BIG-IP® Local Traffic Manager™: Implementations

Version 11.6

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Configuring a Simple Intranet

Overview: A simple intranet configuration

The simple intranet implementation is commonly found in a corporate intranet (see the following illustration). In this implementation, the BIG-IP® system performs load balancing for several different types of connection requests:

- HTTP connections to the company's intranet web site. The BIG-IP system load balances the two web servers that host the corporate intranet web site, `Corporate.main.net`.
- HTTP connections to Internet content. These are handled through a pair of cache servers that are also load balanced by the BIG-IP system.
- Non-HTTP connections to the Internet.

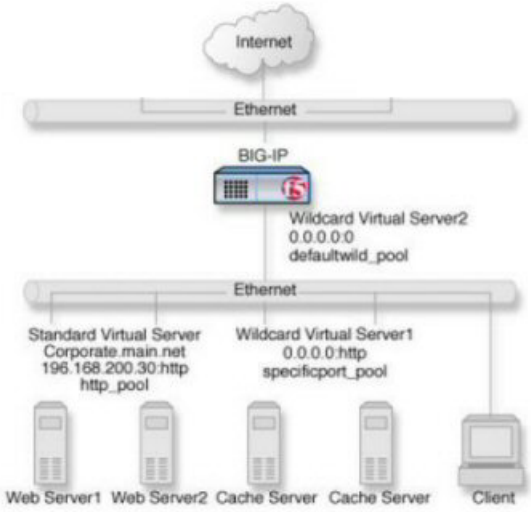

Figure 1: Non-intranet connections

As the illustration shows, the non-intranet connections are handled by wildcard virtual servers; that is, servers with the IP address `0.0.0.0`. The wildcard virtual server that is handling traffic to the cache servers is port specific, specifying port `80` for HTTP requests. As a result, all HTTP requests not matching an IP address on the intranet are directed to the cache server. The wildcard virtual server handling non-HTTP requests is a default wildcard server. A default wildcard virtual server is one that uses only port `0`. This makes it a catch-all match for outgoing traffic that does not match any standard virtual server or any port-specific wildcard virtual server.

Task summary

To create this configuration, you need to complete these tasks.

Task list

Creating a pool

You can a create pool of servers that you group together to receive and process traffic, to efficiently distribute the load on your server resources.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. In the Resources area of the screen, use the **New Members** setting to add the pool members. For example, in the illustration, the pool members for `http_pool` are `192.168.100.10:80` and `192.168.100.11:80`. The pool members for `specificport_pool` are `192.168.100.20:80` and `192.168.100.21:80`.
5. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server

This task creates a destination IP address for application traffic. As part of this task, you must assign the relevant pool to the virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. For a host, in the **Destination Address** field, type an IPv4 or IPv6 address in CIDR format to allow all traffic to be translated.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `0.0.0.0/0`, and an IPv6 address/prefix is `::/0`.
5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. In the Configuration area of the screen, locate the **Type** setting and select either **Standard** or **Forwarding (IP)**.
7. From the **HTTP Profile** list, select an HTTP profile.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

You now have a virtual server to use as a destination address for application traffic.

Configuring ISP Load Balancing

Overview: ISP load balancing

You might find that as your network grows, or network traffic increases, you require an additional connection to the Internet. You can use this configuration to add an Internet connection to your existing network. The following illustration shows a network configured with two Internet connections.

Illustration of ISP load balancing

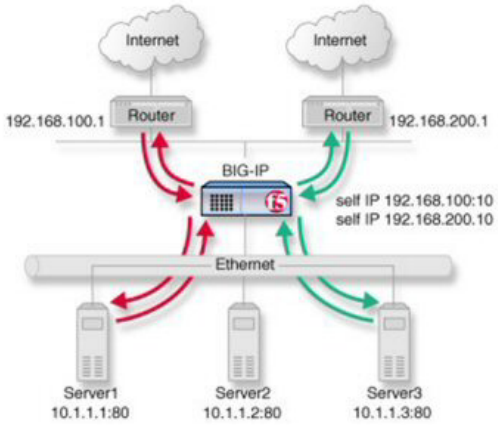

Figure 2: ISP load balancing

Task summary for ISP load balancing

There are number of tasks you must perform to implement load balancing for ISPs.

Task list

Creating a load balancing pool
Creating a virtual server for inbound content server traffic
Creating a virtual server for outbound traffic for routers
Creating self IP addresses an external VLAN
Enabling SNAT automap for internal and external VLANs

Creating a load balancing pool

You can a create load balancing pool, which is a logical set of devices, such as web servers, that you group together to receive and process traffic, to efficiently distribute the load on your resources. Using this procedure, create one pool that load balances the content servers, and one pool to load balance the routers.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Repeat** and create another pool.
9. Click **Finished**.

The load balancing pools appear in the Pools list.

Creating a virtual server for inbound content server traffic

You must create a virtual server to load balance inbound connections. The default pool that you assign as a resource in this procedure is the pool of internal servers.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.

4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. If the traffic to be load balanced is of a certain type, select the profile type that matches the connection type.
   To load balance HTTP traffic, locate the **HTTP Profile** setting and select **http**.
7. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
8. Click **Finished**.

The virtual server is configured to load balance inbound connections to the servers.

Creating a virtual server for outbound traffic for routers

You must create a virtual server to load balance outbound connections. The default pool that you assign as a resource in this procedure is the pool of routers.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
6. Click **Finished**.

The virtual server is configured to load balance outbound connections to the routers.

Creating self IP addresses an external VLAN

You must assign two self IP addresses to the external VLAN.

1. On the Main tab, click **Network** > **Self IPs**.
2. Click **Create**.
   The New Self IP screen opens.
3. In the **IP Address** field, type an IP address.

   This IP address should represent the network of the router.

The system accepts IPv4 and IPv6 addresses.

4. In the **Netmask** field, type the full network mask for the specified IP address.

   For example, you can type `ffff:ffff:ffff:ffff:0000:0000:0000:0000` or `ffff:ffff:ffff:ffff::`.

5. Select **External** from the **VLAN** list.
6. Click **Repeat**.
7. In the **IP Address** field, type an IPv4 or IPv6 address.

   This IP address should represent the address space of the VLAN that you specify with the **VLAN/Tunnel** setting.

8. Click **Finished**.
   The screen refreshes, and displays the new self IP address.

The self IP address is assigned to the external VLAN.

Enabling SNAT automap for internal and external VLANs

You can configure SNAT automapping on the BIG-IP system for internal and external VLANs.

1. On the Main tab, click **Local Traffic** > **Address Translation**.
   The **SNAT List** screen displays a list of existing SNATs.
2. Click **Create**.
3. Name the new SNAT.
4. From the **Translation** list, select **Automap**.
5. For the **VLAN / Tunnel List** setting, in the **Available** field, select **external** and **internal**, and using the Move button, transfer the VLANs to the **Selected** field.
6. Click the **Finished** button.

SNAT automapping on the BIG-IP system is configured for internal and external VLANs.

Routing Based on XML Content

Overview: XML content-based routing

You can use the BIG-IP® system to perform XML content-based routing whereby the system routes requests to an appropriate pool, pool member, or virtual server based on specific content in an XML document. For example, if your company transfers information in XML format, you could use this feature to examine the XML content with the intent to route the information to the appropriate department.

You configure content-based routing by creating an XML profile and associating it with a virtual server. In the XML profile, define the matching content to look for in the XML document. Next, specify how to route the traffic to a pool by writing simple iRules®. When the system discovers a match, it triggers an iRule event, and then you can configure the system to route traffic to a virtual server, a pool, or a node. You can allow multiple query matches, if needed.

This example shows a simple XML document that the system could use to perform content-based routing. It includes an element called `FinanceObject` used in this implementation.

```
<soapenv:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:eai="http://192.168.149.250/eai_enu/"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/">
   <soapenv:Header/>
   <soapenv:Body>
     <eai:SiebelEmployeeDelete
soapenv:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
             <FinanceObject xsi:type="xsd:string">Route to
Financing</FinanceObject>
             <SiebelMessage xsi:type="ns:ListOfEmployeeInterfaceTopElmt"
xmlns:ns="http://www.siebel.com/xml">
                   <ListOfEmployeeInterface
xsi:type="ns:ListOfEmployeeInterface">
                         <SecretKey>123456789</SecretKey>
                                 <Employee>John</Employee>
                                 <Title>CEO</Title>
                   </ListOfEmployeeInterface>
             </SiebelMessage>
     </eai:SiebelEmployeeDelete>
   </soapenv:Body>
</soapenv:Envelope>
```

Task summary

You can perform tasks to enable XML content-based routing whereby the system routes requests to an appropriate pool, pool member, or virtual server based on specific content in an XML document.

Task list

Creating a custom XML profile

Writing XPath queries
Creating a pool to manage HTTP traffic
Creating an iRule
Viewing statistics about XML content-based routing

Creating a custom XML profile

To implement content-based routing, you first need to create an XML profile. XML profiles specify the content to look for in XML documents. In the XML profile, you define XPath queries to locate items in an XML document.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **XML**.
   The XML screen opens.
2. Click **Create**.
   The New XML screen opens.
3. In the **Name** field, type a unique name for the XML profile, such as `cbr_xml_profile`.
4. In the Settings area, select the **Custom** check box at right.
   The settings become available.
5. If you want to reference XML elements with namespaces in XPath queries, from **Namespace Mappings**, select **Specify**.
   The screen displays the **Namespace Mappings List** settings.
6. Add namespaces to the list to specify how to map XML namespaces (as defined by the `xmlns` attribute) for the system to use when routing XML traffic to the correct pool, pool member, or virtual server:
   a) In the **Prefix** field, type the namespace prefix.
   b) In the **Namespace** field, type the URL that the prefix maps to.
   c) Click **Add** to add the namespace to the **Namespace Mappings List**.
7. To define the matching criteria in the XML document, from **XPath Queries**, select **Specify**.
   The screen displays the **XPath Queries** settings.
8. Add XPath queries to the list to define matching criteria in XML payloads so the system can route the traffic to the correct pool, pool member, or virtual server:
   a) In the **XPath** field, type an XPath expression.
   For example, to look for an element called `FinanceObject`, type `//FinanceObject`.
   b) Click **Add** to add the XPath expression to the XPath Queries list.
   You can define up to three XPath queries.
   The expression is added to the list.
9. To allow each query to have multiple matches, select **Multiple Query Matches**.
10. Click **Finished**.
    The system creates an XML profile.

You can use the XML profile to route XML traffic. Note that XML profiles do not support use of the Expect header field. This is because the header of a transaction could direct it to one pool, and the payload could invoke an iRule to direct the transaction to a different pool.

Writing XPath queries

You can write up to three XPath queries to define the content that you are looking for in XML documents. When writing XPath queries, you use a subset of the XPath syntax described in the XML Path Language (XPath) standard at `http://www.w3.org/TR/xpath`.

These are the rules for writing XPath queries for XML content-based routing.

1. Express the queries in abbreviated form.
2. Map all prefixes to namespaces.
3. Use only ASCII characters in queries.
4. Write queries to match elements and attributes.
5. Use wildcards as needed for elements and namespaces; for example, `//emp:employee/*`.
6. Do not use predicates in queries.

Syntax for XPath expressions

This table shows the syntax to use for XPath expressions.

Expression	Description
`Nodename`	Selects all child nodes of the named node.
`@Attname`	Selects all attribute nodes of the named node.
`/`	Indicates XPath step.
`//`	Selects nodes that match the selection no matter where they are in the document.

XPath query examples

This table shows examples of XPath queries.

Query	Description
`/a`	Selects the root element `a`.
`//b`	Selects all `b` elements wherever they appear in the document.
`/a/b:*`	Selects any element in a namespace bound to prefix `b`, which is a child of the root element `a`.
`//a/b:c`	Selects elements in the namespace of element `c`, which is bound to prefix `b`, and is a child of element `a`.

Creating a pool to manage HTTP traffic

For implementing content-based routing, you can create one or more pools that contain the servers where you want the system to send the traffic. You write an iRule to route the traffic to the pool.

If you want to specify a default pool to which to send traffic when it does not match the content you are looking for, repeat the procedure to create a second pool. You specify the default pool in the virtual server. Alternatively, you can create a node or a virtual server to route traffic to instead of creating a pool.

1. On the Main tab, click **Local Traffic** > **Pools**.

The Pool List screen opens.

2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a name for the pool, such as `finance_pool`.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating an iRule

You create iRules® to automate traffic forwarding for XML content-based routing. When a match occurs, an iRule event is triggered, and the iRule directs the individual request to a pool, a node, or virtual server. This implementation targets a pool.

1. On the Main tab, click **Local Traffic** > **iRules**.
2. Click **Create**.
3. In the **Name** field, type a name, such as `XML_CBR_iRule`.

   The full path name of the iRule cannot exceed 255 characters.
4. In the **Definition** field, type the syntax for the iRule using Tool Command Language (Tcl) syntax.

   For complete and detailed information iRules syntax, see the F5 Networks DevCentral web site `http://devcentral.f5.com`.
5. Click **Finished**.

Examples of iRules for XML content-based routing

This example shows an iRule that queries for an element called `FinanceObject` in XML content and if a match is found, an iRule event is triggered. The system populates the values of the Tcl variables

(*$XML_count*, *$XML_queries*, and *$XML_values*). Then the system routes traffic to a pool called `finance_pool`.

```
when XML_CONTENT_BASED_ROUTING
{
  for {set i 0} { $i < $XML_count } {incr i} {
    log local0. $XML_queries($i)
    log local0. $XML_values($i)
    if {($XML_queries($i) contains "FinanceObject")} {
       pool finance_pool
    }
  }
}
```

This is another example of XML content-based routing. It shows routing by bank name and by price.

```
      when XML_CONTENT_BASED_ROUTING
{
     for {set i 0} { $i < $XML_count } {incr i} {
       # routing by BANK_NAME
       if {($XML_queries($i) contains "BANK_NAME")} {
         if {($XML_values($i) contains "InternationalBank")} {
           pool pool1
         } elseif {($XML_values($i) contains "Hapoalim")} {
           pool pool2
         } else {
           pool pool3
         }
       }

       # routing by PRICE
       if {($XML_queries($i) contains "PRICE")} {
         if {($XML_values($i) > 50)} {
           pool pool1
         } else {
           pool pool2
         }
       }
     # end for
     }
}
```

Note: *The `XML_CONTENT_BASED_ROUTING` event does not trigger when the client's headers contain `"Expect: 100-continue"` regardless of whether the server sends a 100-continue response. In this case, the request is routed to the default pool.*

Tcl variables in iRules for XML routing

This table lists and describes the Tcl variables in the sample iRule.

Tcl variable	Description
$XML_count	Shows the number of matching queries.
$XML_queries	Contains an array of the matching query names.
$XML_values	Holds the values of the matching elements.

Viewing statistics about XML content-based routing

You can view statistics about XML content-based routing to make sure that the routing is working.

Note: *The system first checks for a match, then checks for malformedness of XML content. So if the system detects a match, it stops checking, and might not detect any subsequent parts of the document that are malformed.*

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.
   The Local Traffic statistics screen opens.
2. From the **Statistics Type** list, select **Profiles Summary**.
3. In the Global Profile Statistics area, for the Profile Type **XML**, click **View** in the Details.
   The system displays information about the number of XML documents that were inspected, the number of documents that had zero to three matches, and the number of XML documents that were found to be malformed.

Configuring nPath Routing

Overview: Layer 2 nPath routing

With the Layer 2 nPath routing configuration, you can route outgoing server traffic around the BIG-IP® system directly to an outbound router. This method of traffic management increases outbound throughput because packets do not need to be transmitted to the BIG-IP system for translation and then forwarded to the next hop.

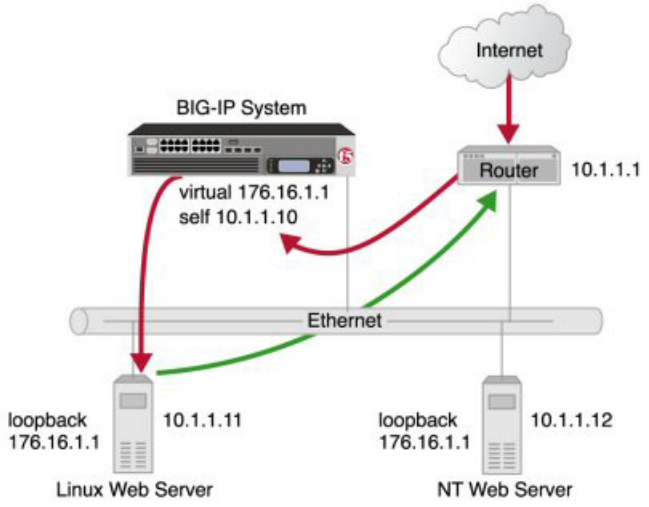

Figure 3: Layer 2 nPath routing

Note: *The type of virtual server that processes the incoming traffic must be a transparent, non-translating type of virtual server.*

In bypassing the BIG-IP system on the return path, Layer 2 nPath routing departs significantly from a typical load-balancing configuration. In a typical load-balancing configuration, the destination address of the incoming packet is translated from that of the virtual server to that of the server being load balanced to, which then becomes the source address of the returning packet. A default route set to the BIG-IP system then sees to it that packets returning to the originating client return through the BIG-IP system, which translates the source address back to that of the virtual server.

Note: *Do not attempt to use nPath routing for Layer 7 traffic. Certain traffic features do not work properly if Layer 7 traffic bypasses the BIG-IP system on the return path.*

About Layer 2 nPath routing configuration

The Layer 2 nPath routing configuration differs from the typical BIG-IP® load balancing configuration in the following ways:

- The default route on the content servers must be set to the router's internal address (**10.1.1.1** in the illustration) rather than to the BIG-IP system's floating self IP address (**10.1.1.10**). This causes the return packet to bypass the BIG-IP system.
- If you plan to use an nPath configuration for TCP traffic, you must create a Fast L4 profile with the following custom settings:
  - Enable the **Loose Close** setting. When you enable this setting, the TCP protocol flow expires more quickly, after a TCP FIN packet is seen. (A FIN packet indicates the tearing down of a previous connection.)
  - Set the **TCP Close Timeout** setting to the same value as the profile idle timeout if you expect half closes. If not, you can set this value to 5 seconds.
- Because address translation and port translation have been disabled, when the incoming packet arrives at the pool member it is load balanced to the virtual server address (**176.16.1.1** in the illustration), not to the address of the server. For the server to respond to that address, that address must be configured on the loopback interface of the server and configured for use with the server software.

Guidelines for UDP timeouts

When you configure nPath for UDP traffic, the BIG-IP® system tracks packets sent between the same source and destination address to the same destination port as a connection. This is necessary to ensure the client requests that are part of a session always go to the same server. Therefore, a UDP connection is really a form of persistence, because UDP is a connectionless protocol.

To calculate the timeout for UDP, estimate the maximum amount of time that a server transmits UDP packets before a packet is sent by the client. In some cases, the server might transmit hundreds of packets over several minutes before ending the session or waiting for a client response.

Guidelines for TCP timeouts

When you configure nPath for TCP traffic, the BIG-IP® system recognizes only the client side of the connection. For example, in the TCP three-way handshake, the BIG-IP system sees the SYN from the client to the server, and does not see the SYN acknowledgment from the server to the client, but does see the acknowledgment of the acknowledgment from the client to the server. The timeout for the connection should match the combined TCP retransmission timeout (RTO) of the client and the node as closely as possible to ensure that all connections are successful.

The maximum initial RTO observed on most UNIX and Windows® systems is approximately 25 seconds. Therefore, a timeout of 51 seconds should adequately cover the worst case. When a TCP session is established, an adaptive timeout is used. In most cases, this results in a faster timeout on the client and node. Only in the event that your clients are on slow, lossy networks would you ever require a higher TCP timeout for established connections.

Task summary

There are several tasks you perform to create a Layer 2 nPath routing configuration.

Task list

Creating a Fast L4 profile
Creating a server pool for nPath routing
Creating a virtual server for Layer 2 nPath routing
Configuring the virtual address on the server loopback interface
Setting the route for inbound traffic

Creating a Fast L4 profile

You can create a custom Fast L4 profile to manage Layer 4 traffic more efficiently.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Protocol** > **Fast L4**.
   The Fast L4 screen opens.
2. Click **Create**.
   The New Fast L4 profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select the **Custom** check box.
5. Select the **Loose Close** check box only for a one-arm virtual server configuration.
6. Set the **TCP Close Timeout** setting, according to the type of traffic that the virtual server will process.
7. Click **Finished**.

The custom Fast L4 profile appears in the list of Fast L4 profiles.

Creating a server pool for nPath routing

After you create a custom Fast L4 profile, you need to create a server pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.

c) In the **Service Port** field, type a port number, or select a service name from the list.
d) In the **Priority** field, type a priority number.
This step is optional.
e) Click **Add**.

6. Click **Finished**.

Creating a virtual server for Layer 2 nPath routing

After you create a server pool, you need to create a virtual server that references the profile and pool you created.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
The Virtual Server List screen opens.
2. Click the **Create** button.
The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address you type must be available and not in the loopback network.*

---

5. From the **Configuration** list, select **Advanced**.
6. From the **Type** list, select **Performance (Layer 4)**.
7. From the **Protocol** list, select one of the following:
   - **UDP**
   - **TCP**
   - *** All Protocols**
8. From the **Protocol Profile (Client)** list, select a predefined or user-defined Fast L4 profile.
9. For the **Address Translation** setting, clear the **Enabled** check box.
10. For the **Port Translation** setting, clear the **Enabled** check box.
11. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
12. Click **Finished**.

Configuring the virtual address on the server loopback interface

You must place the IP address of the virtual server (**176.16.1.1** in the illustration) on the loopback interface of each server. Most UNIX variants have a loopback interface named **lo0**. Consult your server operating system documentation for information about configuring an IP address on the loopback interface. The loopback interface is ideal for the nPath configuration because it does not participate in the ARP protocol.

Setting the route for inbound traffic

For inbound traffic, you must define a route through the BIG-IP® system self IP address to the virtual server. In the example, this route is **176.16.1.1**, with the external self IP address **10.1.1.10** as the gateway.

Note: *You need to set this route only if the virtual server is on a different subnet than the router.*

For information about how to define this route, please refer to the documentation provided with your router.

Configuring Layer 3 nPath Routing

Overview: Layer 3 nPath routing

Using Layer 3 nPath routing, you can load balance traffic over a routed topology in your data center. In this deployment, the server sends its responses directly back to the client, even when the servers, and any intermediate routers, are on different networks. This routing method uses IP encapsulation to create a uni-directional outbound tunnel from the server pool to the server.

You can also override the encapsulation for a specified pool member, and either remove that pool member from any encapsulation or specify a different encapsulation protocol. The available encapsulation protocols are IPIP and GRE.

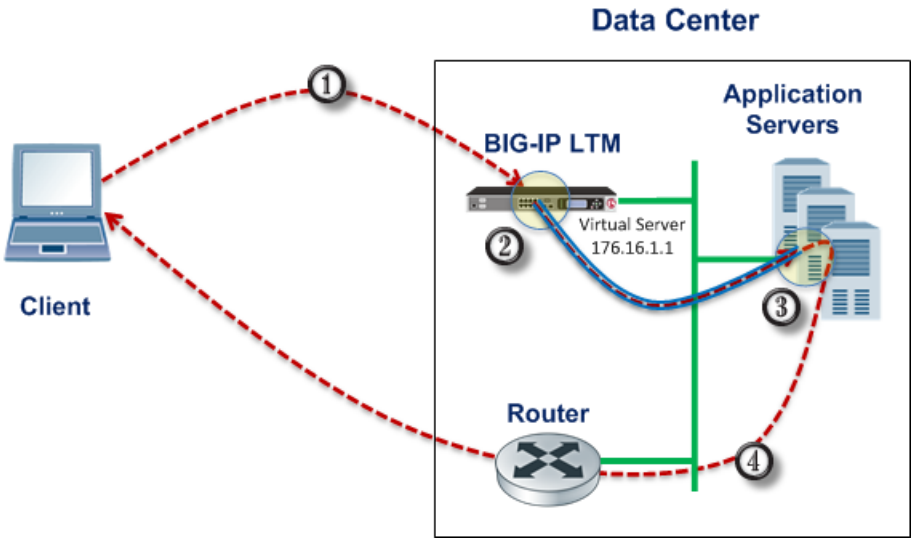

Figure 4: Example of a Layer 3 routing configuration

This illustration shows the path of a packet in a deployment that uses Layer 3 nPath routing through a tunnel.

1. The client sends traffic to a Fast L4 virtual server.
2. The pool encapsulates the packet and sends it through a tunnel to the server.
3. The server removes the encapsulation header and returns the packet to the network.
4. The target application receives the original packet, processes it, and responds directly to the client.

Configuring Layer 3 nPath routing using tmsh

Before performing this procedure, determine the IP address of the loopback interface for each server in the server pool.

Use Layer 3 nPath routing to provide direct server return for traffic in a routed topology in your data center.

1. On the BIG-IP® system, start a console session.
2. Create a server pool with an encapsulation profile.

```
tmsh create ltm pool npath_ipip_pool profiles add
{ ipip } members add { 10.7.1.7:any 10.7.1.8:any 10.7.1.9:any }
```

   This command creates the pool `npath_ipip_pool`, which has three members that specify all services: `10.7.1.7:any`, `10.7.1.8:any`, and `10.7.1.9:any`, and applies IPIP encapsulation to outbound traffic.
3. Create a profile that disables hardware acceleration.

```
tmsh create ltm profile fastl4 fastl4_npath pva-acceleration none
```

   This command disables the Packet Velocity® ASIC acceleration mode in the new Fast L4 profile named `fastl4_npath`.
4. Create a virtual server that has address translation disabled, and includes the pool with the encapsulation profile.

```
tmsh create ltm virtual npath_udp destination 176.16.1.1:any
pool npath_ipip_pool profiles add { fastl4_npath } translate-address
disabled ip-protocol udp
```

   This command creates a virtual server named `npath_udp` that intercepts all UDP traffic, does not use address translation, and does not use hardware acceleration. The destination address `176.16.1.1` matches the IP address of the loopback interface on each server.

These implementation steps configure only the BIG-IP device in a deployment example. To configure other devices in your network for L3 nPath routing, consult the device manufacturer's documentation for setting up direct server return (DSR) for each device.

Configuring a Layer 3 nPath monitor using tmsh

Before you begin this task, configure a server pool with an encapsulation profile, such as `npath_ipip_pool`.

You can create a custom monitor to provide server health checks of encapsulated tunnel traffic. Setting a variable in the `db` component causes the monitor traffic to be encapsulated.

1. Start at the Traffic Management Shell (tmsh).
2. Create a transparent health monitor with the destination IP address of the virtual server that includes the pool with the encapsulation profile.

```
tmsh create ltm monitor udp npath_udp_monitor transparent enabled destination
 176.16.1.1:*
```

   This command creates a transparent monitor for UDP traffic with the destination IP address 176.16.1.1, and the port supplied by the pool member.
3. Associate the health monitor with the pool that has the encapsulation profile.

```
tmsh modify pool npath_ipip_pool monitor npath_udp_monitor
```

This command specifies that the BIG-IP® system monitors UDP traffic to the pool `npath_ipip_pool`.

4. Enable the variable in the `db` component that causes the monitor traffic to be encapsulated.

```
tmsh modify sys db tm.monitorencap value enable
```

This command specifies that the monitor traffic is encapsulated.

Layer 3 nPath routing example

The following illustration shows one example of an L3 nPath routing configuration in a network.

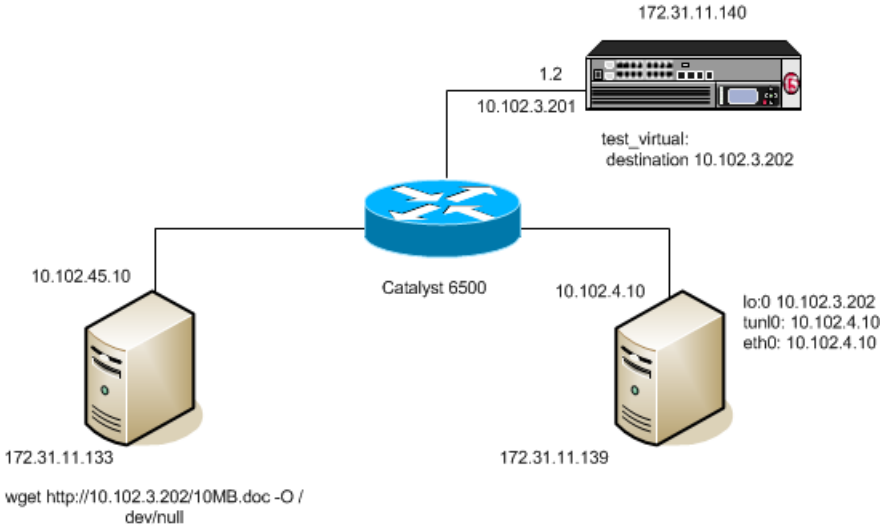

Figure 5: Example of a Layer 3 routing configuration

The following examples show the configuration code that supports the illustration.

Client configuration:

```
# ifconfig eth0 inet 10.102.45.10 netmask 255.255.255.0 up
# route add -net 10.0.0.0 netmask 255.0.0.0 gw 10.102.45.1
```

BIG-IP® device configuration:

```
#  - create node pointing to server's ethernet address
# ltm node 10.102.4.10 {
#     address 10.102.4.10
# }
# - create transparent monitor
# ltm monitor tcp t.ipip {
#     defaults-from tcp
#     destination 10.102.3.202:http
#     interval 5
#     time-until-up 0
#     timeout 16
#     transparent enabled
# }
# - create pool with ipip profile
```

```
# ltm pool ipip.pool {
#     members {
#         10.102.4.10:any {          - real server's ip address
#             address 10.102.4.10
#         }
#     }
#     monitor t.ipip                 - transparent monitor
#     profiles {
#         ipip
#     }
# }
# - create FastL4 profile with PVA disabled
# ltm profile fastl4 fastL4.ipip {
#     app-service none
#     pva-acceleration none
# }
# - create FastL4 virtual with custom FastL4 profile from previous step
# ltm virtual test_virtual {
#     destination 10.102.3.202:any   - server's loopback address
#     ip-protocol tcp
#     mask 255.255.255.255
#     pool ipip.pool                 - pool with ipip profile
#     profiles {
#         fastL4.ipip { }            - custom fastL4 profile
#     }
#     translate-address disabled     - translate address disabled
#     translate-port disabled
#     vlans-disabled
# }
```

Linux DSR server configuration:

```
# modprobe ipip
# ifconfig tunl0 10.102.4.10 netmask 255.255.255.0 up
# ifconfig lo:0 10.102.3.202 netmask 255.255.255.255 -arp up
# echo 1 > /proc/sys/net/ipv4/conf/all/arp_ignore
# echo 2 > /proc/sys/net/ipv4/conf/all/arp_announce
# echo 0 >/proc/sys/net/ipv4/conf/tunl0/rp_filter
```

Creating a Basic Web Site and E-commerce Configuration

Overview: Basic web site and eCommerce configuration

The most common use for the BIG-IP® system is distributing traffic across an array of web servers that host standard web traffic, including eCommerce traffic. The following illustration shows a configuration where a BIG-IP system load balances two sites: `www.siterequest.com` and `store.siterequest.com`. The `www.siterequest.com` site provides standard web content, and the `store.siterequest.com` site is the e-commerce site that sells items to `www.siterequest.com` customers.

Illustration of basic web site and eCommerce configuration

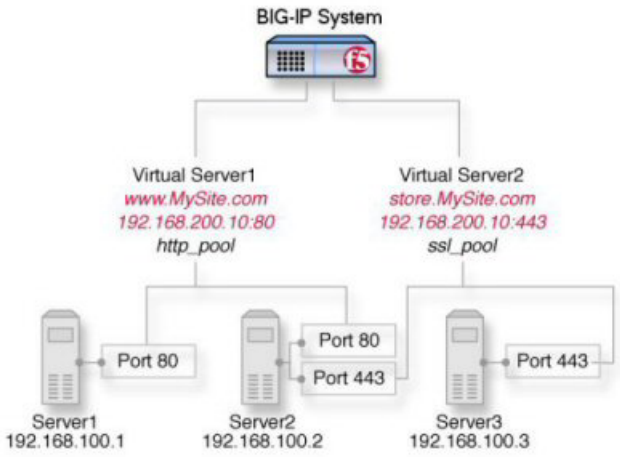

Figure 6: Basic web site and eCommerce configuration

Task summary

You can implement a basic configuration for load balancing application traffic to a web site, as well as load balancing secure traffic to an eCommerce site.

Before you use this implementation:

- Verify that you have created two VLANs on the BIG-IP® system. One VLAN should reside on the external network and another on the internal network.
- Verify that you have created a self IP address for each VLAN.

Task list

Creating a pool to process HTTP traffic
Creating a pool to manage HTTPS traffic

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a pool to manage HTTPS traffic

You can create a pool (a logical set of devices, such as web servers, that you group together to receive and process HTTPS traffic) to efficiently distribute the load on your server resources.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, assign **https** or **https_443** by moving it from the **Available** list to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:

- Select **Disabled** to disable priority groups. This is the default option.
- Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.

7. Use the **New Members** setting to add each resource that you want to include in the pool:
   a) In the **Address** field, type an IP address.
   b) In the **Service Port** field type `443` , or select **HTTPS** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The HTTPS load balancing pool now appears in the Pool List screen.

Creating a virtual server to manage HTTP traffic

You can create a virtual server to manage HTTP traffic as either a host virtual server or a network virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **HTTP Profile** list, select **http**.
7. From the **HTTP Compression Profile** list, select one of the following profiles:
   - **httpcompression**
   - **wan-optimized-compression**
   - A customized profile
8. (Optional) From the **Web Acceleration Profile** list, select one of the following profiles:
   - **optimized-acceleration**
   - **optimized-caching**
   - **webacceleration**
   - A customized profile
9. From the **Web Acceleration Profile** list, select one of the following profiles with an enabled application:
   - **optimized-acceleration**
   - **optimized-caching**
   - **webacceleration**
   - A customized profile

10. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
11. Click **Finished**.

The HTTP virtual server appears in the list of existing virtual servers on the Virtual Server List screen.

Creating a virtual server to manage HTTPS traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTPS traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. Type `443` in the **Service Port** field, or select **HTTPS** in the list.
6. Select **http** in the **HTTP Profile** list.
7. From the **HTTP Compression Profile** list, select one of the following profiles:
   - **httpcompression**
   - **wan-optimized-compression**
   - A customized profile
8. From the **Web Acceleration Profile** list, select one of the following profiles:
   - **optimized-acceleration**
   - **optimized-caching**
   - **webacceleration**
   - A customized profile
9. For the **SSL Profile (Client)** setting, from the **Available** list, select **clientssl**, and using the Move button, move the name to the **Selected** list.
10. Click **Finished**.

The HTTPS virtual server appears in the Virtual Server List screen.

Installing a BIG-IP System Without Changing the IP Network

Overview: Installing a BIG-IP system without changing the IP network

A combination of several features of the BIG-IP® system makes it possible for you to place a BIG-IP system in a network without changing the existing IP network. The following illustration shows the data center topology before you add the BIG-IP system. The data center has one LAN, with one IP network, `10.0.0.0`. The data center has one router to the Internet, two web servers, and a back-end mail server.

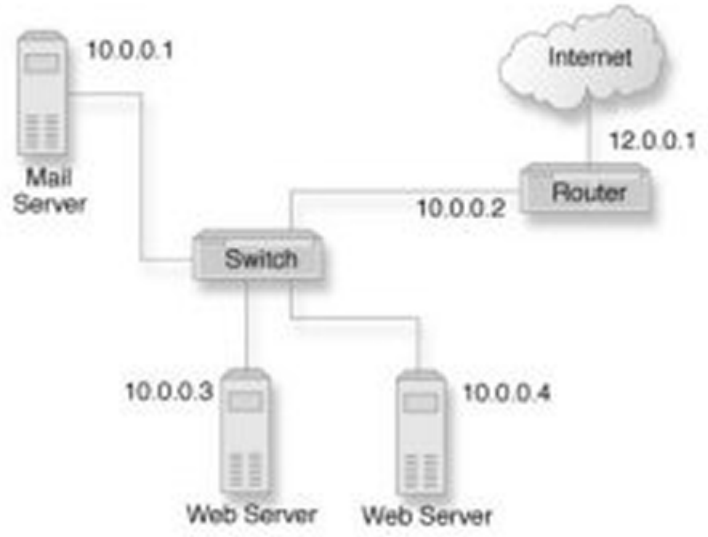

Figure 7: Data center example before adding a BIG-IP system

The existing data center structure does not support load balancing or high availability. The following illustration shows an example of the data center topology after you add the BIG-IP system.

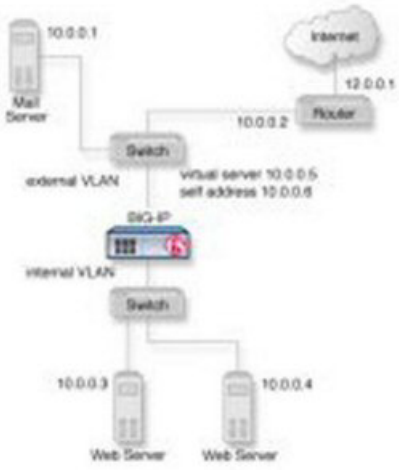

Figure 8: Data center example after adding a BIG-IP system

Task summary

To configure the BIG-IP® system for this implementation, you must perform a few key tasks. The example shown in the illustration is based on the use of the default internal and external VLAN configuration with self IP addresses on each of the VLANs that are on the same IP network on which you are installing the BIG-IP system.

Important: *The default route on each content server should be set to the IP address of the router. In this example, you set the default route to* ***10.0.0.2****.*

Task list

Removing the self IP addresses from the default VLANs
Creating a VLAN group
Creating a self IP for a VLAN group
Creating a pool of web servers
Creating a virtual server

Removing the self IP addresses from the default VLANs

Remove the self IP addresses from the individual VLANs. After you create the VLAN group, you will create another self IP address for the VLAN group for routing purposes. The individual VLANs no longer need their own self IP addresses.

1. On the Main tab, click **Network** > **Self IPs**.
2. Select the check box for each IP address and VLAN that you want to delete.
3. Click **Delete**.
4. Click **Delete**.

The self IP address is removed from the Self IP list.

Creating a VLAN group

VLAN groups consolidate Layer 2 traffic from two or more separate VLANs.

1. On the Main tab, click **Network** > **VLANs** > **VLAN Groups**.
   The VLAN Groups list screen opens.
2. From the VLAN Groups menu, choose List.
3. Click **Create**.
   The New VLAN Group screen opens.
4. In the General Properties area, in the **VLAN Group** field, type a unique name for the VLAN group.
5. For the **VLANs** setting, from the **Available** field select the **internal** and **external** VLAN names, and click **<<** to move the VLAN names to the **Members** field.
6. Click **Finished**.

Creating a self IP for a VLAN group

Before you create a self IP address, ensure that you have created at least one VLAN or VLAN group.

Self IP addresses enable the BIG-IP® system, and other devices on the network, to route application traffic through the associated VLAN or VLAN group.

1. On the Main tab, click **Network** > **Self IPs**.
2. Click **Create**.
   The New Self IP screen opens.
3. In the **IP Address** field, type a self IP address for the VLAN group. In the example shown, this IP address is **10.0.0.6**.
4. In the **Netmask** field, type the full network mask for the specified IP address.

   For example, you can type `ffff:ffff:ffff:ffff:0000:0000:0000:0000` or `ffff:ffff:ffff:ffff::`.
5. From the **VLAN/Tunnel** list, select the name of the VLAN group you previously created.
6. From the **Port Lockdown** list, select **Allow Default**.
7. Click **Finished**.
   The screen refreshes, and displays the new self IP address.

The BIG-IP system can send and receive traffic through the specified VLAN or VLAN group.

