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1. About this Guide
This guide details the steps required to configure a load balanced IBM Watson Health iConnect Access environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any iConnect Access 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 IBM Watson Health iConnect Access. 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>
</tr>
<tr>
<td>Enterprise VA</td>
<td>Enterprise 10G</td>
</tr>
<tr>
<td>Enterprise R320</td>
<td>Enterprise 40G</td>
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<tr>
<td></td>
<td>Enterprise Ultra</td>
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<td></td>
<td>Enterprise VA R20</td>
</tr>
<tr>
<td></td>
<td>Enterprise VA MAX</td>
</tr>
<tr>
<td></td>
<td>Enterprise AWS **</td>
</tr>
<tr>
<td></td>
<td>Enterprise AZURE **</td>
</tr>
<tr>
<td></td>
<td>Enterprise GCP **</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

- V8.3.6 and later

4. IBM Watson Health iConnect Access Software Versions Supported

- IBM Watson Health iConnect Access – all versions
5. Load Balancing iConnect Access

For high availability and scalability, IBM Watson Health recommend that multiple iConnect Access Servers are deployed in a load balanced cluster.

Note: It's highly recommended that you have a working iConnect Access environment first before implementing the load balancer.

Load Balanced Ports

The following table shows the ports/services that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 &amp; 443</td>
<td>TCP</td>
<td>HTTP &amp; HTTPS</td>
</tr>
<tr>
<td>4444</td>
<td>TCP</td>
<td>DICOM</td>
</tr>
</tbody>
</table>

Deployment Concept

When iConnect Access is deployed with the load balancer, clients connect to the Virtual Services (VIPs) on the load balancer rather than connecting directly to one of the iConnect Access Servers. These connections are then load balanced across the iConnect Access Servers to distribute the load according to the load balancing 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 section 1 in the appendix on page 15 for more details on configuring a clustered pair.
VIP Requirements
To provide load balancing and HA for iConnect Access, 2 VIPS are required as depicted in the diagram above, these are:

- VIP1 : ICA_WEB
- VIP2 : ICA_DICOM

Deployment Mode
The Virtual Services (VIPS) are configured using Layer 4 DR (Direct Return) mode. This mode offers the best possible performance since replies go directly from the iConnect Access Servers to the client, and not via the load balancer. To use this mode, the “ARP Problem” must be solved as explained on page 10.

6. 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)

1. Browse to the following URL: https://192.168.2.21:9443/lbadmin/
   *(replace with your IP address if it's been changed)*
   * Note the port number → 9443 *

2. Login to the WebUI:

   **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 below:
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 1 of the appendix on page 15.
7. Appliance & iConnect Access Configuration

Appliance Configuration

Configuring VIP1 – ICA_WEB

a) Setting up the Virtual Service (VIP)

1. Using the WebUI, navigate to Cluster Configuration > Layer 4 – Virtual Services and click Add a new Virtual Service
2. Enter the following details:

![Virtual Service Configuration](image)

3. Enter an appropriate label (name) for the VIP, e.g. ICA_WEB
4. Set the Virtual Service IP address field to the required IP address, e.g. 192.168.100.100
5. Set the Virtual Service Ports field to 80,443
6. Leave Protocol set to TCP
7. Leave Forwarding Method set to Direct Routing
8. Click Update
9. Now click Modify next to the newly created VIP
10. Scroll down to the Health Checks section
11. Set the Check Port to 443
12. Click Update

b) Setting up the Real Servers (RIPs)

1. Using the WebUI, navigate to Cluster Configuration > Layer 4 – Real Servers and click Add a new Real Server next to the newly created ICA_WEB VIP
2. Enter the following details:
3. Enter an appropriate label (name) for the RIP, e.g. **ICA_WEB1**
4. Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.100.110**
5. Click **Update**
6. Repeat these steps to add your other iConnect Access Server(s)

**Configuring VIP2 – ICA_DICOM**

**a) Setting up the Virtual Service (VIP)**
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>Label</th>
<th>ICA_DICOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Service IP Address</td>
<td>192.168.100.100</td>
</tr>
<tr>
<td>Ports</td>
<td>4444</td>
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<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 (name) for the VIP, e.g. **ICA_DICOM**
4. Set the **Virtual Service IP address** field to the required IP address, e.g. **192.168.100.100**
5. Set the **Virtual Service Ports** field to **4444**
6. Leave **Protocol** set to **TCP**
7. Leave **Forwarding Method** set to **Direct Routing**
8. Click **Update**
b) Setting up the Real Servers (RIPs)

1. Using the WebUI, navigate to Cluster Configuration > Layer 4 – Real Servers and click **Add a new Real Server** next to the newly created ICA_DICOM VIP
2. Enter the following details:

   ![Real Server Configuration](image)

   - Enter an appropriate label (name) for the RIP, e.g. **ICA_DICOM1**
   - Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.100.110**
   - Click **Update**
   - Repeat these steps to add your other iConnect Access Server(s)

### iConnect Access Configuration

#### Solve The ARP Problem

As mentioned on page 4, when using Layer 4 DR mode, the ARP problem must be solved. This involves configuring each iConnect Access Server to be able to receive traffic destined for the VIP, and ensuring that each iConnect Access Server does not respond to ARP requests for the VIP address – only the load balancer should do this.

