which appliances are available in the service group.

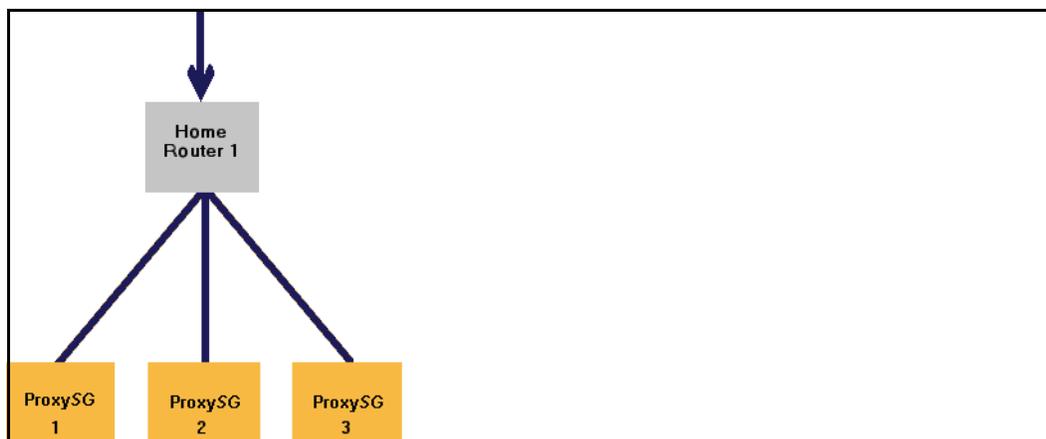


Figure C-1. A Typical WCCP Version 1 Configuration

The following are WCCP version 1 caveats:

- ❑ The home router IP must be configured on all participating interfaces and must match the home router address configured on the SG appliance.
- ❑ The adapter connected to the SG appliance must be Ethernet or Fast Ethernet.
- ❑ For Cisco routers using WCCP version 1, minimum IOS releases are 11.1(18)CA and 11.2(13)P. Note that releases prior to IOS 12.0(3)T only support WCCP version 1. Ensure that you are using the correct IOS software for the router and that the SG configuration protocol version number and router protocol version number match.

For more information on WCCP Version 1, refer to the Cisco Web site. The rest of this appendix discusses WCCP version 2 only.

## WCCP Version 2

For Cisco routers using WCCP version 2, minimum IOS releases are 12.0(3)T and 12.0(4). Release 12.0(5) and later releases support WCCP versions 1 and 2. Ensure that you use the correct IOS software for the router and that you have a match between the SG configuration WCCP version number and router protocol version number.

WCCP version 2 protocol offers the same capabilities as version 1, along with increased protocol security and multicast protocol broadcasts. Version 2 multicasting allows caches and routers to discover each other through a common multicast service group and matching passwords. In addition, up to 32 WCCP-capable routers can transparently redirect traffic to a set of up to 32 appliances. Version 2 WCCP-capable routers are capable of redirecting IP traffic to a set of appliances based on various fields within those packets.

Version 2 allows routers and caches to participate in multiple, simultaneous service groups. Routers can transparently redirect IP packets based on their formats. For example, one service group could redirect HTTP traffic and another could redirect FTP traffic.

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**Note:** Blue Coat recommends that WCCP-compliant caches from different vendors be kept separate and that only one vendor's routers be used in a service group.

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One of the caches participating in the WCCP service group is automatically elected to configure the home router's redirection tables. This way, caches can be transparently added and removed from the WCCP service group without requiring operator intervention. WCCP version 2 supports multiple service groups.

The figure below illustrates a WCCP version 2 implementation using multiple routers and Appliances. In this scenario, routers 1 through  $n$  and caches 1 through  $m$  participate in the same service group. As in version 1, an appliance from the group is selected to define the redirection hash table in all routers for all caches. All caches periodically communicate with all routers to verify WCCP protocol synchronization and appliance and router availability within the service group. In return, each router responds to caches with information as to what caches and discovered routers are available in the service group.

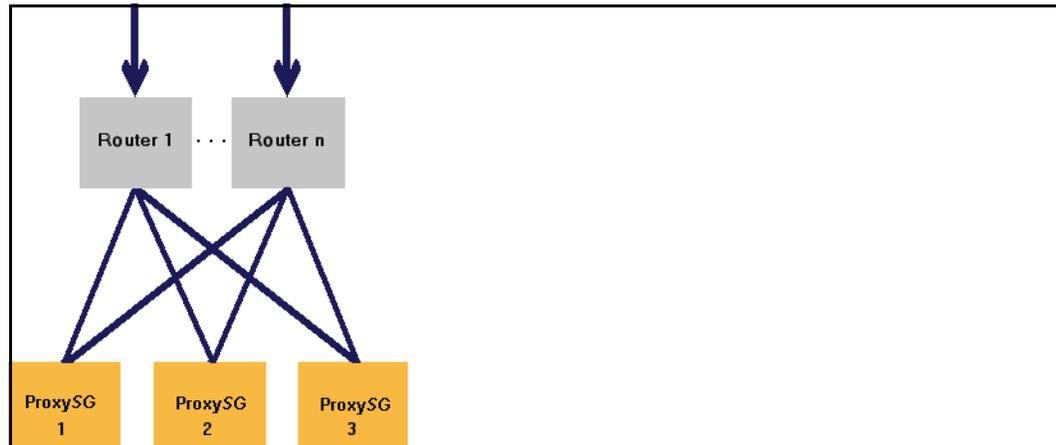


Figure C-2. A Version 2 Configuration Using Packet Redirection to Multiple Routers and Caches

## Quick Start

Two tasks must be completed to get WCCP running: configuring the router and configuring the SG appliance. If you have a standard router and SG configuration, use the Quick Start below. Otherwise, begin with the instructions in the procedure "To do initial router configuration:", below, and "To create an SG appliance WCCP configuration file and enable WCCP:" on page 214.

If you require a more complicated configuration, start with "Creating an SG Appliance WCCP Configuration File" on page 220.