Creating a pool of web servers

You can a create pool of web servers that you group together to receive and process traffic, to efficiently distribute the load on your server resources.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. In the Resources area of the screen, use the **New Members** setting to add the pool members. In our example, pool members are **10.0.0.3:80** and **10.0.0.4:80**.
5. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server

A virtual server represents a destination IP address for application traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address for this field needs to be on the same subnet as the external self-IP address.*

5. From the **Service Port** list, select ***All Ports**.
6. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.

You now have a destination IP address on the BIG-IP® system for application traffic.

Enabling IP Address Intelligence

Overview: Enabling IP address intelligence

An *IP intelligence database* is a list of IP addresses with questionable reputations. IP addresses gain a questionable reputation and are added to the database as a result of having performed exploits or attacks, or these addresses might represent proxy servers, scanners, or systems that have been infected. You can prevent system attacks by excluding traffic from malicious IP addresses. The IP Intelligence database is maintained online by a third party.

The BIG-IP® system can connect to an IP intelligence database, download the contents, and automatically keep the database up to date. You use iRules® to instruct the system on how to use IP address intelligence information. For example, iRules can instruct the system to verify the reputation of and log the originating IP address of all requests.

You can also use the IP address intelligence information within security policies in the Application Security Manager™ to log or block requests from IP addresses with questionable reputations.

Task Summary

Enabling IP address intelligence
Creating an iRule to log IP address intelligence information
Creating an iRule to reject requests with questionable IP addresses
Checking the reputation of an IP address
Checking the status of the IP intelligence database

Enabling IP address intelligence

The requirements for using IP address intelligence are:

- The system must have an IP Intelligence license.
- The system must have an Internet connection either directly or through an HTTP proxy server.
- The system must have DNS configured (go to **System** > **Configuration** > **Device** > **DNS**).

Important: *IP address intelligence is enabled by default. You only need to enable it if it was previously disabled.*

To enable IP address intelligence on the BIG-IP® system, you enable auto-update to connect the system to the IP intelligence database.

1. Log in to the command line for the BIG-IP® system.
2. To determine whether IP intelligence is enabled, type the following command: `tmsh list sys db iprep.autoupdate`
   If the value of the `iprep.autoupdate` variable is `disable`, IP intelligence is not enabled. If it is `enable`, your task is complete.
3. At the prompt, type `tmsh modify sys db iprep.autoupdate value enable`
   The system downloads the IP intelligence database and stores it in the binary file, `/var/IpRep/F5IpRep.dat`. It is updated every 5 minutes.

4. If the BIG-IP system is behind a firewall, make sure that the BIG-IP system has external access to `vector.brightcloud.com` using port `443`.

   That is the IP Intelligence server from which the system gets IP Intelligence information.

5. (Optional) If the BIG-IP system connects to the Internet using a forward proxy server, set these system database variables.
   a) Type `tmsh modify sys db proxy.host value` *`hostname`* to specify the host name of the proxy server.
   b) Type `tmsh modify sys db proxy.port value` *`port_number`* to specify the port number of the proxy server.
   c) Type `tmsh modify sys db proxy.username value` *`username`* to specify the user name to log in to the proxy server.
   d) Type `tmsh modify sys db proxy.password value` *`password`* to specify the password to log in to the proxy server.

The IP address intelligence feature remains enabled unless you disable it with the command `tmsh modify sys db iprep.autoupdate value disable`.

You can create iRules® to instruct the system how to handle traffic from IP addresses with questionable reputations, or use Application Security Manager™ to configure IP address intelligence blocking. You can configure IP intelligence for Advanced Firewall Manager by assigning IP intelligence policies to the global, route domain, or virtual server context.

Creating an iRule to log IP address intelligence information

Before you can create an iRule to log IP address intelligence information, your system must have IP address intelligence enabled.

You use iRules® to log IP address intelligence categories to the file `/var/log/ltm`. This is an example of the type of iRule you can write.

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen opens, displaying any existing iRules.
2. Click **Create**.
   The New iRule screen opens.
3. In the **Name** field, type a name, such as `my_irule`.

   The full path name of the iRule cannot exceed 255 characters.

4. In the **Definition** field, type the iRule using Tool Command Language (Tcl) syntax.

   For example, to log all IP addresses and any associated IP address intelligence categories, type the following iRule:

```
when CLIENT_ACCEPTED {
            log local0. "IP Address Intelligence for IP address
[IP::client_addr]:
            [IP::reputation [IP::client_addr]]"
          }
```

   Tip: *For complete and detailed information iRules syntax, see the F5 Networks DevCentral web site (`http://devcentral.f5.com`).*

5. Click **Finished**.

The new iRule appears in the list of iRules on the system.

When traffic is received from an IP address with a questionable reputation and that is included in the IP intelligence database, the system prints the IP address intelligence information in the `/var/log/ltm` log.

For complete and detailed information about iRules syntax, see the F5 Networks DevCentral web site, `http://devcentral.f5.com`.

Creating an iRule to reject requests with questionable IP addresses

Before you can create an iRule to reject requests based on an IP address reputation, your system must have IP address intelligence enabled.

You can use iRules® to reject requests from IP addresses that have questionable reputations and are listed in the IP intelligence database. This is an example of the type of iRule you can write.

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen opens, displaying any existing iRules.
2. Click **Create**.
   The New iRule screen opens.
3. In the **Name** field, type a name, such as `my_irule`.

   The full path name of the iRule cannot exceed 255 characters.
4. In the **Definition** field, type the iRule using Tool Command Language (Tcl) syntax.

   For example, to reject requests from IP addresses listed in the IP intelligence database because they could be Windows Exploits or Web Attacks, type the following iRule:

```
when HTTP_REQUEST {
    set ip_reputation_categories [IP::reputation [IP::client_addr]]
    set is_reject 0
    if {($ip_reputation_categories contains "Windows Exploits")} {
       set is_reject 1
    }
    if {($ip_reputation_categories contains "Web Attacks")} {
       set is_reject 1
    }
    if {($is_reject)} {
        log local0. "Attempted access from malicious IP address
[IP::client_addr]
        ($ip_reputation_categories), request was rejected"
        HTTP::respond 200 content
        "<HTML><HEAD><TITLE>Rejected Request</TITLE>
        </HEAD><BODY>The request was rejected. <BR>
        Attempted access from malicious IP address</BODY></HTML>"
    }
}
```

Tip: *For complete and detailed information about iRules syntax, see the F5 Networks DevCentral web site (`http://devcentral.f5.com`).*

5. Click **Finished**.
   The new iRule appears in the list of iRules on the system.

When the system receives traffic from an IP address that is included in the IP intelligence database, the system prints the IP address intelligence information in the `/var/log/ltm` log.

Checking the reputation of an IP address

Before you can verify the reputation of an IP address, your system must have IP address intelligence enabled.

You can verify the reputation of a specific IP address.

1. Log in to the command line for the BIG-IP® system.
2. At the prompt, type `iprep_lookup IP_address`

   where *IP_address* is the address whose reputation you want to verify. For example, to verify `1.1.1.1`:

```
iprep_lookup 1.1.1.1
                      opening database in /var/IpRep/F5IpRep.dat
                      size of IP reputation database = 41693298
                      iprep threats list for ip = 1.1.1.1 is:
                             bit 4 - Scanners
                             bit 5 - Denial of Service
```

   The system looks up the IP address, and if it is in the database, the command output displays the IP address intelligence categories that show the reason. In this case, `1.1.1.1` is a source of potential port or network scans and DoS attacks. If the IP address is not found in the IP intelligence database, the system returns the message `iprep_lookup not found for ip = <ip_address>`.

Checking the status of the IP intelligence database

You can display the status of the IP Intelligence database to learn when it was last updated and the number of questionable IP addresses it contains.

1. Log in to the command line for the BIG-IP® system.
2. To display IP intelligence database status, type `tmsh show sys iprep-status`.
   The system displays the status. For example:

```
-------------------------------------------------------------------------
Sys::IP Reputation Database Status
-------------------------------------------------------------------------
Last time the server was contacted for updates      04/21/2012 09:33:31
Last time an update was received                    04/21/2012 09:33:31
Total number of IP Addresses in the database                 5516336
Number of IP Addresses received in the last update               136
```

IP address intelligence categories

Along with the IP address, the IP intelligence database stores the category that explains the reason that the IP address is considered untrustworthy.

Category Name	Description
Botnets	IP addresses of computers that are infected with malicious software (Botnet Command and Control channels, and infected zombie machines) and are controlled as a group by a Bot master, and are now part of a botnet. Hackers can exploit botnets to send

Category Name	Description
	spam messages, launch various attacks, or cause target systems to behave in other unpredictable ways.
Cloud Provider Networks	IP addresses and networks that are used by cloud providers.
Denial-of-Service	IP addresses that have launched denial-of-service (DoS) attacks, distributed denial-of-service (DDoS) attacks, anomalous SYN flood attacks, or anomalous traffic detection. These attacks are usually requests for legitimate services, but occur at such a fast rate that targeted systems cannot respond quickly enough and become bogged down or unable to service legitimate clients.
Illegal Web sites	IP addresses that contain criminally obscene or potentially criminal internet copyright and intellectual property violations.
Infected Sources	Active IP addresses that issue HTTP requests with a low reputation index score, or that are known malicious web sites offering or distributing malware, shell code, rootkits, worms, or viruses.
Phishing	IP addresses that host phishing sites, and other kinds of fraud activities, such as ad click fraud or gaming fraud.
Proxy/Anonymous Proxies	IP addresses that are associated with web proxies that shield the originator's IP address (such as proxy and anonymization services). This category also includes TOR anonymizer addresses.
Scanners	IP addresses that are involved in reconnaissance, such as probes, host scan, domain scan, and password brute force, typically to identify vulnerabilities for later exploits.
Spam Sources	IP addresses that are known to distribute large amounts of spam email by tunneling spam messages through proxy, anomalous SMTP activities, and forum spam activities.
Web Attacks	IP addresses involved in cross site scripting, iFrame injection, SQL injection, cross domain injection, or domain password brute force.
Windows Exploits	Active IP addresses that have exercised various exploits against Windows resources by offering or distributing malware, shell code, rootkits, worms, or viruses using browsers, programs, downloaded files, scripts, or operating system vulnerabilities.

Managing Client-Side HTTP Traffic Using a Self-Signed RSA Certificate

Overview: Managing client-side HTTP traffic using a self-signed RSA certificate

This implementation uses an RSA self-signed certificate to authenticate HTTP traffic. When you want to manage HTTP traffic over SSL, you can configure the BIG-IP® system to perform the SSL handshake that target web servers typically perform.

A common way to configure the BIG-IP system is to enable client-side SSL, which makes it possible for the system to decrypt client requests before forwarding them to a server, and to encrypt server responses before returning them to the client. In this case, you need to install only one SSL key/certificate pair on the BIG-IP system.

Task summary

To implement client-side authentication using HTTP and SSL with a self-signed certificate, you perform a few basic configuration tasks.

Task list

Creating a self-signed RSA certificate
Creating a custom HTTP profile
Creating a custom Client SSL profile
Creating a pool to process HTTP traffic
Creating a virtual server for client-side HTTP traffic

Creating a self-signed RSA certificate

If you are configuring the BIG-IP® system to manage client-side HTTP traffic, you create an RSA self-signed digital certificate to authenticate and secure the client-side HTTP traffic. If you are also configuring the system to manage server-side HTTP traffic, you create a second RSA self-signed certificate to authenticate and secure the server-side HTTP traffic.

1. On the Main tab, click **System** > **File Management** > **SSL Certificate List**.
   The SSL Certificate List screen opens.
2. Click **Create**.
3. In the **Name** field, type a unique name for the SSL certificate.
4. From the **Issuer** list, select **Self**.
5. In the **Common Name** field, type a name.
   This is typically the name of a web site, such as `www.siterequest.com`.

6. In the **Division** field, type your department name.
7. In the **Organization** field, type your company name.
8. In the **Locality** field, type your city name.
9. In the or **State or Province** field, type your state or province name.
10. From the **Country** list, select the name of your country.
11. In the **E-mail Address** field, type your email address.
12. In the **Lifetime** field, type a number of days, or retain the default, **365**.
13. In the **Subject Alternative Name** field, type a name.
    This name is embedded in the certificate for X509 extension purposes.
    By assigning this name, you can protect multiple host names with a single SSL certificate.
14. From the **Key Type** list, select **RSA**.
15. From the **Size** list, select a key size, in bits.
16. Click **Finished**.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP® system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and decrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these decryption/encryption functions from the destination server. When you perform this task, you specify an RSA type of key chain.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.

5. Select the **Custom** check box.
   The settings become available for change.
6. Using the **Certificate Key Chain** setting, specify one or more certificate key chains:
   a) From the **Certificate** list, select a certificate name.
      This is the name of an RSA certificate that you installed on the BIG-IP® system. If you have not generated a certificate request nor installed a certificate on the BIG-IP system, you can specify the name of an existing certificate, `default`.
   b) From the **Key** list, select a key name.
      This is the name of an RSA key that you installed on the BIG-IP® system. If you have not installed a key on the BIG-IP system, you can specify the name of an existing key, `default`.
   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.
      A certificate chain can contain either a series of public key certificates in Privacy Enhanced Mail (PEM) format or a series of one or more PEM files. A certificate chain can contain certificates for Intermediate certificate Authorities (CAs).

      Note: *The default self-signed certificate and the default CA bundle certificate are not appropriate for use as a certificate chain.*

   d) For the **Passphrase** field, type a string that enables access to the SSL certificate/key pair.
      This setting is optional. For added security, the BIG-IP system automatically encrypts the pass phrase itself. This pass phrase encryption process is invisible to BIG-IP® system administrative users.
   e) Click **Add**.
      The result is that the specified key chain appears in the box.
7. If you want to use a cipher suite other than `DEFAULT`:
   a) From the Configuration list, select **Advanced**.
   b) For the **Ciphers** setting, type the name of a cipher.
      You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.
      Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.
8. Configure all other profile settings as needed.
9. Click **Finished**.

After performing this task, you must assign the profile to a virtual server.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for client-side HTTP traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTP traffic over SSL.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `443`, or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select the HTTP profile that you previously created.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
8. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.
9. Click **Finished**.

After performing this task, the virtual server appears in the Virtual Server List screen.

Implementation result

After you complete the tasks in this implementation, the BIG-IP® system can authenticate and decrypt HTTP traffic coming from a client system, using an RSA self-signed certificate. The BIG-IP system can also re-encrypt server responses before sending them back to the client.

Managing Client- and Server-side HTTP Traffic using a Self-signed Certificate

Overview: Managing client and server HTTP traffic using a self-signed certificate

One of the ways to configure the BIG-IP system to manage SSL traffic is to enable both client-side and server-side SSL processing:

- *Client-side SSL termination* makes it possible for the system to decrypt client requests before sending them on to a server, and encrypt server responses before sending them back to the client. This ensures that client-side HTTP traffic is encrypted. In this case, you need to install only one SSL key/certificate pair on the BIG-IP system.
- *Server-side SSL termination* makes it possible for the system to decrypt and then re-encrypt client requests before sending them on to a server. Server-side SSL termination also decrypts server responses and then re-encrypts them before sending them back to the client. This ensures security for both client- and server-side HTTP traffic. In this case, you need to install two SSL key/certificate pairs on the BIG-IP system. The system uses the first certificate/key pair to authenticate the client, and uses the second pair to request authentication from the server.

This implementation uses a self-signed certificate to authenticate HTTP traffic.

Task summary

To implement client-side and server-side authentication using HTTP and SSL with a self-signed certificate, you perform a few basic configuration tasks.

Task list

Creating a self-signed digital certificate
Creating a custom HTTP profile
Creating a custom Client SSL profile
Creating a custom Server SSL profile
Creating a pool to manage HTTPS traffic
Creating a virtual server for client-side and server-side HTTPS traffic

Creating a self-signed digital certificate

If you are configuring the BIG-IP® system to manage client-side HTTP traffic, you perform this task to create a self-signed certificate to authenticate and secure the client-side HTTP traffic. If you are also configuring the system to manage server-side HTTP traffic, you must repeat this task to create a second self-signed certificate to authenticate and secure the server-side HTTP traffic.

1. On the Main tab, click **System** > **File Management** > **SSL Certificate List**.

The SSL Certificate List screen opens.

2. Click **Create**.
3. In the **Name** field, type a unique name for the SSL certificate.
4. From the **Issuer** list, select **Self**.
5. In the **Common Name** field, type a name.
   This is typically the name of a web site, such as `www.siterequest.com`.
6. In the **Division** field, type your department name.
7. In the **Organization** field, type your company name.
8. In the **Locality** field, type your city name.
9. In the or **State or Province** field, type your state or province name.
10. From the **Country** list, select the name of your country.
11. In the **E-mail Address** field, type your email address.
12. In the **Lifetime** field, type a number of days, or retain the default, **365**.
13. In the **Subject Alternative Name** field, type a name.
    This name is embedded in the certificate for X509 extension purposes.
    By assigning this name, you can protect multiple host names with a single SSL certificate.
14. From the **Key Type** list, select a key type.
    Possible values are: **RSA**, **DSA**, and **ECDSA**.
15. From the **Size** or **Curve Name** list, select either a size, in bits, or a curve name.
16. If the BIG-IP system contains an internal HSM module, specify a location for storing the private key.
17. Click **Finished**.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP® system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and encrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these decryption/encryption functions from the destination server. When you perform this task, you can specify multiple certificate key chains, one for each key type (RSA, DSA, and ECDSA). This allows the BIG-IP system to negotiate secure client connections using different cipher suites based on the client's preference.

Important: *At a minimum, you must specify a certificate key chain that includes an RSA key pair. Specifying certificate key chains for DSA and ECDSA key pairs is optional, although highly recommended.*

Important: *If you create multiple Client SSL profiles and assign them to the same virtual server, then for each of the following profile settings, you must configure the same value in each profile. For example, if the* ***Frequency*** *setting in one profile is set to* ***once****, then the* ***Frequency*** *setting in all other Client SSL profiles for that virtual server must be set to* ***once****.*

- **Ciphers**
- **Client Certificate**
- **Frequency**
- **Certificate Chain Traversal Depth**
- **Certificate Revocation List (CRL)**
- **Trusted Certificate Authorities**
- **Advertised Certificate Authorities**

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. Select the **Custom** check box.
   The settings become available for change.
6. Using the **Certificate Key Chain** setting, specify one or more certificate key chains:
   a) From the **Certificate** list, select a certificate name.
      This is the name of a certificate that you installed on the BIG-IP® system. If you have not generated a certificate request nor installed a certificate on the BIG-IP system, you can specify the name of an existing certificate, `default`.
   b) From the **Key** list, select the name of the key associated with the certificate specified in the previous step.
      This is the name of a key that you installed on the BIG-IP® system. If you have not installed a key on the BIG-IP system, you can specify the name of an existing key, `default`.
   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.
      A certificate chain can contain either a series of public key certificates in Privacy Enhanced Mail (PEM) format or a series of one or more PEM files. A certificate chain can contain certificates for Intermediate certificate Authorities (CAs).

      Note: *The default self-signed certificate and the default CA bundle certificate are not appropriate for use as a certificate chain.*

d) For the **Passphrase** field, type a string that enables access to SSL certificate/key pairs that are stored on the BIG-IP system with password protection.

This setting is optional. For added security, the BIG-IP system automatically encrypts the pass phrase itself. This pass phrase encryption process is invisible to BIG-IP® system administrative users.

e) From the **OCSP Stapling Parameters** list, select an OCSP stapling profile.

This setting is optional. To enable OCSP stapling, you must create an OCSP Stapling profile, which you can then select from this list.

f) Click **Add** and repeat the process for all certificate key chains that you want to specify.

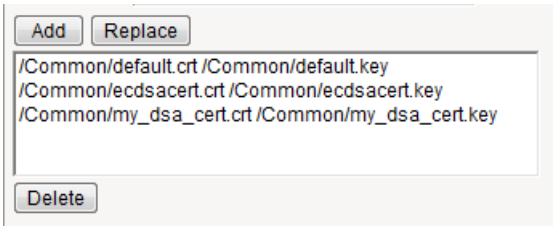

Figure 9: Sample configuration with three key types specified

The result is that all specified key chains appear in the box.

7. If you want to use a cipher suite other than `DEFAULT`:
   a) From the Configuration list, select **Advanced**.
   b) For the **Ciphers** setting, type the name of a cipher.

   You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.

   Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.
8. Configure all other profile settings as needed.
9. Click **Finished**.

After performing this task, you can see the custom Client SSL profile in the list of Client SSL profiles on the system.

You must also assign the profile to a virtual server.

Creating a custom Server SSL profile

With a Server SSL profile, the BIG-IP® system can perform decryption and encryption for server-side SSL traffic.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Server**.
   The SSL Server profile list screen opens.
2. Click **Create**.
   The New Server SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **serverssl** in the **Parent Profile** list.
5. From the **Configuration** list, select **Advanced**.
6. Select the **Custom** check box.
   The settings become available for change.
7. From the **Certificate** list, select the name of an SSL certificate on the BIG-IP system.

8. From the **Key** list, select the name of an SSL key on the BIG-IP system.
9. In the **Pass Phrase** field, select a pass phrase that enables access to the certificate/key pair on the BIG-IP system.
10. From the **Chain** list, select the name of an SSL chain on the BIG-IP system.
11. If you want to use a cipher suite other than `DEFAULT`:
    a) From the Configuration list, select **Advanced**.
    b) For the **Ciphers** setting, type the name of a cipher.

       You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.

       Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.

12. Select the **Custom** check box for **Server Authentication**.
13. Modify the settings, as required.
14. Click **Finished**.

To use this profile, you must assign it to a virtual server.

Creating a pool to manage HTTPS traffic

You can create a pool (a logical set of devices, such as web servers, that you group together to receive and process HTTPS traffic) to efficiently distribute the load on your server resources.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, assign **https** or **https_443** by moving it from the **Available** list to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Use the **New Members** setting to add each resource that you want to include in the pool:
   a) In the **Address** field, type an IP address.
   b) In the **Service Port** field type `443` , or select **HTTPS** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The HTTPS load balancing pool now appears in the Pool List screen.

Creating a virtual server for client-side and server-side HTTPS traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTP traffic over SSL.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. Type `443` in the **Service Port** field, or select **HTTPS** from the list.
6. For the **HTTP Profile** setting, verify that the default HTTP profile, **http**, is selected.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
8. For the **SSL Profile (Server)** setting, from the **Available** list, select the name of the Server SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
9. Click **Finished**.

The virtual server now appears in the Virtual Server List screen.

Implementation results

After you complete the tasks in this implementation, the BIG-IP® system ensures that SSL authentication and encryption occurs for both client-side and server-side HTTP traffic. The system performs this authentication and encryption according to the values you specify in the Client SSL and Server SSL profiles.

Managing Client-side HTTP Traffic Using a Self-Signed Elliptic Curve DSA Certificate

Overview: Managing client-side HTTP traffic using a self-signed, ECC-based certificate

When you configure the BIG-IP® system to decrypt client-side HTTP requests and encrypt the server responses, you can optionally configure the BIG-IP system to use the Elliptic Curve Digital Signature Algorithm (ECDSA) as part of the BIG-IP system's certificate key chain. The result is that the BIG-IP system performs the SSL handshake, usually performed by target web servers, using an ECDSA key type in the certificate key chain.

This particular implementation uses a self-signed certificate.

Task summary

To implement client-side authentication using HTTP and SSL with a self-signed certificate, you perform a few basic configuration tasks.

Task list

Creating a self-signed RSA certificate
Creating a custom HTTP profile
Creating a custom Client SSL profile
Creating a pool to process HTTP traffic
Creating a virtual server for client-side HTTP traffic

Creating a self-signed SSL certificate

If you are configuring the BIG-IP system to manage client-side HTTP traffic, you create a self-signed certificate to authenticate and secure the client-side HTTP traffic. If you are also configuring the system to manage server-side HTTP traffic, you create a second self-signed certificate to authenticate and secure the server-side HTTP traffic.

1. On the Main tab, click **System** > **File Management** > **SSL Certificate List**.
   The SSL Certificate List screen opens.
2. Click **Create**.
3. In the **Name** field, type a unique name for the SSL certificate.
4. From the **Issuer** list, select **Self**.
5. In the **Common Name** field, type a name.
   This is typically the name of a web site, such as `www.siterequest.com`.
6. In the **Division** field, type your department name.

7. In the **Organization** field, type your company name.
8. In the **Locality** field, type your city name.
9. In the or **State or Province** field, type your state or province name.
10. From the **Country** list, select the name of your country.
11. In the **E-mail Address** field, type your email address.
12. In the **Lifetime** field, type a number of days, or retain the default, **365**.
13. In the **Subject Alternative Name** field, type a name.
    This name is embedded in the certificate for X509 extension purposes.
    By assigning this name, you can protect multiple host names with a single SSL certificate.
14. From the **Key Type** list, select **ECDSA**.
15. From the **Curve Name** list, select **prime256v1**.
16. Click **Finished**.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP® system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and decrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these authentication and decryption/encryption functions from the destination server. When you perform this task, you specify a certificate key chain that includes Elliptic Curve Digital Signature Algorithm (ECDSA) as the key type.

Note: *In addition to specifying an ECDSA certificate key chain, you must also specify an RSA key chain. Specifying an RSA key chain is a minimum requirement for all Client SSL profiles that you configure.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.

3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. Select the **Custom** check box.
   The settings become available for change.
6. Using the **Certificate Key Chain** setting, specify both an ECDSA and an RSA certificate key chain:
   a) From the **Certificate** list, select the name of a certificate with a key of type ECDSA.
   b) From the **Key** list, select the name of an ECDSA key.
   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.
   d) Click **Add**.
   e) Repeat this process and specify an RSA certificate key chain.
7. To specify ECDHE ciphers:
   a) From the Configuration list, select **Advanced**.
   b) In the **Ciphers** field, type `ECDHE`.
8. Configure all other profile settings as needed.
9. Click **Finished**.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for client-side HTTP traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTP traffic over SSL.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `443`, or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select the HTTP profile that you previously created.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
8. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.
9. Click **Finished**.

After performing this task, the virtual server appears in the Virtual Server List screen.

Implementation results

After you complete the tasks in this implementation, the BIG-IP® system encrypts client-side ingress HTTP traffic using an SSL certificate key chain. The BIG-IP system also re-encrypts server responses before sending the responses back to the client.

The certificate in the certificate key chain includes an Elliptic Curve Digital Signature Algorithm (ECDSA) key and certificate.

Managing Client-Side HTTP Traffic Using a CA-Signed RSA Certificate

Overview: Managing client-side HTTP traffic using a CA-signed RSA certificate

When you want to manage HTTP traffic over SSL, you can configure the BIG-IP® system to perform the SSL handshake that target web servers normally perform.

A common way to configure the BIG-IP system is to enable client-side SSL, which makes it possible for the system to decrypt client requests before sending them on to a server, and encrypt server responses before sending them back to the client. In this case, you need to install only one SSL key/certificate pair on the BIG-IP system.

This implementation uses a certificate signed by an RSA certificate authority (CA) to authenticate HTTP traffic.

Task summary

To implement client-side authentication using HTTP and SSL with a certificate signed by a certificate authority, you perform a few basic configuration tasks.

Task list

Requesting an RSA certificate from a certificate authority
Creating a custom HTTP profile
Creating a custom Client SSL profile
Creating a pool to process HTTP traffic
Creating a virtual server for client-side HTTP traffic

Requesting an RSA certificate from a certificate authority

You can generate a request for an RSA digital certificate and then copy or submit it to a trusted certificate authority for signature.

1. On the Main tab, click **System** > **File Management** > **SSL Certificate List**.
   The SSL Certificate List screen opens.
2. Click **Create**.
3. In the **Name** field, type a unique name for the SSL certificate.
4. From the **Issuer** list, select **Certificate Authority**.
5. In the **Common Name** field, type a name.
   This is typically the name of a web site, such as `www.siterequest.com`.
6. In the **Division** field, type your department name.
7. In the **Organization** field, type your company name.

8. In the **Locality** field, type your city name.
9. In the or **State or Province** field, type your state or province name.
10. From the **Country** list, select the name of your country.
11. In the **E-mail Address** field, type your email address.
12. In the **Lifetime** field, type a number of days, or retain the default, **365**.
13. In the **Subject Alternative Name** field, type a name.
    This name is embedded in the certificate for X509 extension purposes.
    By assigning this name, you can protect multiple host names with a single SSL certificate.
14. In the **Challenge Password** field, type a password.
15. In the **Confirm Password** field, re-type the password you typed in the **Challenge Password** field.
16. From the **Key Type** list, select **RSA**.
17. From the **Size** list, select a key size, in bits.
18. Click **Finished**.
    The Certificate Signing Request screen displays.
19. Do one of the following to download the request into a file on your system.
    - In the **Request Text** field, copy the certificate.
    - For **Request File**, click the button.
20. Follow the instructions on the relevant certificate authority web site for either pasting the copied request or attaching the generated request file.
21. Click **Finished**.
    The Certificate Signing Request screen displays.

The generated RSA certificate request is submitted to a trusted certificate authority for signature.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP® system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and decrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these decryption/encryption functions from the destination server. When you perform this task, you specify an RSA type of key chain.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. Select the **Custom** check box.
   The settings become available for change.
6. Using the **Certificate Key Chain** setting, specify one or more certificate key chains:
   a) From the **Certificate** list, select a certificate name.
      This is the name of an RSA certificate that you installed on the BIG-IP® system. If you have not generated a certificate request nor installed a certificate on the BIG-IP system, you can specify the name of an existing certificate, `default`.
   b) From the **Key** list, select a key name.
      This is the name of an RSA key that you installed on the BIG-IP® system. If you have not installed a key on the BIG-IP system, you can specify the name of an existing key, `default`.
   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.
      A certificate chain can contain either a series of public key certificates in Privacy Enhanced Mail (PEM) format or a series of one or more PEM files. A certificate chain can contain certificates for Intermediate certificate Authorities (CAs).

      Note: *The default self-signed certificate and the default CA bundle certificate are not appropriate for use as a certificate chain.*

   d) For the **Passphrase** field, type a string that enables access to the SSL certificate/key pair.
      This setting is optional. For added security, the BIG-IP system automatically encrypts the pass phrase itself. This pass phrase encryption process is invisible to BIG-IP® system administrative users.
   e) Click **Add**.
      The result is that the specified key chain appears in the box.
7. If you want to use a cipher suite other than `DEFAULT`:
   a) From the Configuration list, select **Advanced**.
   b) For the **Ciphers** setting, type the name of a cipher.
      You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.
      Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.
8. Configure all other profile settings as needed.
9. Click **Finished**.

After performing this task, you must assign the profile to a virtual server.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for client-side HTTP traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTP traffic over SSL.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `443`, or select **HTTPS** from the list.

6. From the **HTTP Profile** list, select the HTTP profile that you previously created.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
8. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.
9. Click **Finished**.

After performing this task, the virtual server appears in the Virtual Server List screen.

Implementation results

After you complete the tasks in this implementation, the BIG-IP® system can authenticate and decrypt HTTP traffic coming from a client system, using an RSA digital certificate. The BIG-IP system can also re-encrypt server responses before sending them back to the client.

Managing Client-side HTTP Traffic Using a CA-Signed Elliptic Curve DSA Certificate

Overview: Managing client-side HTTP traffic using a CA-signed, ECC-based certificate

When you configure the BIG-IP® system to decrypt client-side HTTP requests and encrypt the server responses, you can optionally configure the BIG-IP system to use the Elliptic Curve Digital Signature Algorithm (ECDSA) as part of the BIG-IP system's certificate key chain. The result is that the BIG-IP system performs the SSL handshake usually performed by target web servers, using an ECDSA key type in the certificate key chain.

This particular implementation uses a certificate signed by a certificate authority (CA).

Task summary

To implement client-side authentication using HTTP and SSL with a certificate signed by a certificate authority, you perform a few basic configuration tasks.

Task list

Requesting an RSA certificate from a certificate authority
Creating a custom HTTP profile
Creating a custom Client SSL profile
Creating a pool to process HTTP traffic
Creating a virtual server for client-side HTTP traffic

Requesting a signed certificate that includes an ECDSA key

You can generate a certificate that includes an Elliptic Curve Digital Signature Algorithm (ECDSA) key type, and then copy it or submit it to a trusted certificate authority for signature.

1. On the Main tab, click **System** > **File Management** > **SSL Certificate List**.
   The SSL Certificate List screen opens.
2. Click **Create**.
3. In the **Name** field, type a unique name for the SSL certificate.
4. From the **Issuer** list, select **Certificate Authority**.
5. In the **Common Name** field, type a name.
   This is typically the name of a web site, such as `www.siterequest.com`.
6. In the **Division** field, type your department name.
7. In the **Organization** field, type your company name.

8. In the **Locality** field, type your city name.
9. In the or **State or Province** field, type your state or province name.
10. From the **Country** list, select the name of your country.
11. In the **E-mail Address** field, type your email address.
12. In the **Lifetime** field, type a number of days, or retain the default, **365**.
13. In the **Subject Alternative Name** field, type a name.
    This name is embedded in the certificate for X509 extension purposes.
    By assigning this name, you can protect multiple host names with a single SSL certificate.
14. In the **Challenge Password** field, type a password.
15. In the **Confirm Password** field, re-type the password you typed in the **Challenge Password** field.
16. From the **Key Type** list, select **ECDSA**.
17. From the **Curve Name** list, select **prime256v1**.
18. Click **Finished**.
    The Certificate Signing Request screen displays.
19. Do one of the following to download the request into a file on your system.
    - In the **Request Text** field, copy the certificate.
    - For **Request File**, click the button.
20. Follow the instructions on the relevant certificate authority web site for either pasting the copied request or attaching the generated request file.
21. Click **Finished**.
    The Certificate Signing Request screen displays.

The generated certificate is submitted to a trusted certificate authority for signature.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP® system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and decrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these authentication and decryption/encryption functions from the destination server. When you perform this task, you specify a certificate key chain that includes Elliptic Curve Digital Signature Algorithm (ECDSA) as the key type.

Note: *In addition to specifying an ECDSA certificate key chain, you must also specify an RSA key chain. Specifying an RSA key chain is a minimum requirement for all Client SSL profiles that you configure.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. Select the **Custom** check box.
   The settings become available for change.
6. Using the **Certificate Key Chain** setting, specify both an ECDSA and an RSA certificate key chain:
   a) From the **Certificate** list, select the name of a certificate with a key of type ECDSA.
   b) From the **Key** list, select the name of an ECDSA key.
   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.
   d) Click **Add**.
   e) Repeat this process and specify an RSA certificate key chain.
7. To specify ECDHE ciphers:
   a) From the Configuration list, select **Advanced**.
   b) In the **Ciphers** field, type `ECDHE`.
8. Configure all other profile settings as needed.
9. Click **Finished**.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for client-side HTTP traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage HTTP traffic over SSL.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `443`, or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select the HTTP profile that you previously created.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.
8. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.
9. Click **Finished**.

After performing this task, the virtual server appears in the Virtual Server List screen.

Implementation results

After you complete the tasks in this implementation, the BIG-IP® system encrypts client-side ingress HTTP traffic using an SSL certificate key chain. The BIG-IP system also re-encrypts server responses before sending the responses back to the client.

The certificate in the certificate key chain includes an Elliptic Curve Digital Signature Algorithm (ECDSA) key and certificate.

Configuring Content Adaptation for HTTP Requests

Overview: Configuring HTTP Request Adaptation

This implementation describes how to configure the BIG-IP® content adaptation feature for adapting HTTP requests. With this feature, a BIG-IP virtual server can conditionally forward HTTP requests to a pool of Internet Content Adaptation Protocol (ICAP) servers for modification, before sending the request to a web server.

In this implementation, you create a standard HTTP virtual server and pool of web servers for processing client requests. The HTTP virtual server accepts each client request in the normal way, but before load balancing the request to the pool of web servers, the virtual server forwards the HTTP request to a special internal virtual server.

The *internal virtual server* receives the HTTP request from the standard virtual server, and load balances the request to a pool of ICAP servers for modification. After the ICAP server modifies the request, the BIG-IP system sends the request to the appropriate web server for processing.

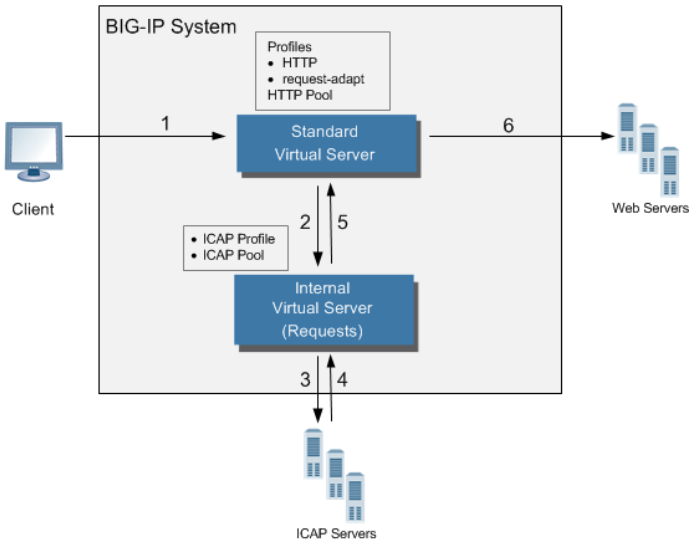

Figure 10: Content adaptation configuration for modifying HTTP requests

The internal virtual server references the pool of content adaptation servers, including the load balancing method to use for those servers. The internal virtual server also references an ICAP profile, which includes specific instructions for how the BIG-IP system should wrap the HTTP request in an ICAP message for adaptation.

Optionally, the internal virtual server can reference:

- Any persistence method that you would like the BIG-IP system to use when load balancing traffic to the ICAP pool.
- Any health or performance monitor that you would like the BIG-IP system to use when load balancing traffic to the ICAP pool.
- Any iRules® related to the content adaptation.

Task summary

Complete the tasks in this implementation to create a BIG-IP® configuration that performs content adaptation for HTTP requests.

Task List

Creating a custom client-side ICAP profile
Creating a pool of ICAP servers
Creating an internal virtual server for forwarding requests to an ICAP server
Creating a custom Request Adapt profile
Creating a custom HTTP profile
Creating a pool to process HTTP traffic
Creating an HTTP virtual server for enabling request adaptation

Creating a custom client-side ICAP profile

You create this ICAP profile when you want to use an ICAP server to wrap an HTTP request in an ICAP message before the BIG-IP® system sends the request to a pool of web servers. The profile specifies the HTTP request-header values that the ICAP server uses for the ICAP message.

Important: *You can use macro expansion for all ICAP header values. For example, if an ICAP header value contains* `${SERVER_IP}`*, the BIG-IP system replaces the macro with the IP address of the ICAP server selected from the pool assigned to the internal virtual server. If an ICAP header value contains* `${SERVER_PORT}`*, the BIG-IP system replaces the macro with the port of the ICAP server selected from the pool assigned to the internal virtual server. For example, you can set the* ***URI*** *value in an ICAP profile to* `icap://${SERVER_IP}:${SERVER_PORT}/virusScan`*.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **ICAP**.
2. Click **Create**.
3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `icap`.
5. On the right side of the screen, select the **Custom** check box.
6. In the **URI** field, type a URI in this format: `icap://hostname:port/path`.
   For example, using macro expansion, you can set the **URI** value to:

   ```
   icap://${SERVER_IP}:${SERVER_PORT}/virusScan
   ```

   .
7. In the **Preview Length** field, type a length or retain the default value `0`.

   This value defines the amount of the HTTP request or response that the BIG-IP system offers to the ICAP server when sending the request or response to the server for adaptation. This value should not exceed the length of the preview that the ICAP server has indicated it will accept.
8. In the **Header From** field, type a value for the `From:` ICAP header.
9. In the **Host** field, type a value for the `Host:` ICAP header.
10. In the **Referer** field, type a value for the `Referer:` ICAP header.

