



Microsoft Terminal Services / Remote Desktop Services Deployment Guide

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About This Guide

This guide details the configuration of Loadbalancer.org appliances for deployment with Microsoft Terminal Services / Remote Desktop Services (TS/RDS).

For an introduction to setting up the appliance as well as more detailed technical information, please refer to our quick-start guide and administration manual which are available at the following link :

<http://www.loadbalancer.org/downloads.php>

(the documentation links are at the bottom of the page)

Appliances Supported

All our products can be used with Terminal Services / Remote Desktop Services. The complete list of models is shown below:

- Enterprise R16
- Enterprise
- Enterprise MAX
- Enterprise 10G
- Enterprise VA
- Enterprise VA R16

For a full specification comparison of these models please refer to : <http://www.loadbalancer.org/matrix.php>

Microsoft Terminal Services / Remote Desktop Services Versions Supported

- All versions

Loadbalancer.org Software Versions Supported

- v6.9, v6.10, v6.11, v6.12, v6.13, v6.14, v6.15, v6.16, v6.17, v6.18
- v7.2, v7.3, v7.3.1, v7.3.2

Microsoft Terminal Server / Remote Desktop Services

Terminal services, is one of the components of Microsoft Windows that allows a user to access applications and data on a remote computer over a network. Terminal services is Microsoft's implementation of thin-client terminal server computing, where Windows applications, or even the entire desktop of the computer running terminal services, are made accessible to a remote client machine.

(Terminal Services was renamed as Remote Desktop Services In Windows 2008 R2)

Load Balancing Terminal Services / Remote Desktop Services

The Basics

Session Load Balancing

The fundamental purpose of deploying a load balancer is to share the load from multiple clients between two or more back-end terminal servers. Typically, all terminal servers within the cluster / farm have the same applications installed to ensure all clients get the same applications irrespective of which server they are connected to.

Session Persistence

An important aspect of load balancing terminal servers is persistence. Within a terminal server environment, this relates to the ability to reconnect to disconnected sessions that occur when a client session is closed rather than logged off. If this reconnection process is not handled correctly, users may not be able to return to their previous sessions.

Port Requirements

The following table shows the ports that must be load balanced.

3389	RDP Protocol
------	--------------

N.B. It is possible to change the port used, but the default is 3389.

Deployment Methods

Layer 4

Source IP Persistence

This is our recommended method and can be used in most cases. It does rely on each client having a unique IP address, so if clients connect via some form of NAT device, this may not work (since the source IP address for all clients may be the same).

Feedback Agent

Loadbalancer.org has developed a feedback agent that provides real time feedback statistics from the real servers to the load balancer. The agent is installed on all back-end terminal servers and runs as a windows service which monitors CPU utilization. This is used to adjust the weighting of the real servers to control the number of sessions allocated. The agent can be used with the IP persistence method in both DR and NAT mode.

Layer 7

HAProxy is utilized by Loadbalancer.org appliances at layer 7. The following methods are supported:

IP Persistence

As at Layer 4, this method is appropriate when client PC's have unique IP addresses. This method is very straight forward to configure and requires no changes to the terminal servers. Performance is slightly lower than IP persistence at layer 4.

RDP Cookies

This method utilizes the cookie sent from the client in the Connection Request PDU. This cookie is created when the username is entered at the first client login prompt (mstsc.exe). If the username is not entered here, the cookie is not created.

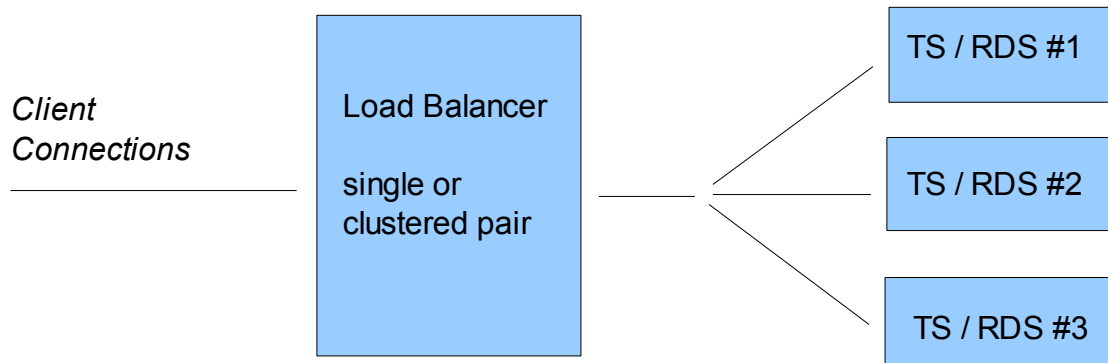
Microsoft Session Directory / Connection Broker