### To do initial router configuration:

1. From the router (`config`) mode, tell WCCP which service group you want use. The Web-cache service group redirects port 80 (HTTP) traffic only.  

```
Router(config) #ip wccp web-cache
```
2. Enter the (`config-if`) submode by telling WCCP which IP address to use.  

```
Router(config)# int interface
```

where *interface* is the adapter interface with an IP address. The prompt changes to configuration interface submode.
3. Enable packet redirection on an outbound (Internet facing) interface.  

```
Router(config-if)# ip wccp web-cache redirect out
```
4. Prevent packets received on an adapter interface from being checked for redirection and allow the use of Blue Coat bypass lists.  

```
Router(config-if)# ip wccp redirect exclude in
```

For more information on WCCP router configuration, see "Configuring a WCCP Version 2 Service on the Router" on page 214.

**To create an SG appliance WCCP configuration file and enable WCCP:**

1. Create a WCCP configuration file through either the SG appliance's CLI inline commands or through a text editor. Make sure that the home router you enter here is the home router that was named in the router's configuration. If you do have a mismatch, you must correct it before continuing. See ["Identifying a Home Router/Router ID Mismatch"](#) on page 231.

For more information on creating a configuration file, see ["Creating an SG Appliance WCCP Configuration File"](#) on page 220.

If you used the `inline` commands, you have completed WCCP configuration for both the router and the SG appliance and you have enabled WCCP on the SG appliance. No further steps are needed.

2. If you used a text editor, copy the file to an HTTP server accessible to the SG appliance.
3. Enable WCCP and download the configuration file to the SG appliance.

```
SGOS#(config) wccp enable
SGOS#(config) wccp path http://205.66.255.10/files/wccp.txt
SGOS#(config) load wccp-settings
```

## Configuring a WCCP Version 2 Service on the Router

Configuring a router requires that you work with two different types of configuration commands:

- ❑ Creating a service group (which uses global settings).
- ❑ Configuring the Internet-Connected Interface (which uses interface settings).

Define service group settings before defining adapter interface settings.

### Setting up a Service Group

Services are of two types:

- ❑ Well known services (web-cache for port 80—HTTP— redirection)
- ❑ The `web-cache` service group is supported by both Cisco and Blue Coat.
- ❑ Dynamic services (which can be used for other services, such as FTP, RTSP redirection, and reverse proxy).
- ❑ Dynamic service uses identifiers ranging from 0-99 to name the service group.

WCCP global settings allow you to name the service group and then define the characteristics for that service group. Even if you use the pre-defined Web-cache service group, you should:

- ❑ configure a multicast group address
- ❑ create and identify a redirection access list and associate it with a service group
- ❑ create and identify a cache bypass list and associate it with a service group
- ❑ create password authentication for messages sent by the service group to the router

Syntax for configuring a service group (global settings):

```
ip wccp {web-cache | service-number} [group-address group_address]
[redirect-list access-list] [group-list access-list] [password
password]
```

where:

<code>web-cache</code>	Enables port 80 (HTTP) service.
<code>service-number</code>	The identification number of the cache service group being controlled by the router. Services are identified using a value from 0 to 99. The reverse-proxy service is indicated using the value 99, although any value can be used for reverse proxy.
<code>group-address</code> <code>groupaddress</code>	(Optional) If no redirect list is defined (the default), all traffic is redirected. The group address option directs the router to use a specified multicast IP address to coalesce the "I See You" responses to the "Here I Am" messages that it has received on this address. The <code>group-address</code> argument requires a multicast address used by the router to determine which cache engine receives redirected messages. The response is sent to the group address, as well. If no group address is defined (the default), all "Here I Am" messages are responded to with a unicast reply.
<code>redirect-list</code> <code>access-list</code>	(Optional) Directs the router to use an access list to control traffic redirected to the defined service group. The access-list parameter specifies either a number from 1 to 99 identifying a predefined standard or extended access list number, or a name (up to 64 characters long) identifying an existing standard or extended access list. The access list itself specifies which traffic can be redirected.
<code>group-list</code> <code>access-list</code>	(Optional) If no group list is defined (the default), all caches might participate in the service group. The <code>group-list</code> option directs the router to use an access list to determine which caches are allowed to participate in the service group. The access-list parameter specifies either a number from 1 to 99 identifying a predefined standard or extended access list number or a name (up to 64 characters long) identifying an existing standard or extended access list. The access list itself specifies which caches are permitted to participate in the service group.
<code>password</code> <code>password</code>	(Optional) By default, password authentication is not configured and authentication is disabled. The password option increases authentication security to messages received from the service group specified by the service-number. Messages that do not pass authentication are discarded. The password can be up to eight characters long. If you specify a password in the router configuration, you must also configure the same password separately on each cache.

## Naming a Service Group and Enabling WCCP

WCCP version 2 is enabled when you name a WCCP service group. (Version 1 requires a specific `enable` command.) The service group can already exist, such as `web-cache`, or it could be a new group, such as `36`.

### To name a service group and enable WCCP:

From the router (`config`) mode, enter the following command:

```
Router#(config) ip wccp web-cache
-or-
Router#(config) ip wccp 36
```

## Configuring a Global Multicast Group Address

Benefits of using a multicast address include reduced WCCP protocol traffic and the ability to easily add and remove caches and routers from a service group without having to reconfigure all service group members. Multicast addresses fall within the range of 224.0.0.0 to 239.255.255.255.

Use the following syntax to configure a global multicast group address for multicast cache discovery.

```
ip wccp {web-cache | service-number} [group-address group_address]
```

### To configure a multicast address:

From the router (config) mode, name the group that uses the multicast address, provide the address, then tell the router which adapter interface is used:

```
Router(config)# ip wccp 36 group-address 225.1.1.1
Router(config)# interface ethernet 0
Router(config-if)# end
```

## Creating a Redirection Access List and Associating it with a Service Group

Redirection access lists can contain commands redirecting packets from one network or cache to another. The lists also can be used to determine which caches participate in which service groups.

The two lists, although similar, have different purposes, and are applied to the router differently. The redirection lists are applied with the redirect-list option. The cache bypass lists are applied with the group-list argument. Both lists can be identified with either a name or a number.