11. In the **User Agent** field, type a value for the `User-Agent:` ICAP header.
12. Click **Finished**.

After you create the ICAP profile, you can assign it to an internal virtual server so that the HTTP request that the BIG-IP system sends to an ICAP server is wrapped in an ICAP message, according to the settings you specified in the ICAP profile.

Creating a pool of ICAP servers

You perform this task to create a pool of ICAP servers that perform content adaptation on HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The pool of ICAP load balancing servers appears in the Pools list.

Creating an internal virtual server for forwarding requests to an ICAP server

A virtual server of type **internal** provides a destination that a **standard** type of virtual server can use when forwarding HTTP requests slated for ICAP-based content adaptation.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.

3. In the **Name** field, type a unique name for the virtual server.
4. In the **Description** field, type a description of the virtual server.
   For example: `This virtual server ensures HTTP request modification through the use of the service_name ICAP service..`
5. From the **Type** list, select **Internal**.
6. For the **State** setting, verify that the value is set to **Enabled**.
7. From the **Configuration** list, select **Advanced**.
8. From the **ICAP Profile** list, select the ICAP profile that you previously created for handling HTTP requests.
9. From the **Default Pool** list, select the pool of ICAP servers that you previously created.
10. Click **Finished**.

After you perform this task, a standard type of virtual server can forward HTTP requests to an internal type of virtual server. The internal virtual server then sends the request to a pool of ICAP servers, before sending the request back to the standard virtual server for forwarding to the pool of web servers.

Creating a custom Request Adapt profile

You create a Request Adapt type of profile when you want a standard HTTP virtual server to forward HTTP requests to an internal virtual server that references a pool of ICAP servers. A Request Adapt type of profile instructs the HTTP virtual server to send an HTTP request to a named internal virtual server for possible request modification.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Request Adapt**.
2. Click **Create**.
3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `requestadapt`.
5. On the right-side of the screen, clear the **Custom** check box.
6. For the **Enabled** setting, retain the default value, `Enabled`.
   When you set this value to **Enabled**, the BIG-IP system forwards HTTP requests to the specified internal virtual server for adaptation.
7. From the **Internal Virtual Name** list, select the name of the internal virtual server that you previously created for forwarding HTTP requests to the pool of iCAP servers.
8. In the **Preview Size** field, type a numeric value.

   This specifies the maximum size of the preview buffer. This buffer holds a copy of the HTTP request header and the data sent to the internal virtual server, in case the adaptation server reports that no adaptation is needed. Setting the preview size to `0` disables buffering of the request and should only be done if the adaptation server always returns a modified HTTP request or the original HTTP request.
9. In the **Timeout** field, type a numeric value, in seconds.
   If the internal virtual server does not return a result within the specified time, a timeout error occurs. To disable the timeout, use the value `0`.
10. From the **Service Down Action** list, select an action for the BIG-IP system to take if the internal virtual server returns an error:
    - Select **Ignore** to instruct the BIG-IP system to ignore the error and send the unmodified HTTP request to an HTTP server in the HTTP server pool.
    - Select **Drop** to instruct the BIG-IP system to drop the connection.
    - Select **Reset** to instruct the BIG-IP system to reset the connection.
11. Click **Finished**.

After you perform this task, the BIG-IP® system contains a Request Adapt profile that a standard HTTP virtual server can use to forward an HTTP request to an internal virtual server for ICAP traffic.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP®system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating an HTTP virtual server for enabling request adaptation

You perform this task to create a standard virtual server that can forward an HTTP request to an internal virtual server. The internal virtual server then sends the request to a pool of ICAP servers before the BIG-IP® system sends the request to the web server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address that you want to use as a destination for client traffic destined for a pool of HTTP web servers.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `443` or select **HTTPS** from the list.

   Note: *If traffic is on a secure internal network, you can use `80`/**HTTP**.*

6. From the **Configuration** list, select **Advanced**.
7. From the **HTTP Profile** list, select the name of the HTTP profile that you created previously.
8. From the **Request Adapt Profile** list, select the name of the Request Adapt profile that you previously created.
9. From the **Source Address Translation** list, select **Auto Map**.
10. From the **Default Pool** list, select the name of the HTTP server pool that you previously created.
11. Click **Finished**.

After you create the virtual server, the BIG-IP® system can forward an HTTP request to a pool of ICAP servers before sending the request to the web server.

Implementation result

After you complete the tasks in this implementation, the BIG-IP® system can perform content adaptation on HTTP requests as they pass through the BIG-IP system during normal HTTP processing. The new objects that this implementation creates are:

- A custom ICAP profile
- A pool of ICAP content adaptation servers
- An internal virtual server that load balances HTTP requests to the ICAP pool
- A custom Request Adapt profile that references the internal virtual server
- A custom HTTP profile

- A standard HTTP pool of web servers
- A standard HTTP virtual server that sends HTTP requests to an internal virtual server for content adaptation and load balances HTTP requests to the web pool

Configuring Content Adaptation for HTTP Requests and Responses

Overview: Configuring HTTP Request and Response Adaptation

This implementation describes how to configure the BIG-IP® content adaptation feature for adapting HTTP requests and responses. With this feature, a BIG-IP system virtual server can conditionally forward HTTP requests and HTTP responses to a pool of Internet Content Adaptation Protocol (ICAP) servers for modification, before sending a request to a web server or returning a response to the client system. There is support for secure connectivity for ICAP between a BIG-IP system internal virtual server and a pool of ICAP servers.

In this implementation, you create a standard HTTP virtual server and pool of web servers for processing client requests. The HTTP virtual server accepts each client request in the normal way, but before load balancing the request to the pool of web servers, the virtual server forwards the HTTP request to a special internal virtual server.

The *internal virtual server* receives the HTTP request from the standard virtual server, and load balances the request to a pool of ICAP servers for modification. After the ICAP server modifies the request, the BIG-IP system sends the request to the appropriate web server for processing. When the web server sends the HTTP response back to the HTTP virtual server, the BIG-IP system sends the response to a second internal virtual server, which in turn load balances the response to the pool of ICAP servers for modification. After the ICAP server modifies the response, the BIG-IP system sends the response back to the client system.

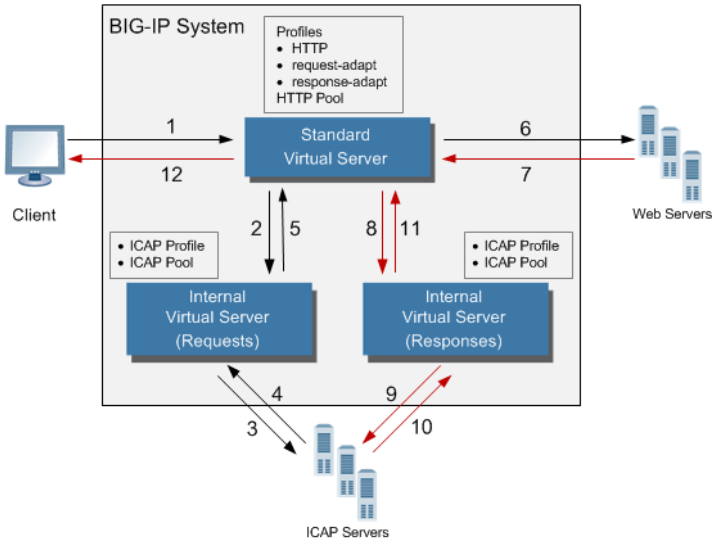

Figure 11: Content adaptation configuration for modifying HTTP requests and responses

The internal virtual server references the pool of content adaptation servers, including the load balancing method to use for those servers. The internal virtual server also references an ICAP profile, which includes specific instructions for how the BIG-IP system should modify each request or response. You can create two separate ICAP profiles, one for wrapping the HTTP request in an ICAP message for adaptation, and one for wrapping the HTTP response in an ICAP message for adaptation.

Optionally, each internal virtual server can reference:

- Any persistence method that you would like the BIG-IP system to use when load balancing traffic to the ICAP pool.
- Any health or performance monitor that you would like the BIG-IP system to use when load balancing traffic to the ICAP pool.
- Any iRules® related to the content adaptation.

Task summary

Complete the tasks in this implementation to create a BIG-IP® configuration that performs content adaptation for HTTP requests and responses.

Task List

Creating a custom client-side ICAP profile
Creating a custom server-side ICAP profile
Creating a pool of ICAP servers
Creating an internal virtual server for forwarding requests to an ICAP server
Creating an internal virtual server for forwarding responses to an ICAP server
Creating a custom Request Adapt profile
Creating a custom Response Adapt profile
Creating a custom HTTP profile
Creating a pool to process HTTP traffic
Creating an HTTP virtual server for enabling request and response adaptation

Creating a custom client-side ICAP profile

You create this ICAP profile when you want to use an ICAP server to wrap an HTTP request in an ICAP message before the BIG-IP® system sends the request to a pool of web servers. The profile specifies the HTTP request-header values that the ICAP server uses for the ICAP message.

Important: *You can use macro expansion for all ICAP header values. For example, if an ICAP header value contains* `${SERVER_IP}`*, the BIG-IP system replaces the macro with the IP address of the ICAP server selected from the pool assigned to the internal virtual server. If an ICAP header value contains* `${SERVER_PORT}`*, the BIG-IP system replaces the macro with the port of the ICAP server selected from the pool assigned to the internal virtual server. For example, you can set the* ***URI*** *value in an ICAP profile to* `icap://${SERVER_IP}:${SERVER_PORT}/virusScan`*.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **ICAP**.
2. Click **Create**.
3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `icap`.
5. On the right side of the screen, select the **Custom** check box.
6. In the **URI** field, type a URI in this format: `icap://hostname:port/path`.
   For example, using macro expansion, you can set the **URI** value to:

```
icap://${SERVER_IP}:${SERVER_PORT}/virusScan
```

.

7. In the **Preview Length** field, type a length or retain the default value `0`.

   This value defines the amount of the HTTP request or response that the BIG-IP system offers to the ICAP server when sending the request or response to the server for adaptation. This value should not exceed the length of the preview that the ICAP server has indicated it will accept.
8. In the **Header From** field, type a value for the `From:` ICAP header.
9. In the **Host** field, type a value for the `Host:` ICAP header.
10. In the **Referer** field, type a value for the `Referer:` ICAP header.
11. In the **User Agent** field, type a value for the `User-Agent:` ICAP header.
12. Click **Finished**.

After you create the ICAP profile, you can assign it to an internal virtual server so that the HTTP request that the BIG-IP system sends to an ICAP server is wrapped in an ICAP message, according to the settings you specified in the ICAP profile.

Creating a custom server-side ICAP profile

You create this ICAP profile when you want to use an ICAP server to wrap an HTTP response in an ICAP message before the BIG-IP® system sends the response back to the client. The profile specifies the HTTP response-header values that the ICAP server uses for the ICAP message.

Important: *Optionally, you can use macro expansion for all ICAP header values. For example, if an ICAP header value contains* `${SERVER_IP}`*, the BIG-IP system replaces the macro with the IP address of the ICAP server selected from the pool assigned to the internal virtual server. If an ICAP header value contains* `${SERVER_PORT}`*, the BIG-IP system replaces the macro with the port of the ICAP server selected from the pool assigned to the internal virtual server. For example, you can set the* ***URI*** *value in an ICAP profile to* `icap://${SERVER_IP}:${SERVER_PORT}/videoOptimization`*.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **ICAP**.
2. Click **Create**.
3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `icap`.
5. On the right side of the screen, select the **Custom** check box.
6. In the **URI** field, type a URI in this format: `icap://hostname:port/path`.
   For example, using macro expansion, you can set the **URI** value to:

```
icap://${SERVER_IP}:${SERVER_PORT}/videoOptimization
```

7. In the **Preview Length** field, type a length or retain the default value `0`.

   This value defines the amount of the HTTP request or response that the BIG-IP system offers to the ICAP server when sending the request or response to the server for adaptation. This value should not exceed the length of the preview that the ICAP server has indicated it will accept.
8. In the **Header From** field, type a value for the `From:` ICAP header.
9. In the **Host** field, type a value for the `Host:` ICAP header.
10. In the **Referer** field, type a value for the `Referer:` ICAP header.
11. In the **User Agent** field, type a value for the `User-Agent:` ICAP header.
12. Click **Finished**.

After you create the ICAP profile, you can assign it to an internal virtual server so that the HTTP response that the BIG-IP system sends to an ICAP server is wrapped in an ICAP message, according to the settings you specified in the ICAP profile.

Creating a pool of ICAP servers

You perform this task to create a pool of ICAP servers that perform content adaptation on HTTP requests and responses.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The pool of ICAP load balancing servers appears in the Pools list.

Creating an internal virtual server for forwarding requests to an ICAP server

A virtual server of type **internal** provides a destination that a **standard** type of virtual server can use when forwarding HTTP requests slated for ICAP-based content adaptation.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Description** field, type a description of the virtual server.

For example: `This virtual server ensures HTTP request modification through the use of the service_name ICAP service..`

5. From the **Type** list, select **Internal**.
6. For the **State** setting, verify that the value is set to **Enabled**.
7. From the **Configuration** list, select **Advanced**.
8. From the **ICAP Profile** list, select the ICAP profile that you previously created for handling HTTP requests.
9. From the **Default Pool** list, select the pool of ICAP servers that you previously created.
10. Click **Finished**.

After you perform this task, a standard type of virtual server can forward HTTP requests to an internal type of virtual server. The internal virtual server then sends the request to a pool of ICAP servers, before sending the request back to the standard virtual server for forwarding to the pool of web servers.

Creating an internal virtual server for forwarding responses to an ICAP server

A virtual server of type **internal** provides a destination that a **standard** type of virtual server can use when forwarding HTTP responses slated for ICAP-based content adaptation.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Description** field, type a description of the virtual server.
   For example: `This virtual server ensures HTTP response modification through the use of the service_name ICAP service..`
5. From the **Type** list, select **Internal**.
6. For the **State** setting, verify that the value is set to **Enabled**.
7. From the **Configuration** list, select **Advanced**.
8. From the **ICAP Profile** list, select the ICAP profile that you previously created for handling HTTP responses.
9. From the **Default Pool** list, select the pool of ICAP servers that you previously created.
10. Click **Finished**.

After you perform this task, a standard type of virtual server can forward an HTTP response to an internal type of virtual server. The internal virtual server then sends the response to a pool of ICAP servers before sending the response back to the standard virtual server for forwarding to the client system.

Creating a custom Request Adapt profile

You create a Request Adapt type of profile when you want a standard HTTP virtual server to forward HTTP requests to an internal virtual server that references a pool of ICAP servers. A Request Adapt type of profile instructs the HTTP virtual server to send an HTTP request to a named internal virtual server for possible request modification.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Request Adapt**.
2. Click **Create**.

3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `requestadapt`.
5. On the right-side of the screen, clear the **Custom** check box.
6. For the **Enabled** setting, retain the default value, `Enabled`.
   When you set this value to **Enabled**, the BIG-IP system forwards HTTP requests to the specified internal virtual server for adaptation.
7. From the **Internal Virtual Name** list, select the name of the internal virtual server that you previously created for forwarding HTTP requests to the pool of iCAP servers.
8. In the **Preview Size** field, type a numeric value.

   This specifies the maximum size of the preview buffer. This buffer holds a copy of the HTTP request header and the data sent to the internal virtual server, in case the adaptation server reports that no adaptation is needed. Setting the preview size to `0` disables buffering of the request and should only be done if the adaptation server always returns a modified HTTP request or the original HTTP request.
9. In the **Timeout** field, type a numeric value, in seconds.
   If the internal virtual server does not return a result within the specified time, a timeout error occurs. To disable the timeout, use the value `0`.
10. From the **Service Down Action** list, select an action for the BIG-IP system to take if the internal virtual server returns an error:
    - Select **Ignore** to instruct the BIG-IP system to ignore the error and send the unmodified HTTP request to an HTTP server in the HTTP server pool.
    - Select **Drop** to instruct the BIG-IP system to drop the connection.
    - Select **Reset** to instruct the BIG-IP system to reset the connection.
11. Click **Finished**.

After you perform this task, the BIG-IP® system contains a Request Adapt profile that a standard HTTP virtual server can use to forward an HTTP request to an internal virtual server for ICAP traffic.

Creating a custom Response Adapt profile

You create a Response Adapt type of profile when you want a standard HTTP virtual server to forward HTTP responses to an internal virtual server that references a pool of ICAP servers. A Response Adapt type of profile instructs the HTTP virtual server to send an HTTP response to a named internal virtual server for possible response modification.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Response Adapt**.
2. Click **Create**.
3. In the **Name** field, type a unique name for the profile.
4. For the **Parent Profile** setting, retain the default value, `responseadapt`.
5. On the right-side of the screen, select the **Custom** check box.
6. For the **Enabled** setting, retain the default value, `Enabled`.
   When you set this value to **Enabled**, the BIG-IP system forwards HTTP responses to the specified internal virtual server for adaptation.
7. From the **Internal Virtual Name** list, select the name of the internal virtual server that you previously created for forwarding HTTP responses to the pool of iCAP servers.
8. In the **Preview Size** field, type a numeric value.

   This specifies the maximum size of the preview buffer. This buffer holds a copy of the HTTP response header and the data sent to the internal virtual server, in case the adaptation server reports that no

adaptation is needed. Setting the preview size to `0` disables buffering of the response and should only be done if the adaptation server always returns a modified HTTP response or the original HTTP response.

9. In the **Timeout** field, type a numeric value.
   If the internal virtual server does not return a result within the specified time, a timeout error occurs. To disable the timeout, use the value `0`.
10. From the **Service Down Action** list, select an action for the BIG-IP system to take if the internal virtual server returns an error:
    - Select **Ignore** to instruct the BIG-IP system to ignore the error and send the unmodified HTTP response to an HTTP server in the HTTP server pool.
    - Select **Drop** to instruct the BIG-IP system to drop the connection.
    - Select **Reset** to instruct the BIG-IP system to reset the connection.
11. Click **Finished**.

After you perform this task, the BIG-IP® system contains a Response Adapt profile that a standard HTTP virtual server can use to forward an HTTP response to an internal virtual server for ICAP traffic.

Creating a custom HTTP profile

An HTTP profile defines the way that you want the BIG-IP®system to manage HTTP traffic.

Note: *Other HTTP profile types (HTTP Compression and Web Acceleration) enable you to configure compression and cache settings, as required. Use of these profile types is optional.*

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1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click **Create**.
   The New HTTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **http**.
5. Select the **Custom** check box.
6. Modify the settings, as required.
7. Click **Finished**.

The custom HTTP profile now appears in the HTTP profile list screen.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.

7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.

8. Click **Finished**.

The new pool appears in the Pools list.

Creating an HTTP virtual server for enabling request and response adaptation

You perform this task to create a standard virtual server that can forward an HTTP request or response to an internal virtual server. The internal virtual server then sends the request or response to a pool of ICAP servers before the BIG-IP® system sends the request or response to the client or web server. There is support for secure connectivity for ICAP between a BIG-IP system internal virtual server and a pool of ICAP servers.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address that you want to use as a destination for client traffic destined for a pool of HTTP web servers.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **Configuration** list, select **Advanced**.
7. From the **HTTP Profile** list, select the name of the HTTP profile that you created previously.
8. From the **Request Adapt Profile** list, select the name of the Request Adapt profile that you previously created.
9. From the **Response Adapt Profile** list, select the name of the Response Adapt profile that you previously created.
10. From the **Source Address Translation** list, select **Auto Map**.
11. From the **Default Pool** list, select the name of the HTTP server pool that you previously created.
12. Click **Finished**.

After you create the virtual server, the BIG-IP® system can forward an HTTP request or response to a pool of ICAP servers before sending the request or response to the client or web server, respectively.

Implementation result

After performing the tasks in this implementation, the BIG-IP® can perform content adaptation on HTTP requests and responses as they pass through the BIG-IP system during normal HTTP processing. The new objects that this implementation creates are:

- Two custom ICAP profiles (for requests and responses)
- One pool of ICAP content adaptation servers
- Two separate internal virtual servers. One internal virtual server load balances HTTP requests to the ICAP pool , while the other load balances responses to the ICAP pool.
- Two custom adaptation profiles (a Request Adapt profile and a Response Adapt profile) that each reference a separate internal virtual server (for requests and responses, respectively)
- A custom HTTP profile
- A standard HTTP pool of web servers
- A standard HTTP virtual server that sends HTTP requests and responses to an internal virtual server for content adaptation, load balances HTTP requests to the web pool, and forwards HTTP responses to the relevant client

Implementing SSL Forward Proxy on a Single BIG-IP System

Overview: SSL forward proxy client and server authentication

With the BIG-IP® system's *SSL forward proxy* functionality, you can encrypt all traffic between a client and the BIG-IP system, by using one certificate, and to encrypt all traffic between the BIG-IP system and the server, by using a different certificate.

A client establishes a three-way handshake and SSL connection with the wildcard IP address of the BIG-IP system virtual server. The BIG-IP system then establishes a three-way handshake and SSL connection with the server, and receives and validates a server certificate (while maintaining the separate connection with the client). The BIG-IP system uses the server certificate to create a second unique server certificate to send to the client. The client receives the second server certificate from the BIG-IP system, but recognizes the certificate as originating directly from the server.

Important: *To enable SSL forward proxy functionality, you can either:*

- Disassociate existing Client SSL and Server SSL profiles from a virtual server and configure the SSL Forward Proxy settings.
- Create new Client SSL and Server SSL profiles and configure the SSL Forward Proxy settings.

Then with either option, select the Client SSL and Server SSL profiles on a virtual server. You cannot modify existing Client SSL and Server SSL profiles while they are selected on a virtual server to enable SSL forward proxy functionality.

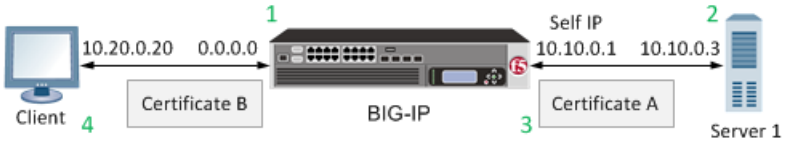

Figure 12: A virtual server configured with Client and Server SSL profiles for SSL forward proxy functionality

1. Client establishes three-way handshake and SSL connection with wildcard IP address.
2. BIG-IP system establishes three-way handshake and SSL connection with server.
3. BIG-IP system validates a server certificate (Certificate A), while maintaining the separate connection with the client.
4. BIG-IP system creates different server certificate (Certificate B) and sends it to client.

Task summary

To implement SSL forward proxy client-to-server authentication, as well as application data manipulation, you perform a few basic configuration tasks. Note that you must create both a Client SSL and a Server SSL profile, and enable the SSL Forward Proxy feature in both profiles.

Task list

Creating a custom Client SSL forward proxy profile
Creating a custom Server SSL forward proxy profile
Creating a load balancing pool
Creating a virtual server for client-side and server-side SSL traffic

Creating a custom Client SSL forward proxy profile

You perform this task to create a Client SSL forward proxy profile that makes it possible for client and server authentication while still allowing the BIG-IP® system to perform data optimization, such as decryption and encryption. This profile applies to client-side SSL forward proxy traffic only.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. From the **SSL Forward Proxy** list, select **Advanced**.
6. Select the **Custom** check box for the SSL Forward Proxy area.
7. Modify the SSL Forward Proxy settings.
   a) From the **SSL Forward Proxy** list, select **Enabled**.
   b) From the **CA Certificate** list, select a certificate.
   c) From the **CA Key** list, select a key.
   d) In the **CA Passphrase** field, type a passphrase.
   e) In the **Confirm CA Passphrase** field, type the passphrase again.
   f) In the **Certificate Lifespan** field, type a lifespan for the SSL forward proxy certificate in days.
   g) (Optional) From the **Certificate Extensions** list, select **Extensions List**.
   h) (Optional) For the **Certificate Extensions List** setting, select the extensions that you want in the **Available extensions** field, and move them to the **Enabled Extensions** field using the **Enable** button.
   i) Select the **Cache Certificate by Addr-Port** check box if you want to cache certificates by IP address and port number.
   j) From the **SSL Forward Proxy Bypass** list, select **Enabled**.
   Additional settings display.
   k) From the **Bypass Default Action** list, select **Intercept** or **Bypass**.
   The default action applies to addresses and hostnames that do not match any entry specified in the lists that you specify. The system matches traffic first against destination IP address lists, then source IP address lists, and lastly, hostname lists. Within these, the default action also specifies whether to search the intercept list or the bypass list first.

   Note: *If you select* ***Bypass*** *and do not specify any additional settings, you introduce a security risk to your system.*

8. Click **Finished**.

The custom Client SSL forward proxy profile now appears in the Client SSL profile list screen.

Creating a custom Server SSL forward proxy profile

You perform this task to create a Server SSL forward proxy profile that makes it possible for client and server authentication while still allowing the BIG-IP® system to perform data optimization, such as decryption and encryption. This profile applies to server-side SSL forward proxy traffic only.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Server**.
   The SSL Server profile list screen opens.
2. Click **Create**.
   The New Server SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list select **serverssl**.
5. Select the **Custom** check box for the Configuration area.
6. From the **SSL Forward Proxy** list, select **Enabled**.
7. Click **Finished**.

The custom Client SSL forward proxy profile now appears in the Client SSL profile list screen.

Creating a load balancing pool

You can create a *load balancing pool* (a logical set of devices such as web servers that you group together to receive and process traffic) to efficiently distribute the load on your server resources.

Note: *You must create the pool before you create the corresponding virtual server.*

---

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

   ---

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.

c) In the **Service Port** field, type a port number, or select a service name from the list.
d) In the **Priority** field, type a priority number.
This step is optional.
e) Click **Add**.

8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server for client-side and server-side SSL traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage application traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
The Virtual Server List screen opens.
2. Click the **Create** button.
The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. For a network, in the **Destination Address** field, type an IPv4 or IPv6 address in CIDR format to allow all traffic to be translated.
The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `0.0.0.0/0`, and an IPv6 address/prefix is `::/0`.
5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL forward proxy profile you previously created, and using the Move button, move the name to the **Selected** list.

Important: *To enable SSL forward proxy functionality, you can either:*

- Disassociate existing Client SSL and Server SSL profiles from a virtual server and configure the SSL Forward Proxy settings.
- Create new Client SSL and Server SSL profiles and configure the SSL Forward Proxy settings.

Then with either option, select the Client SSL and Server SSL profiles on a virtual server. You cannot modify existing Client SSL and Server SSL profiles while they are selected on a virtual server to enable SSL forward proxy functionality.

---

7. For the **SSL Profile (Server)** setting, from the **Available** list, select the name of the Server SSL forward proxy profile you previously created, and using the Move button, move the name to the **Selected** list.

Important: *To enable SSL forward proxy functionality, you can either:*

- Disassociate existing Client SSL and Server SSL profiles from a virtual server and configure the SSL Forward Proxy settings.
- Create new Client SSL and Server SSL profiles and configure the SSL Forward Proxy settings.

Then with either option, select the Client SSL and Server SSL profiles on a virtual server. You cannot modify existing Client SSL and Server SSL profiles while they are selected on a virtual server to enable SSL forward proxy functionality.

---

8. Assign other profiles to the virtual server if applicable.
9. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.

10. Click **Finished**.

The virtual server now appears in the Virtual Server List screen.

Implementation result

After you complete the tasks in this implementation, the BIG-IP® system ensures that the client system and server system can authenticate each other independently. After client and server authentication, the BIG-IP system can intelligently decrypt and manipulate the application data according to the configuration settings in the profiles assigned to the virtual server.

Implementing Proxy SSL on a Single BIG-IP System

Overview: Direct client-server authentication with application optimization

When setting up the BIG-IP® system to process application data, you might want the destination server to authenticate the client system directly, for security reasons, instead of relying on the BIG-IP system to perform this function. Retaining direct client-server authentication provides full transparency between the client and server systems, and grants the server final authority to allow or deny client access.

The feature that makes it possible for this direct client-server authentication is known as *Proxy SSL*. You enable this feature when you configure the Client SSL and Server SSL profiles.

Note: *To use this feature, you must configure both a Client SSL and a Server SSL profile.*

Without the Proxy SSL feature enabled, the BIG-IP system establishes separate client-side and server-side SSL connections and then manages the initial authentication of both the client and server systems.

With the Proxy SSL feature, the BIG-IP system makes it possible for direct client-server authentication by establishing a secure SSL tunnel between the client and server systems and then forwarding the SSL handshake messages from the client to the server and vice versa. After the client and server successfully authenticate each other, the BIG-IP system uses the tunnel to decrypt the application data and intelligently manipulate (optimize) the data as needed.

Task summary

To implement direct client-to-server SSL authentication, as well as application data manipulation, you perform a few basic configuration tasks. Note that you must create both a Client SSL and a Server SSL profile, and enable the Proxy SSL feature in both profiles.

Before you begin, verify that the client system, server system, and BIG-IP® system contain the appropriate SSL certificates for mutual authentication.

Important: *The BIG-IP certificate and key referenced in a Server SSL profile must match those of the server system.*

As you configure your network for Proxy SSL, keep in mind the following considerations:

- Proxy SSL supports only the RSA key exchange. For proper functioning, the client and server must not negotiate key exchanges or cipher suites that Proxy SSL does not support, such as the Diffie-Hellman (DH) and Ephemeral Diffie-Hellman (DHE) key exchanges, and the Elliptic Curve Cryptography (ECC) cipher suite. To avoid this issue, you can either configure the client so that the ClientHello packet does not include DH, DHE, or ECC; or configure the server to not accept DH, DHE, or ECC.
- Proxy SSL supports only the NULL compression method.

Task list

Creating a custom Server SSL profile
Creating a custom Client SSL profile

Creating a load balancing pool
Creating a virtual server for client-side and server-side SSL traffic

Creating a custom Server SSL profile

You perform this task to create a Server SSL profile that makes it possible for direct client-server authentication while still allowing the BIG-IP® system to perform data optimization, such as decryption and encryption. This profile applies to server-side SSL traffic only.

Important: *The certificate and key that you specify in this profile must match the certificate/key pair that you expect the back-end server to offer. If the back-end server has two or more certificates to offer, you must create a separate Server SSL profile for each certificate and then assign all of the Server SSL profiles to a single virtual server.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Server**.
   The SSL Server profile list screen opens.
2. Click **Create**.
   The New Server SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **serverssl** in the **Parent Profile** list.
5. From the **Certificate** list, select a relevant certificate name.
6. From the **Key** list, select a relevant key name.
7. For the **Proxy SSL** setting, select the check box.
8. From the **Configuration** list, select **Advanced**.
9. Modify all other settings, as required.
10. Choose one of the following actions:
    - If you need to create another Server SSL profile, click **Repeat**.
    - If you do not need to create another Server SSL profile, click **Finished**.

All relevant Server SSL profiles now appear on the SSL Server profile list screen.

Creating a custom Client SSL profile

You perform this task to create a Client SSL profile that makes it possible for direct client-server authentication while still allowing the BIG-IP system to perform data optimization, such as decryption and encryption. This profile applies to client-side SSL traffic only.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **clientssl** in the **Parent Profile** list.
5. For the **Proxy SSL** setting, select the check box.
6. From the **Configuration** list, select **Advanced**.
7. Modify all other settings, as required.
8. Click **Finished**.

The custom Client SSL profile now appears in the Client SSL profile list screen.

Creating a load balancing pool

You can create a *load balancing pool* (a logical set of devices such as web servers that you group together to receive and process traffic) to efficiently distribute the load on your server resources.

Note: *You must create the pool before you create the corresponding virtual server.*

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server for client-side and server-side SSL traffic

You can specify a virtual server to be either a host virtual server or a network virtual server to manage application traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.

The New Virtual Server screen opens.

3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type an address, as appropriate for your network.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.
5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the custom Client SSL proxy profile you previously created, and using the Move button, move the name to the **Selected** list.

   Important: *To enable proxy SSL functionality, you can either:*

   - Disassociate existing Client SSL and Server SSL profiles from a virtual server and configure the Proxy SSL settings.
   - Create new Client SSL and Server SSL profiles and configure the Proxy SSL settings.

   Then with either option, select the Client SSL and Server SSL profiles on a virtual server. You cannot modify existing Client SSL and Server SSL profiles while they are selected on a virtual server to enable proxy SSL functionality.
7. For the **SSL Profile (Server)** setting, from the **Available** list, select the name of the custom Server SSL proxy profile you previously created, and using the Move button, move the name to the **Selected** list.

   Important: *To enable SSL proxy functionality, you can either:*

   - Disassociate existing Client SSL and Server SSL profiles from a virtual server and configure the Proxy SSL settings.
   - Create new Client SSL and Server SSL profiles and configure the Proxy SSL settings.

   Then with either option, select the Client SSL and Server SSL profiles on a virtual server. You cannot modify existing Client SSL and Server SSL profiles while they are selected on a virtual server to enable SSL proxy functionality.
8. Assign other profiles to the virtual server if applicable.
9. In the Resources area, from the **Default Pool** list, select the name of the pool that you created previously.
10. Click **Finished**.

The virtual server now appears in the Virtual Server List screen.

Implementation result

After you complete the tasks in this implementation, the BIG-IP® system ensures that the client system and server system can initially authenticate each other directly. After client-server authentication, the BIG-IP system can intelligently decrypt and manipulate the application data according to the configuration settings in the profiles assigned to the virtual server.

Configuring HTTP Load Balancing with Source Address Affinity Persistence

Overview: HTTP load balancing with source affinity persistence

Many computing environments want to use a BIG-IP® system to intelligently manage their HTTP traffic. You can easily control your HTTP traffic by implementing a BIG-IP system feature known as an HTTP profile. An HTTP profile is a group of settings that affect the behavior of HTTP traffic. An HTTP profile defines the way that you want the BIG-IP system to manage HTTP traffic.

You can use the default HTTP profile, with all of its default values, or you can create a custom HTTP profile. This particular implementation uses the default HTTP profile.

When you configure the BIG-IP system to manage HTTP traffic, you can also implement simple session persistence, also known as *source address affinity persistence*. Source address affinity persistence directs session requests to the same server based solely on the source IP address of a packet. To implement source address affinity persistence, the BIG-IP system offers a default persistence profile that you can implement. Just as for HTTP, you can use the default profile, or you can create a custom simple persistence profile.

Task summary

This implementation describes how to set up a basic HTTP load balancing scenario and source address affinity persistence, using the default HTTP and source address affinity persistence profiles.

Because this implementation configures HTTP load balancing and session persistence using the default HTTP and persistence profiles, you do not need to specifically configure these profiles. Instead, you simply configure some settings on the virtual server when you create it.

Task list

Creating a pool to process HTTP traffic
Creating a virtual server for HTTP traffic

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.

7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.

8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for HTTP traffic

This task creates a destination IP address for application traffic. As part of this task, you must assign the relevant pool to the virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

   ---

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **HTTP Profile** list, select **http**.
7. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
8. From the **Default Persistence Profile** list, select **source_addr**.
   This implements simple persistence, using the default source address affinity profile.
9. Click **Finished**.

You now have a virtual server to use as a destination address for application traffic.

Configuring HTTP Load Balancing with Cookie Persistence

Overview: HTTP load balancing with cookie persistence

Many computing environments want to use a BIG-IP® system to intelligently manage their HTTP traffic. You can easily control your HTTP traffic by implementing a BIG-IP system feature known as an HTTP profile. An HTTP profile is a group of settings that affects the behavior of HTTP traffic. An HTTP profile defines the way that you want the system to manage HTTP traffic.

You can use the default HTTP profile, with all of its default values, or you can create a custom HTTP profile. When you create a custom HTTP profile, you not only modify the setting values, but you can enable more advanced features such as data compression of server responses.

When you configure the BIG-IP system to manage HTTP traffic, you can also implement cookie-based session persistence. *Cookie persistence* directs session requests to the same server based on HTTP cookies that the BIG-IP system stores in the client's browser.

Task summary

This implementation describes how to set up a basic HTTP load balancing scenario and cookie persistence, using the default HTTP profile.

Because this implementation configures HTTP load balancing and session persistence using the default HTTP, you do not need to specifically configure this profile. Instead, you simply configure some settings on the virtual server when you create it.

Task list

Creating a custom cookie persistence profile
Creating a pool to process HTTP traffic
Creating a virtual server for HTTP traffic

Creating a custom cookie persistence profile

A good way to implement cookie persistence is to create a custom cookie persistence profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Persistence**.
   The Persistence profile list screen opens.
2. Click **Create**.
   The New Persistence Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Persistence Type** list, select **Cookie**.
5. From the **Parent Profile** list, select **cookie**.
6. Select the **Custom** check box.

7. From the **Cookie Method** list, select **HTTP Cookie Insert**.
8. Clear the **Session Cookie** check box.
9. Type `60` in the **Minutes** field.
10. Click **Finished**.

The custom cookie persistence profile appears in the Persistence list.

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for HTTP traffic

This task creates a destination IP address for application traffic. As part of this task, you must assign the relevant pool to the virtual server.

Note: *You can also use HTTP Cookie Insert persistence with a Performance (HTTP) type of virtual server.*

---

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.

4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **HTTP Profile** list, select **http**.
7. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
8. From the **Default Persistence Profile** list, select the name of the custom cookie profile you created earlier, such as `mycookie_profile`.
   This implements cookie persistence, using a custom cookie persistence profile.
9. Click **Finished**.

You now have a virtual server to use as a destination address for application traffic.

Compressing HTTP Responses

Overview: Compressing HTTP responses

An optional feature of the BIG-IP® system is the system's ability to off-load HTTP compression tasks from the target server. All of the tasks that you need to configure HTTP compression, as well as the compression software itself, are centralized on the BIG-IP system. The primary way to enable HTTP compression is by configuring an HTTP Compression type of profile and then assigning the profile to a virtual server. This causes the system to compress HTTP content for any responses matching the values that you specify in the **Request-URI** or **Content-Type** settings of the HTTP Compression profile.

Tip: *If you want to enable HTTP compression for specific connections, you can write an iRule that specifies the HTTP:compress enable command. Using the BIG-IP system HTTP compression feature, you can include or exclude certain types of URIs or files that you specify. This is useful because some URI or file types might already be compressed. F5 Networks does not recommend using CPU resources to compress already-compressed data because the cost of compressing the data usually outweighs the benefits. Examples of regular expressions that you might want to specify for exclusion are* `.*\.pdf`, `.*\.gif`, *or* `.*\.html`.

Task summary

To configure HTTP data compression, you need to create an HTTP compression type of profile, as well as a virtual server.

Task list

Creating a customized HTTP compression profile
Creating a virtual server for HTTP compression

Creating a customized HTTP compression profile

If you need to adjust the compression settings to optimize compression for your environment, you can modify a custom HTTP compression profile.

1. On the Main tab, click **Acceleration** > **Profiles** > **HTTP Compression**.
   The HTTP Compression profile list screen opens.
2. Click **Create**.
   The New HTTP Compression profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select one of the following profiles:
   - **httpcompression**.
   - **wan-optimized-compression**.
5. Select the **Custom** check box.

6. Modify the settings, as required.
7. Click **Finished**.

The modified HTTP compression profile is available in the **HTTP Compression** list screen.

Creating a virtual server for HTTP compression

You can create a virtual server that uses an HTTP profile with an HTTP compression profile to compress HTTP responses.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. Select **http** in the **HTTP Profile** list.
7. From the **HTTP Compression Profile** list, select one of the following profiles:
   - **httpcompression**
   - **wan-optimized-compression**
   - A customized profile
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

The virtual server with an HTTP profile configured with an HTTP compression profile appears in the Virtual Server list.

After you have created a custom HTTP Compression profile and a virtual server, you can test the configuration by attempting to pass HTTP traffic through the virtual server. Check to see that the BIG-IP system includes and excludes the responses that you specified in the custom profile, and that the system compresses the data as specified.

Managing HTTP Traffic with the HTTP/2 Profile

Overview: Managing HTTP traffic with the HTTP2 (experimental) profile

You can configure a virtual server with the BIG-IP® Local Traffic Manager™ (LTM®) HTTP/2 profile to provide gateway functionality for HTTP 2.0 traffic, minimizing the latency of requests by multiplexing streams and compressing headers.