Session Directory (Windows 2003) / Connection Broker (Windows 2008 R2) provides functionality that allows a group of terminal servers to coordinate the reconnection of disconnected sessions. All sessions are stored as records in a central database. This database is updated and queried by the terminal servers whenever users log on, log off, or disconnect their session, while leaving their applications active.

The load balancer is able to interact with Session Directory / Connection Broker by enabling Routing Token Redirection mode. This mode allows the reconnection of disconnected sessions by utilizing a routing token to enable the load balancer to re-connect the client to the correct terminal server.

Deployment Architecture

The load balancer is deployed in front of the terminal servers to provide load balancing and fail-over functionality.



Loadbalancer.org Appliance Configuration

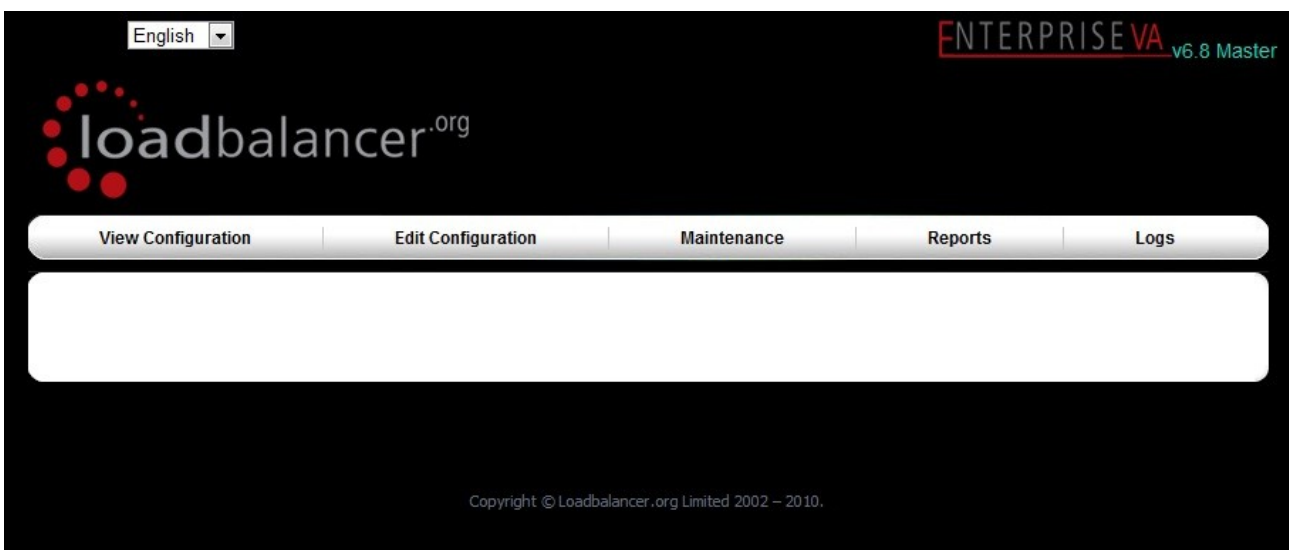
Accessing the WUI

The WUI can be accessed from a browser at: ***http://192.168.2.21:9080/lbadmin***
(replace 192.168.2.21 with the IP address of your load balancer)

Username: loadbalancer

Password: loadbalancer

Once you have entered the logon credentials the Loadbalancer.org web interface will be displayed:



Layer 4 - IP Persistence

Configure the Virtual Server

- Go to *Edit Configuration > Virtual Servers*
- Click [**Add a new Virtual Server**]
- Type an appropriate name (label) for the Virtual Server, e.g. TS-FARM1
- Enter an IP address followed by :3389 (e.g. 192.168.23.166:3389) – this is the IP that clients will connect to
- Change Persistent to Yes
- Click the Update button to save/apply the settings
- Now click [**Modify**] next to the newly created Virtual Server
- Set the Persistence Timeout (in seconds) to an appropriate value. A good starting point would be 3600 (1 hour). This is the time that the load balancer tracks the client IP to terminal server mapping. If clients might be disconnected from running sessions for several hours and then reconnected, this value should be increased accordingly to ensure the clients are connected back to the correct server
- Set the Scheduler (the load balancing algorithm) mode according to your needs (recommended: 'wlc' = weighted least lconnection)
- Set the forwarding method to either DR or NAT. DR mode is a one-arm configuration and requires that the ARP problem is solved (please refer to the administration guide). NAT mode is a two-arm configuration where eth0 and eth1 are configured and reside in different subnets. Alternatively, eth0 only can be used with two allocated IP addresses (one in each subnet)
- Click the Update button to save/apply the settings



To allocate a second IP address to eth0, go to *Edit Configuration > Network Interface Configuration*, expand Aliases and click [**Add new Alias**]. In V7, simply add the relevant IP addresses to the interface.

The Virtual Server configuration:

EDIT CONFIGURATION > VIRTUAL SERVERS

Label	<input type="text" value="TS-FARM1"/>	?
Virtual Server (ipaddress:port)	<input type="text" value="192.168.23.165:3389"/>	?
Persistent	<input type="text" value="yes"/>	?
Persistence Timeout	<input type="text" value="3600"/>	?
Scheduler	<input type="text" value="wlc"/>	?
Fallback Server	<input type="text" value="127.0.0.1:3389"/>	?
Check Type	<input type="text" value="connect"/>	?
Service to check	<input type="text" value="none"/>	?
Check Port	<input type="text"/>	?
Check Command	<input type="text"/>	?
Virtual Host	<input type="text"/>	?
Login	<input type="text"/>	?
Password	<input type="text"/>	?
Protocol	<input type="text" value="tcp"/>	?
Granularity	<input type="text" value="255.255.255.255"/>	?
File to check	<input type="text" value="check.txt"/>	?
Response expected	<input type="text" value="OK"/>	?
Email Alerts	<input type="text"/>	?
Forwarding Method	<input type="text" value="DR"/>	?
Feedback Method	<input type="text" value="none"/>	?

Configure the Real Servers

- Go to *Edit Configuration > Real Servers*
- Click [**Add a new Real Server**]
- Type an appropriate name for the server, e.g. TS1
- Enter the IP address followed by :3389 (e.g. 192.168.23.20:3389)
- Click the Update button to save/apply the settings
- Now repeat for your other real servers

Configured Real Servers:

EDIT CONFIGURATION > REAL SERVERS

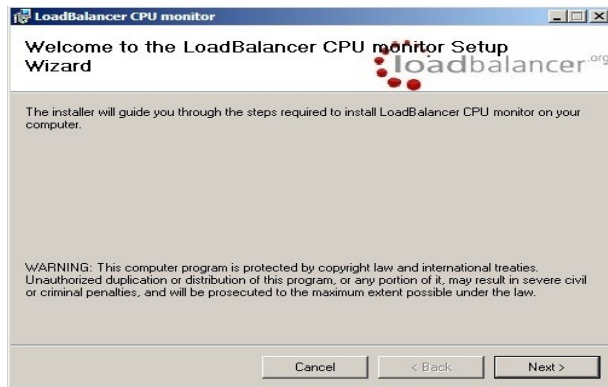
<hr/>			
<i>TS-FARM1</i>	(192.168.23.165:3389)	[Add a new Real Server]	
TS2	192.168.23.21:3389	1	[Modify] [Delete]
TS1	192.168.23.20:3389	1	[Modify] [Delete]
[Virtual Servers]			

