Load Balancing Fiserv DNA®connect
Version 1.2.0
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1. About this Guide
This guide details the steps required to configure a load balanced Fiserv DNAconnect environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Fiserv server 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 Administration Manual.

2. Loadbalancer.org Appliances Supported
All our products can be used for load balancing Fiserv DNA. For full specifications of available models please refer to https://www.loadbalancer.org/products. Some features may not be supported in all cloud platforms due to platform specific limitations, please check with Loadbalancer.org support for further details.

3. Software Versions Supported
3.1. Loadbalancer.org Appliance
- V8.3.8 and later

Note: The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If using an older software version, note that the screenshots presented here may not match the WebUI exactly.

3.2. Fiserv DNAconnect
- All versions

4. Fiserv DNAconnect
DNAconnect – a suite of applications and services that facilitate the creation and processing of interfaces between different systems you can use to support communication between a source system and one or more target systems.

5. Load Balancing Fiserv DNAconnect
For high availability and scalability, Fiserv recommends that DNAconnect is deployed in load balanced clusters.

5.1. Port Requirements
The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Ports</th>
<th>Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>TCP</td>
<td>HTTP - Fiserv</td>
</tr>
</tbody>
</table>
6. Deployment Concept

When Fiserv services are deployed with the load balancer, clients connect to the Virtual Service (VIP on the load balancer) rather than connecting directly to one of the Fiserv servers. The load balancer then distributes these connections to the load-balanced servers according to the algorithm selected.

Note: The load balancer can be deployed as a single unit, although Loadbalancer.org recommends a clustered pair for resilience & high availability. Please refer to Configuring HA - Adding a Secondary Appliance for more details on configuring a clustered pair.

7. Load Balancer Deployment Methods

For Fiserv DNAconnect, using Layer 4 DR mode is the recommended deployment method.

7.1. Layer 4 DR Mode

One-arm direct routing (DR) mode is a very high performance solution that requires little change to your existing infrastructure.

Note: Kemp, Brocade, Barracuda & A10 Networks call this Direct Server Return and F5 call it nPath.
DR mode works by changing the destination MAC address of the incoming packet to match the selected Real Server on the fly which is very fast.

When the packet reaches the Real Server it expects the Real Server to own the Virtual Services IP address (VIP). This means that you need to ensure that the Real Server (and the load balanced application) respond to both the Real Server’s own IP address and the VIP.

The Real Servers should not respond to ARP requests for the VIP. Only the load balancer should do this. Configuring the Real Servers in this way is referred to as **Solving the ARP problem**. For more information please refer to DR Mode Considerations.

On average, DR mode is 8 times quicker than NAT for HTTP, 50 times quicker for Terminal Services and much, much faster for streaming media or FTP.

The load balancer must have an Interface in the same subnet as the Real Servers to ensure layer 2 connectivity required for DR mode to work.

The VIP can be brought up on the same subnet as the Real Servers, or on a different subnet provided that the load balancer has an interface in that subnet.

Port translation is not possible with DR mode, e.g. VIP:80 → RIP:8080 is not supported.

DR mode is transparent, i.e. the Real Server will see the source IP address of the client.

### 8. Configuring Fiserv DNAconnect for Load Balancing

Please refer to the Fiserv DNAconnect documentation for the configuration of the application.

The following screenshot is an example from the Fiserv Runtime Environment console and shows the listening IP and associated settings.
9. Loadbalancer.org Appliance – the Basics

9.1. Virtual Appliance
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, XEN and Nutanix AHV and has been optimized for each Hypervisor. By default, the VA is allocated 2 vCPUs, 4GB of RAM and has a 20GB 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 Virtual Appliance Installation and the ReadMe.txt text file included in the VA download for additional information on deploying the VA using the various Hypervisors.

Note
The VA has 4 network adapters. For VMware only the first adapter (eth0) is connected by default. For HyperV, KVM, XEN and Nutanix AHV all adapters are disconnected by default. Use the network configuration screen within the Hypervisor to connect the required adapters.

9.2. Initial Network Configuration
After boot up, follow the instructions on the appliance console to configure the management IP address, subnet mask, default gateway, DNS Server and other network settings.

Important
Be sure to set a secure password for the load balancer, when prompted during the setup routine.

