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1. About this Guide
This guide details the steps required to configure a load balanced Dell EMC ECS environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Dell EMC ECS configuration changes that are required to enable load balancing.

For more information about initial appliance deployment, network configuration and using the Web User Interface (WebUI), please also refer to the relevant Administration Manual:

- v7 Administration Manual
- v8 Administration Manual

2. Loadbalancer.org Appliances Supported
All our products can be used for load balancing Dell EMC ECS. The complete list of models is shown below:

<table>
<thead>
<tr>
<th>Discontinued Models</th>
<th>Current Models *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise R16</td>
<td>Enterprise R20</td>
</tr>
<tr>
<td>Enterprise VA R16</td>
<td>Enterprise MAX</td>
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<tr>
<td>Enterprise VA</td>
<td>Enterprise 10G</td>
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<tr>
<td>Enterprise R320</td>
<td>Enterprise 40G</td>
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<td>Enterprise Ultra</td>
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<td></td>
<td>Enterprise VA R20</td>
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<td>Enterprise VA MAX</td>
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<td>Enterprise AWS **</td>
</tr>
<tr>
<td></td>
<td>Enterprise AZURE **</td>
</tr>
</tbody>
</table>

* For full specifications of these models please refer to: [http://www.loadbalancer.org/products/hardware](http://www.loadbalancer.org/products/hardware)

** Some features may not be supported, please check with Loadbalancer.org support

3. Loadbalancer.org Software Versions Supported

- V8.35 and later

4. Dell EMC ECS Software Versions Supported

- Dell EMC ECS – all versions
5. Dell EMC ECS

ECS (Elastic Cloud Storage) is an object storage solution developed by Dell EMC. It uses hardware ‘nodes’ to provide storage, and is designed to be flexible, resilient, and simple to deploy.

Dell recommend the use of load balancing in an ECS deployment, in order to distribute the inbound workload across all ECS nodes in an effort to maximise performance.

One of Dell EMC’s approved and documented solutions for load balancing ECS is the free and open source HAProxy load balancer. HAProxy is a key component of the Loadbalancer.org appliance, making it a great fit for load balancing ECS deployments.

6. Load Balancing Dell EMC ECS

Note: It’s highly recommended that you have a working Dell EMC ECS environment first before implementing the load balancer.

Persistence (aka Server Affinity)

Persistence is only recommended for NFS connections when load balancing a Dell EMC ECS deployment. This is due to the fact that caching occurs on the ECS servers when the NFS protocol is used. To maximise efficiency, a given NFS client should continue connecting to the same ECS server, so as to continue re-using the established cache.

Virtual Service (VIP) Requirements

To provide load balancing and HA for Dell EMC ECS, the following VIPs are usually required:

- S3 (for object access via the S3 protocol)
- Atmos (for object access via the Atmos protocol)
- Swift (for object access via the Swift protocol)
- NFS (for providing highly available NFS services)

Optionally, additional VIPs may be required as follows:

- ECS Combined Service (for scenario 2, where only a single IP address is client-facing)
- TLS/SSL termination service (for scenario 2, where HTTPS traffic must be decrypted for inspection)

Port Requirements

The following table shows the ports that are load balanced:
### TLS/SSL Termination

Terminating TLS/SSL connections on the load balancer is not recommended, due to the significant computational overhead this introduces on the load balancer. Termination and decryption should continue to occur at the ECS servers, which are designed and best placed to perform this function.

It may be necessary to terminate and decrypt traffic at the load balancer, so that it may then be read as plaintext and sorted. This is required if sorting incoming traffic by protocol is not possible by using different ports or IP addresses. This is explained in detail in section 7, Deployment Concept.

### Health Checks

#### S3, Atmos, And Swift Virtual Services

The S3 and Swift virtual services use protocol-specific health checks to query the readiness of a given ECS server to accept connections for those protocols.

The Atmos virtual service uses a standard ‘connect to port’ check, which examines whether the Atmos port is open on a given ECS server to determine whether the server is ready to accept connections using the Atmos protocol.