You can configure the BIG-IP® Acceleration HTTP/2 profile to provide full-proxy functionality for HTTP 2.0 traffic, minimizing the latency of requests by multiplexing streams and compressing headers.

Important: *Because the HTTP 2.0 specification is currently in a draft phase (draft 12), F5 Networks® considers the HTTP/2 Profile functionality in this release to be experimental, primarily intended for evaluation, and not intended for use in a production environment.*

A client initiates an HTTP/2 request to the BIG-IP system, the HTTP/2 virtual server receives the request on port `443`, and sends the request to the appropriate server. When the server provides a response, the BIG-IP system compresses and caches it, and sends the response to the client.

Important: *The BIG-IP system supports HTTP/2 for client-side connections only. This means that when a client that supports HTTP/2 connects to a virtual server that has an HTTP/2 profile assigned to it, the resulting server-side traffic (such as traffic sent to pool members) is sent over HTTP/1.1.*

Source address persistence is not supported by the HTTP/2 profile.

Summary of HTTP/2 profile functionality

By using the HTTP/2 profile, the BIG-IP system provides the following functionality for HTTP/2 requests.

Creating concurrent streams for each connection.
You can specify the maximum number of concurrent HTTP requests that are accepted on a HTTP/2 connection. If this maximum number is exceeded, the system closes the connection.

Limiting the duration of idle connections.
You can specify the maximum duration for an idle HTTP/2 connection. If this maximum duration is exceeded, the system closes the connection.

Enabling a virtual server to process HTTP/2 requests.
You can configure the HTTP/2 profile on the virtual server to receive HTTP, SPDY, and HTTP/2 traffic, or to receive only HTTP/2 traffic, based in the activation mode you select. (Note the HTTP/2 profile to receive only HTTP/2 traffic is primarily intended for troubleshooting.)

Inserting a header into the request.
You can insert a header with a specific name into the request. The default name for the header is `X-HTTP/2`.

Important: *The HTTP/2 protocol is incompatible with NTLM protocols. Do not use the HTTP/2 protocol with NTLM protocols.*

Task summary

About HTTP/2 profiles

The BIG-IP® system includes an HTTP/2 profile type that you can use to manage HTTP/2 traffic, improving the efficiency of network resources while reducing the perceived latency of requests and responses. The LTM HTTP/2 profile enables you to achieve these advantages by multiplexing streams and compressing headers with Transport Layer Security (TLS) or Secure Sockets Layer (SSL) security.

Important: *Subsequent versions of the HTTP/2 protocol might be incompatible with this release.*

The BIG-IP® system's Acceleration functionality includes an HTTP/2 profile type that you can use to manage HTTP/2 traffic, improving the efficiency of network resources while reducing the perceived latency of requests and responses. The Acceleration HTTP/2 profile enables you to achieve these advantages by multiplexing streams and compressing headers with Transport Layer Security (TLS) or Secure Sockets Layer (SSL) security.

The HTTP/2 protocol uses a binary framing layer that defines a frame type and purpose in managing requests and responses. The binary framing layer determines how HTTP messages are encapsulated and transferred between the client and server, a significant benefit of HTTP 2.0 when compared to earlier versions.

All HTTP/2 communication occurs by means of a connection with bidirectional streams. Each stream includes messages, consisting of one or more frames, that can be interleaved and reassembled using the embedded stream identifier within each frame's header. The HTTP/2 profile enables you to specify a maximum frame size and write size, which controls the total size of combined data frames, to improve network utilization.

Multiplexing streams

You can use the HTTP/2 profile to multiplex streams (interleaving and reassembling the streams), by specifying a maximum number of concurrent streams permitted for a single connection. Also, because multiplexing streams on a single TCP connection compete for shared bandwidth, you can use the profile's Priority Handling settings to configure stream prioritization and define the relative order of delivery. For example, a Strict setting processes higher priority streams to completion before processing lower priority streams; whereas, a Fair setting allows higher priority streams to use more bandwidth than lower priority streams, without completely blocking the lower priority streams.

Additionally, you can specify the way that the HTTP/2 profile controls the flow of streams. The Receive Window setting allows HTTP/2 to stall individual upload streams, as needed. For example, if the BIG-IP system is unable to process a slow stream on a connection, but is able to process other streams on the connection, it can use the Receive Window setting to specify a frame size for the slow stream, thus delaying that upload stream until the size is met and the receiver is able to process it, while concurrently proceeding to process frames for another stream.

Compressing headers

When you configure the HTTP/2 profile's Header Table Size setting, you can compress HTTP headers to conserve bandwidth. Compressing HTTP headers reduces the object size, which reduces required bandwidth. For example, you can specify a larger table value for better compression, but at the expense of using more memory.

HTTP/2 (experimental) profile settings

This table provides descriptions of the HTTP/2 profile settings.

Setting	Default	Description
Name		Specifies the name of the HTTP/2 profile.
Parent Profile	**http2**	Specifies the profile that you want to use as the parent profile. Your new profile inherits all settings and values from the parent profile specified.
Concurrent Streams Per Connection	`10`	Specifies the number of concurrent requests allowed to be outstanding on a single HTTP/2 connection.
Connection Idle Timeout	`300`	Specifies the number of seconds an HTTP/2 connection is left open idly before it is closed.
Insert Header	**Disabled**	Specifies whether an HTTP header that indicates the use of HTTP/2 is inserted into the request sent to the origin web server.
Insert Header Name	`X-HTTP/2`	Specifies the name of the HTTP header controlled by the **Insert Header Name** setting.
Activation Modes	**Select Modes**	Specifies how a connection is established as a HTTP/2 connection.
Selected Modes	**ALPN** **NPN**	Used only with an **Activation Modes** selection of **Select Modes**, specifies the extension, **ALPN** for HTTP/2 or **NPN** for SPDY, used in the HTTP/2 profile. The order of the extensions in the **Selected Modes Enabled** list ranges from most preferred (first) to least preferred (last). Clients typically use the first supported extension. At least one HTTP/2 mode must be included in the **Enabled** list. The values **ALPN** and **NPN** specify that the TLS Application Layer Protocol Negotiation (ALPN) and Next Protocol Negotiation (NPN) will be used to determine whether HTTP/2 or SPDY should be activated. Clients that use TLS, but only support HTTP will work as if HTTP/2 is not present. The value **Always** specifies that all connections function as HTTP/2 connections. Selecting **Always** in the **Activation Mode** list is primarily intended for troubleshooting.
Priority Handling	**Strict**	Specifies how the HTTP/2 profile handles priorities of concurrent streams within the same connection. Selecting **Strict** processes higher priority streams to completion before processing lower priority streams. Selecting **Fair** enables higher priority streams to use more bandwidth than lower priority streams, without completely blocking the lower priority streams.
Receive Window	`32`	Specifies the *receive window*, which is HTTP/2 protocol functionality that controls flow, in KB. The receive window allows the HTTP/2 protocol to stall individual upload streams when needed.
Frame Size	`2048`	Specifies the size of the data frames, in bytes, that the HTTP/2 protocol sends to the client. Larger frame sizes improve network utilization, but can affect concurrency.
Write Size	`16384`	Specifies the total size of combined data frames, in bytes, that the HTTP/2 protocol sends in a single write function. This setting controls the size of the TLS records when the HTTP/2 protocol is used over Secure Sockets Layer (SSL). A large write size causes the HTTP/2 protocol to buffer more data and improves network utilization.

Setting	Default	Description
Header Table Size	4096	Specifies the size of the header table, in KB. The HTTP/2 protocol compresses HTTP headers to save bandwidth. A larger table size allows better compression, but requires more memory.

Creating a pool to manage HTTPS traffic

You can create a pool (a logical set of devices, such as web servers, that you group together to receive and process HTTPS traffic) to efficiently distribute the load on your server resources.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, assign **https** or **https_443** by moving it from the **Available** list to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Use the **New Members** setting to add each resource that you want to include in the pool:
   a) In the **Address** field, type an IP address.
   b) In the **Service Port** field type 443 , or select **HTTPS** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The HTTPS load balancing pool now appears in the Pool List screen.

Creating a virtual server to manage HTTP traffic

You can create a virtual server to manage HTTP traffic redirected from an HTTP/2 virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is 10.0.0.1 or 10.0.0.0/24, and an IPv6 address/prefix is ffe1::0020/64 or

`2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address for this field needs to be on the same subnet as the external self-IP.*

5. In the **Service Port** field, type `443` or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select **http**.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select **clientssl**, and using the Move button, move the name to the **Selected** list.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

The HTTP virtual server is now available with the specified settings.

Creating an HTTP/2 profile

You can create an HTTP/2 profile for a virtual server, which responds to clients that send HTTP/2 requests.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP/2 (experimental)**.
   The HTTP/2 profile list screen opens.
2. On the Main tab, click **Acceleration** > **Profiles** > **HTTP/2 (experimental)**.
   The HTTP/2 profile list screen opens.
3. Click **Create**.
   The New HTTP/2 Profile screen opens.
4. In the **Name** field, type a unique name for the profile.
5. From the **Configuration** list, select **Advanced**.
6. Select the **Custom** check box.
7. In the **Concurrent Streams Per Connection** field, type the number of concurrent connections to allow on a single HTTP/2 connection.
8. In the **Connection Idle Timeout** field, type the number of seconds that a HTTP/2 connection is left open idly before it is closed.
9. (Optional) From the **Insert Header** list, select **Enabled** to insert a header name into the request sent to the origin web server.
10. (Optional) In the **Insert Header Name** field, type a header name to insert into the request sent to the origin web server.
11. From the **Activation Modes** list, accept the default enabled modes.
12. In the **Selected Modes** setting, select the protocol modes that you want to enable.

Option	Description
All Modes Enabled	Enables all supported protocol versions: HTTP/2, SPDY, and HTTP1.1.
Select Modes	Enables one or more specific protocol versions that you specify. For the **Selected Modes** setting, select a protocol entry in the **Available** field, and move the entry to the **Selected** field using the **Move** button.

13. From the **Priority Handling** list, select how the HTTP/2 profile handles priorities of concurrent streams within the same connection.

Option	Description
Strict	Processes higher priority streams to completion before processing lower priority streams.
Fair	Enables higher priority streams to use more bandwidth than lower priority streams, without completely blocking the lower priority streams.

14. In the **Receive Window** field, type the flow-control size for upload streams, in KB.
15. In the **Frame Size** field, type the size of the data frames, in bytes, that the HTTP/2 protocol sends to the client.
16. In the **Write Size** field, type the total size of combined data frames, in bytes, that the HTTP/2 protocol sends in a single write function.
17. In the **Header Table Size** field, type the size of the header table, in KB, for the HTTP headers that the HTTP/2 protocol compresses to save bandwidth.
18. Click **Finished**.

An HTTP/2 profile is now available with the specified settings.

Creating a virtual server to manage HTTP/2 traffic

You can create a virtual server to manage HTTP/2 traffic.

Important: *Do not use the HTTP/2 protocol with NTLM protocols as they are incompatible.*

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `443` or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select **http**.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select **clientssl**, and using the Move button, move the name to the **Selected** list.
8. From the **Acceleration** list, select **Advanced**.
9. From the **HTTP/2 (experimental) Profile** list, select **http2**, or a user-defined HTTP/2 profile.
10. From the **Default Pool** list, select a pool that is configured for an HTTP/2 profile.
11. Click **Finished**.

The HTTP/2 virtual server is now ready to manage HTTP/2 traffic.

Managing HTTP Traffic with the SPDY Profile

Overview: Managing HTTP traffic with the SPDY profile

You can use the BIG-IP® Local Traffic Manager™ SPDY (pronounced "speedy") profile to minimize latency of HTTP requests by multiplexing streams and compressing headers. When you assign a SPDY profile to an HTTP virtual server, the HTTP virtual server informs clients that a SPDY virtual server is available to respond to SPDY requests.

You can use the BIG-IP® Acceleration SPDY (pronounced "speedy") profile to minimize latency of HTTP requests by multiplexing streams and compressing headers. When you assign a SPDY profile to an HTTP virtual server, the HTTP virtual server informs clients that a SPDY virtual server is available to respond to SPDY requests.

When a client sends an HTTP request, the HTTP virtual server, with an assigned iRule, manages the request as a standard HTTP request. It receives the request on port `80`, and sends the request to the appropriate server. When the BIG-IP provides the request to the origin web server, the virtual server's assigned iRule inserts an HTTP header into the request (to inform the client that a SPDY virtual server is available to handle SPDY requests), compresses and caches it, and sends the response to the client.

A client that is enabled to use the SPDY protocol sends a SPDY request to the BIG-IP system, the SPDY virtual server receives the request on port `443`, converts the SPDY request into an HTTP request, and sends the request to the appropriate server. When the server provides a response, the BIG-IP system converts the HTTP response into a SPDY response, compresses and caches it, and sends the response to the client.

Note: *Source address persistence is not supported by the SPDY profile.*

Summary of SPDY profile functionality

By using the SPDY profile, the BIG-IP system provides the following functionality for SPDY requests.

Creating concurrent streams for each connection.
You can specify the maximum number of concurrent HTTP requests that are accepted on a SPDY connection. If this maximum number is exceeded, the system closes the connection.

Limiting the duration of idle connections.
You can specify the maximum duration for an idle SPDY connection. If this maximum duration is exceeded, the system closes the connection.

Enabling a virtual server to process SPDY requests.
You can configure the SPDY profile on the virtual server to receive both HTTP and SPDY traffic, or to receive only SPDY traffic, based in the activation mode you select. (Note that setting this to receive only SPDY traffic is primarily intended for troubleshooting.)

Inserting a header into the request.
You can insert a header with a specific name into the request. The default name for the header is `X-SPDY`.

Important: *The SPDY protocol is incompatible with NTLM protocols. Do not use the SPDY protocol with NTLM protocols. For additional details regarding this limitation, please refer to the SPDY specification:* *`http://dev.chromium.org/spdy/spdy-authentication`.*

Task summary

Creating a pool to process HTTP traffic

You can create a pool of web servers to process HTTP requests.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating an iRule for SPDY requests

You can create an iRule that inserts an HTTP header into responses, enabling a virtual server to respond specifically to SPDY requests.

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen displays a list of existing iRules®.
2. Click the **Create** button.
   The New iRule screen opens.
3. In the **Name** field, type a unique name for the iRule.

4. In the **Definition** field, type an iRule to insert the SPDY header.

```
ltm rule /Common/spdy_enable {
    when HTTP_RESPONSE {
    HTTP::header insert "Alternate-Protocol" "443:npn-spdy/3"
}
}
```

Note: *Some browsers do not support the "Alternate-Protocol" header, and require a direct HTTPS connection to a virtual server that manages SPDY traffic using port 443.*

5. Click **Finished**.

The iRule that you created is now available.

Creating a virtual server to manage HTTP traffic

You can create a virtual server to manage HTTP traffic and initiate SPDY traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address for this field needs to be on the same subnet as the external self-IP.*

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **HTTP Profile** list, select **http**.
7. In the Resources area of the screen, for the **iRules** setting, from the **Available** list, select the name of the SPDY iRule that you want to assign, and using the Move button, move the name into the **Enabled** list.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

The HTTP virtual server is now available with the specified settings.

Creating a SPDY profile

You can create a SPDY profile for a virtual server, which responds to clients that send SPDY requests with a Next Protocol Negotiation (`npn`) extension in the header.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **SPDY**.
   The SPDY profile list screen opens.

2. On the Main tab, click **Acceleration** > **Profiles** > **SPDY**.
   The SPDY profile list screen opens.
3. Click **Create**.
   The New SPDY Profile screen opens.
4. In the **Name** field, type a unique name for the profile.
5. From the **Configuration** list, select **Advanced**.
6. Select the **Custom** check box.
7. In the **Activation Mode** list, accept the default NPN mode.
8. In the **Concurrent Streams Per Connection** field, type the number of concurrent connections to allow on a single SPDY connection.
9. In the **Connection Idle Timeout** field, type the number of seconds that a SPDY connection is left open idly before it is closed.
10. (Optional) In the **Insert Header** list, select **Enabled** to insert a header name into the request sent to the origin web server.
11. (Optional) In the **Insert Header Name** field, type a header name to insert into the request sent to the origin web server.
12. In the Protocol Versions list, select the protocol versions that you want to enable.

Option	Description
All Versions Enabled	Enables all supported SPDY protocol versions and HTTP1.1.
Select Versions	Enables one or more specific protocol versions that you specify. For the **Selected Versions** setting, select a protocol entry in the **Available** field, and move the entry to the **Selected** field using the **Move** button.

13. In the **Priority Handling** list, select how the SPDY profile handles priorities of concurrent streams within the same connection.

Option	Description
Strict	Processes higher priority streams to completion before processing lower priority streams.
Fair	Enables higher priority streams to use more bandwidth than lower priority streams, without completely blocking the lower priority streams.

14. In the **Receive Window** field, type the flow-control size for upload streams, in KB.
15. In the **Frame Size** field, type the size of the data frames, in bytes, that the SPDY protocol sends to the client.
16. In the **Write Size** field, type the total size of combined data frames, in bytes, that the SPDY protocol sends in a single write function.
17. In the **Compression Level** field, type a compression level value from `0` (no compression) through `10` (most compression).
18. In the **Compression Window Size** field, type a size, in KB, for the compression window, where a larger number increases the compression of HTTP headers, but requires more memory.
19. Click **Finished**.

A SPDY profile is now available with the specified settings.

Creating a virtual server to manage SPDY traffic

You can create a virtual server to manage SPDY traffic.

Important: *Do not use the SPDY protocol with NTLM protocols as they are incompatible. For additional details regarding this limitation, please refer to the SPDY specification:* `http://dev.chromium.org/spdy/spdy-authentication`.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `443` or select **HTTPS** from the list.
6. From the **HTTP Profile** list, select **http**.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select **clientssl**, and using the Move button, move the name to the **Selected** list.
8. From the **SPDY Profile** list, select **spdy**, or a user-defined SPDY profile.
9. From the **Default Pool** list, select a pool that is configured for a SPDY profile.
10. Click **Finished**.

The SPDY virtual server is now ready to manage SPDY traffic.

Using Via Headers to Acquire Information About Intermediate Routers

Overview: Using Via headers

Via headers provide useful information about intermediate routers that can be used in network analysis and troubleshooting.

Task summary for identifying intermediate information with Via headers

Perform these tasks to identify intermediate information with Via headers.

Identifying information about intermediate proxies with Via headers

Removing Via headers from requests and responses

Identifying information about intermediate proxies with Via headers

The BIG-IP® system can include Via headers (configured in an HTTP profile) in a request, a response, or both, to identify information, such as protocols and names, for intermediate proxies that forward messages.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click the name of a user-defined profile.
3. Select the **Custom** check box.
4. In the **Send Proxy Via Header In Request** list, do one of the following:
   - Select the **Preserve** option to include the `Via` header in the client request to the origin web server.
   - Select the **Append** option, and then type a string in the **Send Proxy Via Header Host Name** field, which is appended as a comment when sending a `Via` header in a request to an origin web server.
5. In the **Send Proxy Via Header In Response** list, do one of the following:
   - Select the **Preserve** option to include the `Via` header in the client response to the client.
   - Select the **Append** option, and then type a string in the **Send Proxy Via Header Host Name** field, which is appended as a comment when sending a `Via` header in a response to a client.
6. Click **Finished**.

The BIG-IP system is configured to use Via headers to identify protocols and intermediate proxies that forward messages.

Removing Via headers from requests and responses

Via headers are configured in an HTTP profile for requests or responses.

You can remove Via headers from requests and responses if you no longer require them to identify information about intermediate proxies.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **HTTP**.
   The HTTP profile list screen opens.
2. Click the name of a user-defined profile.
3. Select the **Custom** check box.
4. In the **Send Proxy Via Header In Request** list, select **Remove**.
5. In the **Send Proxy Via Header In Response** list, select **Remove**.
6. Click **Finished**.

The BIG-IP® system removes Via headers, as configured, for requests and responses.

Configuring the BIG-IP System as a Reverse Proxy Server

Overview: URI translation and HTML content modification

For environments that use web servers, you might want your websites to appear differently on the external network than on the internal network. For example, you might want the BIG-IP® system to send traffic destined for `http://www.siterequest.com/` to the internal server `http://appserver1.siterequest.com/` instead. Normally, this translation could cause some issues, such as the web server expecting to see a certain host name (such as for name-based virtual hosting) or the web server using the internal host name and/or path when sending a redirect to client systems. Fortunately, you can configure the BIG-IP system to solve these problems.

You can also configure the BIG-IP system to modify HTML content as needed after the system has performed the URI translation.

This implementation describes an example of URI translation and HTML content modification and then provides the tasks to implement this example.

About URI translation

You can configure the BIG-IP® system to perform URI translation on HTTP requests. Suppose that a company named `Siterequest` has a website `www.siterequest.com`, which has a public IP address and a registered DNS entry, and therefore can be accessed from anywhere on the Internet.

Furthermore, suppose that `Siterequest` has two application servers with private IP addresses and unregistered DNS entries, inside the company's firewall. The application servers are visible within the internal network as `appserver1.siterequest.com` and `appserver2.siterequest.com`.

Because these servers have no public DNS entries, any client system that tries to access one of these servers from outside the company network receives a `no such host` error.

As the illustration shows, you can prevent this problem by configuring the BIG-IP system to act as a reverse proxy server:

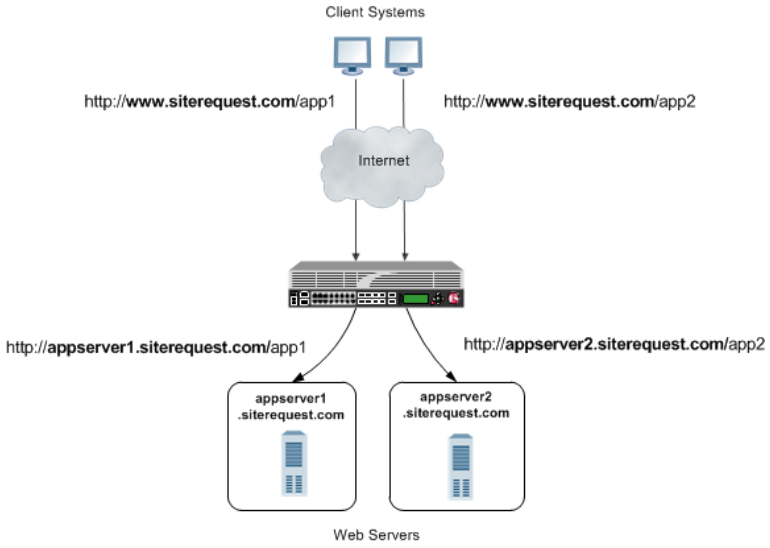

Figure 13: The BIG-IP system as a reverse proxy server for URI translation

In the example, the company `Siterequest` has decided to enable Web access to the internal application servers, without exposing them to the Internet directly. Instead, the company has integrated the servers with the web server `siterequest.com` so that `http://www.siterequest.com/sales` is mapped internally to `http://appserver1.siterequest.com/sales`, and `http://siterequest.com/marketing` is mapped internally to `http://appserver2.example.com/marketing`. This is a typical reverse-proxy configuration.

To configure the BIG-IP system to perform this translation, you create a Rewrite profile and configure one or more URI rules. A *URI rule* specifies the particular URI translation that you want the BIG-IP system to perform. Specifically, a URI rule translates the scheme, host, port, or path of any client URI, server URI, or both. A URI rule also translates any domain and path information in the `Set-Cookie` header of the response when that header information matches the information in the URI rule.

Note: *This profile supports HTML and CSS content types only. To specify MIME types for HTML content, you can either create an HTML profile or accept the default values that the Rewrite profile uses,* `text/html` *and* `text/xhtml`*. For CSS content, only the* `text/css` *MIME type is supported.*

Rules for matching requests to URI rules

The BIG-IP® system follows these rules when attempting to match a request to a URI rule:

- A request does not need to match any entry. That is, if no entries match and there is no catch-all entry, then the Rewrite profile has no effect.
- Each request matches one entry only, which is the entry with the most specific host and path.
- If multiple entries match, then the BIG-IP system uses the entry with the deepest path name on the left side of the specified mapping.
- The BIG-IP system matches those requests that contain host names in URIs before matching requests that do not contain host names in URIs.
- The BIG-IP system processes the specified entries in the mapping from most-specific to least-specific, regardless of the order specified in the actual Rewrite profile.

About URI Rules

When creating a URI rule, you must specify the client and server URIs in these ways:

- When the URI is a path prefix only, the path must be preceded by and followed by a `/`, for example, `/sales/`.
- When the URI contains more than the path prefix (such as, a host), the URI must also contain a scheme and must be followed by a `/`, for example, `http://www.siterequest/sales/`.

Introduction to HTML content modification

When you configure an HTML profile on the BIG-IP® system, the system can modify HTML content that passes through the system, according to your specifications. For example, if you want the BIG-IP system to detect all content of type `text/html` and then remove all instances of the HTML `img` tag with the `src` attribute, you can configure an HTML profile accordingly, and assign it to the virtual server. The HTML profile ensures that the BIG-IP system removes those instances of the tag from any HTML content that passes through the virtual server.

Or, you can configure an HTML profile to match on a certain tag and attribute in HTML content when a particular iRule event is triggered, and then create an iRule that includes a command to replace the value of the matched attribute with a different attribute. The BIG-IP system includes several iRule commands that you can use when the `Raise Event on Comment` or `Raise Event on Tag` events are triggered. For more information on iRule commands related to HTML content modification, see the F5 Networks web site `http://devcentral.f5.com`.

HTML tag removal and replacement are just two of several HTML rules that you can configure to manipulate HTML content. An *HTML rule* defines the specific actions that you want the BIG-IP system to perform on a specified type HTML content.

Task summary

The first step to configuring the BIG-IP® system to act as a reverse proxy server is to create a Rewrite type of profile on the BIG-IP system and associate it with a virtual server. Note that each virtual server must have an HTTP profile. The Rewrite profile is designed for HTTP sites, as well as HTTPS sites where SSL is terminated on the BIG-IP system (that is, the virtual server references a Client SSL profile).

Task List

Creating a Rewrite profile to specify URI rules
Creating an HTML profile for tag removal
Creating pools for processing HTTP traffic
Creating a local traffic policy
Creating a virtual server

Creating a Rewrite profile to specify URI rules

To configure the BIG-IP® system to perform URI translation, you create a *Rewrite profile*, specifying one or more URI rules that associate a client-side path with a server-side URI. You also specify whether you want the URI translation to pertain to HTTP requests, responses, or both.

Note: *This profile supports HTML and CSS content types only. To specify MIME types for HTML content, you can either create an HTML profile or accept the default values that the Rewrite profile uses,* `text/html` *and* `text/xhtml`*. For CSS content, only the* `text/css` *MIME type is supported.*

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1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Rewrite**.
   The Rewrite profile list appears.
2. Click **Create New Profile**.
   The Create New Profile Rewrite pop-up screen opens.
3. In the **Profile Name** field, type a name, such as `my_rewrite_profile`.
4. From the **Parent Profile** list, select `rewrite`.
5. From the **Rewrite Mode** list, select **URI Translation**.
6. On the left pane, click **URI Rules**.
   An empty text box appears for displaying client-server URI mappings that you specify.
7. Click **Add**.
8. From the **Rule Type** list, select **Both**.
9. In the **Client URI** box, type a client path, such as `/sales/`.
10. In the **Server URI** box, type a server URI, such as `http://appserver1.siterequest.com/sales/`.
    You must include a scheme in the server URI that you specify.
    An example of a scheme is `http`.
11. Click **OK**.
    This displays a mapping of the specified client path to the associated server scheme, host, and path.
12. Click **Add** again.
13. From the **Rule Type** list, select **Both**.
14. In the **Client URI** box, type a client path, such as `/marketing/`.
15. In the **Server URI** box, type a server URI, such as `http://appserver2.siterequest.com/marketing/`.
    You must include a scheme in the server URI that you specify.
    An example of a scheme is `http`.
16. Click **OK**.
    This displays a mapping of the specified client path to the associated server scheme, host, and path.
17. Click **OK**.

The BIG-IP system now includes two URI rules for performing URI translation on both requests and responses. For example, the host name in a request destined for `http://www.siterequest.com/sales/` will be translated to `http://appserver1.siterequest.com/sales/`, and the host name in a request destined for `https://www.siterequest.com/marketing/` will be translated to `http://appserver2.siterequest.com/marketing/`. A reverse translation occurs on any response.

Creating an HTML profile for tag removal

You create an HTML profile when you want the BIG-IP® system to act on certain types of HTML content.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Content** > **HTML**.
2. Click the **Create New Profile** button.
3. In the **Profile Name** field, type a name, such as `my_html_profile`.
4. From the **Parent Profile** list, select **/Common/html**.
5. On the left pane, click **HTML Rules**.
6. On the **Create New** button, click the right arrow.
7. Select **Remove Tag**.
   The Create New Remove Tag Rule box appears.
8. In the **Rule Name** field, type a name, such as `my_remove_img_tag_rule`.
9. Optionally, in the **Description** field, type a description of the rule, such as `Removes the img tag with the src attribute`.
10. On the left pane, click **Match Settings**.
11. In the **Match Tag Name** field, type the name of the tag that you want to remove from the HTML content.
    An example of a tag to specify is the HTML `img` tag.
12. In the **Match Attribute Name** field, type the name of the attribute associated with the tag that you specified for removal.
    An example of an attribute to specify is the `src` attribute for the `img` tag.
13. Click **OK**.
14. In the **Available Rules** list, locate the HTML rule that you want to enable, and select the adjacent check box.
15. Using the Move button, move the selected HTML rule to the **Selected Rules** list.
16. Click **OK**.

After creating this HTML profile, you can implement the HTML content modification by assigning the profile to the virtual server that is processing the associated HTTP traffic.

Creating pools for processing HTTP traffic

You can create two load balancing pools, and then create a policy that forwards certain HTTP traffic to one pool, and other HTTP traffic to another pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
5. Click **Finished**.
6. Repeat this task to create a second pool.

The new pools appear in the Pools list.

Creating a local traffic policy

You perform this task to create a local traffic policy that forwards traffic to one or more non-default pools, based on some condition. For example, for a condition such as an HTTP request whose host name equals `siterequest.com` and URI starts with `/sales/`, the BIG-IP® system can forward that request to `pool_app1`.

1. On the Main tab, click **Local Traffic** > **Policies** > **Policy List**.
   The Policy List screen opens.
2. Click **Create**.
   The New Policy screen opens.
3. In the **Name** field, type a unique name for the policy.
4. From the **Strategy** list, select a matching strategy.
5. For the **Requires** setting, select **http** from the **Available** list, and move the entry to the **Selected** list using the Move button.
6. For the **Controls** setting, select **forwarding** from the **Available** list, and move the entry to the **Selected** list using the Move button.
7. Click **Add**.
   The New Rule screen opens.
8. In the **Rule** field, type a unique name for the rule.
9. From the **Operand** list, select **http-host**.
10. Using the options for the **Conditions** setting, configure a rule where the condition equals the criteria specified:
    a) From the **Condition** list, select **equals**.
    b) (Optional) Select the **case sensitive** check box to apply case sensitivity to the condition.
    c) In the **Values** field, type the text for the applicable value and click **Add**.
    An example of a value is `siterequest.com`.
    The specified condition appears in the **Values** list box.
    d) At the lower left, click **Add**.
    The configured condition appears in the **Conditions** list.
11. From the **Operand** list, select **http-uri**.
12. Using the options for the **Conditions** setting, configure a rule where the condition starts with the criteria specified:
    a) From the **Condition** list, select **starts with**.
    b) (Optional) Select the **case sensitive** check box to apply case sensitivity to the condition.
    c) In the **Values** field, type the text for the applicable value and click **Add**.
    An example of a value is `/app1/`.
    The specified condition appears in the **Values** list box.
    d) At the lower left click **Add**.
    The configured condition appears in the **Condition** list.
13. Using the **Actions** setting, configure the applicable options:
    a) From the **Target** list, select **forward**.
    b) From the **Event** list, select an event.
    c) From the **Action** list, select **pool**.

d) From the **Parameters** list, select the pool name to which you want the BIG-IP system to forward the traffic.
e) To the right of the input field, click **Add**.
The configured parameter appears in the **Parameters** list box.
f) At the lower left click **Add**.
The configured settings for the action appear in the **Actions** list.

14. Repeat steps 11 through 13, specifying a second `http-uri` condition value, such as `/marketing`, and specifying a different non-default pool name.
15. Click **Finished**.

For each matching condition specified in the policy, the virtual server to which you assign the policy forwards the packet to the non-default pool that you specified in the policy. For example, you can create one policy that forwards traffic with a URI starting with `/sales/` to `pool_sales` and another policy that forwards traffic with a URI starting with `/marketing/` to `pool_marketing`.

Creating a virtual server

You can create a virtual server that translates a URI in a request or response and modifies HTML content. When you create the virtual server, you can also configure it to forward certain HTTP traffic to one pool, while forwarding other HTTP traffic to a different pool..

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
The Virtual Server List screen opens.
2. Click the **Create** button.
The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address you type must be available and not in the loopback network.*

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5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. For the **HTTP Profile** setting, verify that the default HTTP profile, **http**, is selected.
7. In the Content Rewrite area, from the **Rewrite Profile** list, select the relevant Rewrite profile that you created.
8. From the **HTML Profile** list, select the relevant HTML profile that you created.
9. For the **Policies** setting, from the **Available** list, select the local traffic policy you previously created, and move it to the **Enabled** list.
10. Click **Finished**.

The HTTP virtual server appears in the list of existing virtual servers on the Virtual Server List screen. This virtual server can translate URIs in requests and responses, modify HTML content, and forward the traffic to two different non-default load balancing pools.

Implementation results

After you perform the tasks in this implementation, the BIG-IP® system can:

- Translate URIs according to the URI rules specified in the Rewrite profile.
- Modify specified HTML content according to the HTML rule specified in the HTML profile.
- Forward HTTP traffic to two different non-default pools according to a local traffic policy.

Configuring the BIG-IP System as an MS SQL Database Proxy

Overview: Configuring LTM as a database proxy

You can configure BIG-IP® Local Traffic Manager™ (LTM®) systems to load balance database requests to pools of database servers. In this case, LTM acts as a proxy for databases that use the tabular data stream (TDS) protocol. LTM load balances client requests based on the user issuing the commands.

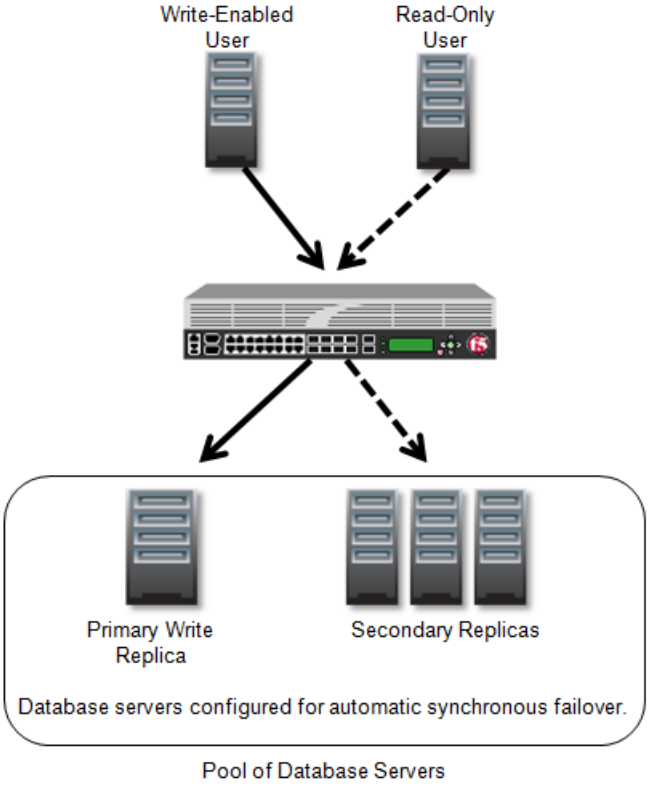

Figure 14: LTM configured as a database proxy

Task summary

About database authentication
About database access configuration
Creating a custom MS SQL monitor
Creating a pool of database servers
Configuring database access by user
Creating a custom OneConnect profile
Creating a database proxy virtual server
Viewing MS SQL profile statistics

About database authentication

BIG-IP®LTM® supports only basic authentication when acting as a proxy for an MS SQL database. You must configure user names and passwords on the database servers and the database servers must handle user authentication. Therefore, the user names and passwords must be synchronized across all database servers.

About database access configuration

You can configure BIG-IP® LTM® for user-based access to database servers. With user-based access, you configure a pool of database servers and indicate whether users write by default. Then, you configure either a read-only list of users or a write-enabled list of users.

Note: *Write requests include at least one of these key words: create, update, insert, delete, into, alter, drop, rename, exec, and execute.*

Creating a custom MS SQL monitor

Create a custom MS SQL monitor to send requests, generated using the settings you specify, to a pool of MS SQL database servers, and to validate the responses.

Important: *When defining values for custom monitors, make sure you avoid using any values that are on the list of reserved keywords. For more information, see SOL number 3653 (for version 9.0 systems and later) on the AskF5™ technical support web site at www.askf5.com.*

1. On the Main tab, click **Local Traffic** > **Monitors**.
   The Monitor List screen opens.
2. Click **Create**.
   The New Monitor screen opens.
3. Type a name for the monitor in the **Name** field.
4. From the **Type** list, select **MSSQL**.
5. Type a SQL statement in the **Send String** field that the monitor sends to the database server to verify availability.
   This is an example of a basic Send String: `SELECT Firstname, LastName FROM Person.Person WHERE LastName = 'name'`. This is an example of a Send String that determines which database is primary: `SELECT role_desc,is_local,synchronization_health_desc FROM sys.dm_hadr_availability_replica_states WHERE is_local = 1 AND synchronization_health_desc = 'HEALTHY';`

   Note: *Based on the string you enter, you may need to enter values in other fields for this monitor.*
6. In the **User Name** field, type the name the monitor uses to access the database server.
7. In the **Password** field, type the password the monitor uses to access the database server.
8. Click **Finished**.

Creating a pool of database servers

Gather the IP addresses of the database servers that you want to include in the pool. In an Always On architecture, normally the pool includes both primary and secondary database servers configured for synchronous automatic failover.

Ensure that a custom MS SQL monitor exists in the configuration.

Create a pool of database servers to process database requests. LTM® acts as a proxy for the database servers by load balancing requests to the members of the pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool of database servers.
4. For the **Health Monitors** setting, from the **Available** list, select the custom **mssql** monitor and move the monitor to the **Active** list.
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   For pool members that are MS SQL database servers, consider **Least Connections**, which selects the server that provides the best response time.
6. Using the **New Members** setting, add the IP address for each database server that you want to include in the pool:
   a) Type an IP address in the **Address** field, or select a node address from the **Node List**.
   b) Type a service number in the **Service Port** field, or select a service name from the list.

   Note: *Typical TDS database servers require port* `1433`.

   c) Click **Add**.
7. Click **Finished**.

The pool of database servers appears in the Pools list.

Configuring database access by user

Create a custom Microsoft SQL Server (MS SQL) profile to configure BIG-IP® LTM® to grant user-based access to a pool of database servers.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Databases** > **MS SQL**.
   The MS SQL Profiles list screen opens.
2. Click **Create**.
   The New MS SQL Profile screen opens.
3. In the **Profile Name** field, type a unique name for the MS SQL profile, for example, `mssql_user_access`.
4. Select the **Custom** check box.
5. From the **Read/Write Split** list, select **By User**.
6. From the **Read Pool** list, select the pool of MS SQL database servers to which the system sends read-only requests.

7. From the **Write Pool** list, select the pool of MS SQL database servers to which the system sends write requests.
8. From the **Users Can Write By Default** list, select **Yes** to give write access to all users, except those in the **Read-Only Users** list.
9. In the **Read-Only Users** area, add users to whom you want to provide read-only access to the database.
10. Click **Finished**.