Use the following syntax to create a redirection access list. This is partial syntax for this command. Access lists are very complicated; refer to the Cisco Web site for complete syntax.

```
access-list acl_ID [deny | permit] protocol {[source_addr source_mask]
| [local_addr local_mask]}
```

where:

<i>acl_ID</i>	Names the access list you are creating. You can use either a name or number.
<i>deny</i>	Indicates that you do not want to allow a packet to traverse the Cisco router. By default, the router firewall denies all inbound or outbound packets unless you specifically permit access.
<i>permit</i>	Selects a packet to traverse the PIX firewall. By default, the router firewall denies all inbound or outbound packets unless you specifically permit access.
<i>protocol</i>	Identifies, by name or number, an IP protocol. This parameter can be one of the keywords <i>icmp</i> , <i>ip</i> , <i>tcp</i> , or <i>udp</i> , or an integer in the range 1 to 254 representing an IP protocol number. To match any Internet protocol, including ICMP, TCP, and UDP, use the keyword <i>ip</i> .
<i>source_addr</i>	Indicates the address of the network or host from which the packet is being sent. Use the keyword <i>any</i> as an abbreviation for an address of 0.0.0.0.
<i>source_mask</i>	Specifies the netmask bits (mask) to be applied to <i>source_addr</i> , if the source address is for a network mask. Use the keyword <i>any</i> as an abbreviation for a mask of 0.0.0.0.
<i>local_addr</i>	Indicates the address of the network or host local to the PIX firewall. The <i>local_addr</i> is the address after NAT has been performed. Use the keyword <i>host</i> , followed by address, as an abbreviation for a mask of 255.255.255.255.
<i>local_mask</i>	Specifies the netmask bits (mask) to be applied to <i>local_addr</i> , if the local address is a network mask. Use the keyword <i>host</i> followed by address as an abbreviation for a mask of 255.255.255.255.

**To create a redirection access list or a cache bypass list:**

From the router (config) prompt, name an access list and assign rules to it.

```
Router(config)# access-list 100 deny ip any host 126.10.10.10
Router(config)# access-list 100 permit ip any any
Router#
```

- ❑ The commands above gave the access list a name of 100.
- ❑ Denied packets from any protocol to be sent from any host on the 126.10.10.10 network.
- ❑ Permitted packets from any protocol to be sent from any other network.

**To associate a redirection access list with a specific service group:**

1. Create a redirection access list.
2. Associate the access list with a specified service group.

```
ip wccp {web-cache | service-number} [redirect-list access-list]
Router(config)# interface ethernet 0/0
Router(config-if)# ip wccp web-cache redirect-list 100
Router(config-if)# end
Router#
```

**To associate a cache bypass access list with a specific service group:**

1. Create a redirection access list, using the syntax discussed above.
2. Associate the access list with a specified service group.

```
ip wccp {web-cache | service-number} [group-list access-list]
Router(config)# interface ethernet 0
Router(config-if)# ip wccp web-cache group-list 120
Router(config-if)# end
Router#
```

## Configuring the Internet-Connected Interface

WCCP interface settings allow you to configure the Internet-connected adapter interface that redirects Web traffic to the content engine.

Using the interface commands allows you to:

- ❑ Enable and prevent packet redirection
- ❑ Enable reception of multicast packets for service group member routers

Syntax for configuring an Internet-connected adapter interface (interface settings):

```
ip wccp [{web-cache | service-number} redirect out | group-listen] |  
redirect exclude in
```

where:

<code>web-cache</code>	Enables the Web cache service group.
<code>service-number</code>	The identification number of the cache service group being controlled by the router. Services are identified using a value from 0 to 99. The reverse-proxy service is indicated using the value 99.
<code>redirect out</code>	Enables packet redirection on an outbound (Internet facing) adapter interface.

group-listen	On a router that is a member of a service group, enables the reception of pre-defined IP multicast packets.
redirect exclude in	Prevents packets received on an adapter interface from being checked for redirection. If the cache <i>service-group</i> is located on a separate router interface, the possibility exists that bypass filters could be enabled on the cache.

## Using Packet Redirection

WCCP communication among the routers and the appliances can be done by either directly addressing protocol packets to each router's and cache's IP address (as illustrated in Figure C-1 on page 212) or by sending these packets to a common multicast address as illustrated in Figure C-3, below:

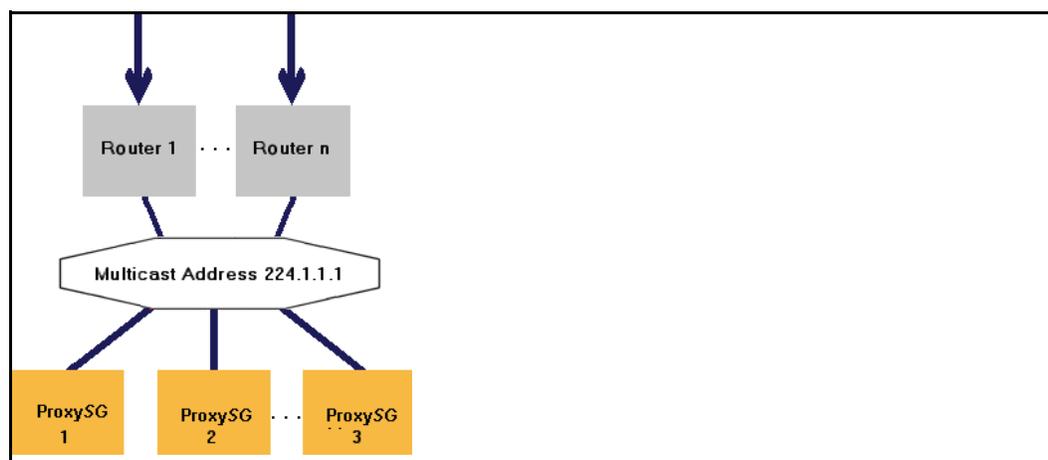


Figure C-3. A Version 2 Configuration Using Multicast Packet Redirection

You can configure redirection on inbound or outbound interfaces.

### To configure redirection on the outbound interfaces:

Use the following syntax to configure redirection on the outbound adapter interface.

```
ip wccp {web-cache | service-number} redirect out
```

From the router (config) prompt, enter the following:

```
Router(config)# interface ethernet 0
Router(config-if)# ip wccp web-cache redirect out
Router(config-if)# end
```

### To exclude packet redirection on an inbound adapter interface:

Use the following command to prevent packets received on an adapter interface from being checked for redirection.

```
ip wccp redirect exclude in
```

The following example shows how to exclude Blue Coat adapter interface (*xx*, in this case) and allow use of Blue Coat bypass lists:

From the router (config) prompt, enter the following:

```
Router(config)# int xx
Router(config-if)# ip wccp redirect exclude in
Router(config-if)# end
```

## Enabling Reception of Multicast Packets

Benefits of using a multicast address include reduced WCCP protocol traffic and the ability to easily add and remove caches and routers from a service group without having to reconfigure all service group members. You (optionally) set up a multicast group address in "Configuring a Global Multicast Group Address". In the following procedure, you enable the reception of the pre-defined IP multicast packets to routers that are members of the group.