#### NFS Virtual Service

The NFS virtual service uses a standard ‘connect to port’ check by default, which examines whether the NFS port (2049) is open on a given ECS server to determine whether the server is ready to accept NFS connections.

It is possible to configure a custom health check for the NFS service, which will check the availability of all three ports related to NFS operation (111, 2049, and 10000) on the real servers. Only if all three ports are available will a real server be considered ‘healthy’ and ready to accept NFS connections.

Please see Appendix 1 – Multi-port NFS Health Check for instructions on how to configure such a custom health check.
7. Deployment Concept

There are two deployment scenarios when using Loadbalancer.org appliances as part of a Dell EMC ECS deployment.

Scenario 1 – Virtual Services for Each Protocol

This is the preferred scenario, and is the easiest to implement. Incoming traffic is not decrypted or modified in any way. The different protocols are handled by different virtual services on the load balancer. Each virtual service is client-facing. The traffic needs to be sorted by protocol (S3, Atmos, and Swift) by the time it reaches the load balancer, either sorted by port or sorted by IP address. The S3 traffic needs to go to the S3 virtual service, the Atmos traffic needs to go to the Atmos virtual service, and the Swift traffic needs to go to the Swift virtual service.

Method A: Sorting By Port

This is the simplest way of sorting ECS traffic. It assumes that your clients are able to send request traffic using the correct protocol-specific ports. For example, an S3 client would send request traffic using ports 9020 and 9021. This is likely to be the case for an internal, non-public Internet facing ECS deployment.

The load balancer’s S3, Atmos, and Swift virtual services would all use the same IP address, but would each listen on their respective ports in the 9020-9025 range.
Method B: Sorting By IP Address

This sorting method is a good alternative if sorting by port is not a possibility (for example if client traffic is being sent over the public Internet and ports 80 and 443 must be used for all traffic of all protocols).

A simple way of sorting the incoming traffic by protocol is to use multiple DNS records, one for each protocol. For example:

- os.website.org (FQDN for the S3 service) resolves to the IP address of the S3 VIP
- atmos.website.org (FQDN for the Atmos service) resolves to the IP address of the Atmos VIP
- swift.website.org (FQDN for the Swift service) resolves to the IP address of the Swift VIP

If the FQDNs in question need to resolve to public IP addresses, a valid setup would be to put the public IP addresses on an external facing firewall and then forward the traffic to the relevant load balancer VIPs.

Scenario 2 – Single Client-facing Virtual Service

This scenario involves inspecting all incoming HTTP(S) traffic and sorting it by FQDN, so that it may be forwarded to the correct protocol-specific virtual service, i.e. the S3, Atmos, or Swift virtual service.

This deployment type is useful when it is not possible to pre-sort traffic by port (for example if clients are on the public Internet and traffic needs to be sent using ports 80 and 443 only) or by IP address (for example if changing public DNS records is not possible).

The disadvantages of this setup are that it is more complex to set up than scenario 1 and that all incoming TLS/SSL encrypted traffic must be decrypted for inspection, which is CPU intensive on the load balancer.
Helping you Choose the Most Appropriate Deployment Type

START

Can clients send request traffic to the correct protocol-specific ports, i.e. ports 9020-9025 for the S3, Atmos, and Swift protocols?

YES

Use Scenario 1, Method A: sorting by port

NO

Can the FQDNs for different protocol access be made to resolve to different IP addresses, e.g. atmos.site.org resolves to 64.70.0.1, swiftsite.org resolves to 64.70.0.2, etc.?

YES

Use Scenario 1, Method B: sorting by IP address

NO

Use Scenario 2
8. Loadbalancer.org Appliance – the Basics

Virtual Appliance Download & Deployment
A fully featured, fully supported 30 day trial is available if you are conducting a PoC (Proof of Concept) deployment. The VA is currently available for VMware, Virtual Box, Hyper-V, KVM and XEN and has been optimized for each Hypervisor. By default, the VA is allocated 1 CPU, 2GB of RAM and has an 8GB virtual disk. The Virtual Appliance can be downloaded [here](#).

