



# Configuring Application Acceleration and Optimization

With application acceleration and optimization features on ACE appliances, you can configure application delivery and application acceleration options that increase productivity and efficiency. The application acceleration features optimize network performance and improve access to critical business information. This capability accelerates the performance of Web applications, including customer relationship management, portals, and online collaboration by up to 10 times.



Note

Application acceleration performance on the ACE appliance is 50 to 100 Mbps throughput. With typical page sizes and browser usage patterns, this equates to roughly 1,000 concurrent connections. Subsequent connections bypass the application acceleration engine. This limitation applies only to traffic that is explicitly configured to receive application acceleration processing (for example, FlashForward, Delta Optimization). Traffic that is not configured to receive application acceleration processing is not subject to these limitations. Also, because the ACE HTTP compression is implemented separately in hardware, it is not subject to these limitations. For example, if you have a mix of application-accelerated and non-application-accelerated traffic, the former is limited; the latter is not. If you have 50 Mbps of application-accelerated traffic, the ACE can still deliver up to 1.9 Gbps throughput for the non-application-accelerated traffic.



Note

When naming ACE objects (such as a real server, virtual server, parameter map, class map, health probe, and so on), enter an alphanumeric string of 1 to 64 characters, which can include the following special characters: underscore (\_), hyphen (-), and dot (.). Spaces are not allowed.

If you are using ANM with an ACE module or ACE appliance and you configure a named object at the ACE CLI, keep in mind that ANM does not support all of the special characters that the ACE CLI allows you to use when configuring a named object. If you use special characters that ANM does not support, you may not be able to import or manage the ACE using ANM.

This chapter includes the following sections:

- [Optimization Overview, page 14-2](#)
- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)
- [Configuring an HTTP Optimization Action List, page 14-3](#)
- [Configuring Optimization Parameter Maps, page 14-6](#)
- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)

- [Enabling HTTP Optimization Using Virtual Servers, page 14-9](#)
- [Configuring Global Application Acceleration and Optimization, page 14-9](#)

## Optimization Overview

The application acceleration functions of the ACE appliance apply several optimization technologies to accelerate application performance. This functionality enables enterprises to optimize network performance and improve access to critical business information.

The ACE appliance provides the following application acceleration and optimization functionality:

- Delta optimization eliminates redundant traffic on the network by computing and transmitting only the changes that occur in a Web page between successive downloads of the same page or similar pages.
- FlashForward object acceleration technology eliminates network delays associated with embedded Web objects able to be cached, such as images, style sheets, and JavaScript files by placing the responsibility for validating object freshness on the ACE appliance, rather than on the client, making the client more efficient.
- Just-in-time object acceleration enables acceleration of non-cacheable embedded objects, resulting in improved application response time by eliminating the need for clients to download these objects on each request.
- Adaptive dynamic caching accelerates enterprise application performance and improves server system scalability by enabling the ACE appliance itself to fulfill requests for dynamic content, which offloads application servers and databases.

Refer to the “[Configuring Application Acceleration and Optimization](#)” section on [page 14-1](#) or the *Cisco 4700 Series Application Control Engine Appliance Application Acceleration and Optimization Configuration Guide* for more information about application acceleration and optimization.

### Related Topics

- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)
- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)
- [Configuring Global Application Acceleration and Optimization, page 14-9](#)

## Optimization Traffic Policies and Typical Configuration Flow

To define the different optimization and application acceleration functions that you want the ACE appliance to perform, you must configure at least one each of the following:

- HTTP optimization action list—This action list specifies the actions that the ACE is to perform for application acceleration and optimization. You can configure action lists when configuring a virtual server, or as a separate procedure. See the following topics:
  - [Configuring Application Acceleration and Optimization, page 7-53](#)
  - [Configuring an HTTP Optimization Action List, page 14-3](#)

- Layer 7 server load-balancing class map—This class map identifies the Layer 7 server load-balancing match criteria to apply to incoming traffic, such as URL, HTTP cookie, HTTP header, or source IP address. See [Configuring Virtual Context Policy Maps, page 13-32](#)
- Layer 7 HTTP optimization policy map—This policy map applies the HTTP optimization action list and optionally an optimization parameter map to Layer 7 HTTP traffic. See the “[Configuring Virtual Context Policy Maps](#)” section on page 13-32.
- Layer 3 and Layer 4 class map—By using match criteria, this class map identifies the network traffic that can pass through the ACE appliance. The match criteria includes the VIP address for the network traffic. The ACE appliance uses these Layer 3 and Layer 4 traffic classes to perform server load balancing. See the “[Configuring Virtual Context Policy Maps](#)” section on page 13-32.
- Layer 3 and Layer 4 policy map—This policy map associates server load-balancing actions and HTTP optimization action lists with the VIP. See the and “[Configuring Traffic Policies for HTTP Optimization](#)” section on page 14-6.
- Layer 7 server load-balancing policy map—This policy map specifies the server load-balancing actions that the ACE appliance is to perform. See the “[Configuring Virtual Context Policy Maps](#)” section on page 13-32.