Creating a custom OneConnect profile

Optionally, you can create a custom OneConnect profile. With this profile, the LTM® system minimizes the number of server-side TCP connections by sharing idle connections among TDS connections owned by the same user name.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Other** > **OneConnect**.
   The OneConnect profile list screen opens.
2. Click **Create**.
   The New OneConnect Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. In the Settings area, configure additional settings based on your network requirements.
5. Click **Finished**.

Creating a database proxy virtual server

Ensure that a pool of database servers exist in the configuration before creating a database proxy virtual server.

You can create a virtual server to represent a destination IP address for database transaction traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

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5. In the **Service Port** field, type `1443`.
6. From the **Configuration** list, select **Advanced**.
7. From the **MS SQL Profile** list, select either the default or a custom MS SQL profile.
8. Optionally, from the **OneConnect Profile** list, select a custom OneConnect profile.
9. From the **Default Pool** list, select the pool of database servers.

You now have a destination IP address on the BIG-IP® system for MS SQL database traffic.

Viewing MS SQL profile statistics

You can view statistics about database requests and responses, user access, and database messages for the traffic LTM® handles as a proxy for a database server.

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.
   The Local Traffic statistics screen opens.
2. From the **Statistics Type** list, select **Profiles Summary**.
3. In the Details column for the MS SQL profile, click **View** to display detailed statistics about database requests and responses, database access, and database messages.

Load Balancing Passive Mode FTP Traffic

Overview: FTP passive mode load balancing

You can set up the BIG-IP system to load balance passive mode FTP traffic. You do this by using the default FTP profile. An *FTP profile* determines the way that the BIG-IP system processes FTP traffic.

Additionally, you can create an iRule to apply to the FTP data channel. You apply the iRule to the data channel by assigning the iRule to the virtual server that you create.

Task Summary for load balancing passive mode FTP traffic

You can perform these tasks to configure FTP passive mode load balancing.

Task list

Creating a custom FTP monitor
Creating a pool to manage FTP traffic
Creating a virtual server for FTP traffic

Creating a custom FTP monitor

An FTP monitor requires a user name and password, and the full path to the file to be downloaded.

Create a custom FTP monitor to verify the File Transfer Protocol (FTP) service. The monitor attempts to download a specified file to the `/var/tmp` directory. If the file is retrieved, the verification is successful.

Note: *The BIG-IP® system does not save the downloaded file.*

Create a custom FTP monitor to verify passive mode File Transfer Protocol (FTP) traffic. The monitor attempts to download a specified file to the `/var/tmp` directory. If the file is retrieved, the verification is successful.

Note: *The BIG-IP® system does not save the downloaded file.*

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1. On the Main tab, click **DNS** > **GSLB** > **Monitors**.
   The Monitor List screen opens.
2. On the Main tab, click **Local Traffic** > **Monitors**.
   The Monitor List screen opens.
3. Click **Create**.
   The New Monitor screen opens.
4. Type a name for the monitor in the **Name** field.
5. From the **Type** list, select **FTP**.
   The screen refreshes, and displays the configuration options for the **FTP** monitor type.

6. From the **Import Monitor** list, select an existing monitor.

   The new monitor inherits initial configuration values from the existing monitor.

7. Type a number in the **Interval** field that indicates, in seconds, how frequently the system issues the monitor check. The default is `10` seconds.

   The frequency of a monitor check must be greater than the value of the global-level **Heartbeat Interval** setting. Otherwise, the monitor can acquire out-of-date data.

8. Type a number in the **Timeout** field that indicates, in seconds, how much time the target has to respond to the monitor check. The default is `31` seconds.

   If the target responds within the allotted time period, it is considered up. If the target does not respond within the time period, it is considered down.

9. Type a number in the **Probe Timeout** field that indicates the number of seconds after which the system times out the probe request to the system. The default is `5` seconds.
10. Type a name in the **User Name** field.
11. Type a password in the **Password** field.
12. Type the full path and file name of the file that the system attempts to download in the **Path/Filename** field.

    The health check is successful if the system can download the file.

13. For the **Mode** setting, select one of the following data transfer process (DTP) modes.

Option	Description
Passive	The monitor sends a data transfer request to the FTP server. When the FTP server receives the request, the FTP server initiates and establishes the data connection.
Port	The monitor initiates and establishes the data connection with the FTP server.

14. From the Configuration list, select **Advanced**.

    This selection makes it possible for you to modify additional default settings.

15. From the **Up Interval** list, do one of the following:

    - Accept the default, **Disabled**, if you do not want to use the up interval.
    - Select **Enabled**, and specify how often you want the system to verify the health of a resource that is up.

16. Type a number in the **Time Until Up** field that indicates the number of seconds to wait after a resource first responds correctly to the monitor before setting the resource to up.

    The default value is `0` (zero), which disables this option.

17. Specify whether the system automatically enables the monitored resource, when the monitor check is successful, for **Manual Resume**.

    This setting applies only when the monitored resource has failed to respond to a monitor check.

Option	Description
Yes	The system does nothing when the monitor check succeeds, and you must manually enable the monitored resource.
No	The system automatically re-enables the monitored resource after the next successful monitor check.

18. For the **Alias Address** setting, do one of the following:

    - Accept the ***All Addresses** default option.

- Type an alias IP address for the monitor to verify, on behalf of the pools or pool members with which the monitor is associated.

If the health check for the alias address is successful, the system marks all associated objects up. If the health check for the alias address is not successful, then the system marks all associated objects down.

19. For the **Alias Service Port** setting, do one of the following:
    - Accept the ***All Ports** default option.
    - Select an alias port or service for the monitor to check, on behalf of the pools or pool members with which the monitor is associated.

    If the health check for the alias port or service is successful, the system marks all associated objects up. If the health check for the alias port or service is not successful, then the system marks all associated objects down.
20. For the **Debug** setting, specify whether you want the system to collect and publish additional information and error messages for this monitor.

    You can use the log information to help diagnose and troubleshoot unsuccessful health checks. To view the log entries, see the **System** > **Logs** screens.

Option	Description
Yes	The system redirects error messages and other information to a log file created specifically for this monitor.
No	The system does not collect additional information or error messages related to this monitor. This is the default setting.

21. Click **Finished**.

You can associate the new custom monitor with the server, virtual server, or pool member that contains the FTP resources.You can associate the new custom monitor with the pool that contains the FTP resources.

Creating a pool to manage FTP traffic

To load balance passive mode FTP traffic, you create a load balancing pool. When you create the pool, you assign the custom FTP monitor that you created in the previous task.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*
5. From the **Priority Group Activation** list, select **Disabled**.
6. Add each resource that you want to include in the pool using the **New Members** setting:
   a) Type an IP address in the **Address** field.
   b) Type `21` in the **Service Port** field, or select **FTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.

7. Click **Finished**.

The pool to manage FTP traffic appears in the Pools list.

Creating a virtual server for FTP traffic

You can define a virtual server that references the FTP profile and the FTP pool.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `21` or select **FTP** from the list.
6. For the **FTP Profile** setting, select the default profile, `ftp`.
7. Locate the Resources area of the screen; for the **Related iRules** setting, from the **Available** list, select the name of the iRule that you want to assign and move the name to the **Enabled** list.
   This setting applies to virtual servers that reference a profile for a data channel protocol, such as FTP or RTSP.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

The custom FTP virtual server appears in the Virtual Servers list.

Load Balancing Passive Mode FTP Traffic with Data Channel Optimization

Overview: FTP passive mode load balancing with data channel optimization

You can set up the BIG-IP system to load balance passive mode FTP traffic, with optimization of both the FTP control channel and the data channel.

By default, the BIG-IP system optimizes FTP traffic for the control channel, according to the configuration settings in the default client and server TCP profiles assigned to the virtual server. When you use this particular implementation, you also configure the system to take advantage of those same TCP profile settings for the FTP data channel. This provides useful optimization of the data channel payload.

Task Summary for load balancing passive mode FTP traffic

You can perform these tasks to configure FTP passive mode load balancing that optimizes traffic on both the control channel and data channel.

Task list

Creating a custom FTP profile
Creating a custom FTP monitor
Creating a pool to manage FTP traffic
Creating a virtual server for FTP traffic

Creating a custom FTP profile

You create a custom FTP profile when you want to fine-tune the way that the BIG-IP®system manages FTP traffic. This procedure creates an FTP profile and optimizes the way that the BIG-IP system manages traffic for the FTP data channel.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **FTP**.
   The FTP profile list screen opens.
2. Click **Create**.
   The New FTP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select the default **ftp** profile.
5. Select the **Custom** check box.
6. For the **Inherit Parent Profile** setting, select the check box.
   This optimizes data channel traffic.
7. Click **Finished**.

The custom FTP profile now appears in the FTP profile list screen.

Creating a custom FTP monitor

An FTP monitor requires a user name and password, and the full path to the file to be downloaded.

Create a custom FTP monitor to verify passive mode File Transfer Protocol (FTP) traffic. The monitor attempts to download a specified file to the `/var/tmp` directory. If the file is retrieved, the check is successful.

Note: *The BIG-IP® system does not save the downloaded file.*

---

1. On the Main tab, click **Local Traffic** > **Monitors**.
   The Monitor List screen opens.
2. Click **Create**.
   The New Monitor screen opens.
3. Type a name for the monitor in the **Name** field.
4. From the **Type** list, select **FTP**.
   The screen refreshes, and displays the configuration options for the **FTP** monitor type.
5. From the **Import Monitor** list, select an existing monitor.

   The new monitor inherits initial configuration values from the existing monitor.
6. Type a number in the **Interval** field that indicates, in seconds, how frequently the system issues the monitor check. The default is `10` seconds.

   The frequency of a monitor check must be greater than the value of the global-level **Heartbeat Interval** setting. Otherwise, the monitor can acquire out-of-date data.
7. Type a number in the **Timeout** field that indicates, in seconds, how much time the target has to respond to the monitor check. The default is `31` seconds.

   If the target responds within the allotted time period, it is considered up. If the target does not respond within the time period, it is considered down.
8. Type a number in the **Probe Timeout** field that indicates the number of seconds after which the system times out the probe request to the system. The default is `5` seconds.
9. Type a name in the **User Name** field.
10. Type a password in the **Password** field.
11. Type the full path and file name of the file that the system attempts to download in the **Path/Filename** field.

    The health check is successful if the system can download the file.
12. For the **Mode** setting, select one of the following data transfer process (DTP) modes.

Option	Description
Passive	The monitor sends a data transfer request to the FTP server. When the FTP server receives the request, the FTP server initiates and establishes the data connection.
Port	The monitor initiates and establishes the data connection with the FTP server.

13. From the Configuration list, select **Advanced**.

    This selection makes it possible for you to modify additional default settings.
14. From the **Up Interval** list, do one of the following:
    - Accept the default, **Disabled**, if you do not want to use the up interval.
    - Select **Enabled**, and specify how often you want the system to verify the health of a resource that is up.

15. Type a number in the **Time Until Up** field that indicates the number of seconds to wait after a resource first responds correctly to the monitor before setting the resource to up.

    The default value is `0` (zero), which disables this option.

16. Specify whether the system automatically enables the monitored resource, when the monitor check is successful, for **Manual Resume**.

    This setting applies only when the monitored resource has failed to respond to a monitor check.

Option	Description
Yes	The system does nothing when the monitor check succeeds, and you must manually enable the monitored resource.
No	The system automatically re-enables the monitored resource after the next successful monitor check.

17. For the **Alias Address** setting, do one of the following:

    - Accept the ***All Addresses** default option.
    - Type an alias IP address for the monitor to verify, on behalf of the pools or pool members with which the monitor is associated.

    If the health check for the alias address is successful, the system marks all associated objects up. If the health check for the alias address is not successful, then the system marks all associated objects down.

18. For the **Alias Service Port** setting, do one of the following:

    - Accept the ***All Ports** default option.
    - Select an alias port or service for the monitor to check, on behalf of the pools or pool members with which the monitor is associated.

    If the health check for the alias port or service is successful, the system marks all associated objects up. If the health check for the alias port or service is not successful, then the system marks all associated objects down.

19. For the **Debug** setting, specify whether you want the system to collect and publish additional information and error messages for this monitor.

    You can use the log information to help diagnose and troubleshoot unsuccessful health checks. To view the log entries, see the **System** > **Logs** screens.

Option	Description
Yes	The system redirects error messages and other information to a log file created specifically for this monitor.
No	The system does not collect additional information or error messages related to this monitor. This is the default setting.

20. Click **Finished**.

You can associate the new custom monitor with the pool that contains the FTP resources.

Creating a pool to manage FTP traffic

To load balance passive mode FTP traffic, you create a load balancing pool. When you create the pool, you assign the custom FTP monitor that you created in the previous task.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.

2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. From the **Priority Group Activation** list, select **Disabled**.
6. Add each resource that you want to include in the pool using the **New Members** setting:
   a) Type an IP address in the **Address** field.
   b) Type `21` in the **Service Port** field, or select **FTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
7. Click **Finished**.

The pool to manage FTP traffic appears in the Pools list.

Creating a virtual server for FTP traffic

You can define a virtual server that references the FTP profile and the FTP pool.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `21` or select **FTP** from the list.
6. From the **FTP Profile** list, select the custom profile that you created earlier.
7. Locate the Resources area of the screen; for the **Related iRules** setting, from the **Available** list, select the name of the iRule that you want to assign and move the name to the **Enabled** list.

   This setting applies to virtual servers that reference a profile for a data channel protocol, such as FTP or RTSP.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

The custom FTP virtual server appears in the Virtual Servers list.

Implementation result

A BIG-IP system with this configuration can process FTP traffic in passive mode, in a way that optimizes the traffic on both the control channel and the data channel. This optimization is based on the settings of the default client-side and server-side TCP profiles.

Referencing an External File from within an iRule

Overview: Referencing an external file from an iRule

Using the BIG-IP® Configuration utility or **tmsh**, you can import a file or URL from another system to the BIG-IP system, with content that you want an iRule to return to a client, based on some iRule event. Possible uses for this feature are:

- To send a web page other than the page that the client requested. For example, you might want the system to send a maintenance page instead of the requested page.
- To send an image.
- To use a file as a template and modify the file in the iRule before sending the file.
- To download policy information from an external server and merge that data with a locally-stored policy.

The file that an iRule accesses is known as an *iFile*, and can be any type of file, such as a binary file or a text file. These files are read-only files.

This example shows an iRule that references an iFile named `ifileURL`, in partition `Common`:

```
ltm rule ifile_rule {
   when HTTP_RESPONSE {
   # return a list of iFiles in all partitions
   set listifiles [ifile listall]
   log local0. "list of ifiles: $listifiles"

   # return the attributes of an iFile specified
   array set array_attributes [ifile attributes "/Common/ifileURL"]
   foreach {array attr} [array get array_attributes ] {
   log local0. "$array : $attr"
   }

   # serve an iFile when http status is 404.
   set file [ifile get "/Common/ifileURL"]
   log local0. "file: $file"
   if { [HTTP::status] equals "404" } {
     HTTP::respond 200 ifile "/Common/ifileURL"

  }
}
}
```

iRule commands for iFiles

This list shows the commands available for referencing an iFile within an iRule. All of these commands return a string, except for the command `[ifile attributes IFILENAME]`, which returns an array.

Available iRule commands for referencing an iFile

```
[ifile get IFILENAME]
```

```
[ifile listall]
[ifile attributes IFILENAME]
[ifile size IFILENAME]
[ifile last_updated_by IFILENAME]
[ifile last_update_time IFILENAME]
[ifile revision IFILENAME]
[ifile checksum IFILENAME]
[ifile attributes IFILENAME]
```

Task summary

You can import an existing file to the BIG-IP® system, create an iFile that is based on the imported file, and then write an iRule that returns the content of that file to a client system, based on an iRule event.

Task list

Importing a file for an iRule
Creating an iFile
Writing an iRule that references an iFile

Importing a file for an iRule

Before you perform this task, the file you want to import must reside on the system you specify.

You can import a file from another system onto the BIG-IP® system, as the first step in writing an iRule that references that file.

1. On the Main tab, click **System** > **File Management** > **iFile List** > **Import**.
2. For the **File Name** setting, click **Browse**.
   The system opens a browse window so that you can locate the file that you want to import to the BIG-IP system.
3. Browse for the file and click **Open**.
   The name of the file you select appears in the **File Name** setting.
4. In the **Name** field, type a new name for the file, such as `1k.html`.
   The new file name appears in the list of imported files.
5. Click the **Import** button.

After you perform this task, the file that you imported resides on the BIG-IP system.

Creating an iFile

As a prerequisite, ensure that the current administrative partition is set to the partition in which you want the iFile to reside. Also ensure that the file has been imported to the BIG-IP® system.

You perform this task to create an iFile that you can then reference in an iRule.

1. On the Main tab, click **Local Traffic** > **iRules** > **iFile List**.
2. Click **Create**.
3. In the **Name** field, type a new name for the iFile, such as `ifileURL`.

4. From the **File Name** list, select the name of the imported file object, such as `1k.html`.
5. Click **Finished**.
   The new iFile appears in the list of iFiles.

The result of this task is that you now have a file that an iRule can reference.

Writing an iRule that references an iFile

You perform this task to create an iRule that references an iFile.

Note: *If the iFile resides in partition `/Common`, then specifying the partition when referencing the iFile is optional. If the iFile resides in a partition other than `/Common`, such as `/Partition_A`, you must include the partition name in the iFile path name within the iRule.*

---

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen opens, displaying any existing iRules.
2. Click **Create**.
   The New iRule screen opens.
3. In the **Name** field, type a name, such as `my_irule`.
   The full path name of the iRule cannot exceed 255 characters.
4. In the **Definition** field, type the syntax for the iRule using Tool Command Language (Tcl) syntax.
   For complete and detailed information iRules syntax, see the F5 Networks DevCentral web site (`http://devcentral.f5.com`).
5. Click **Finished**.
   The new iRule appears in the list of iRules on the system.

Implementation result

You now have an iRule that accesses a file on the BIG-IP®system, based on a particular iRule event.

Configuring the BIG-IP System as a DHCP Relay Agent

Overview: Managing IP addresses for DHCP clients

When you want to manage Dynamic Host Configuration Protocol (DHCP) client IP addresses, you can configure the BIG-IP® system to act as a DHCP relay agent. A common reason to configure the BIG-IP system as a DHCP relay agent is when the DHCP clients reside on a different subnet than the subnet of the DHCP servers.

Before configuring the BIG-IP system to act as a DHCP relay agent, it is helpful to understand some BIG-IP system terminology:

BIG-IP object type	Definition
BIG-IP pool member	A DHCP relay target (such as a DHCP server or BOOTP server). This is the dynamic address server to which the BIG-IP system forwards unicast requests.
BIG-IP virtual server	A BIG-IP system address on the listening VLAN
BIG-IP VLAN assigned to a virtual server	A listening VLAN, controlled on a per-virtual server basis

About the BIG-IP system as a DHCP relay agent

A BIG-IP® virtual server, configured as a Dynamic Host Configuration Protocol (DHCP) type, provides you with the ability to relay DHCP client requests for an IP address to one or more DHCP servers, available as pool members in a DHCP pool, on different +virtual local area networks (VLANs). The DHCP client request is relayed to all pool members, and the replies from all pool members are relayed back to the client.

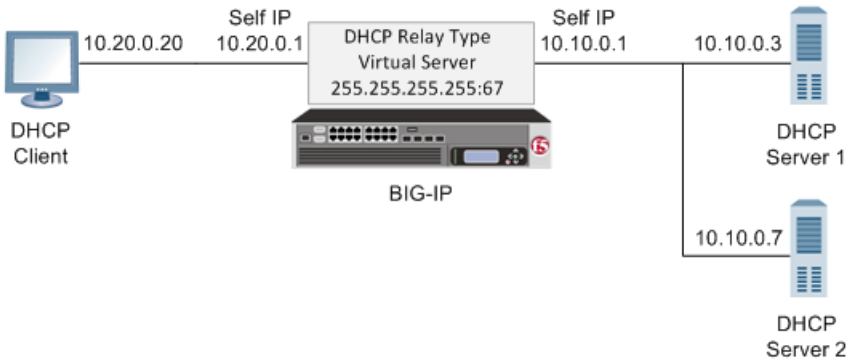


Figure 15: A sample DHCP relay agent configuration

For example, a DHCP client sends a broadcast message to the destination IP address `255.255.255.255`, which is the destination address configured on the virtual server. A DHCP type virtual server automatically uses port 67 for an IPv4 broadcast message or port 547 for an IPv6 broadcast message. The BIG-IP virtual server receives this message on the VLAN with self IP address `10.20.0.1` and relays the DHCP request to all DHCP servers: `10.10.0.3` and `10.10.0.7`.

All DHCP servers provide a DHCP response with available IP addresses to the BIG-IP virtual server, which then relays all responses to the client. The client accepts and uses only one of the IP addresses received.

Note: *In this example, there is no hop between the DHCP client and the BIG-IP relay agent. However, a common topology is one that includes this hop, which is often another BIG-IP system.*

Alternate configuration

If the DHCP client subnet includes a BIG-IP system that serves as a hop to the BIG-IP relay agent, you must perform two additional configuration tasks:

- You must configure the BIG-IP relay agent to relay the client DHCP requests to the DHCP servers without losing the originating subnet (source) IP address. This originating source IP address is typically a self IP address of the BIG-IP system that resides on the client subnet. You configure the BIG-IP relay agent to preserve the originating source IP address by creating a SNAT that specifies the originating self IP address as both the origin address and the translation address. A SNAT configured in this way prevents the BIG-IP relay agent, before sending the DHCP broadcast message to the DHCP servers, from translating the source IP address of the incoming DHCP request to a different address.
- You must add a route (to the BIG-IP relay agent) that specifies the originating source IP address as the destination for DHCP responses. The DHCP servers use this route to send their responses back through the BIG-IP relay agent to the clients.

Task summary

You configure the BIG-IP system to act as a Dynamic Host Configuration Protocol (DHCP) relay agent by creating a pool of DHCP servers and then creating a virtual server to manage DHCP client broadcast messages.

Task list

Creating a pool of DHCP servers
Creating a DHCP type virtual server

Creating a pool of DHCP servers

You must create a pool that includes Dynamic Host Configuration Protocol (DHCP) servers as pool members before you create a DHCP type of virtual server.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. (Optional) Type a description for the pool.
5. (Optional) For the **Health Monitors** setting, in the **Available** list, select **UDP**, and click **<<** to move the monitor to the **Active** list.
6. From the **Load Balancing Method** list, select a method.

Note: *A DHCP pool requires a load balancing method, although actual load balancing across DHCP pool members is ignored and DHCP requests are sent to all DHCP pool members.*

7. For the **Priority Group Activation** setting, select **Disabled**.
8. Add each resource that you want to include in the pool using the **New Members** setting:
   a) (Optional) Type a name in the **Node Name** field, or select a node address from the **Node List**.

   a) Type an IP address in the **Address** field, or select a node address from the **Node List**.
   b) Type `67` (IPv4) or `547` (IPv6) in the **Service Port** field.
   c) Click **Add**.

9. Click **Finished**.

A pool that includes DHCP servers as pool members is created.

Creating a DHCP type virtual server

A DHCP type of BIG-IP® virtual server provides you with the ability to relay DHCP client requests for an IP address to one or more DHCP servers, and provide DHCP server responses with an available IP address for the client.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. (Optional) Type a description for the virtual server.
5. From the **Type** list, select **DHCP**.
6. Select one of the following to configure a **Destination Address** type.

Destination	Steps to configure
255.255.255.255 (IPv4 Default)	None.
ff02::1:2 (IPv6 Default)	None.
Other	For a host or network, in the **Destination Address** field, type an IPv4 address/prefix or an IPv6 address/prefix.

7. From the **State** list, select **Enabled**.
8. In the Configuration area for the **VLAN and Tunnel Traffic** setting, select the VLANs on the same network as the DHCP clients to ensure that the BIG-IP system can accept the broadcast traffic from the client.
9. From the **Default Pool** list, select the pool that is configured for DHCP servers.
10. Click **Finished**.

A DHCP type of virtual server is configured to provide the ability to relay DHCP client requests for an IP address to one or more DHCP servers, and provide DHCP server responses with an available IP address for the client.

Implementation result

The BIG-IP® system is configured to manage Dynamic Host Configuration Protocol (DHCP) client IP addresses, using a DHCP type of virtual server to manage DHCP client broadcast messages.

Configuring the BIG-IP System for DHCP Renewal

Overview: Renewing IP addresses for DHCP clients

You can configure the BIG-IP® system to manage DHCP renewal requests and responses.

Before configuring the BIG-IP system to manage DHCP renewal requests and responses, it is helpful to understand some BIG-IP system terminology:

BIG-IP object type	Definition
BIG-IP pool member	A DHCP relay target (such as a DHCP server or BOOTP server). This is the dynamic address server to which the BIG-IP system forwards unicast requests.
BIG-IP virtual server	A BIG-IP system address on the listening VLAN
BIG-IP VLAN assigned to a virtual server	A listening VLAN, controlled on a per-virtual server basis

About DHCP renewal

You can configure the BIG-IP system to act as a DHCP renewal system. A common reason to configure the BIG-IP system as a renewal system is when the DHCP servers reside on a different subnet than that of the client systems, and the BIG-IP system is also configured as a DHCP relay agent. As a DHCP renewal system, the BIG-IP system manages the renewal of client IP addresses by DHCP servers before the addresses expire.

During the renewal process, a DHCP client sends a renewal request, which is passed through a BIG-IP Forwarding IP type of virtual server directly to the specific DHCP server that issued the initial client IP address. The DHCP server then sends a response to renew the lease for the client's IP address.

In the example shown in the illustration, a DHCP client sends a renewal message to the same BIG-IP system that initially acted as the DHCP relay agent. This renewal request is forwarded through a BIG-IP renewal virtual server directly to DHCP server 1. DHCP server 1 then provides a response to renew the lease for the client's IP address.

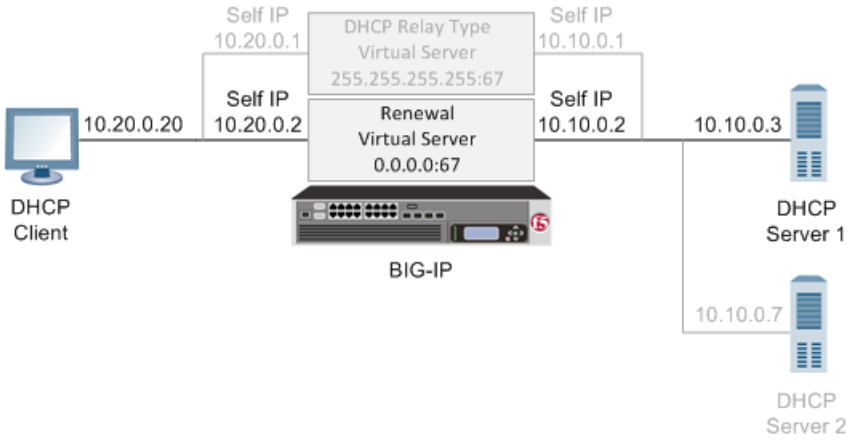


Figure 16: A sample DHCP renewal system configuration

Creating a DHCP renewal virtual server

A Dynamic Host Configuration Protocol (DHCP) renewal virtual server forwards a DHCP request message from a DHCP client directly to a DHCP server, to automatically renew an IP address before it expires.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. (Optional) Type a description for the virtual server.
5. From the **Type** list, select **Forwarding (IP)**.
6. For a host, in the **Destination Address** field, type an IPv4 or IPv6 address in CIDR format to allow all traffic to be translated.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `0.0.0.0/0`, and an IPv6 address/prefix is `::/0`.
7. In the **Service Port** field, type `67` (IPv4) or `547` (IPv6).
8. From the **Protocol** list, select **UDP**.
9. From the **VLAN and Tunnel Traffic** list, select the VLANs on the same network as the DHCP clients.
10. Click **Finished**.

The BIG-IP system is now configured with a virtual server that can forward DHCP renewal requests directly to the appropriate DHCP server.

Implementation result

The BIG-IP® system is configured to forward DHCP client renewal requests to appropriate DHCP servers that reside on a different subnet than the client systems. The BIG-IP also forwards the DHCP server responses back to the client systems, therefore ensuring that client IP addresses do not expire.

Configuring a One-IP Network Topology

Overview: Configuring a one-IP network topology

One configuration option you can use with the BIG-IP® system is a one-IP network topology. This differs from the typical two-network configuration in two ways:

- Because there is only one physical network, this configuration does not require more than one interface on the BIG-IP system.
- Clients need to be assigned SNATs to allow them to make connections to servers on the network in a load balancing pool.

Part of this configuration requires you to configure the BIG-IP system to handle connections originating from the client. You must define a SNAT in order to change the source address on the packet to the SNAT external address, which is located on the BIG-IP system. Otherwise, if the source address of the returning packet is the IP address of the content server, the client does not recognize the packet because the client sent its packets to the IP address of the virtual server, not the content server.

If you do not define a SNAT, the server returns the packets directly to the client without giving the BIG-IP system the opportunity to translate the source address from the server address back to the virtual server. If this happens, the client might reject the packet as unrecognizable.

The single interface configuration is shown in the following illustration.

Illustration of a one-IP network topology for the BIG-IP system

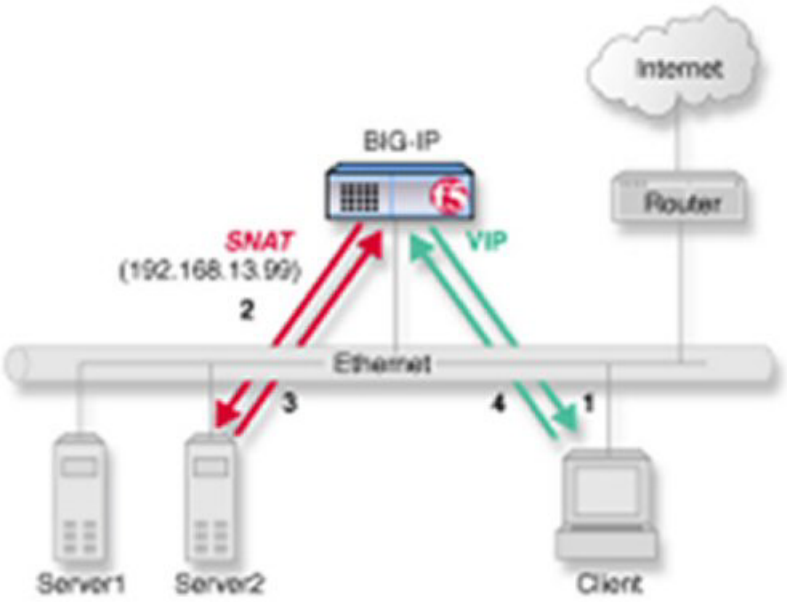


Figure 17: One-IP network topology for the BIG-IP system

Task summary for a one-IP network topology for the BIG-IP system

You can perform these tasks to configure a one-IP network topology.

Task list

Creating a pool for processing HTTP connections with SNATs enabled
Creating a virtual server for HTTP traffic
Defining a default route
Configuring a client SNAT

Creating a pool for processing HTTP connections with SNATs enabled

Verify that all content servers for the pool are in the network of VLAN **external**.

For a basic configuration, you need to create a pool to manage HTTP connections. This pool enables SNATs for any connections destined for a member of the pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **http** monitor and move the monitor to the **Active** list.
5. For the **Allow SNAT** setting, verify that the value is **Yes**.
6. In the Resources area of the screen, use the default values for the **Load Balancing Method** and **Priority Group Activation** settings.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) Type an IP address in the **Address** field.
   b) Type `80` in the **Service Port** field, or select **HTTP** from the list.
   c) (Optional) Type a priority number in the **Priority** field.
   d) Click **Add**.
8. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for HTTP traffic

This task creates a destination IP address for application traffic. As part of this task, you must assign the relevant pool to the virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.

4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **HTTP Profile** list, select **http**.
7. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
8. Click **Finished**.

You now have a virtual server to use as a destination address for application traffic.

Defining a default route

Another task that you must perform to implement one-IP network load balancing is to define a default route for the VLAN `external`.

1. On the Main tab, click **Network** > **Routes**.
2. Click **Add**.
   The New Route screen opens.
3. In the **Name** field, type `Default Gateway Route`.
4. In the **Description** field, type a description for this route entry.
   This setting is optional.
5. In the **Destination** field, type the IP address `0.0.0.0`.
   An IP address of `0.0.0.0` in this field indicates that the destination is a default route.
6. In the **Netmask** field, type `0.0.0.0`, the network mask for the default route.
7. From the **Resource** list, select **Use VLAN/Tunnel**.
   A VLAN represents the VLAN through which the packets flow to reach the specified destination.
8. From the **VLAN/Tunnel** list, select **external**.
9. Click **Finished**.

After you perform this task, the default route for VLAN `external` is defined.

Configuring a client SNAT

To configure the BIG-IP® system to handle connections originating from the client, you can define a SNAT to change the source address on the packet to the SNAT external address located on the BIG-IP system.

1. On the Main tab, click **Local Traffic** > **Address Translation**.
   The **SNAT List** screen displays a list of existing SNATs.
2. Click **Create**.
3. Name the new SNAT.
4. In the **Translation** field, type the IP address that you want to use as a translation IP address.

5. From the **Origin** list, select **Address List**.
6. For each client to which you want to assign a translation address, do the following:
   a) In the **Address** field., type a client IP address.
   b) Click **Add**.
7. From the **VLAN/Tunnel Traffic** list, select **Enabled on**.
8. For the **VLAN List** setting, in the **Available** field, select **external**, and using the **Move** button, move the VLAN name to the **Selected** field.
9. Click the **Finished** button.

The BIG-IP system is configured to handle connections originating from the client

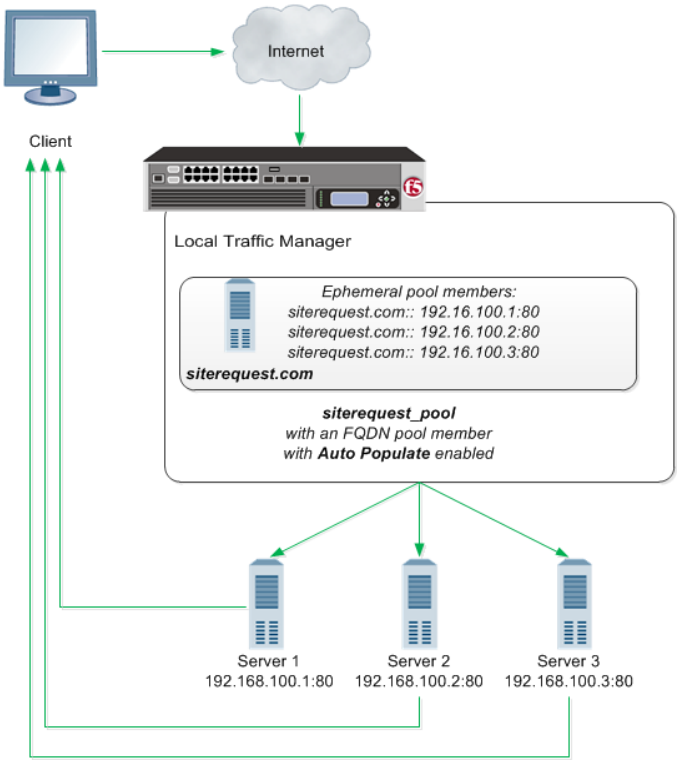
Configuring the BIG-IP System to Auto-Populate Pools

Overview: Using host names to identify pool members and nodes

You create nodes on the BIG-IP® system to represent the backend servers on your network. In turn, you create pool members to represent the backend servers on your network when you create a pool and want to load balance traffic to multiple backend servers.

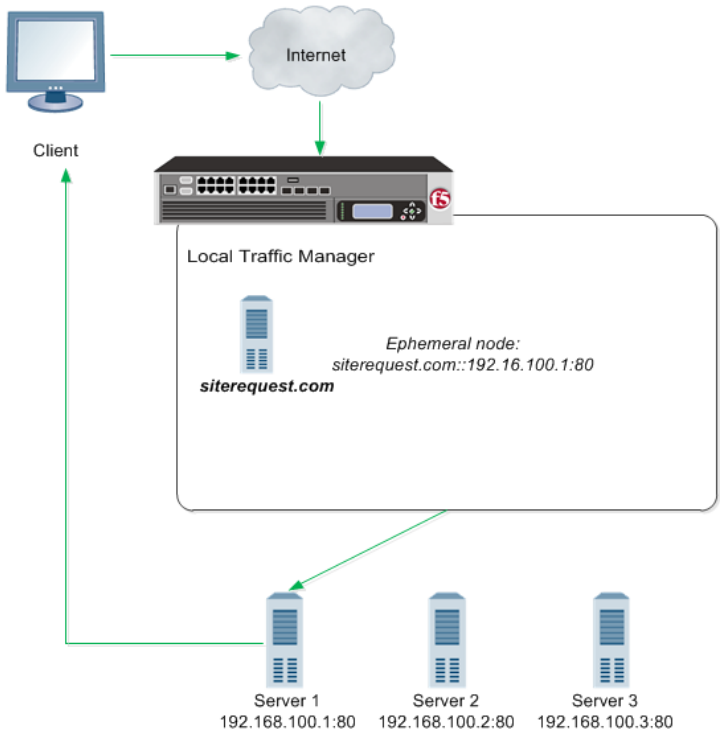
You can configure a BIG-IP system with nodes and pool members that are identified with fully-qualified domain names (FQDNs). When you configure pool members with FQDN, addresses will dynamically follow DNS changes. Fully dynamic DNS-managed pools may even be created. In the following illustration, the BIG-IP Local Traffic Manager™ creates an ephemeral pool member for each IP address returned in the DNS response.

Figure 18: BIG-IP system auto-populating a pool and routing traffic to the pool members



This next illustration shows another option. With this configuration, the system sends a DNS query for the FQDN, and then creates only one ephemeral node or pool member using the first IP address returned in the DNS response. An advantage to this configuration is that you can change the IP addresses of the backend servers that host the domain without reconfiguring the BIG-IP system. However, if your DNS servers are configured to round robin DNS responses, this feature is not recommended.

Figure 19: BIG-IP system routing traffic to a node identified by a host name



About modes of failure and related nodes or pool members

If a node or pool member that is identified by a fully-qualified domain name (FQDN) is down for a specified amount of time, the BIG-IP® system marks the node or pool member down. Failure to resolve a FQDN will not cause the marking down of nodes or pool members currently in service. While the status of the FQDN node or pool member for DNS is reflected in the status of the FQDN node, since the FQDN node or pool member does not itself monitor any servers, its status does not contribute to the status of the pool in any way.

Failure of a monitored ephemeral to respond to monitor probes results in the marking down of a specific node. Niether the FQDN or any of the related ephemeals are directly affected. Because ephemeral objects monitor servers, the status of the epemeral node or pool member affects the pool status in the same way as any other pool member or node.

Task summary

Perform these tasks to configure the BIG-IP® system to auto-populate pools.

Creating a default gateway pool
Configuring the BIG-IP system to handle DNS lookups
Creating nodes using host names
Creating a pool using host names

Creating a default gateway pool

Create a default gateway pool for the system to use to forward traffic.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select the **gateway_icmp** monitor and move the monitor to the **Active** list.
5. Using the **New Members** setting, add each router that you want to include in the default gateway pool:
   a) Type the IP address of a router in the **Address** field.
   b) Type an asterisk (*) in the **Service Port** field, or select ***All Services** from the list.
   c) Click **Add**.
6. Click **Finished**.

Configuring the BIG-IP system to handle DNS lookups

Configure how the BIG-IP® system handles DNS lookups when you want to use fully-qualified domain names (FQDNs) to identify nodes and pool members.

1. On the Main tab, click **System** > **Configuration** > **Device** > **DNS**.
   The DNS Device configuration screen opens.
2. In the DNS Lookup Server List area, in the **Address** field, type the IP address of the DNS server(s) you want to add.
   The system uses these DNS servers to validate DNS lookups and resolve host names. Then, click **Add**.

