

XRoads Networks

Edge Network Appliance Example Guide:
ActiveDNS

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Edge Configuration Series

ActiveDNS

Use this guide as a step-by-step manual for configuring your Edge router ActiveDNS server. The dynamic DNS configuration is designed to enable inbound failover and load balancing for internal network servers and other inbound service requirements.

About the “Screen Shots”

The included screen shots were taken from a working example configuration in the XRoads Networks lab. This configuration was running on XOS 3.4. Some screen shots may be different depending on your version of XOS code.

Step-By-Step Method

Use this guide to assist in configuring your own Edge device. The examples provided herein are designed as a template which can translate to your organizations network environment. The three primary configuration steps are outlined below:

Domain Configuration

This is the actual creation of the domain name with the Edge router. This process automatically creates the primary and secondary NS servers (pointed to WAN1 and WAN2) for the domain.

Mail Server Configuration

In order to receive mail for the domain, MX records need to be created along with their associated A records.

Web & Other Server Configuration

The final step is configuring other server A records, i.e. web servers, ftp servers, etc. These servers, similar to the mail servers, can have load balancing preferences applied to them which directs a certain percentage of traffic through each WAN interface, or the traffic can be equally load balanced between the WAN interfaces.

DNS Overview

DNS (Domain Name Service) is how the Internet translates the names that people use, i.e. www.yahoo.com into the IP addresses that computers use, i.e. 66.94.230.49. To accomplish this task, DNS employs the largest connected database in the world. The following diagram show the standard process used to translate a name into an IP address, and the Edge unit uses this same process to redirect inbound traffic from the WAN₁ IP address or the WAN₂ IP address, etc. Additional information about the Domain Name Service can be obtained by purchasing DNS & BIND by O'Reilly publishing.

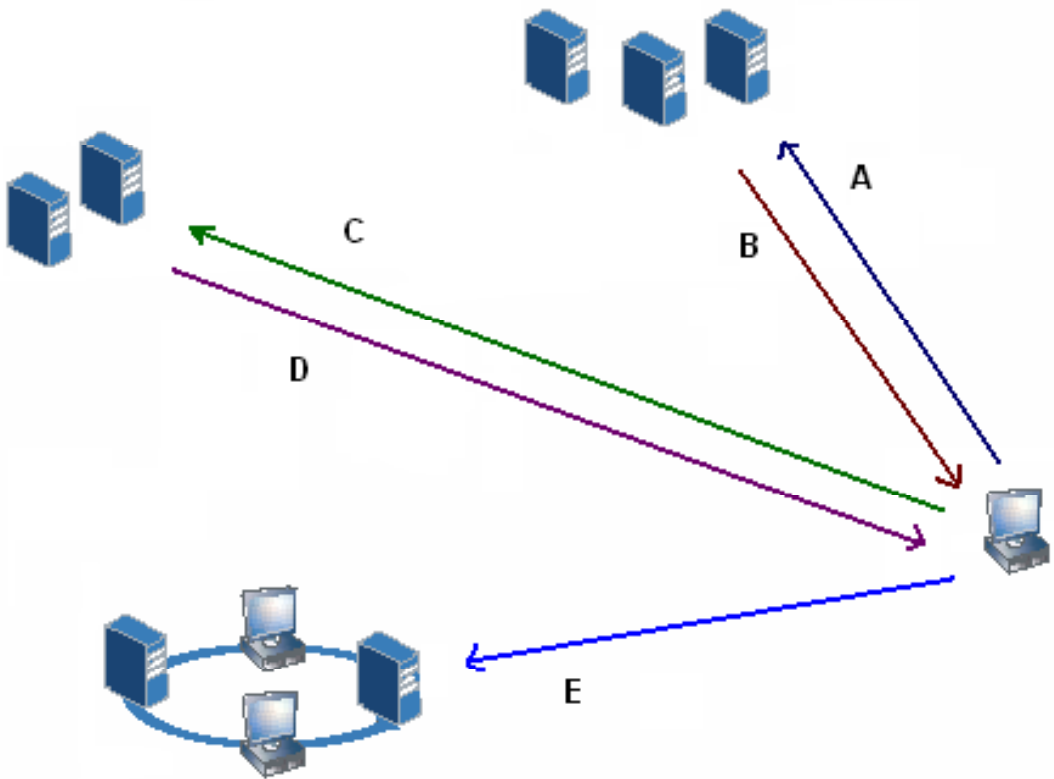


Figure 1.0 demonstrates how the Domain Name Service works.