9.3. Accessing the Appliance WebUI
The WebUI is accessed using a web browser. By default, users are authenticated using Apache authentication. Users can also be authenticated against LDAP, LDAPS, Active Directory or Radius - for more information, please refer to External Authentication.

Note
There are certain differences when accessing the WebUI for the cloud appliances. For details,
A number of compatibility issues have been found with various versions of Microsoft Internet Explorer and Edge. The WebUI has been tested and verified using both Chrome & Firefox.

1. Using a browser, navigate to the following URL:


   You’ll receive a warning about the WebUI’s certificate. This is due to the default self signed certificate that is used. If preferred, you can upload your own certificate - for more information, please refer to Appliance Security Features.

2. Log in to the WebUI using the following credentials:

   Username: loadbalancer  
   Password: <configured-during-network-setup-wizard>

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

Once logged in, the WebUI will be displayed as shown below:
3. You'll be asked if you want to run the Setup Wizard. Click **Dismiss** if you're following a guide or want to configure the appliance manually. Click **Accept** to start the Setup Wizard.

**Note**

The Setup Wizard can only be used to configure Layer 7 services.

**Main Menu Options**

- **System Overview** - Displays a graphical summary of all VIPs, RIPS and key appliance statistics
- **Local Configuration** - Configure local host settings such as IP address, DNS, system time etc.
- **Cluster Configuration** - Configure load balanced services such as VIPs & RIPS
- **Maintenance** - Perform maintenance tasks such as service restarts and taking backups
- **View Configuration** - Display the saved appliance configuration settings
- **Reports** - View various appliance reports & graphs
- **Logs** - View various appliance logs
- **Support** - Create a support download, contact the support team & access useful links
9.4. Appliance Software Update

To ensure that the appliance(s) are running the latest software version, we recommend a software update check is performed.

Determining the Current Software Version

The software version is displayed at the bottom of the WebUI as shown in the example below:

Checking for Updates using Online Update

1. Using the WebUI, navigate to: Maintenance > Software Update.
2. Select Online Update.
3. If the latest version is already installed, a message similar to the following will be displayed:

   Information: Version v8.9.0 is the current release. No updates are available

4. If an update is available, you'll be presented with a list of new features, improvements, bug fixes and security related updates.
5. Click Online Update to start the update process.

   Note
   Do not navigate away whilst the update is ongoing, this may cause the update to fail.

6. Once complete (the update can take several minutes depending on download speed and upgrade version) the following message will be displayed:

   Information: Update completed successfully.

7. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

Using Offline Update

If the load balancer does not have access to the Internet, offline update can be used.
Please contact support@loadbalancer.org to check if an update is available and obtain the latest offline update files.

To perform an offline update:

1. Using the WebUI, navigate to: Maintenance > Software Update.
2. Select Offline Update.
3. The following screen will be displayed:

   **Software Update**

   **Offline Update**

   The following steps will lead you through offline update:

   1. Contact support@loadbalancer.org to obtain the offline update archive and checksum.
   2. Save the archive and checksum to your local machine.
   3. Select the archive and checksum files in the upload form below.
   4. Click Upload and Install to begin the update process.

   ![Upload and Install button]

4. Select the Archive and Checksum files.
5. Click Upload and Install.
6. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

### 9.5. Ports Used by the Appliance

By default, the appliance uses the following TCP & UDP ports:

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Port</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP</td>
<td>22</td>
<td>SSH</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>53</td>
<td>DNS</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>123</td>
<td>NTP</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>161</td>
<td>SNMP</td>
</tr>
<tr>
<td>UDP</td>
<td>6694</td>
<td>Heartbeat between Primary &amp; Secondary appliances in HA mode</td>
</tr>
<tr>
<td>TCP</td>
<td>7778</td>
<td>HAPProxy persistence table replication</td>
</tr>
<tr>
<td>TCP</td>
<td>9080</td>
<td>WebUI - HTTP (disabled by default)</td>
</tr>
<tr>
<td>TCP</td>
<td>9081</td>
<td>Nginx fallback page</td>
</tr>
<tr>
<td>TCP</td>
<td>9443</td>
<td>WebUI - HTTPS</td>
</tr>
</tbody>
</table>
9.6. 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 unit is covered in Configuring HA - Adding a Secondary Appliance.

