Managing the F5 BIG-IP Load Balancer

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About F5 Load Balancing

Cisco UCS Director supports the creation of a Fenced Virtual application container that utilizes F5 load balancing.

Although load balancing may be quite prevalent in the routing environment, it is also of growing importance in the virtual networking and VM environment. Server load balancing is a mechanism for distributing traffic across multiple virtual servers, offering high application and server resource utilization.

Server load balancing (SLB) is the process of deciding to which server a load-balancing device should send a client request for service. For example, a client request can consist of an HTTP GET for a Web page or an FTP GET to download a file. The job of the load balancer is to select the server that can successfully fulfill the client request and do so in the shortest amount of time without overloading either the server or the server farm as a whole.

Depending on the load-balancing algorithm or predictor that you configure, the Cisco UCS Director performs a series of checks and calculations to determine the server that can best service each client request. Cisco UCS
Director bases server selection on several factors, including the server with the fewest connections with respect to load, source or destination address, cookies, URLs, or HTTP headers.

A high-level process flow of load balancing is described below:

1. A client attempts to connect with a service on the load balancer using the Cisco UCS Director F5 Connector.
2. The load balancer accepts the connection.
3. The load balancer decides which host should receive the connection and changes the destination IP address (or port) in order to match the service of the selected host.
4. The host accepts the load balancer's connection and responds back to the original source, the client (through its default route), and to the load balancer.
5. The load balancer acquires the return packet from the host and now changes the source IP (or port) to correspond to the virtual server IP and port, and forwards the packet back to the client.
6. The client receives the return packet assuming it came from the virtual server, and continues the rest of the process.

Cisco UCS Director enables the management, orchestration, and monitoring of the F5 load balancer. Following is a summary of the crucial processes:

1. You add the F5 load balancer using Administration > Physical Accounts > Managed Network Element > Add Network Element.
2. When the F5 load balancer is added to Cisco UCS Director as a managed element, the Cisco UCS Director task inventory collection is triggered. The polling interval configured on the System Tasks tab specifies the frequency of inventory collection.
3. After the F5 is added to the Pod, it is listed with all other components of the pod environment at the account level. To see the F5 component information, navigate to Physical > Network > Network Managed Elements.

There are two ways to implement load balancing using an F5 device:

1. Use an iApps (BIG-IP) application service, OR
2. Use Cisco UCS Director to:
   - Set up a managed element and
   - Create a Pool
   - Add pool members
   - Create a virtual server

The Cisco UCS Director tasks listed above are documented in detail in the Cisco UCS Director Application Container Guide.

**Understanding Load Balancing Terminology**

This section describes common terms found in the Cisco UCS Director F5 connector environment. In a load-balancing environment, a virtual server is a construct that allows multiple physical servers to appear as one for load-balancing purposes. A virtual server is bound to physical services running on real servers in a
server farm and uses IP address and port information to distribute incoming client requests to the servers in the server farm according to a specified load-balancing algorithm.

- **Virtual servers**— In a load-balancing environment, a virtual server is a construct that allows multiple physical servers to appear as one for load-balancing purposes. A virtual server is bound to physical services running on real servers in a server farm and uses IP address and port information to distribute incoming client requests to the servers in the server farm according to a specified load-balancing algorithm.

- **Pools**— A pool is a collection of virtual servers that provide similar services available on multiple hosts. (See the pool members or nodes entry below for additional information).

- **Pool members or nodes**— When creating a pool, you assign one or more pool members to it. A pool member/node is a logical object that represents a physical node (and a service) on the network. When you add a virtual server to a pool, it becomes a pool member. A member/node includes the TCP port of the actual application that is receiving traffic.

  **Tip**  
  Be aware that a virtual server can be a member of multiple pools. In a different pool, it can have different attributes and play a different role. For example, a virtual server could be a backup resource for a different type of requests, such as requests from a different part of the world.

- **Nodes**— Physical servers that receive traffic from a load balancer.

- **Profiles**— A profile can be either local or roaming. It is recommended that you should operate using roaming profiles rather than local profiles. Using roaming profiles assures you that your settings are always available to you at all times.