Note: The same download is used for the licensed product, the only difference is that a license key file (supplied by our sales team when the product is purchased) must be applied using the appliance’s WebUI.

Note: Please refer to the [Administration Manual](#) and the ReadMe.txt text file included in the VA download for more detailed information on deploying the VA using various Hypervisors.

Initial Network Configuration
The IP address, subnet mask, default gateway and DNS settings can be configured in several ways as detailed below:

**Method 1 - Using the Network Setup Wizard at the console**
After boot up, follow the instructions on the console to configure the IP address, subnet mask, default gateway and DNS settings.

**Method 2 - Using the WebUI**
Using a browser, connect to the WebUI on the default IP address/port: `https://192.168.2.21:9443`
To set the IP address & subnet mask, use: `Local Configuration > Network Interface Configuration`
To set the default gateway, use: `Local Configuration > Routing`
To configure DNS settings, use: `Local Configuration > Hostname & DNS`

Accessing the Web User Interface (WebUI)
The WebUI can be accessed via HTTPS at the following URL: `https://192.168.2.21:9443/lbadmin`
* Note the port number → 9443

(replace 192.168.2.21 with the IP address of your load balancer if it’s been changed from the default)

Login using the following credentials:
Username: loadbalancer
Password: loadbalancer

Note: To change the password, use the WebUI menu option: Maintenance > Passwords.

Once logged in, the WebUI will be displayed as shown on the following page:
HA Clustered Pair Configuration

Loadbalancer.org recommend that load balancer appliances are deployed in pairs for high availability. In this guide a single unit is deployed first, adding a secondary slave unit is covered in section 2 of the appendix on page 31.
Changing the Global Layer 7 Settings
It is necessary to change some global layer 7 timeout settings when load balancing an ECS deployment.

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Advanced Configuration
2. Set the Connection Timeout value to 5000
3. Set the Client Timeout value to 50000
4. Set the Real Server Timeout to 50000
5. Click Update to apply the settings

Configuring VIP 1 – S3

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service
2. Define the Label for the virtual service as required, e.g. ECS-S3
3. Set the Virtual Service IP address field as required:
   • If using method A (sorting by port), use the same IP address for all virtual services
   • If using method B (sorting by IP address), use a unique IP address for the S3 virtual service
4. Set the Virtual Service Ports as required:
   • If using method A (sorting by port), use ports 9020,9021
   • If using method B (sorting by IP address), use ports 80,443
5. Set the Layer 7 Protocol to TCP Mode
6. Click Update to create the virtual service

7. Click Modify next to the newly created VIP
8. Set Persistence Mode to **None**
9. Set Health Checks to **Negotiate HTTP (GET)**
10. Set Request to send to **?ping**
11. Set Host Header to **haproxy**
12. Click **Update**

**Defining The Real Servers (RIPs)**

1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Real Servers* and click on **Add a new Real Server** next to the newly created VIP
2. Enter an appropriate name for the server in the **Label** field, e.g. **ECS-Node-1**
3. Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.85.50**
4. Leave the **Real Server Port** field blank
5. Click **Update**
6. Repeat these steps to add additional servers as required

```
Layer 7 Add a new Real Server - ECS-S3

Label: ECS-Node-1
Real Server IP Address: 192.168.85.50
Real Server Port: 
Re-Encrypt to Backend: 
Weight: 100
```

**Configuring VIP 2 – Atmos**

**Configuring The Virtual Service (VIP)**

1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Add a new Virtual Service**
2. Define the **Label** for the virtual service as required, e.g. **ECS-Atmos**
3. Set the **Virtual Service IP address** field as required:
   - If using method A (sorting by port), use the same IP address for all virtual services
   - If using method B (sorting by IP address), use a unique IP address for the Atmos virtual service
4. Set the **Virtual Service Ports** as required:
   - If using method A (sorting by port), use ports **9022,9023**
   - If using method B (sorting by IP address), use ports **80,443**
5. Set the Layer 7 Protocol to **TCP Mode**
6. Click **Update** to create the virtual service