You can also configure the following:

- Optimization parameter maps—Optimization parameter maps allow you to configure specific options for action list items. You can configure optimization parameter maps when configuring a virtual server or as a separate procedure.

When you configure a parameter map with an action list for a class map, the ACE appliance validates the action list and parameter map configurations before deploying them.

See the following topics:

- [Configuring Application Acceleration and Optimization, page 7-53](#)
- [Configuring Optimization Parameter Maps, page 9-12.](#)
- Global application acceleration and optimization options—The acceleration and optimization options allow you to apply specific acceleration and optimization features for logging and debugging on a global level on the ACE appliance. See the “[Configuring Global Application Acceleration and Optimization](#)” section on page 14-9.

#### Related Topics

- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)
- [Optimization Overview, page 14-2](#)

## Configuring an HTTP Optimization Action List

An HTTP optimization action list groups a series of individual application acceleration and optimization operations that you want the ACE to perform.

Use this procedure to configure an HTTP optimization action list.



#### Tip

You can also configure action lists when configuring a virtual server. For more information, see the “[Configuring Application Acceleration and Optimization](#)” section on page 7-53.

**Procedure**

- Step 1** Choose **Config > Devices > context > Expert > Optimization Action List**.  
The Action List table appears.
- Step 2** Click **Add** to add a new optimization action list, or choose an existing action list and click **Edit** to modify it.
- Step 3** Configure the optimization action list using the information in [Table 14-1](#).

**Table 14-1** Action List Configuration Options

| Field            | Description   |
|------------------|---|
| Action List Name | Unique name for the action list. Valid entries are unquoted text strings with a maximum of 64 alphanumeric characters.  |
| Enable Delta     | <p>Check box that enables delta optimization for the specified URLs. Delta optimization dynamically updates client browser caches directly with content differences, or deltas, resulting in faster page downloads.</p> <p>Uncheck the check box to disable delta optimization for the specified URLs.</p> <p><b>Note</b> The ACE restricts you from enabling delta optimization if you have previously specified either Cache Dynamic or Dynamic Dynamic Entity Tag.</p>   |
| Enable AppScope  | <p>Check box that enables AppScope performance monitoring for use with the ACE appliance. AppScope runs on the Management Console of the optional Cisco AVS 3180A Management Station and measures end-to-end application performance.</p> <p>Uncheck the check box to disable AppScope performance monitoring for use with the ACE appliance.</p>   |
| Flash Forward    | <p>Feature that reduces bandwidth usage and accelerates embedded object downloading by combining local object storage with dynamic renaming of embedded objects, thereby enforcing object freshness within the parent HTML page.</p> <p>Specify how the ACE appliance is to implement FlashForward:</p> <ul style="list-style-type: none"> <li>• <b>N/A</b>—Indicates that this feature is not enabled.</li> <li>• <b>FlashForward</b>—Indicates that FlashForward is to be enabled for the specified URLs and that embedded objects are to be transformed.</li> <li>• <b>FlashForward Object</b>—Indicates that FlashForward static caching is to be enabled for the objects that the corresponding URLs refer to, such as Cascading Style Sheets (CSS), JPEG, and GIF files.</li> </ul> |
| Cache Dynamic    | <p>Check box that enables Adaptive Dynamic Caching for the specified URLs even if the expiration settings in the response indicate that the content is dynamic. The expiration of cache objects is controlled by the cache expiration settings based on time or server load.</p> <p>Uncheck the check box to disable this feature.</p> <p><b>Note</b> The ACE restricts you from enabling Cache Dynamic if you have previously specified either Enable Delta or Dynamic Dynamic Entity Tag.</p>   |

Table 14-1 Action List Configuration Options

| Field                      | Description  |
|----------------------------|--|
| Cache Forward              | <p>Check box that enables the cache forward feature for the corresponding URLs. Cache forward allows the ACE to serve the object from its cache (static or dynamic) even when the object has expired if the maximum cache TTL time period has not yet expired (set by specifying the Cache Time-To-Live Duration (%): field in an Optimization parameter map). At the same time, the ACE sends an asynchronous request to the origin server to refresh its cache of the object.</p> <p>Uncheck this check box to disable this feature.</p>   |
| Dynamic Dynamic Entity Tag | <p>Check box that enables the acceleration of noncacheable embedded objects, which results in improved application response time. When enabled, this feature eliminates the need for users to download noncacheable objects on each request.</p> <p>Check the check box to indicate that the ACE appliance is to implement just-in-time object acceleration for noncacheable embedded objects.</p> <p>Uncheck this check box to disable this feature.</p> <p><b>Note</b> The ACE restricts you from enabling Dynamic Dynamic Entity Tag if you have previously specified either Enable Delta or Cache Dynamic.</p> |

**Step 4** Do one of the following:

- Click **Deploy Now** to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files. The ACE appliance validates the action list configuration.
- Click **Cancel** to exit this procedure without saving your entries.
- Click **Next** to save your entries and to configure another action list.