Layer 4 - Feedback Agent

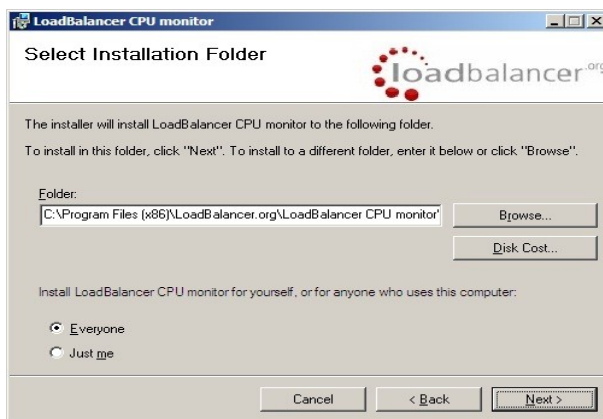
The feedback agent can be downloaded from:

<http://www.loadbalancer.org/download/agent/Windows/LBCPUMonInstallation.msi>

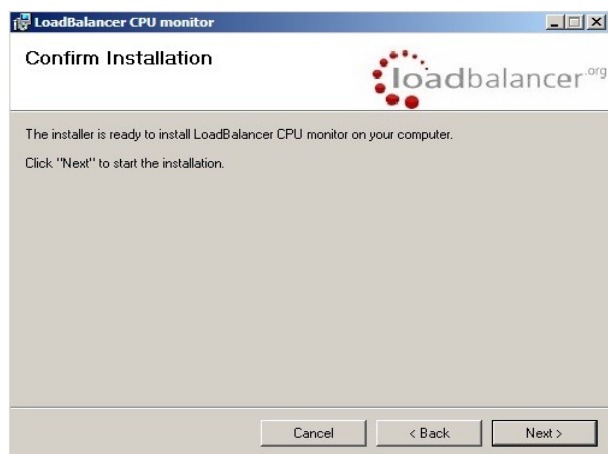
run LBCPUMonInstallation.msi



click next



select the installation folder and click next



click next to start the installation

Once the installation has completed, you'll need to start the service on the real servers. The service is called "Loadbalancer CPU Monitor".

Also, the Feedback Method for the Virtual Server must be changed:

- Go to *Edit Configuration > Virtual Servers*
- Click **[Modify]** next to the Virtual Server
- Change the Feedback Method to 'agent'

- Click Update

Prior to installing & activating the agent, *View Configuration > System Overview* would look similar to the following (weights set to the default of 1) :

Key cluster healthy cluster may need attention cluster is down real server deliberately offline

TS-FARM1 - 192.168.23.165:3389 total connections - active: 0 inactive: 0					
Label	IP	Method	Weight	Active conns	Inactive conns
TS1	192.168.23.20:3389	DR	1	0	0 take offline
TS2	192.168.23.21:3389	DR	1	0	0 take offline

Once the agents are installed on the terminal server and the feedback method is changed, the weights for the real servers are updated :

Key cluster healthy cluster may need attention cluster is down real server deliberately offline

L4TS - 192.168.23.165:3389 total connections - active: 2 inactive: 0					
Label	IP	Method	Weight	Active conns	Inactive conns
TS1	192.168.23.20:3389	DR	10	1	0 take offline
TS2	192.168.23.21:3389	DR	10	1	0 take offline

If one of the real servers is heavily loaded, the weighting is adjusted accordingly - a lower weight causes less sessions for that server. Here, CPU utilization on TS1 is high so the weight has been reduced to 1 :

Key cluster healthy cluster may need attention cluster is down real server deliberately offline

L4TS - 192.168.23.165:3389 total connections - active: 1 inactive: 0					
Label	IP	Method	Weight	Active conns	Inactive conns
TS1	192.168.23.20:3389	DR	1	0	0 take offline
TS2	192.168.23.21:3389	DR	10	1	0 take offline

Layer 7 - IP Persistence

Configure the Virtual Server

- Go to *Edit Configuration > Virtual Servers (HAProxy)*
- Click [**Add a new Virtual Server**]
- Type an appropriate name (label) for the Virtual Server, e.g. TS-FARM1
- Enter an IP address followed by :3389 (e.g. 192.168.23.166:3389) – this is the IP that clients will connect to
- Change the persistence mode to Source IP
- Click the Update button to save/apply the settings
- Now click [**Modify**] next to the newly created Virtual Server
- Set the balance mode according to your needs (recommended: Least Connection)
- Set the Timeout (in minutes) to an appropriate value. A good starting point would be 60 (1 hour). This is the time that the load balancer tracks the client IP to sever mapping. If clients might get disconnected from running sessions for several hours and then reconnected, this value should be increased accordingly to ensure the clients are connected back to the correct server
- Click the Update button to save/apply the settings

The Virtual Server configuration:

... [EDIT CONFIGURATION > VIRTUAL SERVERS \(HAProxy\)](#) ...