### Adding a Network Element

In order to create a virtual server that will support load balancing, you first have to add a network element in Cisco UCS Director. Once the F5 load balancer is added as a network element in Cisco UCS Director, it appears under the **Managed Network Element** tab.

**Before You Begin**

You must be logged in to the appliance to complete this task.

---

**Step 1**  
On the menu bar, choose *Administration > Physical Accounts*.

**Step 2**  
Choose the **Managed Network Elements** tab.

**Step 3**  
Click **Add Network Element**.

**Step 4**  
In the **Add Network Element** dialog box, complete the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pod</strong> drop-down list</td>
<td>Choose the pod to which the network element belongs.</td>
</tr>
<tr>
<td><strong>Device Category</strong></td>
<td>Choose the device category for this network element. For example, <em>F5 Load Balancer</em>.</td>
</tr>
</tbody>
</table>
Virtual Servers

In a load-balancing environment, a virtual server is a construct that allows multiple physical servers to appear as one for load-balancing purposes. A virtual server is bound to physical services running on real servers in a server farm. The virtual server uses IP address and port information to distribute incoming client requests to the servers in the server farm according to a specified load-balancing algorithm.

Although the virtual server is of primary importance because it is used to administer pools and pool members, the practical flow of performing the setup is as follows:

1. Create a pool
2. Add members to pool
3. Create a virtual server that uses the pool
Before you can create a virtual server that will support load balancing, you must add the F5 load balancer as a network element.

Creating a Virtual Server

Tip
To get inventory information about the F5 device, navigate to Converged > Pod, then click on middle of the large Pod icon. In the row of Network images, double-click on BIG-IP to see current information about it.

Before You Begin
An account with the F5 BIG-IP server.

Step 1
On the menu bar, choose Physical > Network.

Step 2
Click on a pod in which one of the Managed Network Elements is the F5 BIG-IP device you want to use, then click on that network. With a Pod highlighted under Physical > Network, and the Managed Network Elements tab selected, a row of information in the table should include the IP address for the F5 BIG-IP device you want to use. In the left-hand column, click on the network associated with this device.

Step 3
Click the Virtual Servers tab, then click Create.

Step 4
In the Create Virtual Server dialogue box, complete the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Server Name field</td>
<td>The virtual server name.</td>
</tr>
<tr>
<td>Virtual Server Description</td>
<td>A unique description of this virtual server.</td>
</tr>
<tr>
<td>Virtual Server Type field</td>
<td>The type of virtual server (pre-selected).</td>
</tr>
<tr>
<td>Destination IP field</td>
<td>The IP address of the destination device, the virtual server. This is a network address, which the system uses this network address in combination with Mask to represent a range of IP addresses.</td>
</tr>
<tr>
<td>Destination IP Address Mask</td>
<td>The IP address mask of the destination device.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Service Port** drop-down list | The data transfer protocol associated with the service port Choose a protocol from the following list:  
  • FTP  
  • HTTP  
  • HTTPS  
  • TELNET  
  • PPTP  
  • SMTP  
  • SNMP  
  • SNMP-TRAP  
  • SSH  
  • Other                                                                 |
| **Port Number**           | The port number to be assigned to this server.                                                                                               |
| **Protocol** drop-down list | Choose a protocol for very high speed data transfer from the following list:  
  • TCP  
  • UDP  
  **Note**   
  TCP is the default value for **Protocol**.                                                                 |
| **Protocol Profile (Client)** button | Choose a client protocol profile with the correct Parent Profile for the Client. The parent profiles are TCP and UDP.  
  The Client Protocol here specifies that the selected profile is a client-side profile. The dropdown list contains entries for each client protocol profile that has been defined.  
  **Remember**   
  The profile selection applies to TCP and UDP connections only. If TCP is set as Protocol, the TCP-related profile should be selected in client and server side profiles. Likewise, UDP related profiles should be selected if UDP is selected as the protocol. hence parent profiles are TCP and UDP. |
Choose a server protocol profile with the correct Parent Profile for the Server.

Server Protocol: Specifies that the selected profile is a server-side profile. Options are: (Use Client Profile) - the default - and entries for each defined server protocol profile.

Choose a default pool.