10. Configuration for Fiserv DNAconnect

10.1. Appliance Configuration

A) Setting up the Virtual Service

1. Using the WebUI, navigate to Cluster Configuration > Layer 4 – Virtual Services and click Add a New Virtual Service.

2. Enter the following details:

<table>
<thead>
<tr>
<th>Virtual Service</th>
<th>Fiserv-DNAconnect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>IP Address</td>
<td>192.168.1.30</td>
</tr>
<tr>
<td>Ports</td>
<td>80,2500,2501,2507,2601,2655,2656,2999</td>
</tr>
<tr>
<td>Protocol</td>
<td>TCP</td>
</tr>
<tr>
<td>Forwarding Method</td>
<td>Direct Routing</td>
</tr>
</tbody>
</table>

3. Enter an appropriate Label for the VIP, e.g. Fiserv-DNAconnect.
4. Set the IP Address to the required IP address, e.g. 192.168.1.30.
5. Set the Ports field to 80,2500,2501,2507,2601,2655,2656,2999.
6. Leave the Protocol set to TCP.
7. Leave the forwarding Method set to Direct Routing.
8. Click Update.

| Note | You can specify a wildcard (*) for all ports, instead on entering specific ports. This is covered in Adding a Wildcard. |

B) Setting up the Real Servers

1. Using the WebUI, navigate to Cluster Configuration > Layer 4 – Real Servers and click Add a New Real Server.
2. Enter the following details:

Layer 4 Add a new Real Server - Fiserv DNAconnect

<table>
<thead>
<tr>
<th>Label</th>
<th>Server1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Server IP Address</td>
<td>192.168.1.40</td>
</tr>
<tr>
<td>Weight</td>
<td>100</td>
</tr>
<tr>
<td>Minimum Connections</td>
<td>0</td>
</tr>
<tr>
<td>Maximum Connections</td>
<td>0</td>
</tr>
</tbody>
</table>

3. Enter an appropriate Label for the RIP, e.g. Server1.

4. Set the Real Server IP address field to the required IP address, e.g. 192.168.1.40.

5. Leave all other fields at their default values.

6. Click Update.

7. Repeat these steps to add the remaining servers.

10.2. Fiserv DNAconnect Configuration

Layer 4 DR mode VIPs require the ‘ARP problem’ to be solved on each associated Fiserv server as mentioned in Load Balancer Deployment Methods. For full details on how this is done, please refer to DR Mode Considerations.

11. Testing & Verification

11.1. Using the System Overview

The System Overview can be accessed via the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the Fiserv DNAConnect servers) and shows the state/health of each server as well as the state of the cluster as a whole. The example below shows that all Fiserv servers are healthy (green) and available to accept connections:
If one of the servers within the cluster fails its health check, that server will be colored red and the cluster will be colored yellow as shown below:

Make sure that all servers are up (green) and verify that clients can connect to the VIP and access all load balanced services.

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

For additional information, please refer to the Administration Manual.
14. Appendix

14.1. Adding a Wildcard, "*", Instead of the Suggested Ports

The specified ports (80, 2500, 2501, 2507, 2600, 2601, 2655, 2656, 2999) may vary between customer installations, so it is possible to allow all ports through the Layer 4 VIP by using the wildcard (*) in the ports section.

So, the VIP edited for the wildcard would look like this:

So, the VIP edited for the wildcard would look like this:

![VIP Configuration Example]

Please note the warning at the top of the WebUI. As we now use the wildcard to access the VIP, the load balancer needs to choose a port for health-checking and automatically chooses the first one, 80.

If the automatically chosen port is unsuitable to use for health checking then please choose another port that can be checked against. To change the health checking port, modify the VIP like shown in this example which uses port 2501:

![Health Check Configuration Example]

14.2. Configuring HA - Adding a Secondary Appliance

Our recommended configuration is to use a clustered HA pair of load balancers to provide a highly available and resilient load balancing solution.
We recommend that the Primary appliance is configured first and then the Secondary should be added. Once the Primary and Secondary are paired, all load balanced services configured on the Primary are automatically replicated to the Secondary over the network using SSH/SCP.