Label	<input type="text" value="TS-FARM1"/>	?
Virtual Server (ipaddress:port)	<input type="text" value="192.168.23.166:3389"/>	?
Extra Ports	<input type="text"/>	?
Persistence mode	<input type="text" value="Source IP"/>	?
Balance mode	<input type="text" value="Least Connections"/>	?
Timeout	<input type="text" value="60"/>	?
Table Size	<input type="text" value="10240"/>	?
Fallback	<input type="text" value="127.0.0.1:9081"/>	?
Check Port	<input type="text"/>	?
File to check	<input type="text"/>	?
Response expected	<input type="text"/>	?
Maximum Connections	<input type="text"/>	?

Configure the Real Servers

- Go to *Edit Configuration > Real Servers (HAProxy)*
- Click [**Add a new Real Server**]
- Type an appropriate name for the server, e.g. TS1
- Enter the IP address followed by :3389 (e.g. 192.168.23.20:3389)
- Click the Update button to save/apply the settings
- Now repeat for your other real servers

Configured Real Servers:

EDIT CONFIGURATION > REAL SERVERS (HAPROXY)

TS-FARM1	(192.168.23.166:3389)	[Add a new Real Server]		
TS2	192.168.23.21:3389	1	[Modify]	[Delete]
TS1	192.168.23.20:3389	1	[Modify]	[Delete]

[Virtual Servers]

Configure Global Settings

The load balancer's session timeouts (in milliseconds) should be set the same as the idle timeout on your terminal servers. e.g. if you have a 2 hour idle timeout, set the client and server timeouts to 7200000:

- Go to *Edit Configuration > Global Settings*
- Change **clitimeout** to 7200000
 - Note: from v7.3.2 onwards this setting is named *Client Timeout*
- Change **srvtimeout** to 7200000
 - Note: from v7.3.2 onwards this setting is named *Server Timeout*
- Click the Update button to save the settings
- Now restart HAProxy, go to *Maintenance > Restart HAProxy*

Layer 7 - RDP Cookies

Configure the Virtual Server

- Go to *Edit Configuration > Virtual Servers (HAProxy)*
- Click [**Add a new Virtual Server**]
- Type an appropriate name (label) for the Virtual Server, e.g. TS-FARM1
- Enter an IP address followed by :3389 (e.g. 192.168.23.166:3389) – this is the IP that clients will connect to
- Change the persistence mode to RDP Cookie
- Click the Update button to save/apply the settings
- Now click [**Modify**] next to the newly created Virtual Server
- Set the balance mode according to your needs (recommended: Least Connection)
- The timeout does not need to be set in this case
- Click the Update button to save/apply the settings

The Virtual Server Configuration:

EDIT CONFIGURATION > VIRTUAL SERVERS (HAPROXY)

Label	<input type="text" value="TS-FARM1"/>	?
Virtual Server (ipaddress:port)	<input type="text" value="192.168.23.166:3389"/>	?
Extra Ports	<input type="text"/>	?
Persistence mode	<input type="text" value="RDP cookie"/>	?
Balance mode	<input type="text" value="Least Connections"/>	?
Timeout	<input type="text" value="60"/>	?
Table Size	<input type="text" value="10240"/>	?
Fallback	<input type="text" value="127.0.0.1:9081"/>	?
Check Port	<input type="text"/>	?
File to check	<input type="text"/>	?
Response expected	<input type="text"/>	?
Maximum Connections	<input type="text"/>	?