An initial request (A) is sent from a web browser to the root servers. The root servers respond (B) with the authoritative DNS servers for the requested domain. The web browser sends a request (C) to the authoritative DNS servers, which responds (D) with the web server address. The web browser then sends a web request (E) to the web servers IP address.

Example Network

This example network is provided as a template which can be used to determine how to best configure your Edge unit. In the example network environment, the Edge device is connected to two WAN interfaces. The WAN1 interface is being proxy'd by the Edge router, while the WAN2 interface is being NAT'd to the LAN network. The LAN network contains several workstations and a single web and email server. The LAN network contains several workstations and a single web and email server.

Example Proxy / NAT Load Balancing Solution

WAN1 is set for proxy mode with the Edge router assigned an unused address for management.

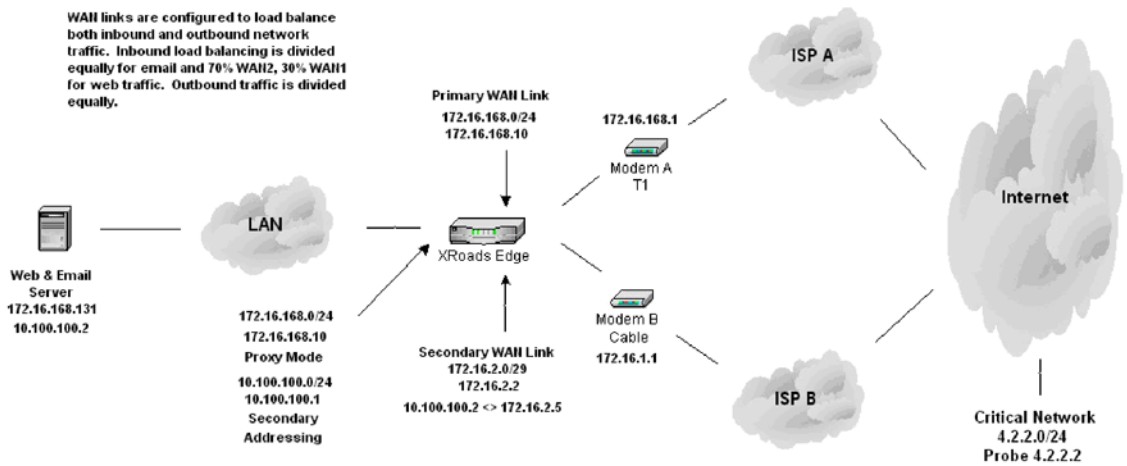


Figure 2.0 demonstrates how the Edge device could be configured in a Proxy/NAT Load Balancing scenario.