**Note**

For Enterprise Azure, the HA pair should be configured first. In Azure, when creating a VIP using an HA pair, 2 private IPs must be specified – one for the VIP when it's active on the Primary and one for the VIP when it's active on the Secondary. Configuring the HA pair first, enables both IPs to be specified when the VIP is created.

The clustered HA pair uses Heartbeat to determine the state of the other appliance. Should the active device (normally the Primary) suffer a failure, the passive device (normally the Secondary) will take over.

**Non-Replicated Settings**

A number of settings are not replicated as part of the Primary/Secondary pairing process and therefore must be manually configured on the Secondary appliance. These are listed by WebUI menu option in the table below:

<table>
<thead>
<tr>
<th>WebUI Main Menu Option</th>
<th>Sub Menu Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Configuration</td>
<td>Hostname &amp; DNS</td>
<td>Hostname and DNS settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Network Interface</td>
<td>All network settings including IP address(es), bonding configuration and VLANs</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Routing</td>
<td>Routing configuration including default gateways and static routes</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>System Date &amp; time</td>
<td>All time and date related settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Physical – Advanced</td>
<td>Various settings including Internet Proxy, Management Gateway, Firewall</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Security</td>
<td>Appliance security settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>SNMP Configuration</td>
<td>Appliance SNMP settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Graphing</td>
<td>Appliance graphing settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>License Key</td>
<td>Appliance licensing</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Software Updates</td>
<td>Appliance software update management</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Script</td>
<td>Appliance firewall (iptables) configuration</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Lockdown</td>
<td>Appliance management lockdown settings</td>
</tr>
</tbody>
</table>

**Important**

Make sure that if these settings/updates have been configured on the Primary appliance, they’re also configured on the Secondary appliance.

**Adding a Secondary Appliance - Create an HA Clustered Pair**

**Note**

If you have already run the firewall lockdown wizard on either appliance, you'll need to ensure
that it is temporarily disabled on both appliances whilst performing the pairing process.

1. Deploy a second appliance that will be the Secondary and configure initial network settings.

2. Using the WebUI on the Primary appliance, navigate to: Cluster Configuration > High-Availability Configuration.

3. Specify the IP address and the loadbalancer user's password for the Secondary (peer) appliance as shown in the example above.

4. Click Add new node.

5. The pairing process now commences as shown below:

6. Once complete, the following will be displayed on the Primary appliance:
7. To finalize the configuration, restart heartbeat and any other services as prompted in the "Commit changes" message box at the top of the screen.

- **Note**  
  Clicking the **Restart Heartbeat** button on the Primary appliance will also automatically restart heartbeat on the Secondary appliance.

- **Note**  
  For more details on configuring HA with 2 appliances, please refer to [Appliance Clustering for HA](#).

- **Note**  
  For details on testing and verifying HA, please refer to [Clustered Pair Diagnostics](#).
## 15. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.0</td>
<td>3 July 2020</td>
<td>Initial version</td>
<td></td>
<td>RPC</td>
</tr>
<tr>
<td>1.1.0</td>
<td>1 January 2022</td>
<td>Converted the document to AsciiDoc</td>
<td>Move to new documentation system</td>
<td>AH, RJC, ZAC</td>
</tr>
<tr>
<td>1.1.1</td>
<td>5 January 2023</td>
<td>Updated Testing &amp; Verification section</td>
<td>General Improvements</td>
<td>RJC</td>
</tr>
<tr>
<td>1.1.2</td>
<td>5 January 2023</td>
<td>Combined software version information into one section</td>
<td>Housekeeping across all documentation</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added one level of section numbering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added software update instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added table of ports used by the appliance</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Reworded 'Further Documentation' section</td>
<td></td>
<td></td>
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<tr>
<td>1.1.3</td>
<td>2 February 2023</td>
<td>Updated screenshots</td>
<td>Branding update</td>
<td>AH</td>
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<tr>
<td>1.1.4</td>
<td>7 March 2023</td>
<td>Removed conclusion section</td>
<td>Updates across all documentation</td>
<td>AH</td>
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<td>1.2.0</td>
<td>24 March 2023</td>
<td>New document theme</td>
<td>Branding update</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified diagram colours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.