Update

Configure the Real Servers

- Go to *Edit Configuration > Real Servers (HAProxy)*
- Click [**Add a new Real Server**]
- Type an appropriate name for the server, e.g. TS1
- Enter the IP address followed by :3389 (e.g. 192.168.23.20:3389)
- Click the Update button to save/apply the settings
- Now repeat for your other real servers

Configured Real Servers:

EDIT CONFIGURATION > REAL SERVERS (HAPROXY)

TS-FARM1	(192.168.23.166:3389)	[Add a new Real Server]		
TS2	192.168.23.21:3389	1	[Modify]	[Delete]
TS1	192.168.23.20:3389	1	[Modify]	[Delete]

[Virtual Servers]

Configure Global Settings

The load balancer's session timeouts (in milliseconds) should be set the same as the idle timeout on your terminal servers. e.g. if you have a 2 hour idle timeout, set the client and server timeouts to 7200000:

- Go to *Edit Configuration > Global Settings*
- Change **clitimeout** to 7200000
 - Note: from v7.3.2 onwards this setting is named *Client Timeout*
- Change **srvtimeout** to 7200000
 - Note: from v7.3.2 onwards this setting is named *Server Timeout*
- Click the Update button to save the settings
- *Now restart HAProxy, go to Maintenance > Restart HAProxy*

Configure the Terminal Servers

- On each terminal server open Terminal Server Configuration (2003 & 2008 R1) or Remote Desktop Session Host Configuration (2008 R2)
- Right-click RDP-Tcp and select Properties
- Ensure Security Layer is set to **RDP Security Layer**
- Ensure Encryption level is set to **Low**
- Ensure that Connection Broker is not configured



NOTE: As specified in the Microsoft RDP specification, the RDP cookie string is the login name of the user truncated to the first nine characters. If used in a domain environment then this also includes the domain name. e.g. if the Netbios name for the domain is 'abc' and the username is 'hsmith', the cookie would contain 'abc\hsmi'.

If the domain name is longer, e.g. 'companyltd' then the cookie in all cases would contain 'companylt' (the first 9 characters). Since a hash of the cookie is used to determine which real server to send the session, all sessions in this case would be sent to the same server.

One way to work around the 9 character limitation is to get your users to login using their User Principle Name (UPN). The UPN is in the format [username@domain](#), e.g. [stephen@company.com](#).

This way, provided the username is less than 9 characters, the full username will be captured in the cookie.

This method may or may not be suitable depending on how you've configured your servers and domain.

RDP Cookies are supported by all versions of the RDP client since v5.2

Layer 7 - Microsoft Connection Broker

(In Windows 2008 R1 this is known as Session Broker, in Windows 2003 as Session Directory)

Configure Connection Broker (aka Session Directory, Session Broker)

Windows 2003

The Terminal Services Session Directory service should be started on the server designated for this purpose. (Note that Windows 2003 Enterprise Edition is required to support Session Directory)

On Terminal Servers to be included in the cluster / Farm:

- Open Terminal Services Configuration
- Click Server Settings
- Right-click Session Directory and select Properties
- Tick the check box to Join Session Directory
- Enter a name for the Terminal Server Cluster (Farm), e.g. FARM1 (all servers within the same farm require the same name to be specified)
- Enter the DNS name or IP address for the server running the Session Directory service
- Un-check the IP Address Redirection check-box. This is an important step which enables Routing Token Redirection Mode. In this mode the load balancer is able to interact with routing tokens from the client to determine which real server is running a previously disconnected session
- Click OK


Session Directory Settings:

Session Directory Settings

Join session directory

Cluster name:
FARM1

Session directory server name:
192.168.2.50

 You must ensure the Terminal Services Session Directory Service is running on the specified session directory server.