> Note: The steps below are for Windows 2012 / 2016 IPv4 addresses, for other versions of Windows & IPv6 configuration steps, please refer to chapter 6 in the Administration Manual.

#### Step 1 of 3 : Install the Microsoft Loopback Adapter

1. Click **Start**, then run **hdwwiz** to start the Hardware Installation Wizard
2. When the Wizard has started, click **Next**
3. Select **Install the hardware that I manually select from a list (Advanced)**, click **Next**
4. Select **Network adapters**, click **Next**
5. Select **Microsoft & Microsoft KM-Test Loopback Adapter**, click **Next**
6. Click **Next** to start the installation, when complete click **Finish**

**Step 2 of 3 : Configure the Loopback Adapter**

1. Open Control Panel and click **Network and Sharing Center**
2. Click **Change adapter settings**
3. Right-click the new Loopback Adapter and select **Properties**
4. Un-check all items except **Internet Protocol Version 4 (TCP/IPv4)** as shown below:

5. For IPv4 addresses, select **Internet Protocol Version (TCP/IPv4)**, click **Properties** and configure the IP address to be
the same as the address you’ve used for the Virtual Service (VIP) with a subnet mask of 255.255.255.255, e.g. 192.168.100.100/255.255.255.255 as shown below:

6. Click OK on TCP/IP Properties, then click Close on the Interface Properties to save and apply the new settings.

Step 3 of 3: Configure the strong/weak host behavior

Windows Server 2000 and Windows Server 2003 use the weak host model for sending and receiving for all IPv4 interfaces and the strong host model for sending and receiving for all IPv6 interfaces. You cannot configure this behavior. The Next Generation TCP/IP stack in Windows 2008 and later supports strong host sends and receives for both IPv4 and IPv6 by default. To ensure that Windows 2012/2016 is running in the correct mode to be able to respond to the VIP, the following commands must be run on each Real Server:

For IPv4 addresses:

```
netsh interface ipv4 set interface "net" weakhostreceive=enabled
netsh interface ipv4 set interface "loopback" weakhostreceive=enabled
netsh interface ipv4 set interface "loopback" weakhostsend=enabled
```

For these commands to work, the LAN connection NIC must be named “net” and the loopback NIC must be named “loopback” as shown below. If you prefer to leave your current NIC names, then the commands above must be modified accordingly. For example, if your network adapters are named “LAN” and “LOOPBACK”, the commands required would be:

```
netsh interface ipv4 set interface "LAN" weakhostreceive=enabled
```
netsh interface ipv4 set interface "LOOPBACK" weakhostreceive=enabled
netsh interface ipv4 set interface "LOOPBACK" weakhostsend=enabled

Note: The names for the NICs are case sensitive, so make sure that the name used for the interface and the name used in the commands match exactly.

- Start Powershell or use a command window to run the appropriate netsh commands as shown in the example below:

Repeat steps 1 – 3 on all remaining iConnect Access Server(s).

8. Testing & Verification

Checking the Status Using the System Overview
The System Overview in the WebUI shows a graphical view of all VIPs & RIPs (i.e. the iConnect Access Servers) and shows the state/health of each server as well as the state of the cluster as a whole. This can be used to ensure all servers are up and available.
**Client Connection Tests**

Ensure that clients can connect via the load balancer to the iConnect Access Servers. For this, you’ll probably need to create new DNS records or modify your existing DNS records, replacing the IP addresses of individual servers with the IP address of the relevant Virtual Service on the load balancer.

Note: For more details on testing & diagnosing load balanced services please refer to chapter 12 in the Administration Manual.

9. **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.

10. **Additional Documentation**


11. **Conclusion**

Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced IBM Watson Health iConnect Access environments.
12. Appendix

1 - 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

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:

![Create a Clustered Pair](image)

• Once complete, the following will be displayed:

![High Availability Configuration - Master](image)

• To finalize the configuration, restart heartbeat and any other services as prompted in the blue message box at the top of the screen

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.
13. Document Revision History

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<th>Changed By</th>
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<td>Styling and layout</td>
<td>General styling updates</td>
<td>RJC</td>
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<td>24 August 2020</td>
<td>New title page</td>
<td>Branding update</td>
<td>AH</td>
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<td></td>
<td></td>
<td>Updated Canadian contact details</td>
<td>Change to Canadian contact details</td>
<td></td>
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</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.