Note: If you have created a virtual server for load balancing, you must assign a default load balancing pool to this virtual server. A default pool is the pool to which the BIG-IP system sends traffic if no iRule exists specifying a different pool. When you first create the virtual server, you assign an existing default pool to it. From then on, the virtual server automatically directs traffic to that default pool. It is not strictly mandatory to add default pool while creating a virtual server, so there is no default.

Step 5 Click Submit.

Viewing Virtual Servers

The Virtual Servers tab provides information on the following items:

- Pod Name
- Virtual Server Name
- Status
- Destination IP Address
- Service Port
- Type
- Partition or Path
Before You Begin
Create a Virtual Server.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>On the menu bar, choose <strong>Physical &gt; Network</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>Click on a pod that includes a load balancing network.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Click on the load balancing server.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Click the <strong>Virtual Servers</strong> tab to view the F5 server.</td>
</tr>
</tbody>
</table>

### Viewing Virtual Server Statistics

The **Virtual Servers Statistics** tab provides information on the following items:

- Pod Name
- Virtual Server
- Status
- Partition or Path
- Bits In
- Bits Out
- Packets In
- Packets Out
- Current Connections
- Maximum Connections
- Total Request
- CPU Utilization

Before You Begin
Create a Virtual Server.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>On the menu bar, choose <strong>Physical &gt; Network</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>Click on a pod.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Click on the load balancing server.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Click the <strong>Virtual Servers Statistics</strong> tab to view the statistics.</td>
</tr>
</tbody>
</table>
Creating an Application Service

This topic describes how to create an application service for a selected pod.

**Step 1**
On the menu bar, choose **Physical > Networks**.

**Step 2**
Click on a pod that includes the F5 network, expand the directory as necessary, and click on the F5 network.

**Step 3**
Click on the **Application Services** tab.

**Step 4**
Click **Create**.

**Step 5**
In the **Create Application Service** dialogue box, complete the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application Service Name field</strong></td>
<td>The virtual server name.</td>
</tr>
<tr>
<td><strong>Template field</strong></td>
<td>The name of the template.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>When working with an F5 network, this value should be set as f5.http.</td>
</tr>
<tr>
<td><strong>Virtual Server IP field</strong></td>
<td>The IP address of the destination device.</td>
</tr>
<tr>
<td><strong>FQDN names of Virtual Server field</strong></td>
<td>The fully qualified domain name (FQDN) names of the virtual server. Separate each FQDN name with a comma.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>Clients can use the FQDNs that you enter here to access the web servers. For each FQDN, your DNS Administrator must configure a DNS entry that resolves to the IP address you entered for the BIG-IP virtual server.</td>
</tr>
</tbody>
</table>

**Nodes List**
Select a node from the Nodes list and click **Submit**.

If a node that you want to associate with the Virtual Server does not appear in the Nodes list:

- Click + to add it. The **Add Entry to Nodes list** dialog box appears.
- Provide the Node IP address, the Port, and the Connection limit; then click **Submit**.

**Step 6**
Click **Submit**.
Creating a Pool

The Pool list tab enables you to create a new pool to the list of pools associated with an F5 load balancer. It also allows you to delete a pool, or to modify a pool by adding or deleting pool members.

The Pool list tab lists the following data for each pool:

- Pod Name
- Server Name
- Status
- Members
- Partition or Path

**Step 1**
On the menu bar, choose Physical > Network.

**Step 2**
Click on the pod that supports the F5 BIG_IP network that you want to use, then click on that network.

**Step 3**
Click the Pool List tab to view the existing list of pools.
Using controls that appear in this tab, you can also delete a pool from this list, see the members of any selected pool, or add or delete members of an existing pool.

**Step 4**
Click Create.

**Step 5**
In the Create Pool dialog box, complete the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool Name field</td>
<td>The Pool name.</td>
</tr>
</tbody>
</table>
| **Load Balancing Method** drop-down list | Choose a load balancing method from the following list:  
  - Round Robin  
  - Ratio (member)  
  - Lease Connections (member)  
  - Observed (member)  
  - Predictive (member)  
  - Ratio (node)  |
From the Existing Nodes list, add a node to the named pool. If the node you want to use does not yet appear in the Existing Nodes List, click + to add it. A dialog box appears, titled Add Entry to Existing Node List. Provide the Node Name and the port that this node will use, then click Submit. Choose the node. Then click Submit.