7. Click **Modify** next to the newly created VIP
8. Set **Persistence Mode** to **None**
9. Click **Update**

### Defining The Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on **Add a new Real Server** next to the newly created VIP
2. Enter an appropriate name for the server in the **Label** field, e.g. **ECS-Node-1**
3. Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.85.50**
4. Leave the **Real Server Port** field blank
5. Click **Update**
6. Repeat these steps to add additional servers as required
Configuring VIP 3 – Swift

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service
2. Define the Label for the virtual service as required, e.g. ECS-Swift
3. Set the Virtual Service IP address field as required:
   • If using method A (sorting by port), use the same IP address for all virtual services
   • If using method B (sorting by IP address), use a unique IP address for the Swift virtual service
4. Set the Virtual Service Ports as required:
   • If using method A (sorting by port), use ports 9024,9025
   • If using method B (sorting by IP address), use ports 80,443
5. Set the Layer 7 Protocol to TCP Mode
6. Click Update to create the virtual service

![Layer 7 - Add a new Virtual Service]

7. Click Modify next to the newly created VIP
8. Set Persistence Mode to None
9. Set Health Checks to Negotiate HTTP (HEAD)
10. Set Request to send to healthcheck
11. Click Update

Defining The Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP
2. Enter an appropriate name for the server in the Label field, e.g. ECS-Node-1
3. Change the Real Server IP Address field to the required IP address, e.g. 192.168.85.50
4. Leave the Real Server Port field blank
5. Click **Update**
6. Repeat these steps to add additional servers as required

---

### Configuring VIP 4 – NFS

#### Configuring The Virtual Service (VIP)
1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Add a new Virtual Service**
2. Define the Label for the virtual service as required, e.g. ECS-NFS
3. Set the Virtual Service IP address field to the IP address to be used for NFS access, in this example **192.168.85.200**
4. Set the Virtual Service Ports field to **111,2049,10000**
5. Set the Layer 7 Protocol to **TCP Mode**
6. Click **Update** to create the virtual service

---

7. Click **Modify** next to the newly created VIP
8. Set Persistence Mode to **Source IP**
9. Set the Persistence Timeout field to 1440 (units are minutes; 1440 minutes is 24 hours)
10. Check the Timeout checkbox
11. Set the Client Timeout field to 1m
12. Set the Real Server Timeout field to 1m
13. Set Health Checks to Connect to port
14. Set Check Port to 2049

Note: It is possible to configure a custom health check for the NFS service, which will check the availability of all three NFS ports (111, 2049, and 10000) on the real servers. Only if all three ports are available will a real server be considered ‘healthy’ and ready to accept connections. Please see Appendix 1 – Multi-port NFS Health Check for instructions on how to configure such a custom health check.

15. Click Update

Defining The Real Servers (RIPs)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP
2. Enter an appropriate name for the server in the Label field, e.g. ECS-Node-1
3. Change the Real Server IP Address field to the required IP address, e.g. 192.168.85.50
4. Leave the Real Server Port field blank
5. Click Update
6. Repeat these steps to add additional servers as required

Finalizing the Configuration
To apply the new settings, HAProxy must be reloaded as follows:
1. Using the WebUI, navigate to: Maintenance > Restart Services and click Reload HAProxy

10. Appliance Configuration for Dell EMC ECS – Scenario 2

Changing the Global Layer 7 Settings
It is necessary to change some global layer 7 timeout settings when load balancing an ECS deployment.

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Advanced Configuration
2. Set the Connection Timeout value to 5000
3. Set the Client Timeout value to 50000
4. Set the Real Server Timeout to 50000
5. Click Update to apply the settings

Configuring VIP 1 – S3

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service
2. Define the Label for the virtual service as required, e.g. ECS-S3
3. Set the Virtual Service IP address field to an unused IP address, e.g. 192.168.85.200
4. Set the Virtual Service Ports field to 80
5. Set the Layer 7 Protocol to HTTP Mode
6. Click Update to create the virtual service