Multicast addresses fall within the range 224.0.0.0 to 239.255.255.255.

Use the following syntax to configure for multicast discovery of the cache(s).

```
ip wccp {web-cache | service-number} group-listen
```

The following example configures the router to use the WCCP 36 service group to redirect port 80 destination traffic. WCCP protocol traffic uses multicast address 225.1.1.1. Adapter interface "Ethernet 0" is used to receive the multicast WCCP traffic.

```
Router(config)# ip wccp 36 group-address 225.1.1.1
Router(config)# interface ethernet 0
Router(config-if)# ip wccp web-cache group-listen
Router(config-if)# end
```

## Saving and Viewing Changes

Once you have made all the changes, you must permanently save them to disk. If not, the changes are lost at the next reboot of the router.

### To save router configuration:

```
Router# write memory
```

### To display all current WCCP configuration settings:

Use the following syntax to verify the settings in the new router configuration and to ensure that the appropriate cache engines are visible to the router.

```
show ip wccp {web-cache | service-number} [view | detail]
```

where

view	(Optional) Lists all members of the identified service group and whether they have been detected.
detail	(Optional) Displays IP and protocol version information about the router. Displays IP, protocol version, state, initial and assigned hash, hash allotment, redirected packet, and connection time information about the associated cache engine (SG appliance).

For example:

```
Router# show ip wccp web-cache view
```

```
Global WCCP Information:
Service Name: web-cache:
Number of Cache Engines:1
Number of Routers:1
Total Packets Redirected:186
Redirect Access-list:120
Total Packets Denied Redirect:57
Total Packets Unassigned:-none-
Group Access-list:0
Total Messaged Denied to Group:0
Total Authentication Failures:0
```

```
WCCP Router Informed of:
 86.135.77.10
186.135.77.20

WCCP Cache Engines Visible:
186.135.77.11
186.135.77.12

WCCP Cache Engines Not Visible:
-none-
```

## Creating an SG Appliance WCCP Configuration File

Once you have the router global and adapter interface settings complete, you must create a WCCP configuration file for the SG appliance. These configurations should include the following:

- ❑ Identify the service group.
- ❑ Identify the queuing priorities for all defined service groups.
- ❑ Identify the protocol.
- ❑ Load balancing caches in a service group.
- ❑ Identify ports.
- ❑ Identify the home router as defined in the router configuration.
- ❑ Identify the packet forwarding method.

## Understanding Packet Forwarding

By default, Cisco's GRE encapsulation (Generic Routing Encapsulation) is used to forward packets from the WCCP router to the caches. If you have a version 2 WCCP router, you can alternatively use Layer 2 (L2) rewrites to forward packets, which is faster than GRE and saves network bandwidth.

Using GRE, redirected packets are encapsulated in a new IP packet with a GRE header.

Using L2, redirected packets are not encapsulated; the MAC address of the target cache replaces the packet's destination MAC address. This different way of directing packets saves you the overhead of creating the GRE packet at the router and decoding it at the cache. Also, it saves network bandwidth that would otherwise be consumed by the GRE header.

If you want to continue using GRE, you need not change any settings. To use L2 packet redirection, you must add the forwarding option to the SG configuration file.

If WCCP version 2 is supported, the router sends out a list of forwarding mechanisms supported by the router in the first `WCCP2_I_SEE_YOU` message. The cache responds with a `WCCP2_HERE_I_AM` message. If the router does not send the list, the cache aborts its attempt to join the WCCP service group. If the method of forwarding mechanism is not supported by the router, the WCCP2 messages from the cache are ignored.

Caveats for using L2 redirection:

- ❑ You must use WCCP version 2.
- ❑ If a cache is not connected directly to a router, the router does allow the cache to negotiate the rewrite method.

- The same rewrite method must be used for both packet forwarding and packet return.

## Understanding Cache Load Balancing

If you use WCCP version 2, you can balance the load on the caches in a service group. When a router receives an IP packet for redirection, it hashes fields within the packet to yield an index within the hash table. The packet then is forwarded to the *owner* SG appliance for servicing. The proportion of redirection hash table assigned to each SG appliance can be altered to provide a form of load balancing between caches in a service group.

A hash table is configured by a dynamically elected SG appliance participating in a service group, enabling the simultaneous interception of multiple protocols on multiple ports. You can configure up to 100 dynamic or standard service groups plus standard service groups. A single service can intercept up to eight port numbers.

Each element in this 256-entry hash table refers to an active SG appliance within the service group. By default, each SG appliance is assigned roughly an even percentage of the 256-element redirection hash table. Multiple network cards within an SG appliance can participate in the same service group. To the routers and other caches, each adapter interface appears as a unique cache. Using this strategy, redirected traffic can be better distributed among network interfaces in a cache.

Using Figure C-4, below, all caches would be assigned  $1/m$  of the redirection hash table, but since Cache 2 and Cache 3 are physically located within the same appliance, that appliance is actually assigned  $2/m$  of the redirection hash table.