**Related Topics**

- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)
- [Configuring Optimization Parameter Maps, page 14-6](#)
- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)
- [Configuring Global Application Acceleration and Optimization, page 14-9](#)

# Configuring Optimization Parameter Maps

You can configure an Optimization parameter map for use with a Layer 3/Layer 4 policy map.



## Tip

You can also configure optimization parameter maps when configuring a virtual server. For more information, see the [“Configuring Application Acceleration and Optimization”](#) section on page 7-53.

## Procedure

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- Step 1** Choose **Config > Devices > context > Load Balancing > Parameter Maps > Optimization Parameter Maps**.
- The Optimization Parameter Maps table appears.
- Step 2** Click **Add** to add a new parameter map, or choose an existing parameter map and click **Edit** to modify it. The Optimization Parameter Maps configuration window appears.
- Step 3** In the Parameter Name field, enter a unique name for this parameter map. Valid entries are unquoted text strings with no spaces and a maximum of 64 alphanumeric characters.
- Step 4** Configure optimization using the information in [Table 9-6](#).
- Step 5** Do one of the following:
- Click **Deploy Now** to immediately deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files. The ACE validates the parameter map configuration and deploys it. This option appears for virtual contexts.
  - Click **Cancel** to exit this procedure without saving your entries and to return to the Parameter Map table.
  - Click **Next** to accept your entries and to add another parameter map.
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## Related Topics

- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)
- [Configuring an HTTP Optimization Action List, page 14-3](#)
- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)
- [Configuring Global Application Acceleration and Optimization, page 14-9](#)

# Configuring Traffic Policies for HTTP Optimization

[Table 14-2](#) provides a high-level overview of the steps required to configure HTTP optimization on an ACE appliance.



## Note

[Table 14-2](#) includes only the significant steps in each task. For detailed information on configuring these items, select the links provided, click **Help** in the ANM GUI, or refer to the [“Configuring Traffic Policies”](#) section on page 13-1.

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**Assumption**

A virtual IP address has been configured for the context in which you configure HTTP optimization.

**Table 14-2** Configuring Traffic Policies for HTTP Optimization

| Task   | Procedure  |
|--|--|
| <p><b>Step 1</b> Create a Layer 7 class map for server load balancing.</p>   | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Class Maps</b>.</li> <li>b. Click <b>Add</b> to add a new class map.</li> <li>c. In the Class Map Type field, choose <b>Layer 7 Server Load Balancing</b>.</li> <li>d. In the Match Type field, choose the method the ACE appliance is to use to evaluate multiple match statements when multiple match conditions exist in the class map.</li> <li>e. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> <li>f. Configure match conditions for this class map.</li> </ol> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Configuring Virtual Context Class Maps, page 13-6</a></li> <li>• <a href="#">Setting Match Conditions for Layer 7 Server Load Balancing Class Maps, page 13-14</a></li> </ul> |
| <p><b>Step 2</b> Create an HTTP optimization action list to specify the optimization actions that are to be performed.</p>   | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Action Lists</b>.</li> <li>b. Click <b>Add</b> to add a new action list.</li> <li>c. Configure the action list using the information in <a href="#">Table 14-1</a>.</li> <li>d. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> </ol> <p>For more information, see the “<a href="#">Configuring an HTTP Optimization Action List</a>” section on <a href="#">page 14-3</a>.</p>   |
| <p><b>Step 3</b> Create a Layer 7 HTTP optimization policy map and associate it with the server load-balancing class map in <a href="#">Step 1</a> and the action list configured in <a href="#">Step 2</a>.</p> | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Policy Maps</b>.</li> <li>b. Click <b>Add</b> to add a new policy map.</li> <li>c. In the Type field, choose <b>Layer 7 HTTP Optimization</b>.</li> <li>d. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> <li>e. In the Rules table, add the server load-balancing class map created in <a href="#">Step 1</a>.</li> <li>f. In the Action table, add the action list created in <a href="#">Step 2</a>.</li> </ol> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Configuring Virtual Context Policy Maps, page 13-32</a></li> <li>• <a href="#">Setting Policy Map Rules and Actions for Layer 7 HTTP Optimization, page 13-63</a></li> </ul>  |