7. Click Modify next to the newly created VIP
8. Set Persistence Mode to None
9. Set Health Checks to Negotiate HTTP (GET)
10. Set Request to send to `ping`
11. Set Host Header to `haproxy`
12. Click **Update**

**Defining The Real Servers (RIPs)**

1. Using the web user interface, navigate to `Cluster Configuration > Layer 7 – Real Servers` and click on **Add a new Real Server** next to the newly created VIP
2. Enter an appropriate name for the server in the **Label** field, e.g. **ECS-Node-1**
3. Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.85.50**
4. Set the **Real Server Port** field to **9020**
5. Click **Update**
6. Repeat these steps to add additional servers as required

![Layer 7 Add a new Real Server - ECS-S3](image)

**Configuring VIP 2 – Atmos**

**Configuring The Virtual Service (VIP)**

1. Using the web user interface, navigate to `Cluster Configuration > Layer 7 – Virtual Services` and click on **Add a new Virtual Service**
2. Define the **Label** for the virtual service as required, e.g. **ECS-Atmos**
3. Set the **Virtual Service IP address** field to an unused IP address, e.g. **192.168.85.201**
4. Set the **Virtual Service Ports** field to **80**
5. Set the **Layer 7 Protocol** to **HTTP Mode**
6. Click **Update** to create the virtual service
7. Click **Modify** next to the newly created VIP
8. Set **Persistence Mode** to **None**
9. Click **Update**

**Defining The Real Servers (RIPs)**

1. Using the web user interface, navigate to **Cluster Configuration > Layer 7 – Real Servers** and click on **Add a new Real Server** next to the newly created VIP
2. Enter an appropriate name for the server in the **Label** field, e.g. **ECS-Node-1**
3. Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.85.50**
4. Set the **Real Server Port** field to **9022**
5. Click **Update**
6. Repeat these steps to add additional servers as required
Configuring VIP 3 – Swift

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service
2. Define the Label for the virtual service as required, e.g. ECS-Swift
3. Set the Virtual Service IP address field to an unused IP address, e.g. 192.168.85.202
4. Set the Virtual Service Ports field to 80
5. Set the Layer 7 Protocol to HTTP Mode
6. Click Update to create the virtual service

```
Layer 7 - Add a new Virtual Service

Label
ECS-Swift

Virtual Service IP Address
192.168.85.202

Ports
80

Layer 7 Protocol
HTTP Mode

Manual Configuration

```

7. Click Modify next to the newly created VIP
8. Set Persistence Mode to None
9. Set Health Checks to Negotiate HTTP (HEAD)
10. Set Request to send to healthcheck
11. Click Update

Defining The Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP
2. Enter an appropriate name for the server in the Label field, e.g. ECS-Node-1
3. Change the Real Server IP Address field to the required IP address, e.g. 192.168.85.50
4. Set the Real Server Port field to 9024
5. Click Update
6. Repeat these steps to add additional servers as required
Configuring VIP 4 – NFS

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service
2. Define the Label for the virtual service as required, e.g. ECS-NFS
3. Set the Virtual Service IP address field to the IP address to be used for NFS access, in this example 192.168.85.204
4. Set the Virtual Service Ports field to 111,2049,10000
5. Set the Layer 7 Protocol to TCP Mode
6. Click Update to create the virtual service

7. Click Modify next to the newly created VIP
8. Set Persistence Mode to Source IP
9. Set the Persistence Timeout field to 1440 (units are minutes; 1440 minutes is 24 hours)
10. Set Health Checks to Connect to port
11. Set Check Port to 2049
12. Check the Timeout checkbox
13. Set the Client Timeout field to 1m
14. Set the Real Server Timeout field to 1m

Note: In the default setup presented here, each ECS server will be checked on port 2049 only (the NFS port) to judge whether the server is ready to accept NFS connections.

It is possible to configure a custom health check for the NFS service, which will check the availability of all three ports related to NFS operation (111, 2049, and 10000) on the real servers. In that case, only if all three ports are available will a real server be considered ‘healthy’ and ready to accept connections.

Please see Appendix 1 – Multi-port NFS Health Check for instructions on how to configure such a custom health check.