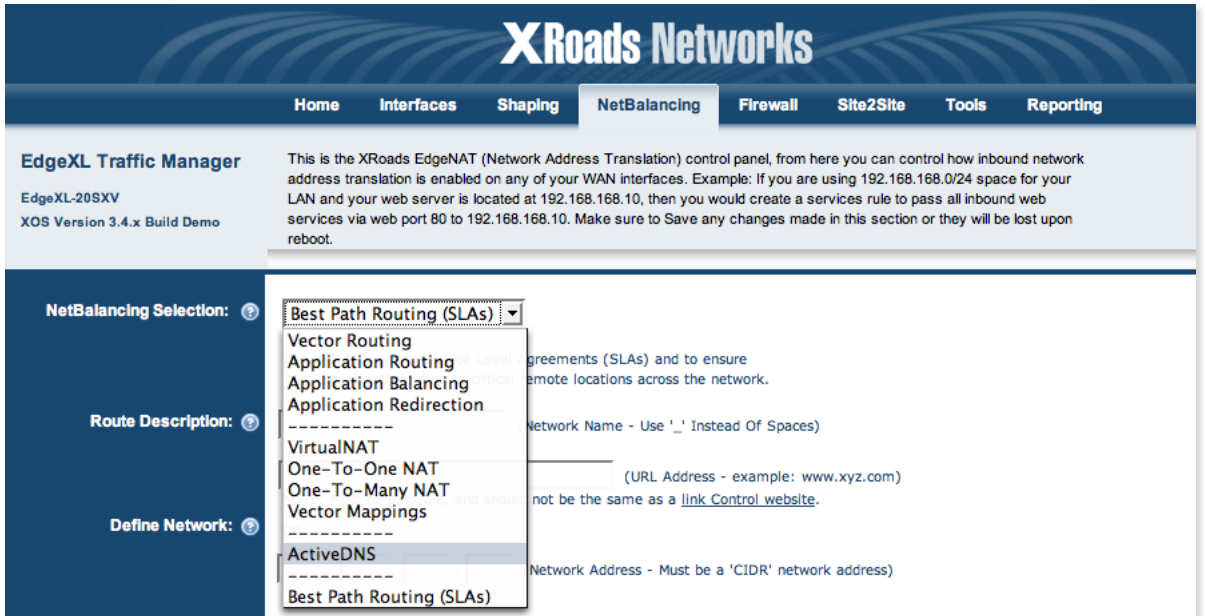
Network Overview

This network has one WAN network on the 172.16.168.0/24 network and one WAN interface on the 172.16.2.0/29 network. The LAN network is also using the 172.16.168.0/24 space. The WAN2 interface is being NAT'd to the LAN network. A single server on 172.16.168.131 (with a secondary network address assigned 10.100.100.2) is configured with both web and email services. Inbound web services will be load balanced 70% on WAN2 and 30% on WAN1. The Edge unit is only using NAT to firewall inbound traffic in this example. Best Path Routing is also configured with the 4.2.2.0/24 network being setup as critical with monitoring enabled. A single email alert has also been configured in this example.

ActiveDNS Step-By-Step

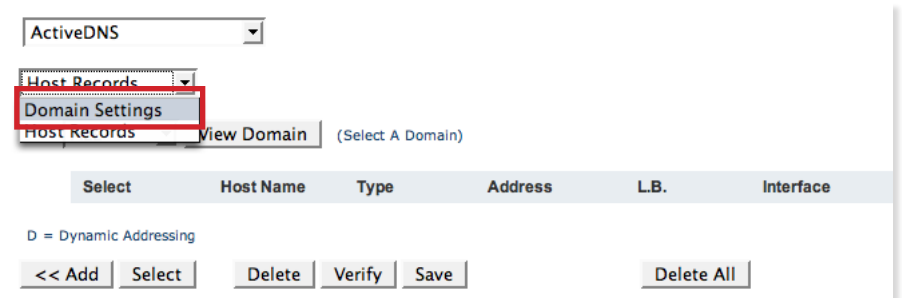
The following pages show a step-by-step example of how to configure the Edge router based on the network environment in the example configuration on page six.

Step One



NOTE: To begin the configuration, click the RETURN button.

Step Two



NOTE: Select the Domain Settings to create the initial domain name.

Step Three

NetBalancing Selection:

ActiveDNS Resolution:

Authoritative Domains: (Enter A Domain Name, Example: abc.com)

NOTE: The root servers must be redirected to the Edge router in order to enable the DNS functionality.

Zone Transfer: Enable Disable (Enable zones transfers for this domain.)

Domain Parameters:

(TTL - The number of seconds that this zone may be cached, '0' means no cache)

(Refresh - The number of seconds after which nameservers should check to see if this zone has changed)

(Serial - The incremental number assigned to this zone, used for zone transfers)

(Expire - If the Edge cannot be reached, all information is invalidated after 'expire' seconds)

NOTE: Enter the domain name and click the Add/Update button, this will create the domain within the Edge routers DNS server and generate the initial NS records.

Step Four

ActiveDNS

Domain Settings

Host Records

Domain Name	Zone Xfer	TTL	Refresh	Serial	Expire
xyz.com.	Off	30	30	1	86400

<< Back | Select Domain | Remove | Save

NOTE: Once the domain has been created, select the Host Records menu option to begin creating server name records, i.e. mail, www, etc.

Step Five

ActiveDNS

Host Records

xyz.com. View Domain (Select A Domain)

Host Name	Type	Address	L.B.	Interface	Status	Internal
.xyz.com.	NS	ns1.xyz.com.	1	wan1	✓	
ns1.xyz.com.	A	D	1	wan1	✓	

D = Dynamic Addressing

<< Add | Select | Delete | Verify | Save | Delete All

NOTE: Notice that the NS records initially have no IP address information. This will be obtained from the ACTIVE interfaces once the first server record is added, or upon a link update. Click the Add button to begin entering server information for this domain.

Step Six

xyz.com (Domain name associated with the host)

mail WAN1 (Enter host name [example: www] and bound to an interface)

(Enter an ip address or a cname, TXT, or SRV record, see '?' help for more)
OR Click for dynamic WAN addressing

(Enter the LAN IP address for this record, 'A' records only)

MX (Host Type)

30 (TTL determines how long this record is cached by DNS clients)

1 (Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

ACTIVE (Host Status)

Reset Add / Update View Hosts >>

NOTE: The first server to be added is the MAIL server. To do this, an MX record must first be created. Notice that no IP address information is entered. Also notice that the Host Type must be set to MX.