**Note** For the purposes of setting up an F5 pool, the node name here does not have to use IPO address format. If a node is created by a virtual server creation service or by an application creation service, then the name of the node is set as the IP address of the node. If a node is created using the Create Node option, a name of another format may be displayed.

**Step 6** Click Submit.

**Step 7** To see additional details about available pools and nodes, see the tabs titled Pool Statistics, Node List, and Node Statistics.

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**What to Do Next**

**Adding Members to a Pool**

**Before You Begin**

Create a Pool.

---

**Step 1** On the menu bar, choose Physical > Network.

**Step 2** Click on the pod that supports the F5 BIG IP network of interest to you, then click on that network.

**Step 3** Click the Pool List tab to view the existing list of pools. Using controls that appear in this tab, you can also create or delete a pool from this list, or see the members of any selected pool.

**Step 4** Click on the pool in which you want to add, delete, or modify members, then click View Details. The Pool Members tab appears, listing the members of the pool you most recently selected.

**Step 5** To add a member to the selected pool, click Add. The Add Pool Member dialog box appears.

**Step 6** If you want to use an existing Node, then check the box labeled "Do you want to use existing node?" Otherwise, provide the Address and Service port.

   a) Check the box labeled "Do you want to use existing node?"

   b) Provide the following information.
c) In the **Add Pool Member** dialogue box, complete the following fields:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| Node Name selector. | • Click **Select...** to open a list of existing nodes associated with the Pool-related account.  
                        • Checkmark a node to select it, then click **Select**.  
                        The selected node appears in the **Add Pool Member** dialog box.                                |
| Service Port        | Enter the service port for the node.                                                                                                         |

d) Click **Submit**.  
A message confirms that the member was added to the pool successfully.

**Step 7**  
If you do NOT want to use an existing Node, then provide the Address and Service Port data and click **Submit**.  
A message confirms that the member was added to the pool successfully and the new member is listed in the **Pool Members** tab.

**Step 8**  
To return to the **Pool List** tab, click the **Back** button.

---

**Viewing Pool Statistics**

The **Pool Statistics** tab provides the following information:

- Pod Name
- NoPool Name
- Status
- Partition/Path
- Bits In
- Bits Out
- Packets In
- Packets Out
- Current Connections
- Maximum Connections
- Total Connections
- Total Requests
- Request Queue Depth
Managing the F5 BIG-IP Load Balancer

Viewing Node Lists

The Node list tab provides information on the following items:

- Pod Name
- Server Name
- Status
- Description
- IP Address
- Partition or Path

Before You Begin
Create a Virtual Server.

Step 1
On the menu bar, choose Physical > Network.

Step 2
In the left pane, click on a pod that includes an F5 BIG_IP network.

Step 3
Expand the pod, then click the F5 BIG-IP load balancer account.

Step 4
Click the Pool Statistics tab to view the existing information.

Viewing Node Statistics

The Node Statistics tab provides the following information:

- Pod Name
- Node Name
Before You Begin
Create a Virtual Server.

Step 1 On the menu bar, choose Physical >Network.
Step 2 In the left pane, click on a pod that includes an F5 BIG_IP network.
Step 3 Expand the pod, then click the F5 BIG-IP load balancer account.
Step 4 Click the Node Statistics tab to view the existing information.

Viewing TCP Profiles

The TCP Profiles tab provides information on the following items:

- Pod Name
- Server Name
- Parent Profile
- Partition or Path
Before You Begin
Create a Virtual Server.

Viewing UDP Profiles

The UDP Profiles tab provides information on the following items:

- Pod Name
- Server Name
- Parent Profile
- Partition or Path

Step 1 On the menu bar, choose Physical > Network.
Step 2 In the left pane, click on a pod that includes an F5 BIG-IP network.
Step 3 Expand the pod, then click the F5 BIG-IP load balancer account.
Step 4 Click the UDP Profiles tab to view the existing list of UDP profiles.
Viewing UDP Profiles