   Note: *If you did not disable DHCP before the first boot of the system, and if the DHCP server provides the information about your local DNS servers, then this field is automatically populated.*
3. Click **Update**.

Creating nodes using host names

Determine the fully-qualified domain name (FQDN) that you want to use to identify a node.

You can create nodes identified by FQDNs and then create a pool and add pool members from a list of nodes.

1. On the Main tab, expand **Local Traffic**, and click **Nodes**.
   The Node List screen opens.
2. Click the **Create** button.
   The New Node screen opens.
3. In the **Name** field, type a descriptive label for the node.
   Names are case-sensitive.
4. For the **Address** setting, click **FQDN** , and in the input field, type the FQDN.
5. From the **Address Type** list, select whether the node resolves to an IPv4 or IPv6 address. The default is **IPv4**.
6. From the **Auto Populate** list, select **Enabled**. The options are:

Option	Description
Enabled	The system automatically creates ephemeral nodes using the IP addresses returned by the resolution of a DNS query for the FQDN, that is, for each DNS entry of the resolved FQDN.
Disabled	The system automatically creates a node that corresponds to the IP address of only the first DNS entry of the resolved FQDN.

7. In the **Interval** field, type the number of seconds before the system creates new ephemeral nodes or deletes expired ephemeral nodes based on the IP addresses returned in response to a DNS query for the FQDN of the node. The default is the TTL of the IP address in the DNS response.
8. In the **Down Interval** field, type the number of seconds the system waits to mark an FQDN node down following a DNS query failure.
9. Click **Finished**.
   The screen refreshes, and the new node appears in the node list.

Creating a pool using host names

Before creating a pool, determine the servers that you want to add to the pool using a fully-qualified domain name (FQDN).

Ensure that your DNS servers are not configured for round robin DNS resolutions; instead, ensure that your DNS servers return all available IP addresses in a DNS resolution.

When you want the BIG-IP® system to automatically update pool members as you make changes to the IP addresses of servers in your network, you can create a pool of servers that are identified by FQDNs.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, from the **Available** list, select a monitor and move the monitor to the **Active** list.

   Note: *A pool containing nodes represented by FQDNs cannot be monitored by* ***inband*** *or* ***sasp*** *monitors.*

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

   The default is **Round Robin**.
6. In the **New Members** setting, add the FQDNs for members that you want to include in the pool.
   a) Select **New FQDN Node**.
   b) In the **FQDN** field, type the fully-qualified domain name of the node.
   c) From the **Service Port** list, make a selection.
   d) From the **Auto Populate** list, select **Enabled**.

   Note: *When* ***Auto Populate*** *is enabled, the system generates an ephemeral pool member for each IP address returned in response to a DNS query for the FQDN. Additionally, when a DNS response indicates the IP address of an ephemeral pool member no longer exists, the system deletes the ephemeral pool member.*

e) Click **Add**.

7. In the **New Members** setting, add at least one node with a static IP address. This node serves as a fallback value if a DNS query returns no records for the nodes identified by FQDNs.
   a) Click **New Node**.
   b) In the **Address** field, type a node identified by a static IP address.
   c) For the **Service Port** field, type a port number or select a port name from the list.
   d) Click **Add**.
8. Configure the **New Members** setting repeatedly to add other members to the pool.
9. Click **Finished**.
   The screen refreshes, and the name of the new pool appears in the list of pools.

About modifying nodes and pool members identified by host names

When you change the configuration of a fully-qualified domain name (FQDN) pool member or node, any ephemeral pool members or nodes that the BIG-IP® system created based on the IP addresses returned in a DNS response for that FQDN are automatically modified, as well. For example, if you change the monitor on an FQDN node, the system automatically changes the monitor assigned to the ephemeral nodes associated with that node.

When you want to modify an FQDN pool member or node, but you want persistent and active connections to be completed before the BIG-IP system marks the pool member or node as down, disable the pool member or node first, and then make modifications.

Task summary

Disabling a node
Disabling a pool member

Disabling a node

Determine the node that you want to disable.

You can disable a node when you want to make changes to your network, but you want persistent and active connections to be completed before the BIG-IP® system marks the node as down.

1. On the Main tab, click **Local Traffic** > **Nodes**.
   The Node List screen opens.
2. In the Name column, click a node name.
3. In the State area, click **Disabled (Only persistent or active connections allowed)**.

   Note: *You can only disable the parent FQDN node or pool member. After disabling, the ephemeral dependents are then disabled, but you cannot directly disable an ephemeral node.*

4. Click **Update**.
   The screen refreshes, and the status in the Availability area changes.

Disabling a pool member

Determine the pool member that you want to disable. You can only disable a parent fully-qualified domain name (FQDN) node or pool member. The ephemeral dependents are then disabled. You cannot directly disable the ephemerals.

Disable a pool member when you want to make changes to your network, but you want persistent and active connections to be completed before the BIG-IP® system marks the pool member as down.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click a pool name in the Pool List.
3. On the menu bar, click **Members**.
4. In the Member list, select the relevant pool member.
5. In the State area, click **Disabled (Only persistent or active connections allowed)**.
6. Click **Update**.
   The screen refreshes, and the status in the Availability area changes.

About pool member and node statistics

You can view statistics about pool members and nodes identified by host names.

Task summary

Viewing statistics for a specific node
Viewing statistics for ephemeral pool members

Viewing statistics for a specific node

Ensure that at least one LTM® node exists on the BIG-IP® system.

You can view statistics for an LTM node when you want to analyze BIG-IP system traffic.

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.
   The Local Traffic statistics screen opens.
2. From the **Statistics Type** list, select **Nodes**.
   Information displays about the node.

Viewing statistics for ephemeral pool members

Ensure that at least one LTM® node exists on the BIG-IP® system.

When you want to analyze how the BIG-IP system is handling traffic, you can view statistics for pools and pool members, including the ephemeral pools created when the pool member is identified by a fully-qualified domain name (FQDN) and **Auto Populate** is enabled for the pool member.

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.

The Local Traffic statistics screen opens.

2. From the **Statistics Type** list, select **Pools**.
   Information displays about the pools configured on the BIG-IP system. The ephemeral pool members are shown indented below their parent pool member and with two dashes preceding the pool member name.

Implementing Health and Performance Monitoring

Overview: Health and performance monitoring

You can set up the BIG-IP® system to monitor the health or performance of certain nodes or servers that are members of a load balancing pool. Monitors verify connections on pool members and nodes. A monitor can be either a health monitor or a performance monitor, designed to check the status of a pool, pool member, or node on an ongoing basis, at a set interval. If a pool member or node being checked does not respond within a specified timeout period, or the status of a pool member or node indicates that performance is degraded, the BIG-IP system can redirect the traffic to another pool member or node.

Some monitors are included as part of the BIG-IP system, while other monitors are user-created. Monitors that the BIG-IP system provides are called pre-configured monitors. User-created monitors are called custom monitors.

Before configuring and using monitors, it is helpful to understand some basic concepts regarding monitor types, monitor settings, and monitor implementation.

Monitor types

Every monitor, whether pre-configured or custom, is a certain type of monitor. Each type of monitor checks the status of a particular protocol, service, or application. For example, one type of monitor is HTTP. An HTTP type of monitor allows you to monitor the availability of the HTTP service on a pool, pool member, or node. A WMI type of monitor allows you to monitor the performance of a pool, pool member, or node that is running the Windows Management Instrumentation (WMI) software. An ICMP type of monitor simply determines whether the status of a node is up or down.

Monitor settings

Every monitor consists of settings with values. The settings and their values differ depending on the type of monitor. In some cases, the BIG-IP system assigns default values. For example, the following shows the settings and default values of an ICMP-type monitor.

```
Name my_icmp
Type ICMP
Interval 5
Timeout 16
Transparent No
Alias Address * All Addresses
```

Note: *If you want to monitor the performance of a RealNetworks® RealServer server or a Windows®-based server equipped with Windows Management Instrumentation (WMI), you must first download a special plug-in file onto the BIG-IP system.*

Task summary

To implement a health or performance monitor, you perform these tasks.

Task list

Creating a custom monitor

Before creating a custom monitor, you must decide on a monitor type.

You can create a custom monitor when the values defined in a pre-configured monitor do not meet your needs, or no pre-configured monitor exists for the type of monitor you are creating.

Important: *When defining values for custom monitors, make sure you avoid using any values that are on the list of reserved keywords.*

1. On the Main tab, click **Local Traffic** > **Monitors**.
   The Monitor List screen opens.
2. Click **Create**.
   The New Monitor screen opens.
3. Type a name for the monitor in the **Name** field.
4. From the **Type** list, select the type of monitor.
   The screen refreshes, and displays the configuration options for the monitor type.
5. From the **Import Monitor** list, select an existing monitor.
   The new monitor inherits initial configuration values from the existing monitor.
6. From the Configuration list, select **Advanced**.
   This selection makes it possible for you to modify additional default settings.
7. Configure all settings shown.
8. Click **Finished**.

Creating a load balancing pool

You can create a *load balancing pool* (a logical set of devices such as web servers that you group together to receive and process traffic) to efficiently distribute the load on your server resources.

Note: *You must create the pool before you create the corresponding virtual server.*

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server

A virtual server represents a destination IP address for application traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.

Preventing TCP Connection Requests From Being Dropped

Overview: TCP request queuing

TCP request queuing provides the ability to queue connection requests that exceed the capacity of connections for a pool, pool member, or node, as determined by the connection limit. Consequently, instead of dropping connection requests that exceed the capacity of a pool, pool member, or node, TCP request queuing makes it possible for those connection requests to reside within a queue in accordance with defined conditions until capacity becomes available.

When using session persistence, a request becomes queued when the pool member connection limit is reached.

Without session persistence, when all pool members have a specified connection limit, a request becomes queued when the total number of connection limits for all pool members is reached.

Conditions for queuing connection requests include:

- The maximum number of connection requests within the queue, which equates to the maximum number of connections within the pool, pool member, or node. Specifically, the maximum number of connection requests within the queue cannot exceed the cumulative total number of connections for each pool member or node. Any connection requests that exceed the capacity of the request queue are dropped.
- The availability of server connections for reuse. When a server connection becomes available for reuse, the next available connection request in the queue becomes dequeued, thus allowing additional connection requests to be queued.
- The expiration rate of connection requests within the queue. As queue entries expire, they are removed from the queue, thus allowing additional connection requests to be queued.

Connection requests within the queue become dequeued when:

- The connection limit of the pool is increased.
- A pool member's slow ramp time limit permits a new connection to be made.
- The number of concurrent connections to the virtual server falls to less than the connection limit.
- The connection request within the queue expires.

Preventing TCP connection requests from being dropped

When you enable TCP request queuing, connection requests become queued when they exceed the total number of available server connections.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click a pool name in the Pool List.
3. From the **Configuration** list, select **Advanced**.
4. In the **Enable Request Queuing** list, select **Yes**.
5. In the **Request Queue Depth** field, type the maximum number of connections allowed in the queue.

Note: *If you type zero (0) or leave the field blank, the maximum number of queued connections is unlimited, constrained only by available memory.*

6. In the **Request Queue Timeout** field, type the maximum number of milliseconds that a connection can remain queued.

Note: *If you type zero (0) or leave the field blank, the maximum number of milliseconds is unlimited.*

7. Click **Update**.

Connection requests become queued when they exceed the total number of available server connections.

Setting Connection Limits

Overview: About connection limits

You can configure a virtual server, pool member, or node to prevent an excessive number of connection requests during events such as a Denial of Service (DoS) attack or a planned, high-demand traffic event. To ensure the availability of a virtual server, pool member, or node, you can use the BIG-IP® Local Traffic Manager™ to manage the total number of connections and the rate at which connections are made.

When you specify a connection limit, the system prevents the total number of concurrent connections to the virtual server, pool member, or node from exceeding the specified number.

When you specify a connection rate limit, the system controls the number of allowed new connections per second, thus providing a manageable increase in connections without compromising availability.

Limiting connections for a virtual server, pool member, or node

You can improve the availability of a virtual server, pool member, or node by using the BIG-IP® Local Traffic Manager™ to specify a connection limit and a connection rate limit.

1. On the Main tab, expand **Local Traffic**, and then click **Virtual Servers**, **Pools**, or **Nodes**.
2. Click the name of the virtual server, pool, or node you want to modify.
3. For virtual servers only, from the **Configuration** list, select **Advanced**.
4. In the **Connection Limit** field, type a number that specifies the maximum number of concurrent open connections.
5. In the **Connection Rate Limit** field, type a number that specifies the number of new connections accepted per second for the virtual server.
6. Click **Update** to save the changes.

After configuring connection and connection rate limits on a virtual server, or after configuring these limits on a pool member or node associated with a virtual server, the system controls the total number of concurrent connections and the rate of new connections to the virtual server, pool member, or node.

Implementation results

Configuring a connection limit or a connection rate limit for a virtual server, pool member, or node prevents an excessive number of connection requests during events such as a Denial of Service (DoS) attack or a planned, high-demand traffic event. In this way, you can manage the total number of connections to a virtual server, pool member, or node, as well as the rate at which connections are made. When you specify a connection rate limit, the system controls the number of allowed new connections per second, thus providing a manageable increase in connections without compromising availability.

Load Balancing to IPv6 Nodes

Overview: Load balancing to iPv6 nodes

To set up the BIG-IP® system to function as an IPv4-to-IPv6 gateway, you create a load balancing pool consisting of members that represent IPv6 nodes. You also create a virtual server that load balances traffic to those pool members.

As an option, you can use the `tmsh` command line interface to configure the BIG-IP system to send out ICMPv6 routing advisory messages, and to respond to ICMPv6 route solicitation messages. When you perform this task, the BIG-IP system begins to support auto-configuration of downstream nodes. Also, the downstream nodes automatically discover that the BIG-IP system is their router.

Task summary

When you configure IPv4-to-IPv6 load balancing, you must create a pool for load balancing traffic to IPv6 nodes, and then create an IPv4 virtual server that processes application traffic.

Task list

Creating a load balancing pool
Creating a virtual server for IPv6 nodes

Creating a load balancing pool

The first task in configuring IPv4-to-IPv6 load balancing is to create a pool to load balance connections to IPv6 nodes. Use the Configuration utility to create this pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.

- Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.

7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server for IPv6 nodes

You can define a virtual server that references the pool of IPv6 nodes.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IPv6 address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`.
5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. In the Resources area of the screen, from the **Default Pool** list, select the name of the pool that contains the IPv6 servers.
7. Click **Finished**.

The virtual server that references the pool of IPv6 nodes appears in the Virtual Servers list.

Mitigating Denial of Service Attacks

Overview: Mitigating Denial of Service and other attacks

The BIG-IP® system contains several features that provide you with the ability to create a configuration that contributes to the security of your network. In particular, the BIG-IP system is in a unique position to mitigate some types of Denial of Service (DoS) attacks that try to consume system resources in order to deny service to the intended recipients.

The following features of the BIG-IP system help it resist many types of DoS attacks:

- The BIG-IP kernel has a mechanism built in to protect against SYN Flood attacks by limiting simultaneous connections, and tearing down connections that have unacknowledged SYN/ACK packets after some time period as passed. (A SYN/ACK packet is a packet that is sent as part of the TCP three-way handshake).
- BIG-IP system can handle tens of thousands of Layer 4 (L4) connections per second. It would take a very determined attack to affect either the BIG-IP system itself, or the site, if sufficient server resources and bandwidth are available.
- SYN floods, or Denial of Service (DoS) attacks, can consume all available memory. The BIG-IP system supports a large amount of memory to help it resist DoS attacks.

Denial of Service attacks and iRules

You can create BIG-IP® iRules® to filter out malicious DoS attacks. After you identify a particular attack, you can write an iRule that discards packets containing the elements that identify the packet as malicious.

iRules for Code Red attacks

The BIG-IP® system is able to filter out the Code Red attack by using an iRule to send the HTTP request to a dummy pool.

```
when HTTP_REQUEST {
  if {string tolower [HTTP::uri] contains "default.ida" } {
     discard
  } else {
     pool RealServerPool
}
```

iRules for Nimda attacks

The Nimda worm is designed to attack systems and applications based on the Microsoft® Windows® operating system.

```
when HTTP_REQUEST {
    set uri [string tolower [HTTP::uri]]
    if { ($uri contains "cmd.exe") or ($uri contains
          "root.exe") or ($uri contains "admin.dll") } {
         discard
    } else {
       pool ServerPool
  }
}
```

Common Denial of Service attacks

You might want to know how the BIG-IP® system reacts to certain common attacks that are designed to deny service by breaking the service or the network devices. The following information lists the most common attacks, along with how the BIG-IP system functionality handles the attack.

Attack type	Description	Mitigation
SYN flood	A *SYN flood* is an attack against a system for the purpose of exhausting that system's resources. An attacker launching a SYN flood against a target system attempts to occupy all available resources used to establish TCP connections by sending multiple SYN segments containing incorrect IP addresses. Note that the term SYN refers to a type of connection state that occurs during establishment of a TCP/IP connection. More specifically, a SYN flood is designed to fill up a SYN queue. A SYN queue is a set of connections stored in the connection table in the SYN-RECEIVED state, as part of the standard three-way TCP handshake. A SYN queue can hold a specified maximum number of connections in the SYN-RECEIVED state. Connections in the SYN-RECEIVED state are considered to be half-open and waiting for an acknowledgment from the client. When a SYN flood causes the maximum number of allowed connections in the SYN-RECEIVED state to be reached, the SYN queue is said to be full, thus preventing the target system from establishing other legitimate connections. A full SYN queue therefore results in partially-open TCP connections to IP addresses that either do not exist or are unreachable. In these cases, the connections must reach their timeout before the server can continue fulfilling other requests.	The BIG-IP system includes a feature designed to alleviate SYN flooding. Known as SYN Check™, this feature sends information about the flow, in the form of cookies, to the requesting client, so that the system does not need to keep the SYN-RECEIVED state that is normally stored in the connection table for the initiated session. Because the SYN-RECEIVED state is not kept for a connection, the SYN queue cannot be exhausted, and normal TCP communication can continue. The SYN Check feature complements the existing adaptive reaper feature in the BIG-IP system. While the adaptive reaper handles established connection flooding, SYN Check prevents connection flooding altogether. That is, while the adaptive reaper must work overtime to flush connections, the SYN Check feature prevents the SYN queue from becoming full, thus allowing the target system to continue to establish TCP connections.
ICMP flood (Smurf)	The *ICMP flood*, sometimes referred to as a Smurf attack, is an attack based on a method of making a remote network send ICMP Echo replies to a single host. In this attack, a single packet from the attacker goes to an unprotected network's broadcast address.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.

Attack type	Description	Mitigation
	Typically, this causes every machine on that network to answer with a packet sent to the target. The BIG-IP system is hardened against these attacks because it answers only a limited number of ICMP requests per second, and then drops the rest. On the network inside the BIG-IP system, the BIG-IP system ignores directed subnet broadcasts, and does not respond to the broadcast ICMP Echo that a Smurf attacker uses to initiate an attack.	
UDP flood	The *UDP flood* attack is most commonly a distributed Denial of Service attack (DDoS), where multiple remote systems are sending a large flood of UDP packets to the target. The BIG-IP system handles these attacks similarly to the way it handles a SYN flood. If the port is not listening, the BIG-IP system drops the packets. If the port is listening, the reaper removes the false connections.	Setting the UDP idle session timeout to between 5 and 10 seconds reaps these connections quickly without impacting users with slow connections. However, with UDP this might still leave too many open connections, and your situation might require a setting of between 2 and 5 seconds.
UDP fragment	The *UDP fragment* attack is based on forcing the system to reassemble huge amounts of UDP data sent as fragmented packets. The goal of this attack is to consume system resources to the point where the system fails. The BIG-IP system does not reassemble these packets, it sends them on to the server if they are for an open UDP service. If these packets are sent with the initial packet opening the connection correctly, then the connection is sent to the back-end server. If the initial packet is not the first packet of the stream, the entire stream is dropped.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.
Ping of Death	The *Ping of Death* attack is an attack with ICMP echo packets that are larger than 65535 bytes. As this is the maximum allowed ICMP packet size, this can crash systems that attempt to reassemble the packet. The BIG-IP system is hardened against this type of attack. However, if the attack is against a virtual server with the Any IP feature enabled, then these packets are sent on to the server. It is important that you apply the latest updates to your servers.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.
Land	A *Land* attack is a SYN packet sent with the source address and port the same as the destination address and port. The BIG-IP system is hardened to resist this attack. The BIG-IP system connection table matches existing connections so that a spoof of this sort is not passed on to the servers. Connections to the BIG-IP system are checked and dropped if spoofed in this manner.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.
Teardrop	A *Teardrop* attack is carried out by a program that sends IP fragments to a machine connected to the Internet or a network. The Teardrop attack exploits an overlapping IP fragment problem present in some common operating systems. The problem causes the TCP/IP fragmentation re-assembly code to improperly handle overlapping IP fragments. The BIG-IP system handles these attacks by correctly checking frame alignment and discarding improperly aligned fragments.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.
Data	The BIG-IP system can also offer protection from data attacks to the servers behind the BIG-IP system. The BIG-IP system acts as a port-deny device, preventing many common exploits by simply not passing the attack through to the server.	You do not need to make any changes to the BIG-IP system configuration for this type of attack.

Attack type	Description	Mitigation
WinNuke	The *WinNuke* attack exploits the way certain common operating systems handle data sent to the NetBIOS ports. NetBIOS ports are 135, 136, 137 and 138, using TCP or UDP. The BIG-IP system denies these ports by default.	On the BIG-IP system, do not open these ports unless you are sure your servers have been updated against this attack.
Sub 7	The *Sub 7* attack is a Trojan horse that is designed to run on certain common operating systems. This Trojan horse makes it possible the system to be controlled remotely. This Trojan horse listens on port 27374 by default. The BIG-IP system does not allow connections to this port from the outside, so a compromised server cannot be controlled remotely.	Do not open high ports (ports higher than 1024) without explicit knowledge of what applications will be running on these ports.
Back Orifice	A *Back Orifice* attack is a Trojan horse that is designed to run on certain common operating systems. This Trojan horse makes it possible the system to be controlled remotely. This Trojan horse listens on UDP port 31337 by default. The BIG-IP system does not allow connections to this port from the outside, so a compromised server cannot be controlled remotely.	Do not open high ports (ports higher than 1024) without explicit knowledge of what will be running on these ports

Task summary

There are several tasks you can perform to mitigate Denial of Service attacks.

Task list

Configuring adaptive reaping
Setting the TCP and UDP connection timers
Applying a rate class to a virtual server
Calculating connection limits on the main virtual server
Setting connection limits on the main virtual server
Adjusting the SYN Check threshold

Configuring adaptive reaping

This procedure configures adaptive reaping. The *adaptive connection reaper* closes idle connections when memory usage on the BIG-IP system increases. This feature makes it possible for the BIG-IP system to aggressively reap connections when the system memory utilization reaches the low-water mark, and to stop establishing new connections when the system memory utilization reaches the high-water mark percentage.

If the BIG-IP platform includes an LCD panel, an adaptive reaping event causes the BIG-IP system to display the following message on the LCD panel:

```
Blocking DoS attack
```

Warning: *The adaptive reaper settings do not apply to SSL connections. However, you can set TCP and UDP connection timeouts that reap idle SSL connections.*

1. On the Main tab, click **System** > **Configuration**.
   The General screen opens.

2. From the Local Traffic menu, choose **General**.
3. In the Properties area of the screen, set the **Reaper High-water Mark** property to `95`.
4. Set the **Reaper Low-water Mark** property to `85`.
5. Click **Update**.

When aggressive mode is activated on the BIG-IP system, the event is marked in the `/var/log/ltm` file with messages similar to these examples:

```
tmm tmm[PID]: 011e0002:4: sweeper_update: aggressive mode activated. (117504/138240 pages)
```

```
tmm tmm[PID]: 011e0002:4: sweeper_update: aggressive mode deactivated. (117503/138240 pages)
```

Important: *Setting both of the adaptive reaper values to `100` disables this feature.*

Setting the TCP and UDP connection timers

You can set the TCP and UDP timers in the profile settings for the TCP profile and the UDP profiles. You should set these timers for the services that you use for your virtual servers. For example, you can set a value of `60` for HTTP connections and `60` for SSL connections.

1. On the Main tab, click **Local Traffic** > **Profiles**.
2. From the **Protocol** menu, choose TCP or UDP.
3. Click the name of the profile type you want to configure.
4. Set the **Idle Timeout** setting to `60`.
5. Click **Update**.

Applying a rate class to a virtual server

After you create a rate class, you can apply it to the virtual servers in the configuration.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. In the **Virtual Server** list, click the virtual server that you want.
3. In the **Configuration** list, click **Advanced**.
4. In the **Rate Class** list, select a rate class.
5. Click **Update**.

The rate class is applied to the virtual server.

Calculating connection limits on the main virtual server

Use this procedure to determine a connection limit.

Before you set a connection limit, use the following formula to calculate the connection limit value for the main virtual server:

```
Connection Limit = Approximate Amount of RAM in KB * 0.8.
```

For example, if you have 256 MB of RAM, the calculation is:

```
256,000 * 0.8 = 204800
```

In this case, you set the connection limit to **204800**.

Setting connection limits on the main virtual server

Connection limits determine the maximum number of concurrent connections allowed on a virtual server. In this context, the main virtual server is the virtual server that receives the most traffic to your site.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the virtual server that you want to modify.
3. From the **Configuration** list, select **Advanced**.
4. In the **Connection Limit** field, type the number that you calculated for the connection limit.
5. Click **Update** to save the changes.

The virtual server is configured for the specified maximum number of concurrent connections.

Adjusting the SYN Check threshold

You can configure the SYN Check™ feature to prevent the BIG-IP SYN queue from becoming full during a SYN flood attack. The **SYN Check Activation Threshold** setting indicates the number of new or untrusted TCP connections that can be established before the BIG-IP activates the SYN Cookies authentication method for subsequent TCP connections.

1. On the Main tab, click **System** > **Configuration**.
2. From the Local Traffic menu, choose General.
3. In the **SYN Check Activation Threshold** field, type the number of connections that you want to define for the threshold.
4. Click **Update**.

If SYN flooding occurs, the BIG-IP system now protects the BIG-IP SYN queue from becoming full.

Configuring Rapid-Response to Mitigate DNS Flood Attacks

Overview: Configuring DNS Rapid-Response

When the BIG-IP® system is processing authoritative DNS responses for domains on your network using DNS Express, you can configure DNS Rapid-Response to protect your network from DNS flood attacks on those domains.

DNS Rapid-Response uses the maximum system resources available to mitigate a DNS attack. Statistics are available that show the number of DNS queries handled, the number of DNS responses generated, and the number of dropped DNS queries. However, when this feature is enabled, the system does not log DNS requests and responses.

If you enable the Rapid Response Mode for a Rapid-Response profile, only global server load balancing (GSLB) and DNS Express will function.

About configuring DNS Rapid-Response

When DNS Rapid-Response is enabled on a DNS profile attached to a BIG-IP® Local Traffic Manager™ (LTM™) virtual server or DNS listener, system validation can cause a configuration load failure. When this occurs, an administrator can change the options on the DNS profile and load the configuration again. When the configuration loads, system validation may display entries in the logs in `/var/log/ltm`.

Before creating a DNS Rapid-Response profile, you should be aware of the configurations in the following table that result in system validation errors and warnings, once DNS Rapid-Response is enabled.

Configuration	Validation Result
Protocol other than UDP associated with GTM listener or LTM virtual server	Error. DNS profile fails to load.
Auto Last Hop disabled on GTM listener or LTM virtual server	Error. DNS profile fails to load.
LTM iRule associated with an LTM virtual server	Warning. Matching DNS queries do not cause the iRules to run.
LTM pool associated with LTM virtual server	Warning. Matching DNS queries are not load balanced to the pool.
Additional profiles associated with GTM listener or LTM virtual server	Warning. Matching DNS queries do not activate features enabled on other profiles.

Creating a DNS Rapid-Response profile

To protect your network on a BIG-IP® system from a DNS flood attack, configure a custom DNS Rapid-Response profile.

Note: *DNS Rapid-Response works only for traffic over the UDP protocol.*

---

1. On the Main tab, click **DNS** > **Delivery** > **Profiles** > **DNS** or **Local Traffic** > **Profiles** > **Services** > **DNS**.
   The DNS profile list screen opens.
2. Click **Create**.
   The New DNS Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. In the General Properties area, from the **Parent Profile** list, accept the default **dns** profile.
5. Select the **Custom** check box.
6. In the Denial of Service Protection area, from the **Rapid Response Mode** list, select **Enabled**.

   Note: *Enable this setting after a DNS flood attack occurs. When you enable, all other DNS features are disabled, except for DNS Express and global server load balancing (GSLB), unless the* ***Rapid Response Last Action*** *is set to Allow.*

7. In the Denial of Service Protection area, from the **Rapid Response Last Action** list, select an option to protect your network:

Option	Description
Allow	BIG-IP sends non-matching DNS queries along the regular packet processing path
Drop	BIG-IP drops the message without sending a response to the client. This is the default value.
No Error	BIG-IP returns NOERROR response to the client..
NX Domain	BIG-IP returns non-existent name response to the client.
Refuse	BIG-IP returns REFUSED response to the client.
Truncate	BIG-IP truncates the response to the client.

8. Click **Finished**.

Viewing DNS Rapid-Response statistics

Ensure that you configure the BIG-IP® system for DNS Rapid-Response.

View statistics about DNS Rapid-Response traffic to debug network traffic problems.

1. On the Main tab, click **DNS** > **Delivery** > **Listeners** > **Statistics**.
   The Listeners screen opens.
2. In the Details column of a Listener, click **View**.
3. In the Profiles area, for the **Select Profile** settings list, select a DNS profile.
4. In the Rapid Response area, view the list of statistics.

Configuring Remote CRLDP Authentication

Overview of remote authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication with CRLDP, you must create a configuration object and a profile that correspond to the authentication server you are using to store your user accounts. You must also create a third type of object. This object is referred to as a server object.

Task list

Creating a CRLDP configuration object for authenticating application traffic remotely
Creating a custom CRLDP profile
Modifying a virtual server for CRLDP authentication

Creating a CRLDP configuration object for authenticating application traffic remotely

The CRLDP authentication module verifies the revocation status of an SSL certificate, as part of authenticating that certificate. A *CRLDP configuration object* specifies information that the BIG-IP system needs to perform the remote authentication.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.

4. In the **Name** field, type a unique name for the configuration object, such as `my_crldp_config`.
5. From the **Type** list, select **CRLDP**.
6. In the **Connection Timeout** field, retain or change the time limit, in seconds, for the connection to the Certificate Revocation List Distribution Points (CRLDP) server.
7. In the **Update Interval** field, retain or change the interval, in seconds, for the system to use when receiving updates from the CRLDP server.

   If you use the default value of `0` (zero), the CRLDP server updates the system according to the expiration time specified for the CRL.
8. For the **Use Issuer** setting, retain the default value (cleared) or select the box.

   When cleared (disabled), the BIG-IP system extracts the CRL distribution point from the incoming client certificate. When selected (enabled), the BIG-IP system extracts the CRL distribution point from the signing certificate.
9. For the **CRLDP Servers** setting, select a CRLDP server name in the **Available** list, and using the Move button, move the name to the **Selected** list.
10. Click **Finished**.

You now have a CRLDP configuration object that a CRLDP profile can reference.

Creating a custom CRLDP profile

The next task in configuring CRLDP-based remote authentication on the BIG-IP® system is to create a custom CRLDP profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **CRLDP** from the **Type** list.
5. Select **ssl_crldp** in the **Parent Profile** list.
6. Select the **Custom** check box.
7. Select a CRLDP configuration object from the **Configuration** list.
8. Click **Finished**.

Modifying a virtual server for CRLDP authentication

The final task in the process of implementing CRLDP authentication is to assign the custom CRLDP profile to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a virtual server.
3. From the **Configuration** list, select **Advanced**.
4. For the **Authentication Profiles** setting, in the **Available** field, select a custom CRLDP profile, and using the **Move** button, move the custom CRLDP profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom CRLDP profile.

Configuring Remote LDAP Authentication

Overview of remote LDAP authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication for LDAP traffic, you must create a configuration object and a profile that correspond to the LDAP authentication server you are using to store your user accounts. You must also modify the relevant virtual server.

Task list

Creating an LDAP configuration object for authenticating application traffic remotely
Creating a custom LDAP profile
Modifying a virtual server for LDAP authentication

Creating an LDAP configuration object for authenticating application traffic remotely

An *LDAP configuration object* specifies information that the BIG-IP system needs to perform the remote authentication. For example, the configuration object specifies the remote LDAP tree that the system uses as the source location for the authentication data.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.

4. In the **Name** field, type a unique name for the configuration object, such as`my_ldap_config`.
5. From the **Type** list, select **LDAP**.
6. In the **Remote LDAP Tree field**, type the file location (tree) of the user authentication database on the LDAP or Active Directory server.

   At a minimum, you must specify a domain component (that is, **dc=**`value`).
7. In the **Hosts** field, type the IP address of the remote LDAP or Active Directory server.
8. Click **Add**.
   The IP address of the remote LDAP or Active Directory server appears in the **Hosts** area.
9. Retain or change the **Service Port** value.
10. Retain or change the **LDAP Version** value.
11. Click **Finished**.

You now have an LDAP configuration object that the LDAP authentication profile can reference.

Creating a custom LDAP profile

The next task in configuring LDAP-based or Active Directory-based remote authentication on the BIG-IP® system is to create a custom LDAP profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **LDAP** from the **Type** list.
5. Select **ldap** in the **Parent Profile** list.
6. Select the LDAP configuration object that you created from the **Configuration** list.
7. Click **Finished**.

The custom LDAP profile appears in the **Profiles** list.

Modifying a virtual server for LDAP authentication

The final task in the process of implementing authentication using a remote LDAP server is to assign the custom LDAP profile and a default LDAP authentication iRule to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a Standard type of virtual server to which an HTTP profile is assigned.
3. From the **Configuration** list, select **Advanced**.
4. For the **Authentication Profiles** setting, in the **Available** field, select a custom LDAP profile, and using the **Move** button, move the custom LDAP profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom LDAP profile.

Configuring Remote RADIUS Authentication

Overview of remote authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP® system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task summary for RADIUS authentication of application traffic

To configure remote authentication for RADIUS traffic, you must create a configuration object and a profile that correspond to the RADIUS authentication server you are using to store your user accounts. You must also create a third type of object. This object is referred to as a server object.

Task list

Creating a RADIUS server object for authenticating application traffic remotely
Creating a RADIUS configuration object for authenticating application traffic remotely
Creating a custom RADIUS profile
Modifying a virtual server for RADIUS authentication

Creating a RADIUS server object for authenticating application traffic remotely

A *RADIUS server object* represents the remote RADIUS server that the BIG-IP system uses to access authentication data.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **RADIUS Servers**.
3. Click **Create**.

4. In the **Name**field, type a unique name for the server object, such as`my_radius_server`.
5. In the **Host** field, type the host name or IP address of the RADIUS server.
6. In the **Service Port** field, type the port number for RADIUS authentication traffic, or retain the default value (`1812`).
7. In the **Secret** field, type the secret key used to encrypt and decrypt packets sent or received from the server.
8. In the **Confirm Secret** field, re-type the secret you specified in the **Secret** field.
9. In the **Timeout** field, type a timeout value, in seconds, or retain the default value (`3`).
10. Click **Finished**.

You now have a RADIUS server object that the RADIUS configuration object can reference.

Creating a RADIUS configuration object for authenticating application traffic remotely

The BIG-IP system configuration must include at least one RADIUS server object.

You use a RADIUS authentication module when your authentication data is stored on a remote RADIUS server. A *RADIUS configuration object* specifies information that the BIG-IP system needs to perform the remote authentication.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.
4. In the **Name** field, type a unique name for the configuration object, such as`my_radius_config`.
5. From the **Type** list, select **RADIUS**.
6. For the **RADIUS Servers**setting, select a RADIUS server name in the **Available** list, and using the Move button, move the name to the **Selected** list.
7. In the **Client ID** field, type a string for the system to send in the **Network Access Server (NAS)-Identifier** RADIUS attribute.
8. Click **Finished**.

You now have a RADIUS configuration object that a RADIUS profile can reference.

Creating a custom RADIUS profile

The next task in configuring RADIUS-based remote authentication on the BIG-IP® system is to create a custom RADIUS profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **RADIUS** from the **Type** list.
5. Select **radius** in the **Parent Profile** list.
6. Select the RADIUS configuration object that you created from the **Configuration** list.
7. Click **Finished**.

The custom RADIUS profile appears in the **Profiles** list.

Modifying a virtual server for RADIUS authentication

The final task in the process of implementing authentication using a remote RADIUS server is to assign the custom RADIUS profile to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a virtual server.
3. From the **Configuration** list, select **Advanced**.
4. For the **Authentication Profiles** setting, in the **Available** field, select a custom RADIUS profile, and using the **Move** button, move the custom RADIUS profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom RADIUS profile.

Configuring Remote SSL LDAP Authentication

Overview of remote SSL LDAP authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication for SSL LDAP traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts.

Task list

Creating an LDAP Client Certificate SSL configuration object
Creating a custom SSL Client Certificate LDAP profile
Modifying a virtual server for SSL Client Certificate LDAP authorization

Creating an LDAP Client Certificate SSL configuration object

An *SSL Client Certificate LDAP configuration object* specifies information that the BIG-IP system needs to perform the remote authentication. This configuration object is one of the required objects you need to impose certificate-based access control on application traffic.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.
4. In the **Name** field, type a unique name for the configuration object, such as`my_ssl_ldap_config`.

5. From the **Type** list, select **SSL Client Certificate LDAP**.
6. In the **Hosts**field, type an IP address for the remote LDAP authentication server storing the authentication data, and click **Add**.
   The IP address appears in the **Hosts** area of the screen.
7. Repeat the previous step for each LDAP server you want to use.
8. From the **Search Type** list, select one of the following:

Option	Description
User	Choose this option if you want the system to extract a user name from the client certificate and search for that user name in the remote LDAP database.
Certificate Map	Choose this option if you want the system to search for an existing user-certificate mapping in the remote LDAP database.
Certificate	Choose this option if you want the system to search for a certificate stored in the user's profile in the remote LDAP database.

9. Click **Finished**.

You now have a configuration object that an SSL Client Certificate LDAP profile can reference.

Creating a custom SSL Client Certificate LDAP profile

The next task in configuring LDAP-based remote authentication on the BIG-IP® system is to create a custom SSL Client Certificate LDAP profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select the **Custom** check box.
5. Select **SSL Client Certificate LDAP** from the **Type** list.
6. Select **ssl_cc_ldap** in the **Parent Profile** list.
7. Select the name of a LDAP configuration object from the **Configuration** list.
8. Click **Finished**.

The custom SSL Client Certificate LDAP profile appears in the **Profiles** list.

Modifying a virtual server for SSL Client Certificate LDAP authorization

The final task in the process of implementing authorization using a remote LDAP server is to assign the custom SSL Client Certificate LDAP profile and a default LDAP authentication iRule to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a Standard-type virtual server to which an HTTP server profile is assigned.
3. From the **Configuration** list, select **Advanced**.

4. For the **Authentication Profiles** setting, in the **Available** field, select a custom SSL Client Certificate LDAP profile, and using the **Move** button, move the custom SSL Client Certificate LDAP profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom SSL Client Certificate LDAP profile.

Configuring Remote SSL OCSP Authentication

Overview of remote authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts.

When implementing an SSL OCSP authentication module, you must also create a third type of object. This object is referred to as an OCSP responder.

Task list

Creating an SSL OSCP responder object for authenticating application traffic remotely
Creating an SSL OCSP configuration object for authenticating application traffic remotely
Creating a custom SSL OCSP profile
Modifying a virtual server for SSL OCSP authentication

Creating an SSL OSCP responder object for authenticating application traffic remotely

An *SSL OCSP responder object* is an object that you create that includes a URL for an external SSL OCSP responder. You must create a separate SSL OCSP responder object for each external SSL OCSP responder.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **OCSP Responders**.