Step Seven

ActiveDNS

Host Records

xyz.com. View Domain (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
<input type="checkbox"/>	.xyz.com.	NS	ns1.xyz.com.	1	wan1	✓	
<input type="checkbox"/>	.xyz.com.	MX	mail.xyz.com.	1	wan1	✓	
<input type="checkbox"/>	ns1.xyz.com.	A	D	1	wan1	✓	

D = Dynamic Addressing

<< Add Select Delete Verify Save Delete All

NOTE: Upon adding the MX record, the DNS Host List will appear with the latest addition. Now that the MX record has been added, an A record must also be added. < Add

Step Eight

Authoritative Domain: (Domain name associated with the host)

Host Name: (Enter host name [example: www] and bound to an interface)

Host Address / URL: (Enter an ip address or a cname, TXT, or SRV record, see '?' help for more)
 OR Click for dynamic WAN addressing

Internal Address: (Enter the LAN IP address for this record, 'A' records only)

Record Type: (Host Type)

Time-To-Live: (TTL determines how long this record is cached by DNS clients)

Load Balancing: (Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

(Host Status)

NOTE: To add the A record for the MAIL record, simply use the same name as used to create the MX record, and enter the IP address for the actual mail server (as seen from the WAN network), finally for the Host Type select the A record.

Step Nine

Host Records (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		

D = Dynamic Addressing

NOTE: Again the DNS Host List will appear, which now includes the MX and A records for the MAIL server. Now, in order for failover and/or load balancing to work, a secondary MX record must be created. <Add

SCREEN shot taken from Edge unit showing the DNS Host List.

Step Ten

Authoritative Domain: ?	xyz.com (Domain name associated with the host)
Host Name: ?	mail WAN2 (Enter host name [example: www] and bound to an Interface)
Host Address / URL: ?	(Enter an ip address or a cname, TXT, or SRV record, see '?' help for more) OR Click for dynamic WAN addressing <input type="checkbox"/>
Internal Address: ?	(Enter the LAN IP address for this record, 'A' records only)
Record Type: ?	MX (Host Type)
Time-To-Live: ?	30 (TTL determines how long this record is cached by DNS clients)
Load Balancing: ?	1 (Used for load balancing server records, lower numbers are provided first more often [1 - 9999]) <input checked="" type="radio"/> Disabled <input type="radio"/> Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)
	ACTIVE (Host Status)
	Reset Add / Update View Hosts >>

NOTE: To create the secondary MX record, repeat the same steps as the primary, except change the interface from WAN1 to WAN2. If this is a failover record, set the load balancing field equal to 'o' to ensure that the secondary record is only used during an outage.

Step Eleven

Host Records [View Domain](#) (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	BACKUP	wan2		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		

NOTE: The DNS Host List now shows the secondary MX record, however an A record still needs to be created. <Add

Step Twelve

-select- (Domain name associated with the host)

mail **WAN2** (Enter host name [example: www] and bound to an interface)

172.16.2.5 (Enter an ip address or a cname, TXT, or SRV record, see '?' help for more)
OR Click for dynamic WAN addressing

10.100.100.2 (Enter the LAN IP address for this record, 'A' records only)

A (Host Type)

30 (TTL determines how long this record is cached by DNS clients)

1 (Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

ACTIVE (Host Status)

Reset Add / Update View Hosts >>

NOTE: Following the same pattern as before, the associated A record is created. The difference being that the interface is changed from WAN1 to WAN2.

IMPORTANT: Notice that in this case the IP address is not the internal mail servers address, but the One-To-One NAT address from WAN2, i.e. the address of the mail server as seen from the WAN.

Step Thirteen

Host Records

xyz.com. View Domain (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	BACKUP	wan2		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	mail.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		

NOTE: Upon adding the secondary MAIL servers A record, the DNS Host List is again displayed, now with all of the MAIL server information added. The next step is to add the web and other server name information. <Add

Step Fourteen

(Domain name associated with the host)

(Enter host name [example: www] and bound to an interface)

(Enter an IP address or a cname, TXT, or SRV record, see '?' help for more)
 OR Click for dynamic WAN addressing

(Enter the LAN IP address for this record, 'A' records only)

(Host Type)

(TTL determines how long this record is cached by DNS clients)

(Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

(Host Status)

NOTE: The only other server in the example network is the web server. This server is added using the 'www' reference name. The IP address used is the internal address of the web server as seen from WAN1.

Step Fifteen

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	BACKUP	wan2		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	mail.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		
	www.xyz.com.	A	172.16.168.131	1	wan1		10.100.100.2

NOTE: The DNS Host List now show the web server added as 'www'.