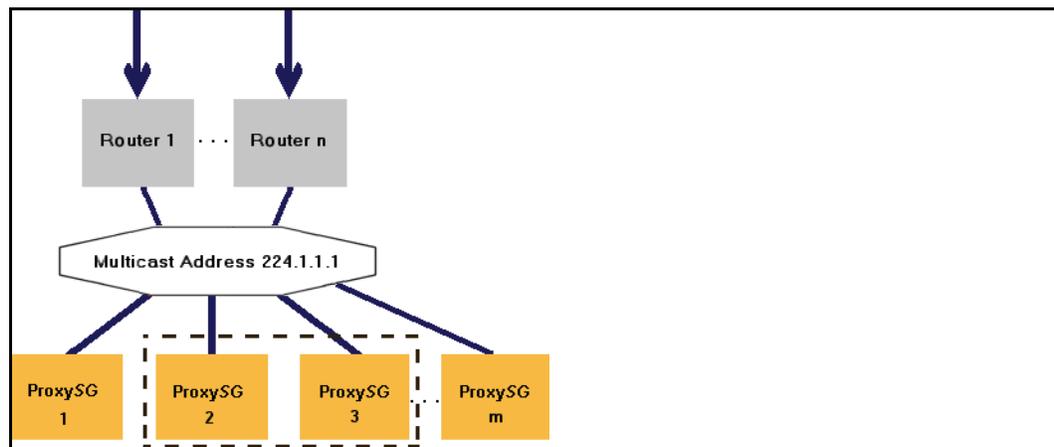


Figure C-4. A Version 2 Configuration Using Multicast Packet Redirection to Multiple Routers, Multiple Caches, and a Service Group

## Assigning Percentages

You can override the default of each SG appliance being assigned roughly an even percentage; the relative distribution of the redirection hash table can be specified for each cache. Multiple hash-distributions are supported. Also, all, none, or part of a source and/or destination IP address or port number can be used in the hash. Each SG appliance can be assigned a primary-hash-weight value to determine the proportion of the 256-element hash table to be assigned.

If all caches are configured with a 0 primary-hash-weight value (the default) then each SG appliance is assigned an equal proportion of the redirection hash table. However, if any SG appliance is configured with a non-zero primary-hash-weight, each SG appliance is assigned a relative proportion of the table.

For instance, consider a configuration with five caches that use a primary-hash-weight defined as {25, 200, 0, 50, 25}. The total requested weight value is  $25+200+0+50+25=300$  and, therefore, the proportion of the hash table assigned to each SG appliance is  $25/300$ ,  $200/300$ ,  $0/300$ ,  $50/300$ , and  $25/300$ .

Because one cache did not specify a non-zero primary-hash-weight, that cache is assigned any elements within the redirection hash table and, therefore, does not receive any redirected traffic. Also, the hash weight can be specified for each caching member within a SG appliance. In Figure C-4, Cache 2 and Cache 3 can be assigned different weight values.

### Alternate Hash Table

In some cases, a Web site becomes an Internet *hot spot*, receiving a disproportional number of client traffic relative to other sites. This situation can cause a larger request load on a specific SG appliance because the hash element associated with the popular site receives more activity than other hash elements.

To balance the redirection traffic load among the caches, a service group can be configured to use an alternate hash function when the number of GRE packets forwarded to the cache exceeds a certain number. (If you use L2 forwarding, the SG appliance counts MAC addresses.) Therefore, when a router receives an IP packet that hashes to an element flagged as a hot spot, the alternate hash function is computed. The SG appliance specified by the new index in the redirection hash table receives the redirected packet.

Each SG appliance can dynamically determine a hot spot within its assigned portion of the redirection hash table.

Alternate hash tables are only used for dynamic service groups that specify alternate-hash flags within their service-flags. The default Web-cache service group cannot use an alternate hash table. Instead, a comparable dynamic service group must be created.

To use hot spot detection, the SG appliance's WCCP configuration file must specify:

```
service-flags source-ip-hash
service-flags destination-port-alternate-hash
```

## Creating a Configuration File

An example of a file using a dynamic service, as opposed to the default Web-cache service, is shown below:

If using the default Web-cache service, the service group settings `priority`, `protocol`, `service flags`, and `ports` are not used.

```
wccp enable
wccp version 2
service-group 9
forwarding-type L2
priority 1
protocol 6
service-flags destination-ip-hash
service-flags ports-defined
ports 80 21 1755 554 80 80 80 80
interface 6
home-router 10.16.18.2
end
```

You can create a configuration file customized for the environment two ways: CLI inline commands or through a text file. In either case, the configuration file must include the information required by the commands below.

Syntax to create a customized configuration file:

```

service-group {web-cache | service-number}
[priority priority-number]
[protocol protocol-number]
[service-flags hash-bit-identifier]
[ports port1 ... port8]
home-router [ip-address | domain-name]
interface [interface-number]
[password string]
[primary-hash-weight interface-number value]
forwarding-type [GRE | L2]

```

Using Optional Negation Syntax, you can create an alternative WCCP configuration file using these negative commands; this is especially helpful when testing and debugging. This functionality enables you to change some of the configuration settings without altering or reloading the main configuration file.

```

[no] service-group {web-cache | service-number}
[priority priority-number]
[protocol protocol-number]
[no] service-flags hash-bit-identifier
[ports port1 ...port8]
home-router [ip-address | domain-name]
[multicast-ttl [ttl_value]]
[no] interface [interface-number]
[password string | no password]
[primary-hash-weight interface-number value]

```

where:

<code>web-cache</code>	Enables the Web cache service group. If using the Web-cache service group for WCCP, the dynamic service group settings ( <code>priority</code> , <code>protocol</code> , <code>service-flags</code> , and <code>ports</code> ) are not applicable.
<code><i>service-number</i></code>	The identification number of the dynamic service group being controlled by the router. Services are identified using a value from 0 to 99. The reverse-proxy service is indicated using the value 99.
<code><i>priority-number</i></code>	(Applies to a dynamic service group only. A dynamic service group is one identified by a <code>service-number</code> .) Establishes queuing priorities for all defined service groups, based on a priority number from 0 through 255, inclusive.
<code><i>protocol-number</i></code>	(Applies to a dynamic service group only. A dynamic service group is one identified by a <code>service-number</code> .) Number of an Internet protocol. <code>Protocol-number</code> must be an integer in the range 0 through 255, inclusive, representing an IP protocol number.
<code><i>hash-bit-identifier</i></code>	<p>(Applies to a dynamic service group only. A dynamic service group is one identified by a <code>service-number</code>.) Sets the hash index, for load balancing purposes. The key associated with the <code>hash-bit-identifier</code> you specify is hashed to produce the primary redirection hash table index. For instance, if only the <code>destination-ip-hash</code> flag is set, then the packet destination IP address is used to determine the index. The index is constructed by starting with an initial value of zero and then computing an exclusive OR (XOR) of the fields specified in the <code>hash-bit-identifier</code>.</p> <p>If alternative hashing has been enabled, any alternate hash flags are processed in the same way and produce a secondary redirection hash table index. Alternate hash flags end with the suffix “-alternate-hash.”</p> <p>For more information using the hashing table, see <a href="#">“Understanding Cache Load Balancing” on page 221</a>.</p>