15. Click Update

Defining The Real Servers (RIPs)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP
2. Enter an appropriate name for the server in the Label field, e.g. ECS-Node-1
3. Change the Real Server IP Address field to the required IP address, e.g. 192.168.85.50
4. Leave the Real Server Port field blank
5. Click Update
6. Repeat these steps to add additional servers as required
Configuring VIP 5 – ECS Combined Service

Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.
2. Define the Label for the virtual service as required, e.g. ECS-Combined-Service.
3. Set the Virtual Service IP address field to the IP address that all incoming client traffic will be arriving at on the load balancer. In the example presented here, all client traffic (regardless of port) is being sent to the IP address 192.168.85.150, and so the IP address used for the combined service is 192.168.85.150.
4. Set the Virtual Service Ports field to 80.
5. Set the Layer 7 Protocol to HTTP Mode.
6. Click Update to create the virtual service.

7. Click Modify next to the newly created VIP.
8. Under Configure Content Redirects click Edit ACL Rules.
9. Create the first ACL rule, which will redirect S3 traffic to the S3 virtual service. Set Rule Type to hdr_host, use the Boolean option Equals, and set the URL Text/Ip field to -m dom, to specify domain matching, followed by the domain in question. For example, use -m dom os.website.org (replacing “website.org” with the correct domain, e.g. the domain that clients’ S3 protocol traffic is sent to). Note that this rule also picks up traffic to * os.website.org, which accounts for S3 virtually hosted buckets. Set Rule Action Type to Backend, Finally, set the Redirect Location to the name of the S3 virtual service created earlier, which in the example presented here is ECS-S3. Click the Add button to insert the ACL rule.
10. Create similar ACL rules to redirect Atmos and Swift protocol traffic to their respective virtual services in the same way. Use URL Text/IP values of the form atmos.website.org for Atmos traffic and swift.website.org for Swift traffic. The completed set of rules for the example presented here look like the following:
11. Click Save to save all of the added ACL rules
12. Click Update

Setting Up the TLS/SSL Termination
Incoming TLS/SSL encrypted traffic must be decrypted at the load balancer, so that it can then be read as plaintext HTTP traffic. This is necessary to separate the traffic by FQDN using the previously configured ACL rules, i.e. traffic destined for os.website.org (and *.os.website.org) goes to the S3 virtual service, traffic destined for atmos.website.org goes to the Atmos virtual service, and traffic destined for swift.website.org goes to the Swift virtual service.

Uploading The Certificate
The appropriate public certificate, including both the private key and public certificate parts, must be uploaded to the load balancer for TLS/SSL termination to work.
Detailed information on creating PEM certificate files and converting between certificate formats is presented in our Administration Manual: http://pdfs.loadbalancer.org/loadbalanceradministrationv8.pdf
The process for uploading a certificate is as follows:

1. Using the web user interface, navigate to Cluster Configuration > SSL Certificate and click on Add a new SSL Certificate
2. Press the Upload prepared PEM/PFX file radio button
3. Define the Label for the certificate as required. It may make sense to use the domain that the certificate is associated to, e.g. website.org
4. Click on Browse and select the appropriate PEM or PFX style certificate
5. If uploading a PFX certificate, enter the certificate's password in the PFX File Password field
6. Click Upload certificate

Creating The TLS/SSL Termination
1. Using the web user interface, navigate to Cluster Configuration > SSL Termination and click on Add a new Virtual Service
2. From the Associated Virtual Service drop-down list, select the ‘ECS Combined’ service that was created
3. Set the Virtual Service Port field to 443
4. From the SSL Certificate drop-down list, select the certificate for the service in question, which in this example is website.org
5. Click Update to create the TLS/SSL termination service

Finalizing the Configuration
To apply the new settings, HAProxy and stunnel must both be reloaded as follows:

1. Using the WebUI, navigate to: Maintenance > Restart Services and click Reload STunnel
2. Using the WebUI, navigate to: Maintenance > Restart Services and click Reload HAProxy

11. Testing & Verification

Using System Overview
The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the ECS servers) and shows the state/health of each server as well as the state of the cluster as a whole.