3. Click **Create**.
4. In the **Name**field, type a unique name for the responder object, such as`my_ocsp_responder`.
5. In the **URL** field, type the URL that you want the BIG-IP system to use to contact the Online Certificate Status Protocol (OCSP) service on the responder.
6. In the **Certificate Authority File** field, type the name of the file containing trusted Certificate Authority (CA) certificates that the BIG-IP system uses to verify the signature on the OCSP response.

You now have a responder that the SSL OCSP configuration object can reference.

Creating an SSL OCSP configuration object for authenticating application traffic remotely

The BIG-IP system configuration must include at least one SSL OCSP responder object.

An *SSL OCSP authentication module* checks the revocation status of an SSL certificate during remote authentication, as part of authenticating that certificate.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.
4. In the **Name** field, type a unique name for the configuration object, such as`my_ocsp_config`.
5. From the **Type** list, select **SSL OCSP**.
6. For the **Responders** setting, select a responder server name from the **Available** list, and using the Move button, move the name to the **Selected** list.
7. Click **Finished**.

You now have an SSL OCSP configuration object that an SSL OCSP profile can reference.

Creating a custom SSL OCSP profile

The next task in configuring SSL OCSP-based remote authentication on the BIG-IP® system is to create a custom SSL OCSP profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **SSL OCSP** from the **Type** list.
5. Select the **Custom** check box.
6. Select an SSL OCSP configuration object from the **Configuration** list.
7. Select **ssl_ocsp** in the **Parent Profile** list.
8. Click **Finished**.

The custom SSL OCSP profile appears in the **Profiles:Authentication:Profiles** list.

Modifying a virtual server for SSL OCSP authentication

The final task in the process of implementing SSL OCSP authentication is to assign the custom SSL OCSP profile to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a virtual server.
3. From the **Configuration** list, select **Advanced**.
4. For the **Authentication Profiles** setting, in the **Available** field, select a custom SSL OSCP profile, and using the **Move** button, move the custom SSL OSCP profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom SSL OSCP profile.

Configuring Remote TACACS+ Authentication

Overview of remote authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP® system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts.

Task list

Creating a TACACS+ configuration object
Creating a custom TACACS+ profile
Modifying a virtual server for TACACS+ authentication

Creating a TACACS+ configuration object

A *TACACS+ configuration object* specifies information that the BIG-IP system needs to perform the remote authentication. For example, the configuration object specifies the IP address of the remote TACACS+ server.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.
4. In the **Name** field, type a unique name for the configuration object, such as`my_tacacs_config`.

5. From the **Type** list, select **TACACS+**.
6. For the **Servers** setting, select a server name in the **Available** list, and using the Move button, move the name to the **Selected** list.
7. In the **Secret** field, type the secret key used to encrypt and decrypt packets sent or received from the server.

   Do not use the pound sign (#) in the secret for TACACS+ servers.
8. In the **Confirm Secret** field, re-type the secret you specified in the **Secret** field.
9. From the **Encryption** list, select an encryption option:

Option	Description
Enabled	Choose this option if you want the system to encrypt the TACACS+ packets.
Disabled	Choose this option if you want the system to send unencrypted TACACS+ packets.

10. In the **Service Name** field, type the name of the service that the user is requesting to be authenticated for use; typically, `ppp`.

    Specifying the service makes it possible for the TACACS+ server to behave differently for different types of authentication requests. Examples of service names that you can specify are: `ppp`, `slip`, `arap`, shell, `tty-daemon`, `connection`, `system`, and `firewall`.
11. In the **Protocol Name** field, type the name of the protocol associated with the value specified in the **Service Name** field.

    This value is usually `ip`. Examples of protocol names that you can specify are: `ip`, `lcp`, `ipx`, `stalk`, `vines`, `lat`, `xremote`, `tn3270`, `telnet`, `rlogin`, `pad`, `vpdn`, `ftp`, `http`, `deccp`, `osicp`, and `unknown`.
12. Click **Finished**.

You now have a configuration object that a TACACS+ authentication profile can reference.

Creating a custom TACACS+ profile

The next task in configuring TACACS+-based remote authentication on the BIG-IP® system is to create a custom TACACS+ profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Authentication** > **Profiles**.
   The Profiles list screen opens.
2. Click **Create**.
   The New Authentication Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **TACACS+** from the **Type** list.
5. Select **tacacs** in the **Parent Profile** list.
6. Select the TACACS+ configuration object that you created from the **Configuration** list.
7. Click **Finished**.

The custom TACACS+ profile appears in the **Profiles** list.

Modifying a virtual server for TACACS+ authentication

The final task in the process of implementing authentication using a remote TACACS+ server is to assign the custom TACACS+ profile and an existing default authentication iRule to a virtual server that is configured to process HTTP traffic (that is, a virtual server to which an HTTP profile is assigned).

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the name of a virtual server.
3. From the **Configuration** list, select **Advanced**.
4. For the **Authentication Profiles** setting, in the **Available** field, select a custom TACACS+ profile, and using the **Move** button, move the custom TACACS+ profile to the **Selected** field.
5. Click **Update** to save the changes.

The virtual server is assigned the custom TACACS+ profile.

Configuring SIP Message Routing and Load Balancing

Overview: Configuring a SIP proxy

You can use the BIG-IP® system as a SIP proxy. When the BIG-IP system is placed between your SIP routers, session border controllers, and soft switches, you can configure the system to route and load balance SIP messages across the servers on your SIP network.

This graphic illustrates the relationships of the configuration objects that you must configure on the BIG-IP system.

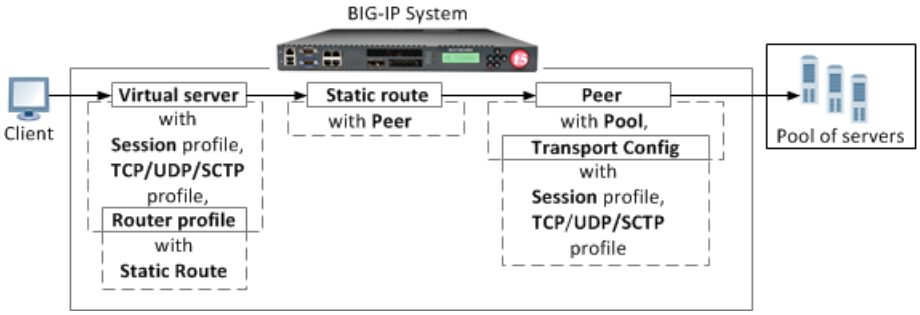


Figure 20: SIP proxy configuration objects

Creating a SIP session profile
Creating a transport config
Creating a pool
Creating a peer
Creating a static route
Creating a SIP router profile
Creating a virtual server to handle SIP client requests

Creating a SIP session profile

Create a SIP session profile to define how the BIG-IP® system processes SIP messages, including the data the system uses to persist SIP connections.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Message Routing** > **SIP**.
   The SIP transport config list screen opens.
2. On the menu bar, click **Session Profiles**.
   The Session Profiles list screen opens.
3. Click **Create**.
   The New SIP Session Profile screen opens.
4. In the **Name** field, type a unique name for the SIP session profile.
5. From the **Persist Key** list, select the value the system uses for persistence of a SIP session. The options are:

Option	Description
Call-ID	The system uses the value in the Call-ID header field in the SIP message.
Custom	The system uses the value of a custom key specified in an iRule.
Src-Addr	The system uses the originating IP address in the SIP message.

6. From the **Persist Type** list, select one of these options:

Option	Description
Session	Persistence is enabled.
None	Persistence is disabled.

7. In the **Persist Timeout (seconds)** field, type the number of seconds before a SIP session persistence record expires.
8. Click **Finished**.

Creating a transport config

Ensure that at least one SIP session profile exists in the BIG-IP® system configuration.

Create a transport config to define how the BIG-IP system connects with the servers on your network when routing and load balancing SIP messages.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Message Routing** > **SIP**.
   The SIP session profiles list screen opens.
2. On the menu bar, click **Transport Config**.
   The New Transport Config screen opens.
3. Click **Create**.
4. In the **Name** field, type a unique name for the transport config.
5. For the **Profiles** setting, move both a transport protocol profile (TCP, UDP, or SCTP) and a SIP session profile from the **Available** list to the **Selected** list.

   You can only associate one protocol profile and one SIP session profile with each transport config.
6. Click **Finished**.

Creating a pool

You can create a pool of servers that you can group together to receive and process traffic. Repeat these steps for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.

      This step is optional.

b) In the **Address** field, type an IP address.
c) In the **Service Port** field, type a port number, or select a service name from the list.
d) In the **Priority** field, type a priority number.
This step is optional.
e) Click **Add**.

5. Click **Finished**.

The new pool appears in the Pools list.

Creating a peer

Ensure that at least one transport config and one pool exist in the BIG-IP® system configuration.

Create a peer to define how the BIG-IP system connects with the servers on your network and to which servers the system routes and load balances SIP messages.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Message Routing** > **SIP**.
The SIP session profiles list screen opens.
2. Click **Create**.
The New Peers screen opens.
3. In the **Name** field, type a unique name for the peer.
4. In the **Description** field, type a description of the peer.
5. From the **Connection Mode** list, specify how connections are limited for this peer. The options are:

Option	Description
Per Blade	The number of connections to this peer is per blade on a VIPRION system.
Per Peer	The number of connections to this peer is per peer.
Per TMM	The number of connections to this peer is per TMM on the BIG-IP system.

6. From the **Pool** list, select the pool of servers to which the system load balances SIP messages.
If you configure only one peer on this BIG-IP system, ensure that you select a pool with only one member.
7. From the **Transport Config** list, select the transport config that defines how the BIG-IP system communicates with the servers on your network.
8. Click **Finished**.

Creating a static route

Ensure that at least one peer and one virtual server exist in the BIG-IP® system configuration.

Create a static route when you want to route SIP messages from specific clients to specific domains, and load balance those SIP messages across a group of peers. If the configured attributes of a static route match the attributes in a SIP message, the system forwards the message to a member of the pool associated with one of the peers.

Note: *The BIG-IP system can use multiple SIP session profiles in a single routing instance, because a different profile can be associated with each member of a pool.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Message Routing** > **SIP**.
   The SIP session profiles list screen opens.
2. On the menu bar, click **Static Routes**.
   The Static Routes list screen opens.
3. Click **Create**.
   The New Route screen opens.
4. In the **Name** field, type a unique name for the static route.
5. In the **Request URI** field, type the value found in the request-uri of a SIP message that the system matches when routing a message.
6. In the **From URI** field, type the value found in the **From** field of a SIP message that the system matches when routing a message.
7. In the **To URI** field, type the value found in the **To** field of a SIP message that the system matches when routing a message.
8. From the **Virtual Server** list, select the virtual server from which the system receives client requests for this static route.

   If you do not select a virtual server, the system uses this static route to route SIP messages originating from any client.
9. From the **Peer Selection Mode** field, select how the system selects the Peer to route a SIP message to:

Option	Description
Ratio	Peer selection is based on the ratio that is set for each peer in the **Selected** list.
Sequential	Peer selection is based on the order of the peers in the **Selected** list.

10. For the **Peers** setting, move the peers that define the servers to which the system load balances SIP messages from the **Available** list to the **Selected** list.
11. Click **Finished**.

Creating a SIP router profile

Ensure that at least one static route exists on the BIG-IP® system.

Create a SIP router profile to define how a router handles SIP traffic.

Note: *A SIP routing profiles binds the virtual server that processes SIP requests from clients with the peers that connect with the servers on your SIP network.*

1. On the Main tab, click **Local Traffic** > **Profiles** > **Message Routing** > **SIP**.
   The SIP transport config list screen opens.
2. On the menu bar, click **Router Profiles**.
   The Router Profiles list screen opens.
3. Click **Create**.
   The New SIP Router Profile screen opens.
4. In the **Name** field, type a unique name for the SIP router profile.
5. For the **Static Routes** setting, move routes that define how the BIG-IP system load balances SIP traffic from the **Available** list to the **Selected** list.

6. Click **Finished**.

Creating a virtual server to handle SIP client requests

Ensure that both a SIP session profile and a SIP router profile exist in the BIG-IP® system configuration.

Create a virtual server to handle SIP client requests.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. In the **Name** field, type a unique name for the virtual server.
3. For the **Type** setting, select **Message Routing**.
4. In the **Destination Address** field, type an address, as appropriate for your network.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.
5. In the **Service Port** field, type `5060` to route SIP traffic or `5061` to route TLS traffic.
6. From the **Configuration** list, select **Advanced**.
7. From the **Application Protocol** list, select **SIP**.
8. From the **Session Profile** list, select a SIP session profile.
9. From the **Router Profile** list, select a SIP router profile.
10. Click **Update**.

Configuration objects required for a SIP proxy

This table names and describes the objects necessary to configure the BIG-IP system as a SIP proxy.

Configuration Objects	Description
Session Profile	Defines how BIG-IP processes SIP messages, including the data used to persist SIP connections.
Transport config	Defines how BIG-IP connects with the servers on your SIP network.
Pool	Defines how BIG-IP load balances connections across a group of servers.
Peer	Defines how BIG-IP connects with the servers on your network and to which servers the system routes and load balances SIP messages.
Static route	Defines how BIG-IP routes SIP messages.
Router profile	Defines an instance of a SIP router.
Virtual Server	Defines the destinations in your network, including the servers that process incoming SIP requests and the pool members that process connections between BIG-IP and your SIP network.

About checking pool member health

You can configure the BIG-IP® system to monitor pool member health using a SIP monitor. Use a SIP monitor to check the health of a host with an active SIP session. The SIP monitor also monitors a SIP connection independent of a specific SIP session and marks a host that had been marked down, but is online again, as available.

Task summary

Perform these tasks to configure health monitors and apply the monitors to a pool:

Creating a SIP monitor
Adding a health monitor to a pool

Creating a SIP monitor

Create a SIP monitor to mark a pool member as down when that server stops responding and then to mark the pool member as available when service is restored.

1. On the Main tab, click **Local Traffic** > **Monitors**.
   The Monitor List screen opens.
2. Click **Create**.
   The New Monitor screen opens.
3. Type a name for the monitor in the **Name** field.
4. From the **Type** list, select **SIP**.
   The screen refreshes, and displays the configuration options for the **SIP** monitor type.
5. Configure additional settings based on your network requirements.
6. Click **Finished**.

Adding a health monitor to a pool

Add health monitors to a pool when you want the BIG-IP system to monitor the health of the pool members. Repeat this procedure for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click the name of the pool you want to modify.
3. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

4. Click **Finished**.

The new pool appears in the Pools list.

About viewing SIP session and router statistics

You can view statistics for SIP sessions and routes.

Task summary

Viewing SIP session statistics

Ensure that at SIP session router profile are assigned to at least one virtual server.

When you want to see how the BIG-IP® system is handling SIP communications, you can view statistics per SIP session profile.

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.
   The Local Traffic statistics screen opens.
2. From the **Statistics Type** list, select **Profiles Summary**.
3. In the Details column for the SIP Session profile, click **View** to display detailed statistics about SIP sessions.

Viewing SIP router statistics

Ensure that at SIP session and SIP router profile are assigned to at least one virtual server.

When you want to see how the BIG-IP® system is handling SIP message routing, you can view statistics per SIP router profile.

1. On the Main tab, click **Statistics** > **Module Statistics** > **Local Traffic**.
   The Local Traffic statistics screen opens.
2. From the **Statistics Type** list, select **Profiles Summary**.
3. In the Details column for the SIP Router profile, click **View** to display detailed statistics about the routing of SIP messages.

Configuring Kerberos Delegation

Overview of remote authentication for application traffic

As an administrator in a large computing environment, you can set up the BIG-IP® system to use this server to authenticate any network traffic passing through the BIG-IP system. This type of traffic passes through a virtual server and through Traffic Management Microkernel (TMM) interfaces. Remote authentication servers typically use one of these protocols:

- Lightweight Directory Access Protocol (LDAP)
- Remote Authentication Dial-in User Service (RADIUS)
- TACACS+ (derived from Terminal Access Controller Access Control System [TACACS])
- Online Status Certificate Protocol (OCSP)
- Certificate Revocation List Distribution Point (CRLDP)
- Kerberos

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts. For example, if your remote authentication server is an LDAP server, you create an LDAP configuration object and an LDAP profile. When implementing a RADIUS, SSL OCSP, or CRLDP authentication module, you must also create a third type of object. For RADIUS and CRLDP authentication, this object is referred to as a server object. For SSL OCSP authentication, this object is referred to as an OCSP responder.

Task Summary

To configure remote authentication for this type of traffic, you must create a configuration object and a profile that correspond to the type of authentication server you are using to store your user accounts.

Task list

Creating a Kerberos Delegation configuration object
Creating a Kerberos delegation profile object from the command line
Creating a load balancing pool
Creating a virtual server with Kerberos delegation and Client SSL profiles

Creating a Kerberos Delegation configuration object

Use this procedure to create a configuration object for Kerberos delegation.

1. On the Main tab of the navigation pane, click **Local Traffic** > **Profiles**.
2. From the Authentication menu, choose **Configurations**.
3. Click **Create**.
4. In the **Name** field, type a unique name for the configuration object, such as `my_kerberos_config`.
5. From the **Type** list, select **Kerberos Delegation**.

6. For the **Enable Protocol Transition** setting, retain the default value (cleared) or select the box.
7. In the **Client Principal Name** field, type the name of the client principal, using the format HTTP/[name], where name is the name of the virtual server you created to use here.

   This principal might be in a different domain from the server principal. If so, you should use the `domaintool(1)` utility to create this principal, because the client principal must have the **OK to Delegate** flag selected in the Microsoft Windows domain.
8. In the **Server Principal Name** field, type the name of the server principal (the back-end web server), using the format HTTP/[fqdn], where fqdn is the fully-qualified domain name.

   This principal might be in a different domain from the client principal. If so, you should use the `domaintool(1)` utility to add the domain. Also, you probably need to use the `--dnsdomain` option to set up DNS-to-Kerberos realm mappings.
9. Click **Finished**.

Creating a Kerberos delegation profile object from the command line

You can create the Kerberos delegation profile object from the command line.

Set a cookie name and strong password for the cookie encryption key on the profile.
In this example, the cookie name is `kerbc` and the key is `kerbc`: `create profile auth my_kerberos_profile { configuration my_kerberos_config cookie-name kerbc cookie-key kerbc defaults-from krbdelegate }`

Note: *The Cookie Key value is an encryption key that encrypts cookie data. A default value is supplied; however, you should change the default value so that attackers who know this value cannot decrypt cookie data and impersonate trusted users.*

The Kerberos delegation profile object is available.

Creating a load balancing pool

You can create a *load balancing pool* (a logical set of devices such as web servers that you group together to receive and process traffic) to efficiently distribute the load on your server resources.

Note: *You must create the pool before you create the corresponding virtual server.*

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*
5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.

The default is **Round Robin**.

6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server with Kerberos delegation and Client SSL profiles

You can create a virtual server with Kerberos delegation and Client SSL profiles.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.
   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
5. In the **Service Port** field, type `80`, or select **HTTP** from the list.
6. From the **Configuration** list, select **Advanced**.
7. From the **Type** list, select **Standard**.
8. From the **Protocol** list, select **TCP**.
9. From the **HTTP Profile** list, select **http**.
10. From the **SSL Profile (Client)** list, select a custom Client SSL profile.
11. For the **Authentication Profiles** setting, in the **Available** field, select a custom Kerberos delegation, and using the **Move** button, move the custom Kerberos delegation to the **Selected** field.
12. From the **Default Pool** list, select a pool name.
13. Click **Finished**.

The virtual server with Kerberos delegation and Client SSL profiles appears in the Virtual Server list.

Load Balancing Diameter Application Requests

Overview: Diameter load balancing

An optional feature of the BIG-IP® system is its ability to load balance and persist requests that applications send to servers running Diameter services. The BIG-IP system can also monitor each server to ensure that the Diameter service remains up and running.

Task summary

You implement Diameter load balancing by creating various local traffic objects in an administrative partition.

Task list

Creating a custom Diameter profile
Creating a custom Diameter monitor
Creating a pool to manage Diameter traffic
Creating a virtual server to manage Diameter traffic

Creating a custom Diameter profile

The first task in configuring Diameter load balancing on the BIG-IP® system is to create a custom Diameter profile.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Diameter**.
   The Diameter profile list screen opens.
2. Click **Create**.
   The New Diameter profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Click **Finished**.

The custom Diameter profile appears in the **New Diameter Profile** list.

Creating a custom Diameter monitor

After you create a Diameter profile, you can create a custom Diameter monitor. The purpose of the Diameter monitor is to monitor the health of all servers running the Diameter service.

1. On the Main tab, click **Local Traffic** > **Monitors**.
2. Click **Create**.

3. In the **Name** field, type a unique name for the monitor, such as **my_diameter_monitor**.
4. From the **Type** list, select **Diameter**.
5. Retain the default values for all other settings.
6. Click **Finished**.

Creating a pool to manage Diameter traffic

The next step in a basic Diameter load balancing configuration is to define a load balancing pool that contains Diameter servers as its members.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
6. Click **Finished**.

The pool is configured to manage Diameter servers as pool members.

Creating a virtual server to manage Diameter traffic

The final task in configuring Diameter load balancing is to define a virtual server that references the custom Diameter profile and Diameter pool that you created in previous tasks.

Note: *The virtual server to which you assign the Diameter profile must be a Standard type of virtual server.*

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address you type must be available and not in the loopback network.*

5. From the **Configuration** list, select **Advanced**.
6. From the **Diameter Profile** list, select a profile.
7. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
8. Click **Finished**.

The virtual server that references the custom Diameter profile and Diameter pool appears in the Virtual Server list.

Configuring the BIG-IP System for Electronic Trading

Overview: Configuring the BIG-IP system for electronic trading

The BIG-IP® system Local Traffic Manager™ (LTM®) FIX profile provides you with the ability to use Financial Information eXchange (FIX) protocol messages in routing, load balancing, persisting, and logging connections. The BIG-IP system uses the FIX profile to examine the header, body, and footer of each FIX message, and then process each message according to the parameters that it contains.

The BIG-IP system supports FIX protocol versions 4.2, 4.4, and 5.0, and uses the key-value pair FIX message format.

Important: *You cannot configure or use the BIG-IP FIX Profile to provide low-latency electronic trading functionality. Instead, you must implement low-latency electronic trading functionality separately. Refer to Implementing Low-Latency Electronic Trading Functionality for details.*

Task summary

There are several tasks you can perform to implement electronic trading.

Task list

Creating a data group list for a FIX profile
Creating a FIX profile for electronic trading
Creating a load balancing pool
Creating a virtual server for secure electronic trading
Viewing FIX message statistics

Creating a data group list for a FIX profile

You can create a data group list for a FIX profile that enables you to provide tag substitution, as required.

1. On the Main tab, click **Local Traffic** > **iRules** > **Data Group List**.
   The Data Group List screen opens, displaying a list of data groups on the system.
2. Click **Create**.
   The New Data Group screen opens.
3. In the **Name** field, type a unique name for the data group.
4. From the **Type** list, select **Integer**.
5. Using the **Integer Records** setting, create tag mapping entries consisting of an integer (client tag) and a value (server tag):
   a) In the **Integer** field, type a value to be used for a specific client.
   b) In the **Value** field, type a value that is substituted on the server.

c) Click **Add**.
The new mapping between the integer and corresponding value appears in the list of Integer Records.

6. Click **Finished**.
The new data group appears in the list of data groups.

A data group list for a FIX profile is available.

Creating a FIX profile for electronic trading

You can create a FIX profile for electronic trading, and steer traffic in accordance with specified parameters.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **FIX**.
The FIX profile list screen opens.
2. Click **Create**.
The New FIX Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select a parent profile.
5. Select the **Custom** check box.
6. (Optional) From the **Report Log Publisher** list, select the publisher for error messages and status reports.
7. (Optional) From the **Message Log Publisher** list, select the publisher for message logging.
8. In the **Rate Sample Interval** field, type the sample interval, in seconds, for the message rate.
9. From the **Error Action** list, select one of the following settings.
   - **Don't Forward** (default) to drop a message with errors and not forward it.
   - **Drop Connection** to disconnect the connection.
10. Select the **Quick Parsing** check box to parse the basic standard fields, and validate the message length and checksum.
11. Select the **Response Parsing** check box to parse the messages from the FIX server, applying the same parser configuration and error handling for the server as for the client.
12. Select the **Fully Parse Logon Message** check box to fully parse the logon message, instead of using quick parsing.
13. From the **Sender and Tag Substitution Data Group Mapping** list, select one of the following settings.

Setting	Description
Not Configured (default)	Disables the tag substitution map between sender ID and tag substitution data group.
Specify	Provides the **Mapping List** settings for you to configure as required. 1. In the **Sender** field, type a sender ID that represents the identity of the firm sending the message. Example: `client1` 2. In the **Data Group** field, type a tag substitution data group. Example: `FIX_tag_map` 3. Click **Add**.

14. Click **Finished**.

The FIX profile is configured for electronic trading.

Creating a load balancing pool

You can create a *load balancing pool* (a logical set of devices such as web servers that you group together to receive and process traffic) to efficiently distribute the load on your server resources.

Note: *You must create the pool before you create the corresponding virtual server.*

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. For the **Health Monitors** setting, in the **Available** list, select a monitor type, and click **<<** to move the monitor to the **Active** list.

   Tip: *Hold the Shift or Ctrl key to select more than one monitor at a time.*

5. From the **Load Balancing Method** list, select how the system distributes traffic to members of this pool.
   The default is **Round Robin**.
6. For the **Priority Group Activation** setting, specify how to handle priority groups:
   - Select **Disabled** to disable priority groups. This is the default option.
   - Select **Less than**, and in the **Available Members** field type the minimum number of members that must remain available in each priority group in order for traffic to remain confined to that group.
7. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
8. Click **Finished**.

The load balancing pool appears in the Pools list.

Creating a virtual server for secure electronic trading

You first need to configure a FIX profile before configuring a virtual server for electronic trading.

You can configure a virtual server for electronic trading, using a FIX profile.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.

The New Virtual Server screen opens.

3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*

5. In the **Service Port** field, type the port number used for the FIX message.
6. From the **Configuration** list, select **Advanced**.
7. From the **Protocol** list, select **TCP**.
8. From the **Protocol Profile (Client)** list, select a predefined or user-defined TCP profile.
9. (Optional) For the **SSL Profile (Client)** setting, from the **Available** list, select **clientssl**, and using the Move button, move the name to the **Selected** list.
10. (Optional) For the **SSL Profile (Server)** setting, from the **Available** list, select **serverssl**, and using the Move button, move the name to the **Selected** list.
11. From the **FIX Profile** list, select the FIX profile you want to assign to the virtual server.
12. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
13. Click **Finished**.

A virtual server is configured for electronic trading, using a FIX profile.

Viewing FIX message statistics

You can view various statistics specific to FIX profile traffic.

1. On the Main tab, click **Local Traffic** > **Virtual Servers** > **Statistics**.
   The Virtual Servers statistics screen opens.
2. From the **Statistics Type** list, select **Profiles Summary**.
3. In the Global Profile Statistics area, for the Profile Type **FIX**, click **View** in the Details.
   The system displays information about the number of current connections, the number of messages, the total message size, and the number of messages in the last sample interval.

The FIX profile statistics are available.

Implementation result

This implementation configures a BIG-IP® system to manage electronic trading functionality, provides you with the ability to use Financial Information eXchange (FIX) protocol messages.

Implementing Low-Latency Electronic Trading Functionality

Overview: Configuring the BIG-IP system for low-latency electronic trading

You can configure the BIG-IP® system to manage traffic for low-latency electronic trading. The BIG-IP system optimizes Financial Information eXchange (FIX) protocol connections to achieve predictable latency and jitter, a critical aspect of successful low-latency electronic trading. When you acquire a special license, you can use the FastL4 profile to optimize the necessary connections, and use the Packet Velocity™ ASIC (PVA) to minimize any latency and deliver high performance L4 throughput without software acceleration.

About FIX features with low latency

The PVA hardware does not examine the FIX packets that stream through it, so FIX-profile features such as parsing and tag substitution are not supported with low-latency.

About induced latency for FIX connections

Induced latency, which is the latency realized after a FIX connection is established, typically has a duration of approximately 10 μsecs or less.

About using TCP protocol for FIX clients and servers

The PVA only supports the TCP protocol, which requires FIX clients and servers to establish TCP connections. When creating a virtual server to manage the traffic for low-latency electronic trading, you must specify the TCP protocol setting.

About using low-latency electronic trading with HSRP or VRRP

You can use low-latency electronic trading in a Hot Standby Router Protocol (HSRP) or Virtual Router Redundancy Protocol (VRRP) environment, with a last-hop pool configured with a single pool member to maintain acceleration flows. When using low-latency electronic trading in an HSRP or VRRP environment, you must set the db variable `tmlhpnomemberaction` to `2`, enabling the BIG-IP® system to only route the client traffic back through a pool member defined in the last hop pool. Additionally, in this configuration, the system can respond to client traffic that originates from an address other than an address defined in the last hop pool.

Example

For example, consider the following configuration.

- Router 1 has an IP address of `10.1.1.251`.
- Router 2 has an IP address of `10.1.1.252`.
- Last-hop pool member has a virtual IP address of `10.1.1.254`.

In this example, you create a last-hop pool with a single pool member that is assigned with a virtual IP address of `10.1.1.254`. You can then use the following tmsh command to set the db variable `tmlhpnomemberaction` to `2`.

```
tmsh modify /sys db tm.lhpnomemberaction value 2
```

Note: *Typically, you will want to use a transparent monitor on the last-hop pool.*

Task summary

There are several tasks you can perform to implement low-latency electronic trading.

Task list

Licensing low-latency electronic trading functionality
Creating a custom Fast L4 profile for FIX
Creating a pool
Creating a virtual server for low-latency electronic trading
Licensing low-latency electronic trading functionality
Creating a custom Fast L4 profile for FIX
Creating a FIX profile for low-latency electronic trading
Creating a pool
Creating an iRule for load-balancing Layer-7 (FIX) traffic
Creating a virtual server for low-latency electronic trading

Licensing low-latency electronic trading functionality

In order to use a BIG-IP® system to manage low-latency electronic trading functionality, you must first acquire a specific license. The license must enable both of the following features:

- Advanced LTM® Protocols
- FIX Low Latency

Please contact your F5® Networks support representative to acquire the necessary license.

Creating a custom Fast L4 profile for FIX

You can create a custom Fast L4 profile to manage Layer 4 traffic for FIX.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Protocol** > **Fast L4**.
   The Fast L4 screen opens.
2. Click **Create**.
   The New Fast L4 profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select the **Custom** check box.
5. Configure the PVA acceleration settings.

a) From the **PVA Offload Dynamic** list, retain the default value, **Enabled**.
b) In the **PVA Dynamic Client Packets** field, type a value for the number of client packets before dynamic ePVA hardware re-offloading occurs.
c) In the **PVA Dynamic Server Packets** field, type a value for the number of server packets before dynamic ePVA hardware re-offloading occurs.

6. Select the **Loose Close** check box only for a one-arm virtual server configuration.
7. Set the **TCP Close Timeout** setting, according to the type of traffic that the virtual server will process.
8. Click **Finished**.

The custom Fast L4 profile appears in the list of Fast L4 profiles.

Creating a pool

You can create a pool of servers that you can group together to receive and process traffic. Repeat these steps for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
5. Click **Finished**.

The new pool appears in the Pools list.

Creating a virtual server for low-latency electronic trading

After you create a server pool, you need to create a virtual server that references the profile and pool you created.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. From the **Type** list, select **Performance (Layer 4)**.
5. In the **Destination Address** field, type the IP address in CIDR format.

The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

Note: *The IP address you type must be available and not in the loopback network.*

6. From the **Configuration** list, select **Advanced**.
7. From the **Protocol** list, select **TCP**.
8. From the **Protocol Profile (Client)** list, select the custom Fast L4 profile you defined for low-latency FIX trading.
9. (Optional) For the **Address Translation** setting, clear the **Enabled** check box to implement direct server return (DSR) functionality.
10. (Optional) For the **Port Translation** setting, clear the **Enabled** check box.

Important: *Clearing the **Enabled** check box disables network address translation (NAT) functionality. If you require NAT, you must select the **Enabled** check box.*

11. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
12. Click **Finished**.

The virtual server is configured to use the specified Fast L4 profile and pool. If a client initiates a FIX connection with this virtual server, the connection uses the Fast L4 (ePVA) hardware.

Implementation result

This implementation configures a BIG-IP® system to manage low-latency electronic trading functionality, optimizing the system for predictable latency and jitter. Clients who send FIX packets to the virtual server's Destination address all receive this low-latency service.

Implementing Low-Latency Electronic Trading with FIX load balancing

Overview: Configuring low-latency electronic trading with FIX load balancing

You can configure the BIG-IP® system to manage electronic trading traffic for both low-latency and intelligent load balancing. The BIG-IP system supports Financial Information eXchange (FIX) protocol connections for electronic trading between financial institutions. When you acquire a special license, you can use the FastL4 profile to optimize the FIX connections, and use the embedded Packet Velocity® ASIC (ePVA) to minimize the latency. You can then use an iRule to implement intelligent load balancing: you do this by enabling the Late Binding feature in the FastL4 profile, then creating an iRule that parses each FIX header to choose a back-end server pool.

About Late Binding

With the Late Binding feature enabled, an iRule can examine the FIX logon packet, the one that establishes the connection, and choose a server pool based on the packet's contents. The iRule finishes by sending the connection down to the ePVA hardware, which processes the stream at high speed.

The only TCP options available to the client and server are MSS, accept Selective ACK, and Time Stamp. The BIG-IP system ignores all other options because it must enable SYN cookies on the client-side interface, and because the ePVA hardware does not slow down for any of those options. For example, the BIG-IP system ignores the Window Scaling option as soon as the flow has been released to the ePVA hardware.

Note: *Secure Sockets Layer (SSL) is not supported by a virtual server that uses Late Binding.*

About FIX features with low latency

After the iRule selects a server, the ePVA hardware manages the FIX stream for the rest of its existence. The ePVA does not examine the individual FIX packets that pass through it, so FIX-profile features such as tag substitution are not supported.

About induced latency for FIX connections

Induced latency, which is the latency realized after a FIX connection is established, typically has a duration of approximately 10 µsecs or less.

About using TCP protocol for FIX clients and servers

The ePVA only supports the TCP protocol, which requires FIX clients and servers to establish TCP connections. When creating a virtual server to manage the traffic for low-latency electronic trading, you must specify the TCP protocol setting.

Task summary

There are several tasks you can perform to implement low-latency electronic trading.

Task list

Licensing low-latency electronic trading functionality

In order to use a BIG-IP® system to manage low-latency electronic trading functionality, you must first acquire a specific license. The license must enable both of the following features:

- Advanced LTM® Protocols
- FIX Low Latency

Please contact your F5® Networks support representative to acquire the necessary license.

Creating a custom Fast L4 profile for FIX

You can create a custom Fast L4 profile to manage Layer-4 traffic for FIX.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Protocol** > **Fast L4**.
   The Fast L4 screen opens.
2. Click **Create**.
   The New Fast L4 profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select the **Custom** check box.
5. Set the **PVA Acceleration** field to **Guaranteed**.
6. If you plan to use **Late Binding** and either of the **Loose Initiation** and **Loose Close** check boxes are enabled, clear them both.

   The **Late Binding** feature examines the first few packets in the FIX stream, and the **Loose Initiation** feature makes it possible to skip those packets without any examination.
7. Set the **TCP Close Timeout** setting, according to the type of traffic that the virtual server will process.
8. Disable the **Hardware SYN Cookie Protection** feature by clearing the check box.
9. Enable the **Software SYN Cookie Protection** feature by selecting the check box.
10. The **Late Binding** feature makes it possible to choose a server pool based on data in the FIX header. An iRule in the virtual server parses the FIX header and selects the server pool. Select the check box to enable **Late Binding**.
    a) You can allow the iRule to explicitly determine when the flow is released from Layer 7 down to Layer 4. The iRule code can then perform additional computation before binding the connection to Layer 4. Enable this by selecting the **Explicit Flow Migration** check box. When this feature is enabled, the flow is not released to layer 4 until the iRule invokes the `BIGTCP::release_flow` command.

By default, this is disabled and the flow drops down to Layer 4 immediately after the connection to the server is established.

b) Use the **Client Timeout** field to determine how much time to allow for any client to send the first 2144 bytes of layer-7 information. In normal cases, this amount of data arrives immediately.

c) Choose an action from the **Timeout Recovery** list that the profile should take in case of timeout. Choose **Disconnect** to drop the connection summarily, or choose **Fallback** to process the packet without parsing the Layer 7 fields. The fallback option sends any timed-out connection to the Virtual Server's default pool.

11. Click **Finished**.

The custom Fast L4 profile appears in the list of Fast L4 profiles.

Creating a FIX profile for low-latency electronic trading

A virtual server with Late Binding enabled can choose a server pool based on the contents of the FIX connection's initial packet. The Late Binding feature makes it possible to combine this load balancing with low latency.

Note: *This is a simplified FIX profile. The low-latency path goes through the ePVA hardware, which does not examine the contents of each FIX packet. The only packet that the BIG-IP software examines is the logon packet, which the BIG-IP® system uses to choose a server pool. Therefore, most of the features in the FIX-profile screen (such as tag substitution) are ignored for low-latency trading.*

---

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **FIX**.
   The FIX profile list screen opens.
2. Click **Create**.
   The New FIX Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select a parent profile.
5. Select the **Custom** check box.
6. (Optional) From the **Report Log Publisher** list, select the publisher for error messages and status reports.
7. (Optional) From the **Message Log Publisher** list, select the publisher for message logging.
8. Click **Finished**.

The FIX profile is configured for low-latency electronic trading with FIX load balancing.

Creating a pool

You can create a pool of servers that you can group together to receive and process traffic. Repeat these steps for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:

a) In the **Node Name** field, type a name for the node portion of the pool member.
   This step is optional.
b) In the **Address** field, type an IP address.
c) In the **Service Port** field, type a port number, or select a service name from the list.
d) In the **Priority** field, type a priority number.
   This step is optional.
e) Click **Add**.

5. Click **Finished**.

The new pool appears in the Pools list.

Creating an iRule for load-balancing Layer-7 (FIX) traffic

Creating an iRule for load-balancing Layer-7 (FIX) traffic requires that the Late Binding feature is enabled in the Fast L4 profile. A virtual server with Late Binding enabled can choose a server pool based on the contents of the FIX connection's initial logon packet(s).

You can create an iRule that reads the FIX logon fields and directs each TCP stream to a different server pool based on the field settings.

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen displays a list of existing iRules®.
2. Click the **Create** button.
   The New iRule screen opens.
3. In the **Name** field, type a unique name for the iRule.
4. In the **Definition** field, type an iRule to match FIX fields and choose a server pool based on their settings.
   Use the FIX_HEADER iRule event to select the first five fields in a FIX packet:
   - BeginString
   - BodyLength
   - MsgType
   - SenderCompID
   - TargetCompID

   The total length of a FIX message is unbounded, so this ensures that you capture all of the relevant data to choose a back-end server pool without waiting to collect all of the FIX message.