Step Sixteen

(Domain name associated with the host)

(Enter host name [example: www] and bound to an Interface)

(Enter an IP address or a cname, TXT, or SRV record, see '?' help for more)

OR Click for dynamic WAN addressing

(Enter the LAN IP address for this record, 'A' records only)

(Host Type)

(TTL determines how long this record is cached by DNS clients)

(Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

(Host Status)

NOTE: Using the same steps as before, the secondary name is added for the web server to ensure inbound connectivity in the event of a failover or load balancing situation. Again, notice that the interface selected is WAN2, and that the IP address entered is the One-To-One address.

Step Seventeen

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	BACKUP	wan2		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	mail.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		
	www.xyz.com.	A	172.16.168.131	1	wan1		10.100.100.2
	www.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2

NOTE: This screen shows the final DNS configuration as outlines in the example network shown on page five. This includes the NS, MX and A records for the network as well as the secondary WAN2 record configuration which ensures failover and load balancing will work correctly.

Verify DNS Functionality

A problem(s) has been found, please review configuration.

ActiveDNS

Host Records

xyz.com. View Domain (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
	.xyz.com.	NS	ns1.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	1	wan1		
	.xyz.com.	MX	mail.xyz.com.	BACKUP	wan2		
	mail.xyz.com.	A	172.16.168.131	1	wan1		172.16.168.131
	mail.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2
	ns1.xyz.com.	A	D 169.0.0.0	1	wan1		
	www.xyz.com.	A	172.16.168.131	1	wan1		10.100.100.2
	www.xyz.com.	A	172.16.2.5	BACKUP	wan2		10.100.100.2

D = Dynamic Addressing

<< Add Select Delete **Verify** Save Delete All

NOTE: To confirm that the DNS server is working correctly based on the configuration information entered, click the VERIFY button. This button will make sure that the DNS server within the Edge router is operating correctly, and that the information entered was within the required parameters.

DNS TESTING: The easiest method to test the DNS information provided by the Edge router is to use a program found in the DOS prompt of any Windows95,NT,XP system. This program is called NSLOOKUP and is commonly used to check the information provided by DNS server.

To direct NSLOOKUP towards the Edge router, use the command 'server xxx.xxx.xxx.xxx' where the x's represent the IP address of the Edge routers LAN interface.

Use the command 'set type=any' or 'set type=mx' to verify the host records.

Then type in either the domain name (i.e. 'xyz.com') or the URL (i.e. 'www.xyz.com').

For more information on NSLOOKUP please review the following:

http://www.microsoft.com/windowsxp/home/using/productdoc/en/default.asp?url=/windowsxp/home/using/productdoc/en/nslookup_set.asp

DNS Failover Mode

xyz.com. (Domain name associated with the host)

www **WAN2** (Enter host name [example: www] and bound to an interface)

172.16.2.5 (Enter an IP address or a cname, TXT, or SRV record, see '?' help for more)
OR Click for dynamic WAN addressing

10.100.100.2 (Enter the LAN IP address for this record, 'A' records only)

A (Host Type)

0 (TTL determines how long this record is cached by DNS clients)

1 (Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

Disabled Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)

BACKUP (Host Status)

Reset **Add / Update** **View Hosts >>**

NOTE: When configuring the ActiveDNS for failover mode, always set Host Status to BACKUP. If the WAN port being configured is not currently active, this Host Status will automatically be set to BACKUP. This ensures that the record information will always be provided as a last resort record. Meaning the remote client will only use it if the primary record is unavailable.

DNS Time-To-Live

Time-To-Live: **30** (TTL determines how long this record is cached by DNS clients)

ActiveDNS uses the DNS TTL parameter to ensure that all new DNS queries are properly forwarded to the Edge appliance for real-time response. The default value of 30 is provided to ensure that DNS caches only hold queries for 30 seconds. Typically any value lower than 30 seconds are not used by caches thus this is the default value.

NOTE: While it is possible to increase or decrease this value, generally it is not recommended.

DNS Load Balancing

Load Balancing: (Used for load balancing server records, lower numbers are provided first more often [1 - 9999])

NOTE: In the example network the web services are balanced 30% on WAN1 and 70% on WAN2. This is configured via the ActiveDNS load balancing field. Each record can be load balanced based on percentage, or based on round-robin (or equal load balancing). To setup the example configuration, the load balancing field for the WAN2 'www' record is set to '70', while the WAN1 record is set to '30'.

	www.xyz.com.	A	172.16.168.131	30	wan1		10.100.100.2
	www.xyz.com.	A	172.16.2.5	70	wan2		10.100.100.2

NOTE: Shows the DNS Host List with percentage load balancing enabled on the 'www' record.

The diagram below demonstrates how inbound sessions are balanced based on these administrative weights.