Table 14-2 Configuring Traffic Policies for HTTP Optimization (continued)

| Task   | Procedure   |
|--|---|
| <p><b>Step 4</b> Create a Layer 3/Layer 4 class map for server load balancing.</p>   | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Class Maps</b>.</li> <li>b. Click <b>Add</b> to add a new class map.</li> <li>c. In the Class Map Type field, choose <b>Layer 3/4 Network Traffic</b>.</li> <li>d. In the Match Type field, choose the method the ACE appliance is to use to evaluate multiple match statements when multiple match conditions exist in the class map.</li> <li>e. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> <li>f. Configure Virtual Address match conditions for this class map.</li> </ol> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Configuring Virtual Context Class Maps, page 13-6</a></li> <li>• <a href="#">Setting Match Conditions for Layer 3/Layer 4 Network Traffic Class Maps, page 13-9</a></li> </ul>   |
| <p><b>Step 5</b> Create a Layer 7 policy map for server load balancing and associate it with the Layer 7 server load-balancing class map from <a href="#">Step 1</a>.</p>  | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Policy Maps</b>.</li> <li>b. Click <b>Add</b> to add a new policy map.</li> <li>c. In the Type field, choose <b>Layer 7 Server Load Balancing</b>.</li> <li>d. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> <li>e. Associate the Layer 7 server load-balancing class map configured in <a href="#">Step 1</a> with this policy map by adding it to the Rule table.</li> </ol> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Configuring Virtual Context Policy Maps, page 13-32</a></li> <li>• <a href="#">Setting Policy Map Rules and Actions for Layer 7 Server Load-Balancing Traffic, page 13-67</a></li> </ul>  |
| <p><b>Step 6</b> Create a Layer 3/Layer 4 network traffic policy map and associate it with the:</p> <ul style="list-style-type: none"> <li>• Layer 3/Layer 4 server load-balancing class map configured in <a href="#">Step 4</a></li> <li>• Layer 7 server load-balancing policy map configured in <a href="#">Step 5</a></li> <li>• HTTP optimization policy map configured in <a href="#">Step 3</a></li> </ul> | <ol style="list-style-type: none"> <li>a. Choose <b>Config &gt; Devices &gt; context &gt; Expert &gt; Policy Maps</b>.</li> <li>b. Click <b>Add</b> to add a new policy map.</li> <li>c. In the Type field, choose <b>Layer 3/4 Network Traffic</b>.</li> <li>d. Click <b>Deploy Now</b> to deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.</li> <li>e. In the Rule table, add the Layer 3/Layer 4 server load-balancing class map configured in <a href="#">Step 4</a>.</li> <li>f. In the Action table, add the: <ul style="list-style-type: none"> <li>– Layer 7 server load-balancing policy map created in <a href="#">Step 5</a></li> <li>– HTTP optimization policy map created in <a href="#">Step 3</a></li> </ul> </li> </ol> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Configuring Virtual Context Policy Maps, page 13-32</a></li> <li>• <a href="#">Setting Policy Map Rules and Actions for Layer 3/Layer 4 Network Traffic, page 13-46</a></li> </ul> |



**Related Topics**

- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)
- [Configuring an HTTP Optimization Action List, page 14-3](#)
- [Optimization Overview, page 14-2](#)

## Enabling HTTP Optimization Using Virtual Servers

You can configure HTTP optimization using virtual servers.

**Procedure**

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- Step 1** Create a virtual server by following the instructions in the “[Configuring Virtual Servers](#)” section on [page 7-2](#).
- Step 2** Configure HTTP optimization by following the instructions in the “[Configuring Application Acceleration and Optimization](#)” section on [page 7-53](#).
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**Related Topics**

- [Configuring Traffic Policies for HTTP Optimization, page 14-6](#)
- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)

## Configuring Global Application Acceleration and Optimization

**Note**

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This functionality is available for Admin contexts only and only on ACE appliances.

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ANM allows you to configure global application acceleration and optimization options for logging and debugging as performed by the ACE appliance.

**Procedure**

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- Step 1** Choose **Config > Virtual Contexts > *admin\_context* > System > Application Acceleration And Optimization**. The Application Acceleration And Optimization configuration window appears.
- Step 2** In the Debug Level field, enter the maximum level of system log messages to be sent to the syslog server, using the values in [Table 5-5](#). The severity level that you specify indicates that you want syslog messages at that level and the more severe levels. For example, if you enter 3 for Error, syslog displays Error, Critical, Alert, and Emergency messages.
- Step 3** Check the **AppScope Log** check box to indicate that the ACE appliance is to upload optimization statistical log information to the optional AVS 3180A Management station. Clear the check box to indicate that the ACE appliance is not to upload this information.

- Step 4** Click **Deploy Now** to immediately deploy this configuration on the ACE and save your entries to the running-configuration and startup-configuration files.
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**Related Topics**

- [Optimization Overview, page 14-2](#)
- [Optimization Traffic Policies and Typical Configuration Flow, page 14-2](#)