Network adapter and IP address session directory should redirect users to:
192.168.23.102 [VMware Accelerated AMD PCNet Adapter]

IP address redirection (uncheck for routing token redirection)

OK Cancel

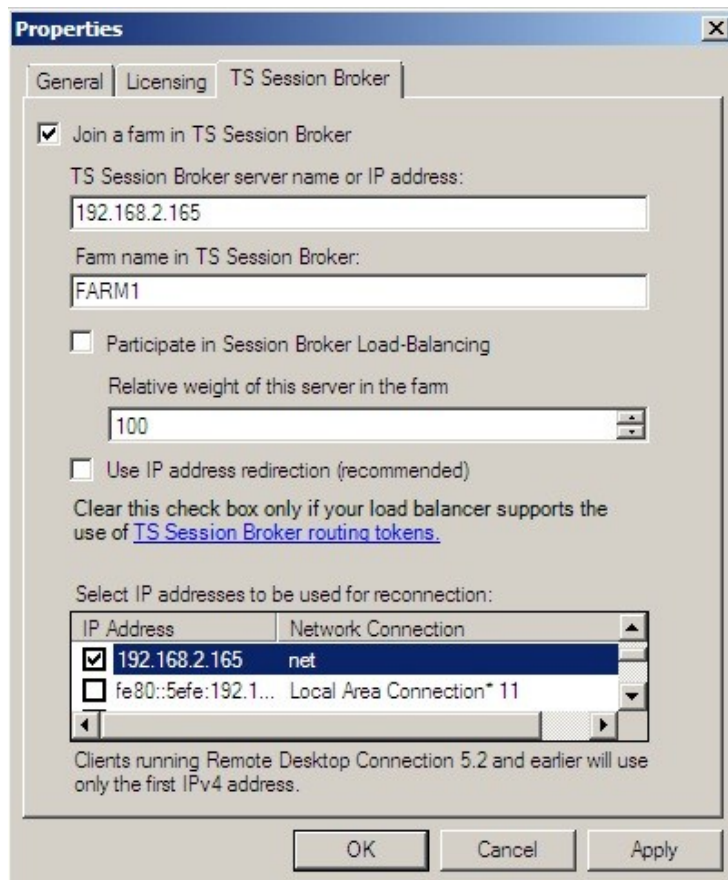
Windows 2008 R1

Install Session Broker on the server designated to hold the Session Broker role.

On Terminal Servers to be included in the cluster / Farm:

- Open Terminal Services Configuration
- Right-click 'Member of farm in TS Session Broker' and select Properties
- Tick the check box to Join a farm in TS Session Broker
- Enter the DNS name or IP address for the server running the Session Broker Role Service
- Enter a name for the Terminal Server Cluster (Farm), e.g. FARM1 (all servers within the same farm require the same name to be specified)
- Un-check the Use IP Address Redirection check-box. This is an important step which enables Routing Token Redirection Mode. In this mode the load balancer is able to interact with routing tokens from the client to determine which real server is running a previously disconnected session
- Click OK

Session Broker Settings:



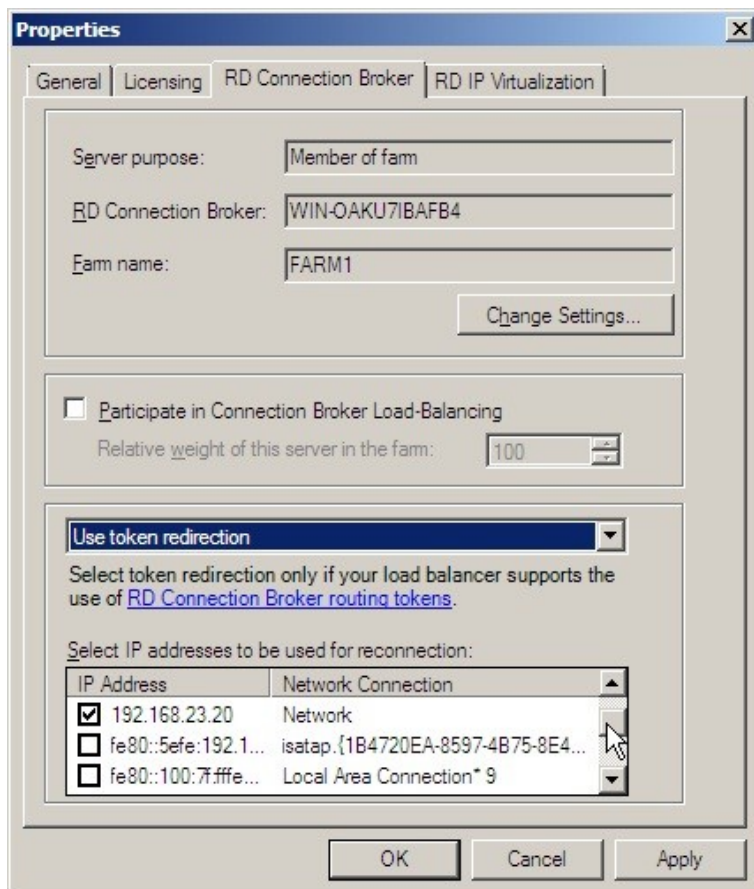
Windows 2008 R2

Install Session Broker on the server designated to hold the Session Broker role.

On Terminal Servers to be included in the cluster / Farm:

- Open Remote Desktop Host Session Configuration
- Right-click 'Member of farm in RD Connection Broker' and select Properties
- Click Change Settings
- Select Farm Member, enter the DNS name of the server running the Connection Broker role service and the name of the farm (all servers within the same farm require the same name to be specified) and click OK
- Select Use Token redirection. This is an important step which enables Routing Token Redirection Mode. In this mode the load balancer is able to interact with routing tokens from the client to determine which real server is running a previously disconnected session
- Click OK

Connection Broker Settings:















Configure the Virtual Server

- Go to *Edit Configuration > Virtual Servers (HAProxy)*
- Click [**Add a new Virtual Server**]
- Type an appropriate name (label) for the Virtual Server, e.g. TS-FARM1
- Enter an IP address followed by :3389 (e.g. 192.168.23.166:3389)
- Change the persistence mode to MS Connection Broker
- Click the Update button to save/apply the settings
- Now click [**Modify**] next to the newly created Virtual Server
- The balance mode will default to least connections, changing the setting here has no effect
- The timeout does not need to be set in this case
- Click the Update button to save/apply the settings

The Virtual Server Configuration:

EDIT CONFIGURATION > VIRTUAL SERVERS (HAPROXY)

Label	<input type="text" value="TS-FARM1"/>	
Virtual Server (ipaddress:port)	<input type="text" value="192.168.23.166:3389"/>	
Extra Ports	<input type="text"/>	
Persistence mode	<input type="text" value="MS Connection Broker"/>	
Balance mode	<input type="text" value="Least Connections"/>	
Timeout	<input type="text" value="60"/>	
Table Size	<input type="text" value="10240"/>	
Fallback	<input type="text" value="127.0.0.1:9081"/>	
Check Port	<input type="text"/>	
File to check	<input type="text"/>	
Response expected	<input type="text"/>	
Maximum Connections	<input type="text"/>	

Configure the Real Servers

- Go to *Edit Configuration > Real Servers (HAProxy)*
- Click [**Add a new Real Server**]
- Type an appropriate name for the server, e.g. TS1
- Enter the IP address followed by :3389 (e.g. 192.168.23.20:3389)
- Click the Update button to save/apply the settings
- Now repeat for your other real servers

Configured Real Servers:

EDIT CONFIGURATION > REAL SERVERS (HAProxy)

TS-FARM1	(192.168.23.166:3389)	[Add a new Real Server]
TS2	192.168.23.21:3389	1 [Modify] [Delete]
TS1	192.168.23.20:3389	1 [Modify] [Delete]

[Virtual Servers]

Configure Global Settings

The load balancer's session timeouts (in milliseconds) should be set the same as the idle timeout on your terminal servers. e.g. if you have a 2 hour idle timeout, set the client and server timeouts to 7200000:

- Go to *Edit Configuration > Global Settings*
- Change **clitimeout** to 7200000
 - *Note*: from v7.3.2 onwards this setting is named *Client Timeout*
- Change **srvtimeout** to 7200000
 - *Note*: from v7.3.2 onwards this setting is named *Server Timeout*
- Click the Update button to save the settings
- Now restart HAProxy, go to *Maintenance > Restart HAProxy*

Technical Support

For more details or assistance with your deployment please don't hesitate to contact the support team :

support@loadbalancer.org

Conclusion

Loadbalancer.org appliances provide a very cost effective and flexible solution for highly available load balanced Terminal Server / Remote Desktop Services environments.