The example below shows a scenario 1 style setup, where all five ECS servers are healthy and available to accept connections for each of the four protocol-specific virtual services:
The example below shows a **scenario 2** style setup, where all five ECS servers are healthy and available to accept connections for each of the four protocol-specific virtual services.

Note that the ‘ECS Combined Service’ shows as red, as it does not have any healthy real servers (because it does not have any real servers defined). This is normal, as it is a ‘dummy’ service used only to redirect incoming traffic to the other four virtual services, based on the destination domain of incoming traffic.
12. Technical Support
For more details about configuring the appliance and assistance with designing your deployment please don't hesitate to contact the support team using the following email address: support@loadbalancer.org

13. Further Documentation

14. Conclusion
Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced Dell EMC ECS environments.
15. Appendix

1 - Multi-port NFS Health Check

A custom health check can be used with the NFS virtual service. This will check the real servers and ensure that all three of the NFS ports (111, 2049, and 10000) are available before considering a server to be online and ready to accept connections.

From an SSH session to the load balancer, or from the console, navigate to the directory /var/lib/loadbalancer.org/check. Open the file Multi-port-check.sh using a text editor (vim and nano are both installed on the appliance).

Change the CHECK_PORT definition so that it reads as:

```
CHECK_PORT="111 2049 10000"
```

Save the modified check file.

Note: If using an HA master-slave pair of load balancers, be sure to make the same change to the Multi-port-check.sh on the slave appliance too.

To put the multi-port check into use, from the WebUI navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Modify next to the NFS virtual service.

Set Health Checks to External script, and then set Check Script to Multi-port-check.sh.

Click Update to apply the change, and then click the Reload HAProxy button when prompted to put the new configuration into use.
2 – Clustered Pair Configuration – Adding a Slave Unit

If you initially configured just the master unit and now need to add a slave - our recommended procedure, please refer to the relevant section below for more details:

Note: A number of settings are not replicated as part of the master/slave pairing process and therefore must be manually configured on the slave appliance. These are listed below:

- Hostname & DNS settings
- Network settings including IP addresses, bonding configuration and VLANs
- Routing configuration including default gateways and static routes
- Date & time settings
- Physical – Advanced Configuration settings including Internet Proxy IP address & port, Firewall table size, SMTP relay and Syslog server
- SNMP settings
- Graphing settings
- Firewall Script & Firewall Lockdown Script settings
- Software updates

Version 7:

Please refer to Chapter 8 – Appliance Clustering for HA in the v7 Administration Manual.

Version 8:

To add a slave node – i.e. create a highly available clustered pair:

- Deploy a second appliance that will be the slave and configure initial network settings
- Using the WebUI, navigate to: Cluster Configuration > High-Availability Configuration
• Specify the IP address and the loadbalancer users password (the default is 'loadbalancer') for the slave (peer) appliance as shown above

• Click Add new node

• The pairing process now commences as shown below:

• Once complete, the following will be displayed:

• To finalize the configuration, restart heartbeat and any other services as prompted in the blue message box at the
Note: Clicking the Restart Heartbeat button on the master appliance will also automatically restart heartbeat on the slave appliance.

Note: Please refer to chapter 9 - Appliance Clustering for HA in the Administration Manual for more detailed information on configuring HA with 2 appliances.
## 16. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
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<th>Reason for Change</th>
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<tr>
<td>1.0.0</td>
<td>24 December 2018</td>
<td>Initial version</td>
<td></td>
<td>AH</td>
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<tr>
<td>1.1.0</td>
<td>30 August 2019</td>
<td>Styling and layout</td>
<td>General styling updates</td>
<td>AH</td>
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About Loadbalancer.org

Loadbalancer.org's mission is to ensure that its clients' businesses are never interrupted. The load balancer experts ask the right questions to get to the heart of what matters, bringing a depth of understanding to each deployment. Experience enables Loadbalancer.org engineers to design less complex, unbreakable solutions - and to provide exceptional personalized support.