<code>source-ip-hash</code> ( <i>hash-bit-identifier</i> )	Sets the source IP bit definition within the redirection hash table index.
<code>destination-ip-hash</code> ( <i>hash-bit-identifier</i> )	Sets the source IP bit definition within the redirection hash table index.
<code>source-port-hash</code> ( <i>hash-bit-identifier</i> )	Sets the source port bit definition within the redirection hash table index.
<code>destination-port-hash</code> ( <i>hash-bit-identifier</i> )	Sets the destination port bit definition within the redirection hash table index.
<code>ports-defined</code> ( <i>hash-bit-identifier</i> )	Sets the port bit definition within the redirection hash table index.
<code>ports-source</code> ( <i>hash-bit-identifier</i> )	Sets the source port bit definition within the redirection hash table index.
<code>source-ip-alternate-hash</code> ( <i>hash-bit-identifier</i> )	Sets the alternate source IP bit definition within the redirection hash table index.
<code>destination-ip-alternate-hash</code> ( <i>hash-bit-identifier</i> )	Sets the alternate destination IP bit definition within the redirection hash table index.
<code>source-port-alternate-hash</code> ( <i>hash-bit-identifier</i> )	The alternate source port bit definition within the redirection hash table index.
<code>destination-port-alternate-hash</code> ( <i>hash-bit-identifier</i> )	Sets the alternate destination port bit definition within the redirection hash table index.
<code>multicast-ttl</code>	Sets the multicast TTL value per WCCP service group. The value must be set between 1 and 255. If the multicast TTL value is not set, the default value is 1. If the home-router address is not multicast, this command is non-operational.
<code>port1...port8</code>	(Applies to a dynamic service group only. A dynamic service group is one identified by a <i>service number</i> .) A zero-terminated list of TCP port identifiers. Note that this must be a list of exactly eight ports. If the <code>service-flags ports-defined</code> flag is set, packets are matched against the set of ports supplied. If the <code>service-flags ports-source</code> flag is set, the ports are assumed to be source ports. Otherwise, the ports are assumed to be destination ports.
<code>ip-address</code>	Indicates the IP address of your network's home router. For version 2, <i>ip-address</i> can be a multicast address. (Multicast addresses are in the range 224.0.0.0 to 239.255.255.255, inclusive.) In version 2, multiple IP addresses can be specified for unicast addressing. For multicast addresses, only one IP address can be specified per service group. If you choose to specify the home router IP address, it is important that the actual home router IP address and the home router IP address specified in this SG configuration file match. If you do not already know the IP address of the home router, you can easily determine it from the router CLI by using the <code>show ip wccp</code> command.

<i>domain-name</i>	Specifies the domain name of your network's home router. Domain-name must be a valid domain name string that successfully resolves on DNS lookup.
<i>interface-number</i>	Specifies the adapter interface number for the service group. You cannot use a colon (0:0 or 0:1, for example).
<i>string</i>	(Applies to a dynamic service group only. A dynamic service group is one identified by a service number.) String can be at least one, and not more than eight, alphanumeric characters long. The password string specified here must match the password string declared for the router.
<i>interface-number</i>	(When used with the hash identifiers) Specifies the adapter interface to which the weight factor is applied to alter the distribution of the primary hash table.
<i>value</i>	Specifies the weight factor value (0 through 255) that is applied to the adapter interface specified to alter the distribution of the primary hash table.
forwarding-type [GRE L2]	Switches between GRE encapsulation (the default) and L2 MAC address rewrite for forwarding packets. If this command is not present, GRE encapsulation is used.

You can create a configuration file customized for the environment through the CLI inline commands or through a text file. The CLI inline commands enable WCCP on the SG appliance immediately; the drawback is that if any information changes, you must re-create the whole file using the inline command. With a text file, if any information changes, you can change the individual line; the drawback is that you must download the file again from an HTTP server to the SG appliance.

To use CLI commands to create a configuration file, continue with the next procedure. To use a text editor to create a configuration file, continue with [“Creating a Configuration File using a Text File” on page 226](#).

## Creating a Configuration File using CLI Inline Commands

For examples of various types of WCCP configurations, see [“Examples” on page 226](#).

If you choose to configure through the CLI and the `inline` command, refer to the example below:

```
SGOS# configure terminal
SGOS#(config) inline wccp eof
```

where `eof` marks the beginning and end of the inline commands.

For example:

```
SGOS#(config) inline wccp eof
wccp enable
wccp version 2
service-group 9
forwarding-type L2
priority 1
protocol 6
service-flags destination-ip-hash
service-flags ports-defined
ports 80 21 1755 554 80 80 80 80
interface 6
home-router 10.16.18.2
end
eof
```

You created a WCCP configuration file and enabled WCCP on the SG appliance. WCCP setup is complete.

## Creating a Configuration File using a Text File

If you create a configuration file using a text editor, assign the file the extension `.txt`. The following are SG configuration file rules:

- ❑ Only one command (and any associated parameters) is permitted, per line.
- ❑ Comments must begin with a semicolon (;) or a pound sign (#).
- ❑ Comments can begin in any column; however, all characters from the beginning of the comment to the end of the line are considered part of the comment and, therefore, are ignored.

For examples of various types of WCCP configurations, see “Examples” on page 226.

### To create a configuration file using a text editor and load the file on an SG appliance:

1. Open a text editor.
2. Using the commands described in “Syntax to create a customized configuration file:” on page 222, enter the arguments you need.
3. Copy the configuration file to an HTTP server so that it can be downloaded to the SG appliance.
4. Enable WCCP and download the WCCP configuration file using the following syntax:

```
wccp {enable | disable | no} [path config-file-url] | [version version-number]
```

where:

<code>enable</code>	Enables WCCP on the SG appliance.
<code>disable</code>	Disables WCCP on the SG appliance.
<code>no</code>	Indicates that you want to clear the current WCCP configuration settings.
<code>config-file-url</code>	Specifies the SG WCCP configuration file or alternate configuration file.
<code>version-number</code>	Indicates the version of WCCP that your router is configured to use. If <code>version version-number</code> is omitted, it is assumed to be 2.