   For example, this iRule sends messages from each of three senders to a specific server pool. Messages from any other senders revert to the default pool in a virtual server that uses this iRule. The iRule also logs a message to indicate that a new FIX stream has opened:

```
when FIX_HEADER {
    set MsgType [FIX::tag get 35]
    if { $MsgType eq "A" } {  # an A message is a logon message
        # record the sender and the target
        set SenderCompID [FIX::tag get 49]
        set TargetCompID [FIX::tag get 56]

        # log the event locally - a new FIX stream is being created
        log "FIX header: Sender $SenderCompID, Target $TargetCompID"

        # log the event with High Speed Logging (HSL), too
        set hsl [HSL::open -proto UDP -pool syslog_server_pool]
        HSL::send $hsl "[IP::client_addr]: Sender $SenderCompID, Target
```

```
$TargetCompID\n"

        # choose a server pool based on the name of the sender
        switch $SenderCompID {
            "Fred's Bank"   { pool FIX1 }
            "Wilma's Bank"  { pool FIX2 }
            "Barney's Bank" { pool FIX3 }
        }
    }
}
```

The iRule may be able to explicitly send the flow down to the ePVA, rather than doing it automatically. This explicit control is only possible if you set it in the Fast L4 profile. In the following example, the rule does not release the flow unless it encounters a FIX packet from a sender named `"Mr. Slate's Bank"`. You must release the flow on both the client side (with the CLIENT_ACCEPTED event) and the server side (in the SERVER_CONNECTED event):

```
when CLIENT_ACCEPTED {
    # prepare for releasing the flow down to the ePVA
    BIGTCP::release_flow
}

when FIX_HEADER {
    # (same as above example, with an additional sender)
    set MsgType [FIX::tag get 35]
    if { $MsgType eq "A" } {  # an A message is a logon message
        # record the sender and the target
        set SenderCompID [FIX::tag get 49]
        set TargetCompID [FIX::tag get 56]

        # log the event - a new FIX stream is being created
        log "FIX header: Sender $SenderCompID, Target $TargetCompID"

        # choose a server pool based on the name of the sender
        switch $SenderCompID {
            "Fred's Bank"      { pool FIX1 }
            "Wilma's Bank"     { pool FIX2 }
            "Barney's Bank"    { pool FIX3 }
            "Mr. Slate's Bank" { pool FIX4 }
        }
    }
}

when SERVER_CONNECTED {
    if {$SenderCompID eq "Mr. Slate's Bank"}{
        # Mr. Slate's Bank sent this, so lower the latency
        log local0. "Detected $SenderCompID - releasing flow to ePVA"
        BIGTCP::release_flow
    }
}
```

The previous code sends all FIX streams through standard FIX-profile processing except the one(s) from `"Mr. Slate's Bank"`, which goes through the ePVA.

5. Click **Finished**.

The iRule is now available. You can use this iRule in a virtual server that also offers a FIX profile and the low latency of Fast L4.

Creating a virtual server for low-latency electronic trading

After you create a server pool, profile(s), and (optionally) iRule, you need to create a virtual server that references those components.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. From the **Type** list, select **Performance (Layer 4)**.
5. In the **Destination Address** field, type the IP address in CIDR format. This is the address to which the FIX clients send their FIX transmissions.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address you type must be available and not in the loopback network.*
6. From the **Configuration** list, select **Advanced**.
7. From the **Protocol** list, select **TCP**.
8. From the **Protocol Profile (Client)** list, select the custom Fast L4 profile you defined for low-latency FIX trading.
9. Go to the **FIX Profile** list and select the custom FIX profile you defined for low-latency trading.
10. (Optional) For the **Address Translation** setting, clear the **Enabled** check box to implement direct server return (DSR) functionality.
11. (Optional) For the **Port Translation** setting, clear the **Enabled** check box.

    Important: *Clearing the **Enabled** check box disables network address translation (NAT) functionality. If you require NAT, you must select the **Enabled** check box.*
12. In the Resources area of the screen, from the **Default Pool** list, select the pool name for FIX streams.

    This pool is for streams that do not match your iRule(s).
13. For the **iRules** setting, from the **Available** list, select the name of the iRule that you created for the Late Binding feature and move it to the **Enabled** list.

    The iRule enables load balancing based on the Layer-7 (FIX) fields at the head of each stream.
14. Click **Finished**.

The virtual server is configured to use the specified Fast L4 profile and pool. If a client initiates a FIX connection with this virtual server, the connection uses the Fast L4 (ePVA) hardware.

Implementation result

This implementation configures a BIG-IP® system to manage low-latency electronic trading functionality, optimizing the system for predictable latency and jitter. Clients who send FIX streams to the virtual server's

Destination address all receive this low-latency service. The virtual server intelligently distributes the streams to different server pools based on information in each stream's FIX logon packet.

Managing GTP Traffic

Overview: Managing GTP traffic

The BIG-IP® system enables you to manage GTP traffic by configuring the GTP profile for use with a pool and virtual server. When using the GTP profile, you can specify the maximum number of messages held in the GTP ingress queue.

Task summary

Creating a pool
Creating a GTP profile
Creating a virtual server for GTP traffic

Creating a pool

You can create a pool of servers that you can group together to receive and process traffic. Repeat these steps for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
5. Click **Finished**.

The new pool appears in the Pools list.

Creating a GTP profile

You create a GTP profile to manage GTP traffic.

1. On the Main tab, click **Local Traffic** > **Profiles**.
2. Click **Create**.

The New GTP Profile screen opens.

3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, retain the default value or select another existing profile of the same type.
5. Select the **Custom** check box.
6. (Optional) In the **Ingress Maximum** field, type the maximum number of messages that can be held in the GTP ingress queue.
7. Click **Finished**.

The GTP profile is configured to manage GTP traffic.

Creating a virtual server for GTP traffic

This task creates a GTP destination to manage GTP traffic. As part of this task, you must assign the relevant pool to the virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. For a host, in the **Destination Address** field, type an IPv4 or IPv6 address in CIDR format to allow all traffic to be translated.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `0.0.0.0/0`, and an IPv6 address/prefix is `::/0`.
5. In the **Service Port** field, type the port number used for the GTP connection.

   Note: *Port `2123` is the default GTP-C port, and port `2152` is the default GTP-U port.*
6. From the **Protocol** list, select **UDP**.
7. From the **GTP Profile** list, select **gtp**, or a user-defined GTP profile.
8. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
9. Click **Finished**.

You now have a virtual server to use as a GTP destination to manage GTP traffic.

Implementing Video Quality of Experience Functionality

Overview: Video Quality of Experience profile

The BIG-IP® system's video Quality of Experience (QoE) profile enables you to assess an audience's video session or overall video experience, providing an indication of customer satisfaction. The QoE profile uses static information, such as bitrate and duration of a video, and video metadata, such as URL and content type, in monitoring video streaming. Additionally, the QoE profile monitors dynamic information, which reflects the real-time network condition.

By considering both the static video parameters and the dynamic network information, the user experience can be assessed and defined in terms of a single mean opinion score (MOS) of the video session, and a level of customer satisfaction can be derived. QoE scores are logged in the `ltm` log file, located in `/var/log`, which you can evaluate as necessary.

Task summary

Creating an iRule to collect video Quality of Experience scores
Creating an iRule to collect static information about video files
Creating a video Quality of Experience profile
Creating a pool
Creating a video Quality of Experience virtual server

Creating an iRule to collect video Quality of Experience scores

You can create an iRule to use with a video Quality of Experience (QoE) profile that defines the QoE scores to collect.

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen opens, displaying any existing iRules.
2. Click **Create**.
   The New iRule screen opens.
3. In the **Name** field, type a name, such as `my_irule`.
   The full path name of the iRule cannot exceed 255 characters.
4. In the **Definition** field, type the syntax for the iRule using Tool Command Language (Tcl) syntax.
   For complete and detailed information about iRules syntax, see the F5 Networks DevCentral web site (`http://devcentral.f5.com`).
   For example, the following iRule saves `Content-Type` to session DB with a 600-second lifetime.

```
…
when HTTP_REQUEST {
   set LogString "Client [IP::client_addr]:[TCP::client_port] ->
   [HTTP::host][HTTP::uri]"
   set x_playback_session_id [HTTP::header "X-Playback-Session-Id"]
}
```

```
when HTTP_RESPONSE {
   set content_type [HTTP::header "Content-Type"]
}

when CLIENT_CLOSED {
   catch {
      if { ($content_type contains "video") &&
         ([QOE::video available] == 1) } {
        set qoe_params [list available width height duration nominal_bitrate

         average_bitrate freeze_period freeze_frequency mos]
         foreach param $qoe_params {
            set value [QOE::video $param]
            append params "$param=$value "
         }
         if {[string length $x_playback_session_id]}{
            log local0. "$LogString X-Playback-Session-Id:
            $x_playback_session_id QOE::video $params"
         } else {
            log local0. "$LogString QOE::video $params"
         }
      }
   }
}
```

5. Click **Finished**.
   The new iRule appears in the list of iRules on the system.

There is now an available iRule to use with a QoE profile that collects specified QoE scores.

Creating an iRule to collect static information about video files

You can create an iRule to collect static information specific to video files, primarily for use with Policy Enforcement Manager™ (PEM).

1. On the Main tab, click **Local Traffic** > **iRules**.
   The iRule List screen opens, displaying any existing iRules.
2. Click **Create**.
   The New iRule screen opens.
3. In the **Name** field, type a name, such as `my_irule`.

   The full path name of the iRule cannot exceed 255 characters.
4. In the **Definition** field, type the syntax for the iRule using Tool Command Language (Tcl) syntax.

   For complete and detailed information iRules syntax, see the F5 Networks DevCentral web site (`http://devcentral.f5.com`).

   For example, the following iRule collects static information specific to video files.

```
when QOE_PARSE_DONE {
  set w [QOE::video width]
  set h [QOE::video height]
  set d [QOE::video duration]
  set b [QOE::video nominal_bitrate]
  log local0. "QOE_PARSE_DONE_ENABLED: width=$w height=$h
  bitrate=$b duration=$d"
}
```

5. Click **Finished**.
   The new iRule appears in the list of iRules on the system.

There is now an iRule available to collect static information specific to video files.

Creating a video Quality of Experience profile

You can use the Traffic Management shell (`tmsh`) to create a video Quality of Experience (QoE) profile to use with Policy Enforcement Manager™ (PEM™) or Application Acceleration Manager™ (AAM™) and determine a customer's video Quality of Experience.

1. Log in to the command-line interface of the system using the root account.
2. Open the Traffic Management Shell (`tmsh`).
   ```
   tmsh
   ```
3. Create a video QoE profile.
   ```
   create ltm profile qoe qoe_profile_name video true
   ```

This creates the video QoE profile.

Creating a pool

You can create a pool of servers that you can group together to receive and process traffic. Repeat these steps for each desired pool.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.
5. Click **Finished**.

The new pool appears in the Pools list.

Creating a video Quality of Experience virtual server

Before creating a video Quality of Experience (QoE) virtual server, you need to have created and configured a video QoE profile.

You can assign video QoE profile to a virtual server.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.

2. Click the **Create** button.
   The New Virtual Server screen opens.
3. From the **HTTP Profile** list, select **http**.
4. In the Resources area, for the **iRules** setting, from the **Available** list, select the name of the iRule that you want to assign, and using the Move button, move the name into the **Enabled** list.
5. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
6. Click **Finished**.
7. Log in to the command-line interface of the system using the root account.
8. Open the Traffic Management Shell (`tmsh`).
   ```
   tmsh
   ```
9. Assign the video QoE profile to the virtual server.
   ```
   modify virtual_server_name profile add qoe_profile_name
   ```

This assigns the video QoE profile and iRules to the virtual server.

Securing Client-side SMTP Traffic

Overview: Securing client-side SMTP traffic

You can add SSL encryption to SMTP traffic quickly and easily, by configuring an SMTPS profile on the BIG-IP® system. *SMTPS* is a method for securing Simple Mail Transport Protocol (SMTP) connections at the transport layer.

Normally, SMTP traffic between SMTP servers and clients is unencrypted. This creates a privacy issue because SMTP traffic often passes through routers that the servers and clients do not trust, resulting in a third party potentially changing the communications between the server and client. Also, two SMTP systems do not normally authenticate each other. A more secure SMTP server might only allow communications from other known SMTP systems, or the server might act differently with unknown systems.

To mitigate these problems, the BIG-IP system includes an SMTPS profile that you can configure. When you configure an SMTPS profile, you can activate support for the industry-standard STARTTLS extension to the SMTP protocol, by instructing the BIG-IP system to either allow, disallow, or require STARTTLS activation for SMTP traffic. The STARTTLS extension effectively upgrades a plain-text connection to an encrypted connection on the same port, instead of using a separate port for encrypted communication.

This illustration shows a basic configuration of a BIG-IP system that uses SMTPS to secure SMTP traffic between the BIG-IP system and an SMTP mail server.

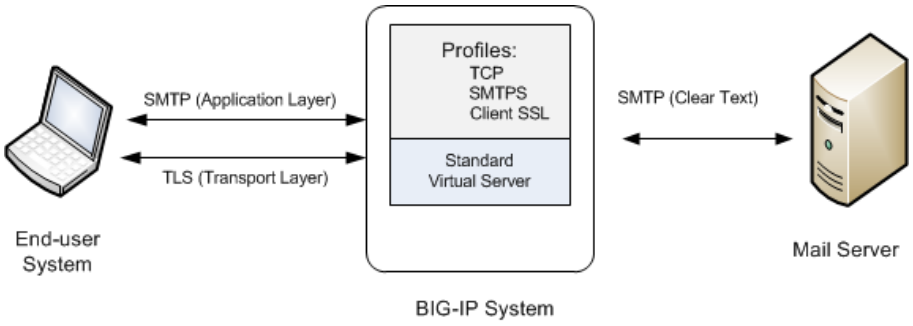


Figure 21: Sample BIG-IP configuration for SMTP traffic with STARTTLS activation

Task summary

To configure the BIG-IP ®system to process Simple Mail Transport Protocol (SMTP) traffic with SSL functionality, you perform a few basic tasks.

Task list

Creating an SMTPS profile
Creating a Client SSL profile
Creating a virtual server and load-balancing pool

Creating an SMTPS profile

This task specifies that STARTTLS authentication and encryption should be required for all client-side Simple Mail Transport Protocol (SMTP) traffic. When you require STARTTLS for SMTP traffic, the BIG-IP® system effectively upgrades SMTP connections to include SSL, on the same SMTP port.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **SMTPS**.
   The SMTPS profile list screen opens.
2. Click **Create**.
   The New SMTPS Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select the **Custom** check box.
5. From the **STARTTLS Activation Mode** list, select **Require**.
6. Click **Finished**.

The BIG-IP system is now required to activate STARTTLS for all client-side SMTP traffic.

Creating a Client SSL profile

You create a Client SSL profile when you want the BIG-IP® system to authenticate and decrypt/encrypt client-side application traffic.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. Configure all profile settings as needed.
4. Click **Finished**.

After creating the Client SSL profile and assigning the profile to a virtual server, the BIG-IP system can apply SSL security to the type of application traffic for which the virtual server is configured to listen.

Creating a virtual server and load-balancing pool

You use this task to create a virtual server, as well as a default pool of Simple Mail Transport Protocol (SMTP) servers. The virtual server listens for, and applies SSL security to, client-side SMTP application traffic. The virtual server then forwards the SMTP traffic on to the specified server pool.

Note: *Using this task, you assign an SMTPS profile to the virtual server instead of an SMTP profile. You must also assign a Client SSL profile.*

---

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type an address, as appropriate for your network.

The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

5. In the **Service Port** field, type `25` or select **SMTP** from the list.
6. From the **Configuration** list, select **Basic**.
7. For the **SSL Profile (Client)** setting, in the **Available** box, select a profile name, and using the Move button, move the name to the **Selected** box.
8. From the **SMTPS Profile** list, select the SMTPS profile that you previously created.
9. In the Resources area of the screen, for the **Default Pool** setting, click the **Create (+)** button.
   The New Pool screen opens.
10. In the **Name** field, type a unique name for the pool.
11. In the Resources area, for the **New Members** setting, select the type of new member you are adding, then type the information in the appropriate fields, and click **Add** to add as many pool members as you need.
12. Click **Finished** to create the pool.
    The screen refreshes, and reopens the New Virtual Server screen. The new pool name appears in the **Default Pool** list.
13. Click **Finished**.

After performing this task, the virtual server applies the custom SMTPS and Client SSL profiles to incoming SMTP traffic.

Implementation result

After you have created an SMTPS profile and a Client SSL profile and assigned them to a virtual server, the BIG-IP system listens for client-side SMTP traffic on port 25. The BIG-IP system then activates the STARTTLS method for that traffic, to provide SSL security on that same port, before forwarding the traffic on to the specified server pool.

Securing Client-side and Server-side LDAP Traffic

Overview: Securing LDAP traffic with STARTTLS encryption

You can configure STARTTLS encryption for Lightweight Directory Access Protocol (LDAP) traffic passing through the BIG-IP® system. *LDAP* is an industry standard application protocol for accessing and maintaining distributed directory information services over an Internet Protocol (IP) network.

You configure the BIG-IP system for STARTTLS encryption by configuring Client LDAP and Server LDAP profiles to activate the STARTTLS communication protocol for any client or server traffic that allows or requires STARTTLS encryption.

Normally, LDAP traffic between LDAP servers and clients is unencrypted. This creates a privacy issue because LDAP traffic often passes through routers that the servers and clients do not trust, resulting in a third party potentially changing the communications between the server and client. Also, two LDAP systems do not normally authenticate each other. A more secure LDAP server might only allow communications from other known LDAP systems, or the server might act differently with unknown systems.

To mitigate these problems, the BIG-IP system includes two LDAP profiles that you can configure. When you configure a Client LDAP or Server LDAP profile, you can instruct the BIG-IP system to activate the STARTTLS communication protocol for any client or server traffic that allows or requires STARTTLS encryption. The *STARTTLS* protocol effectively upgrades a plain-text connection to an encrypted connection on the same port (port 389), instead of using a separate port for encrypted communication.

This illustration shows a basic configuration of a BIG-IP system that activates STARTTLS to secure LDAP traffic between a client system and the BIG-IP system, and between the BIG-IP system and an LDAP authentication server.

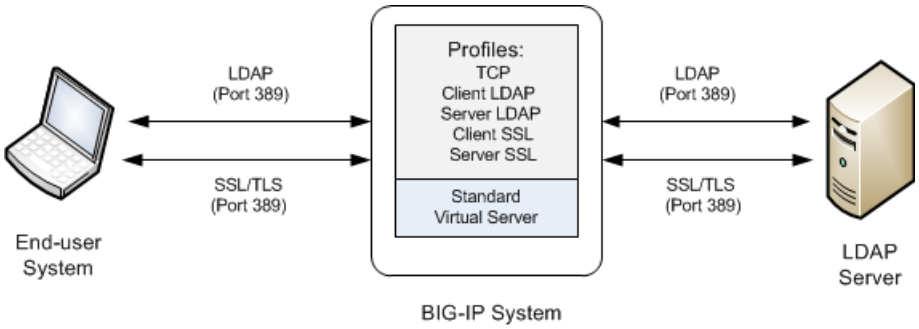


Figure 22: Sample BIG-IP configuration for LDAP traffic with STARTTLS activation

Task summary

To configure the BIG-IP ®system to process Lightweight Directory Access Protocol (LDAP) traffic with TLS encryption, you perform a few basic tasks.

Task list

Creating a Client LDAP profile

Creating a Client LDAP profile

You perform this task to specify the condition under which the BIG-IP system should activate STARTTLS encryption for client-side traffic destined for a specific virtual server.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Client LDAP**.
   The Client LDAP list screen displays.
2. Click **Create**.
   The New Client LDAP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, retain the default value, **clientldap**.
5. Select the **Custom** check box.
6. From the **STARTTLS Activation Mode** list, select a value:

Value	Description
Allow	This value activates STARTTLS encryption for any client-side traffic that allows, but does not require, STARTTLS encryption.
Require	This value activates STARTTLS encryption for any client-side traffic that requires STARTTLS encryption. All messages sent to the BIG-IP system prior to STARTTLS activation are rejected with a message stating that a stonger authentication mechanism is required.
None	This value refrains from activating STARTTLS encryption for client-side traffic. Note if you select this value, that you optionally can create an iRule that identifies client-side traffic that requires STARTTLS encryption and then dynamically activates STARTTLS for that particular traffic.

7. Click **Finished**.

After you perform this task, the Client LDAP profile appears on the Client LDAP list screen.

Creating a Server LDAP profile

You perform this task to specify the condition under which the BIG-IP system should activate STARTTLS encryption for server-side traffic destined for a specific virtual server.

1. On the Main tab, click **Local Traffic** > **Profiles** > **Services** > **Server LDAP**.
   The Server LDAP list screen displays.
2. Click **Create**.
   The New Server LDAP Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, retain the default value, **serverldap**.
5. Select the **Custom** check box.
6. From the **STARTTLS Activation Mode** list, select a value:

Value	Description
Allow	This value activates STARTTLS encryption for server-side traffic that allows, but does not require, STARTTLS encryption. In this case, the BIG-IP system only activates STARTTLS for server-side traffic when the BIG-IP system has activated STARTTLS on the client side and the client has acknowledged the activation.
Require	This value activates STARTTLS encryption for any server-side traffic that requires STARTTLS encryption. In this case, the BIG-IP system activates STARTTLS when a successful connection is made.
None	This value refrains from activating STARTTLS encryption for server-side traffic. Note that if you select this value, you can optionally create an iRule that identifies server-side traffic that requires STARTTLS encryption and then dynamically activates STARTTLS for that particular traffic.

7. Click **Finished**.

After you perform this task, the Server LDAP profile appears on the Server LDAP list screen.

Creating a custom Client SSL profile

You create a custom Client SSL profile when you want the BIG-IP® system to terminate client-side SSL traffic for the purpose of decrypting client-side ingress traffic and encrypting client-side egress traffic. By terminating client-side SSL traffic, the BIG-IP system offloads these decryption/encryption functions from the destination server. When you perform this task, you can specify multiple certificate key chains, one for each key type (RSA, DSA, and ECDSA). This allows the BIG-IP system to negotiate secure client connections using different cipher suites based on the client's preference.

Important: *At a minimum, you must specify a certificate key chain that includes an RSA key pair. Specifying certificate key chains for DSA and ECDSA key pairs is optional, although highly recommended.*

Important: *If you create multiple Client SSL profiles and assign them to the same virtual server, then for each of the following profile settings, you must configure the same value in each profile. For example, if the* ***Frequency*** *setting in one profile is set to* ***once****, then the* ***Frequency*** *setting in all other Client SSL profiles for that virtual server must be set to* ***once****.*

- **Ciphers**
- **Client Certificate**
- **Frequency**
- **Certificate Chain Traversal Depth**
- **Certificate Revocation List (CRL)**
- **Trusted Certificate Authorities**
- **Advertised Certificate Authorities**

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. From the **Parent Profile** list, select **clientssl**.
5. Select the **Custom** check box.

The settings become available for change.

6. Using the **Certificate Key Chain** setting, specify one or more certificate key chains:
   a) From the **Certificate** list, select a certificate name.

      This is the name of a certificate that you installed on the BIG-IP® system. If you have not generated a certificate request nor installed a certificate on the BIG-IP system, you can specify the name of an existing certificate, `default`.

   b) From the **Key** list, select the name of the key associated with the certificate specified in the previous step.

      This is the name of a key that you installed on the BIG-IP® system. If you have not installed a key on the BIG-IP system, you can specify the name of an existing key, `default`.

   c) From the **Chain** list, select the chain that you want to include in the certificate key chain.

      A certificate chain can contain either a series of public key certificates in Privacy Enhanced Mail (PEM) format or a series of one or more PEM files. A certificate chain can contain certificates for Intermediate certificate Authorities (CAs).

      Note: *The default self-signed certificate and the default CA bundle certificate are not appropriate for use as a certificate chain.*

   d) For the **Passphrase** field, type a string that enables access to SSL certificate/key pairs that are stored on the BIG-IP system with password protection.

      This setting is optional. For added security, the BIG-IP system automatically encrypts the pass phrase itself. This pass phrase encryption process is invisible to BIG-IP® system administrative users.

   e) From the **OCSP Stapling Parameters** list, select an OCSP stapling profile.

      This setting is optional. To enable OCSP stapling, you must create an OCSP Stapling profile, which you can then select from this list.

   f) Click **Add** and repeat the process for all certificate key chains that you want to specify.

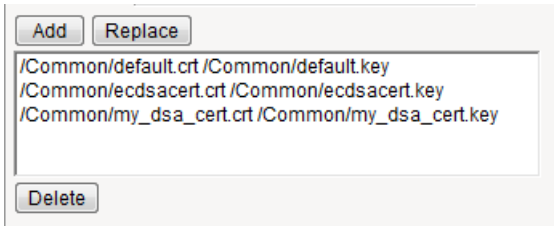


Figure 23: Sample configuration with three key types specified

The result is that all specified key chains appear in the box.

7. If you want to use a cipher suite other than `DEFAULT`:
   a) From the Configuration list, select **Advanced**.
   b) For the **Ciphers** setting, type the name of a cipher.

      You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.

      Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.

8. Configure all other profile settings as needed.
9. Click **Finished**.

After performing this task, you can see the custom Client SSL profile in the list of Client SSL profiles on the system.

You must also assign the profile to a virtual server.

Creating a custom Server SSL profile

With a Server SSL profile, the BIG-IP® system can perform decryption and encryption for server-side SSL traffic.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Server**.
   The SSL Server profile list screen opens.
2. Click **Create**.
   The New Server SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **serverssl** in the **Parent Profile** list.
5. From the **Configuration** list, select **Advanced**.
6. Select the **Custom** check box.
   The settings become available for change.
7. From the **Certificate** list, select the name of an SSL certificate on the BIG-IP system.
8. From the **Key** list, select the name of an SSL key on the BIG-IP system.
9. In the **Pass Phrase** field, select a pass phrase that enables access to the certificate/key pair on the BIG-IP system.
10. From the **Chain** list, select the name of an SSL chain on the BIG-IP system.
11. If you want to use a cipher suite other than `DEFAULT`:
    a) From the Configuration list, select **Advanced**.
    b) For the **Ciphers** setting, type the name of a cipher.

       You can specify a particular string to indicate the ciphers that you want the BIG-IP system to use for SSL negotiation, or you can specify ciphers that you do not want the system to use.

       Examples of cipher values that you can specify are `ECDHE` and `DEFAULT:!ECDHE`.
12. Select the **Custom** check box for **Server Authentication**.
13. Modify the settings, as required.
14. Click **Finished**.

To use this profile, you must assign it to a virtual server.

Creating a virtual server and load-balancing pool

You use this task to create a virtual server, as well as a default pool of LDAP servers. The virtual server then listens for and applies the configured STARTTLS activation to client-side or server-side LDAP traffic, or both. Part of creating this virtual server is specifying the names of any client-side and server-side LDAP and SSL profiles that you previously created.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type an address, as appropriate for your network.

The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

5. In the **Service Port** field, type `389` or select **LDAP** from the list.
6. From the **Configuration** list, select **Basic**.
7. For the **SSL Profile (Client)** setting, in the **Available** box, select a profile name, and using the Move button, move the name to the **Selected** box.
8. From the **Client LDAP Profile** list, select the Client LDAP profile that you previously created.
9. From the **Server LDAP Profile** list, select the Server LDAP profile that you previously created.
10. In the Resources area of the screen, for the **Default Pool** setting, click the **Create (+)** button.
    The New Pool screen opens.
11. In the **Name** field, type a unique name for the pool.
12. In the Resources area, for the **New Members** setting, select the type of new member you are adding, then type the information in the appropriate fields, and click **Add** to add as many pool members as you need.
13. Click **Finished** to create the pool.
    The screen refreshes, and reopens the New Virtual Server screen. The new pool name appears in the **Default Pool** list.
14. Click **Finished**.

After performing this task, the virtual server applies the custom LDAP and SSL profiles to ingress traffic.

Implementation result

After you have created the required LDAP and SSL profiles and assigned them to a virtual server, the BIG-IP® system listens for client- and server-side LDAP traffic on port 389. The BIG-IP system then activates the STARTTLS method for that traffic to provide SSL security on that same port, before forwarding the traffic on to the specified LDAP server pool.

Implementing External Cryptographic Server Offload with BIG-IP Systems

Overview: Implementing external cryptographic server offload

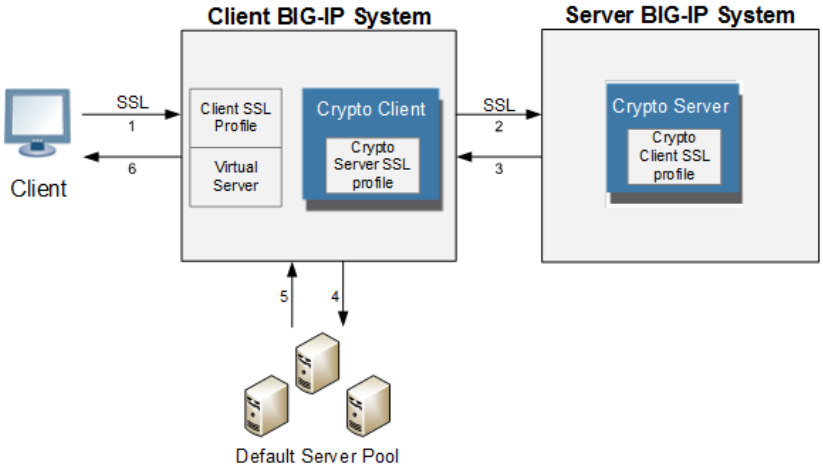
You can offload cryptographic operations to an external BIG-IP® system. For example, you can set up an LTM VE instance (the crypto client) to offload cryptographic operations, such as an RSA decryption operation for an SSL handshake, to an external BIG-IP system (the crypto server) that supports crypographic hardware acceleration.

In general, the setup process includes configuring a client BIG-IP system as a crypto client and a server BIG-IP system as a crypto server, and ensures secure communication between the end user, the crypto client, and the crypto server.

Important: *Both the crypto client and crypto server must be running BIG-IP software version 11.6.0 or later.*

Important: *Before you perform the tasks in this implementation, verify that each BIG-IP system has the default device certificate,* `default.crt`*, installed on it. For more information about device certificates, see BIG-IP® Digital Certificates: Administration.*

This illustration depicts an external cryptographic offload configuration.



The illustration shows the BIG-IP configuration objects that are required for implementing the external cryptographic server offload feature, as well as the flow of client traffic that occurs. In the illustration, one BIG-IP system includes a virtual server configured with the destination IP address for application traffic coming from a client system. Because the client traffic uses SSL, the BIG-IP system with the virtual server must include a standard Client SSL profile, which causes cryptographic functions to be offloaded from the selected destination server (pool member) to that BIG-IP system.

Once this BIG-IP system has assumed cryptographic functions from the destination server, the BIG-IP system can offload these functions to another BIG-IP system to handle the actual cryptographic processing. To enable the BIG-IP system to offload the cryptographic processing to another BIG-IP system, you must designate the two BIG-IP systems as a crypto client and crypto server, and you must create an SSL profile

on each system that is optimized for BIG-IP-to-BIG-IP cryptographic processing (a crypto-optimized Server SSL profile for the BIG-IP crypto client and crypto-optimized Client SSL profile for the BIG-IP crypto server).

Task summary

Creating a Client SSL profile on a client BIG-IP system
Creating a pool on a client BIG-IP system
Creating a virtual server on a client BIG-IP system
Creating a Server SSL profile on a client BIG-IP system
Creating a crypto client object on a client BIG-IP system
Creating a Client SSL profile on a server BIG-IP system
Creating a crypto server object on a server BIG-IP system
Verifying the crypto client and crypto server

Creating a Client SSL profile on a client BIG-IP system

You create a Client SSL profile on a client BIG-IP® system to authenticate and decrypt/encrypt client-side application traffic.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. Configure all profile settings as needed.
4. Click **Finished**.

After you create the Client SSL profile, you assign the profile to a virtual server. The BIG-IP® system can apply SSL security to the type of application traffic for which the virtual server is configured to listen.

Creating a pool on a client BIG-IP system

You can create a pool of servers on a client BIG-IP® system that you can group together to receive and process traffic.

1. On the Main tab, click **Local Traffic** > **Pools**.
   The Pool List screen opens.
2. Click **Create**.
   The New Pool screen opens.
3. In the **Name** field, type a unique name for the pool.
4. Using the **New Members** setting, add each resource that you want to include in the pool:
   a) In the **Node Name** field, type a name for the node portion of the pool member.
      This step is optional.
   b) In the **Address** field, type an IP address.
   c) In the **Service Port** field, type a port number, or select a service name from the list.
   d) In the **Priority** field, type a priority number.
      This step is optional.
   e) Click **Add**.

5. Click **Finished**.

Creating a virtual server on a client BIG-IP system

A virtual server represents a destination IP address for application traffic on a client BIG-IP® system.

1. On the Main tab, click **Local Traffic** > **Virtual Servers**.
   The Virtual Server List screen opens.
2. Click the **Create** button.
   The New Virtual Server screen opens.
3. In the **Name** field, type a unique name for the virtual server.
4. In the **Destination Address** field, type the IP address in CIDR format.

   The supported format is address/prefix, where the prefix length is in bits. For example, an IPv4 address/prefix is `10.0.0.1` or `10.0.0.0/24`, and an IPv6 address/prefix is `ffe1::0020/64` or `2001:ed8:77b5:2:10:10:100:42/64`. When you use an IPv4 address without specifying a prefix, the BIG-IP® system automatically uses a `/32` prefix.

   Note: *The IP address for this field needs to be on the same subnet as the external self-IP address.*

5. In the **Service Port** field, type a port number or select a service name from the **Service Port** list.
6. In the Resources area of the screen, from the **Default Pool** list, select the relevant pool name.
7. For the **SSL Profile (Client)** setting, from the **Available** list, select the name of the Client SSL profile you previously created, and using the Move button, move the name to the **Selected** list.

Creating a Server SSL profile on a client BIG-IP system

With a Server SSL profile, a client BIG-IP® system can perform decryption and encryption for server-side SSL traffic.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Server**.
   The SSL Server profile list screen opens.
2. Click **Create**.
   The New Server SSL Profile screen opens.
3. In the **Name** field, type a unique name for the profile.
4. Select **crypto-client-default-serverssl** in the **Parent Profile** list.
5. Modify the settings, as required.
6. Click **Finished**.

Creating a crypto client object on a client BIG-IP system

You can create a crypto client object to enable a BIG-IP® system to act as a crypto client for external cryptographic server offload.

1. On the Main tab, click **System** > **Crypto Offloading** > **Crypto Client**.
   The Crypto Client screen displays a list of crypto clients configured on the system.
2. Click **Create**.

3. In the **Name** field, type a unique name for the crypto client object.
4. In the **Address** field, type the IP address of the crypto server that you want to use for the crypto server object.
5. In the **Service Port** field, type a port number, or select a service name from the list.
6. In the **TCP Profiles** field, select **tcp**.
7. For the **SSL Profiles** setting, select the Server SSL profile that you previously created.

Creating a Client SSL profile on a server BIG-IP system

You create a Client SSL profile on a server BIG-IP® system to authenticate and decrypt/encrypt application traffic from the client BIG-IP system.

1. On the Main tab, click **Local Traffic** > **Profiles** > **SSL** > **Client**.
   The Client profile list screen opens.
2. Click **Create**.
   The New Client SSL Profile screen opens.
3. Select **crypto-server-default-clientssl** in the **Parent Profile** list.
4. Configure all profile settings as needed.
5. Click **Finished**.

Creating a crypto server object on a server BIG-IP system

You can create a crypto server object to enable your BIG-IP® system to act as a crypto server for external cryptographic server offload.

1. On the Main tab, click **System** > **Crypto Offloading** > **Crypto Server**.
   The Crypto Server screen displays a list of crypto servers configured on the system.
2. Click **Create**.
3. In the **Name** field, type a unique name for the crypto server object.
4. In the **Address** field, type the IP address you want to use for the crypto server object.
5. In the **Service Port** field, type a port number, or select a service name from the list.
6. In the **TCP Profiles** field, select **tcp**.
7. For the **SSL Profiles** setting, select the Client SSL profile that you previously created.
8. (Optional) Using the **Crypto Client List** setting, add the crypto clients that can access the crypto server:
   a) In the **Address** field, type a crypto client self IP address.
   b) Click **Add**.

Verifying the crypto client and crypto server

After the client and server BIG-IP® systems have processed traffic, you can use `tmsh` to verify that the crypto client and crypto server systems are functioning properly.

1. Open the Traffic Management Shell (`tmsh`).
   ```
   tmsh
   ```

2. Verify that the crypto client is functioning.

   ```
   show sys crypto client <crypto_client_name>
   ```

   A summary similar to this example displays:

```
--------------------------
Sys::Crypto Client: crypto_client_name
--------------------------
  Received Packets      2
  Received Bytes       48
  Transmitted Packets   2
  Transmitted Bytes    40
```

3. Verify that the crypto server is functioning.

   ```
   show sys crypto server <crypto_server_name>
   ```

   A summary similar to this example displays:

```
--------------------------
Sys::Crypto Server: crypto_server_name
--------------------------
  Received Packets      2
  Received Bytes       40
  Transmitted Packets   2
  Transmitted Bytes    48
```

Implementing APM System Authentication

Overview: Configuring authentication for a remote system based on APM

As an administrator in a large computing environment, you might prefer to store user accounts remotely, on a dedicated authentication server. When you want to use a remote server to authenticate traffic that manages a BIG-IP® system, you can store BIG-IP system administrative accounts on an AAA server. BIG-IP APM® supports AAA servers such as HTTP, LDAP, RADIUS, Active Directory, and TACACS+. To complete the authentication process, you must add the newly configured AAA action to an access policy. You can find more information about AAA authentication and access policies in *BIG-IP Access Policy Manager: Authentication and Single Sign-On* and *BIG-IP Access Policy Manager: Visual Policy Editor*.

Important: *System authentication using APM methods will not work if the user name and password contains Unicode characters (for example, Chinese characters) or the symbols ampersand (&), colon (:), less than (<), and apostrophe (').*

Creating a user authentication based on APM

Before you begin:

- Verify that the BIG-IP® system user accounts have been created on the remote authentication server.
- Verify that the appropriate user groups, if any, are defined on the remote authentication server.

You can configure the BIG-IP® system to use an APM® server for authenticating BIG-IP® system user accounts, that is, traffic that passes through the management interface (MGMT).

1. On the Main tab, click **System** > **Users**.
2. On the menu bar, click **Authentication**.
3. Click **Change**.
4. From the **User Directory** list, select **Remote - APM Based**.
5. For the **Access Profile** setting, click the + button.
   The screen refreshes to show general properties.
6. In the **Name** field, type a name for the access profile.

   Note: *An access profile name must be unique among all access profile and any per-request policy names.*

7. From the **Default Language** list, select a language.
   The default is **English (en)**.
8. From the **Authentication Type** list, select the type of authentication for the APM based remote user authentication.
   The screen refreshes to show areas and settings specific to the authentication type.
9. Fill in the fields.
10. Click **Finished**.

You can now authenticate administrative traffic for user accounts that are stored on a remote APM server. If you have no need to configure group-based user authorization, your configuration tasks are complete.

Example access policy using APM LDAP authentication

This is an example of an access policy with all the associated elements that are needed to authenticate and authorize your users with LDAP authentication.

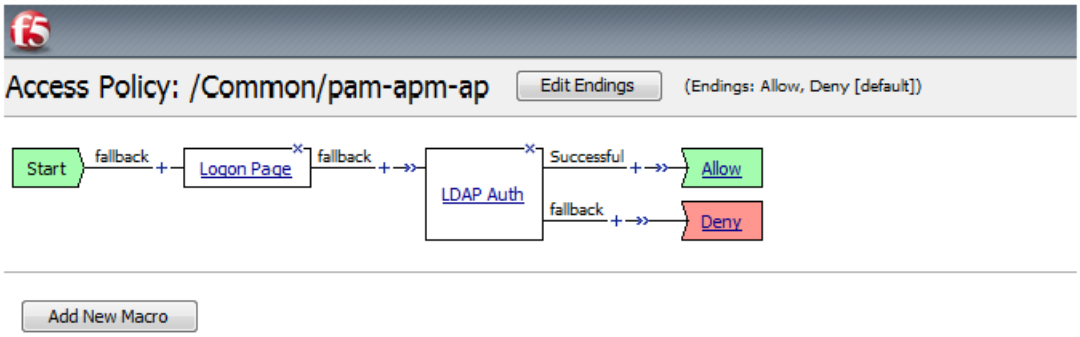


Figure 24: Example of an access policy for LDAP Auth

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