For example:

```
SGOS#(config) wccp enable
SGOS#(config) wccp path http://205.66.255.10/files/wccp.txt
SGOS#(config) load wccp-settings
```

## Examples

This section provides detailed examples of both the router and SG configurations for:

- ❑ Standard HTTP redirection
- ❑ Standard HTTP redirection and a multicast address
- ❑ Standard HTTP redirection and a security password
- ❑ Standard transparent FTP

- A service group and alternate hashing

For information and examples about using WCCP, refer to [http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun\\_r/frprt3/frd3005.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_r/frprt3/frd3005.htm).

## Displaying the Router's Known Caches

Use the router `show` command to display information about the appliances that are known to the router.

```
Router# show ip wccp web-caches
WCCP Web-Cache information:
IP Address:192.168.51.102
Protocol Version:0.3
State:Usable
Initial Hash
Info:FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
Assigned Hash:
Info:FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
Hash Allotment:256 (100.00%)
Packets Redirected:0
Connect Time:00:00:31
Router# exit
```

## Standard HTTP Redirection

The web-cache service group enables HTTP traffic redirection on port 80.

### Router Configuration

The following example enables standard HTTP traffic redirection on a WCCP version 2-capable Cisco router.

```
Router(config)# ip wccp web-cache
Router(config)# interface ethernet 0/0
Router(config-if)# ip wccp web-cache redirect out
Router(config-if)# end
```

### SG Configuration

To enable the Web-cache service group within the SG appliance, the following configuration file could be loaded.

```
# Enable WCCP to allow WCCP protocol communication between
# the ProxySG Appliance and the home router.
wccp enable
# By default, the WCCP version 2 protocol is assumed. An
# explicit "wccp version 2" command could be specified here.
service-group web-cache
# Specify the address for the router.
home-router 90.0.0.90
# Network interface 0 will participate.
interface 0
end
```

## Standard HTTP Redirection and a Multicast Address

Configuring a multicast address on a WCCP-capable router provides reduced WCCP protocol traffic and the ability to easily add and remove caches and routers from a service group without having to reconfigure all service group members.

### Router Configuration

The following example enables the standard HTTP traffic redirection on a WCCP version 2-capable Cisco router. In this case, WCCP protocol traffic is directed to the multicast address 226.1.1.1.

```
Router(config)# ip wccp web-cache group-address 226.1.1.1
Router(config)# interface ethernet 0/0
Router(config-if)# ip wccp web-cache group-listen
Router(config-if)# ip wccp web-cache redirect out
Router(config-if)# end
```

### SG Configuration

To enable the standard Web-cache service group within the SG appliance, the following configuration file should be loaded. In this example, both network interfaces 0 and 1 participate within the service group. Both interfaces send and receive WCCP protocol packets by way of the multicast address.

```
# Enable WCCP to allow WCCP protocol communication between
# the ProxySG Appliance and the home router.
wccp enable
# By default, the WCCP version 2 protocol is assumed. An
# explicit "wccp version 2" command could be specified here.
service-group web-cache
# Specify the multicast address.
home-router 239.192.5.3
# Network interface 0 will participate.
interface 0
# Network interface 1 will also participate.
interface 1
end
```

## Standard HTTP Redirection Using a Security Password

A simple eight-character password is configured within the router. This password must match the password configured within the SG appliance.

### Router Configuration

The following example enables standard HTTP traffic redirection on a WCCP version 2-capable Cisco router.

```
Router(config)# ip wccp web-cache password 29gy8c2
Router(config)# interface ethernet 0
Router(config-if)# ip wccp web-cache redirect out
Router(config-if)# end
```

### SG Configuration

To enable the standard WCCP version 2 service group within the SG appliance, the following configuration file could be loaded.

```
# Enable WCCP to allow WCCP protocol communication between
# the ProxySG Appliance and the home router.
wccp enable
# By default, the WCCP version 2 protocol is assumed. An
# explicit "wccp version 2" command could be specified
# here.
service-group web-cache
# Specify the address for the router.
home-router 90.0.0.90
# Network interface 0 will participate.
interface 0
password 29gy8c2
end
```

## Standard Transparent FTP

In WCCP version 1, only HTTP traffic on port 80 could be redirected. In WCCP version 2, you can create a numbered service group that redirects other protocols on other ports.

You set the service group on the router, and tell the SG appliance which ports should be redirected.

### Router Configuration

In this configuration, you create a new service group that you are dedicating to FTP redirects.

```
# Enables the service group that redirects ports besides 80.
Router(config)# ip wccp 10
# Enables a service group that allows user-defined
# ports to be redirected.
Router(config)# int e0
Router(config-if)# ip wccp 10 redirect out
```

### SG Configuration

In this configuration, you take the service group created by the router and assign the characteristics to the group.

```
SGOS#(config) inline wccp eof
wccp enable
service-group 10
interface 0
home-router 10.1.1.1
protocol 6
priority 1
service-flags ports-defined
service-flags destination-port-hash
ports 20 21 80 80 80 80 80 80
eof
```

## Reverse Proxy Service Group

This service group redirects IP packets for TCP destination port 80 traffic by hashing the source IP address.

### Router Configuration

The following example enables the special SG service group on a WCCP-capable router.

```
Router(config)# ip wccp 99
Router(config)# interface ethernet 0/0
Router(config-if)# ip wccp 99 redirect out
Router(config-if)# end
```

## SG Configuration

To configure the special SG service group on the appliance, a dynamic service group must be created as illustrated by the following example.

```
# Enable WCCP to allow WCCP protocol communication between
# the ProxySG Appliance and the home router.
wccp enable
# By default, the WCCP version 2 protocol is assumed. An
# explicit "wccp version 2" command could be specified here.
# Service Group 99 is specially identified within the router
# as representing the ProxySG Appliance service.
service-group 99
# Specify the address for the router.
home-router 90.0.0.90
# Network interface 0 will participate.
interface 0
# Specify the TCP protocol.
protocol 6
# The hash should be based on the source IP address.
service-flags source-ip-hash
end
```

## Service Group with Alternate Hashing

You can create a special service group on a WCCP-capable router that uses alternate hashing when hot spots are detected. This service group redirects IP packets by hashing the source IP address.

## Router Configuration

In this configuration, you create a new service group that you are dedicating to Website hot spots.

```
Router(config)# ip wccp 5
Router(config)# interface ethernet 0/0
Router(config-if)# ip wccp 5 redirect out
Router(config-if)# end
```

## SG Configuration

To configure this special service group on the SG appliance, a dynamic service group must be created.

```
# Enable WCCP to allow WCCP protocol communication between
# the ProxySG Appliance and the home router.
wccp enable
# By default, the WCCP version 2 protocol is assumed. An
# explicit "wccp version 2" command could be specified here.
# Service Group 5 is created to redirect standard HTTP
# traffic and use an alternate hash function based on the
# source IP address, if necessary.
service-group 5
# Specify the address for router 1.
home-router 90.0.0.90
```

```
# Specify the address for router 2.  
home-router 90.0.1.5  
# Network interface 0 will participate.  
interface 0  
# Specify the TCP protocol.  
protocol 6  
# The following two flags specify that a hash function based  
# on the destination IP address should be applied first. If  
# a hot-spot is detected, then an alternate hash  
# function using the source IP address should be used.  
service-flags destination-ip-hash  
service-flags source-ip-alternate-hash  
end
```

## Troubleshooting: Home Router

If you install WCCP settings and then later upgrade the Cisco IOS software or change network configuration by adding a device with a higher IP address, the change might result in a different home router IP assignment. WCCP might or might not work under these conditions, and performance might decrease. If you upgrade the router software or change the network configuration, verify that the actual home router IP address and home router IP address in the WCCP configuration match.

### **To verify the home router IP address matches the home router IP address listed in the WCCP configuration:**

1. From the router CLI, view the WCCP configuration:

```
Router#(config) show ip wccp
```

The home router information appears, similar to the example below:

```
Global WCCP information:  
Router information:  
Home router Identifier:195.200.10.230  
Protocol Version:2.0
```

2. From the Blue Coat SG appliance, verify that the home router IP address specified in the SG WCCP configuration file is the same as the actual home router IP address discovered through the router CLI command. The following is an SG WCCP configuration file showing the same home router IP as in the example above:

```
SGOS# show wccp config  
;WCCP Settings  
;Version 1.3  
wccp enable  
wccp version 2  
service-group web-cache  
interface 1  
home-router 195.200.10.230  
end
```

In this case, the two home router identifiers match.

## *Identifying a Home Router/Router ID Mismatch*

The following is some helpful information for resolving a home-router/Router ID mismatch that results in the router crashing the SG appliance. This situation can occur when the router interface is set to a higher IP address than the home-router and WCCP messages show w/bad rcv\_id.

WCCP version 1 does not care what home router the cache had configured. So if you upgrade from WCCP version 1 to WCCP version 2, the router might pick a different IP address than was configured as a home router in the cache.

This means that a mismatch can occur after an upgrade.

## SG Configuration

Use the `show wccp statistics` command to identify the configured home router and the highest router IP.

```
SGOS#(config) show wccp statistics
Service Group ident.      :512,1,9, 1,6,18,
1755,554,20,21,80,80,80,80
Home Routers          :10.2.3.224 <<=====Configured Home Router IP
Hotspots announced      :0
Assignment state        :idle
Designated Cache     :10.2.3.228 <<=====Blue Coat IP
Announcement key #      :2
Cache view change #     :13 <<===== # times cache view changed
Router View Changed     :0
Recent hit count        :0
Primary hit count       :0
Alternate hit count     :0
Instance IP address :10.2.3.228 <<=====Blue Coat IP
Sequence info           :10.2.3.231,636
Query response info:
Active                  :1
Primary hash weight    :0
Hotspot information    :0,0,0,0
Total assign weight    :0
Router IP address   :10.2.3.231 <<=====Router ID/Highest IP on
Router
Receive #               :636
Change #                :4
Activation time         :Wed, Jan 30 2002 00:17:58 UTC
Last I-See-You time    :Wed, Jan 30 2002 01:08:58 UTC
Active caches           :10.2.3.228
Assignment key          :10.2.3.228,2
Router state            :active
Cache                   :10.2.3.228,L,D
Active                  :1
```

Notice that .231 is highest IP on router and is automatically selected as the home router, even though .224 is the configured home router IP.

You can also use the `show wccp configuration` command if you already know the highest IP and just want to know what the SG appliance identifies as the home-router.

```
SGOS#(config) show wccp configuration
;WCCP Settings
;Version 1.3
wccp enable
wccp version 2
service-group 9
interface 0
home-router 10.2.3.224
```

```
protocol 6
priority 1
service-flags ports-defined
service-flags destination-ip-hash
ports 1755 554 20 21 80 80 80 80
```

## Router Configuration

The configuration below reveals that two interfaces are active on the router, and that one of the IP addresses is higher than the home router configured in the SG configuration file. The higher IP address takes over duties as the home router, causing a mismatch between the router and the SG appliance.

```
Router# show conf
Using 689 out of 129016 bytes
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
hostname NachoL3
enable secret 5 $1$r6nJ$dr58AZ.ZDg6RKA6MYeGRb.
enable password nacho
ip subnet-zero
no ip routing
ip wccp 9
interface FastEthernet0/0
  ip address 10.2.3.224 255.255.255.0
  ip wccp 9 redirect out
  no ip route-cache
  no ip mroute-cache
  speed 100
  half-duplex
!
interface FastEthernet0/1
  ip address 10.2.3.231 255.255.255.0
  no ip route-cache
  no ip mroute-cache
  speed 100
  half-duplex
```

## Correcting a Home Router Mismatch

The home router must have the same IP address on both the router and the SG appliance. Every time a higher IP address is introduced to the router, the higher address becomes the home router.

On a WCCP router, the `Router Identifier` parameter is dynamically assigned. It cannot be manually configured.

### To set the correct home router IP address on the SG appliance:

You cannot edit a WCCP configuration file created by the SGOS inline commands. You must recreate the configuration file. For more information on creating a WCCP configuration file using CLI commands on an SG appliance, see [“Creating a Configuration File using CLI Inline Commands” on page 225](#).

If you created a text file and downloaded it, you can edit the file and then download it again to the SG appliance. For more information for editing the WCCP text file and downloading it, see [“Creating a Configuration File using a Text File” on page 226](#).

## Tips

If you use IP spoofing with WCCP, do the following for best results:

- ❑ The `ip wccp redirect exclude in` command should be applied to the adapter to which the SG appliance is attached.
- ❑ For L2 forwarding, the SG appliance should be directly connected to the router interface.

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