



XROADS NETWORKS

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Network Appliance How To Guide: EdgeDNS

# How To Guide

EDGE NETWORK APPLIANCE

# How To Guide EdgeDNS

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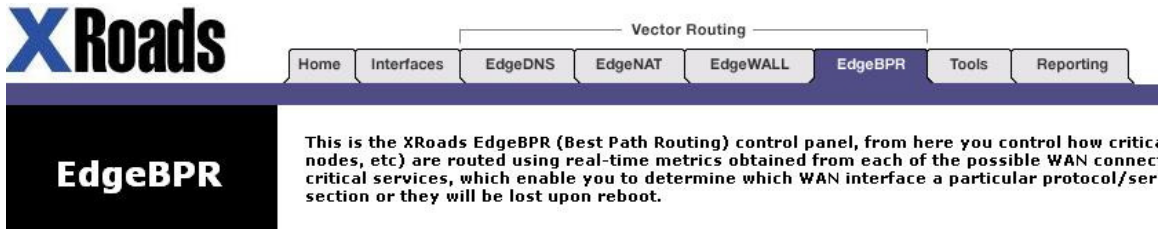
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# Edge Configuration Series

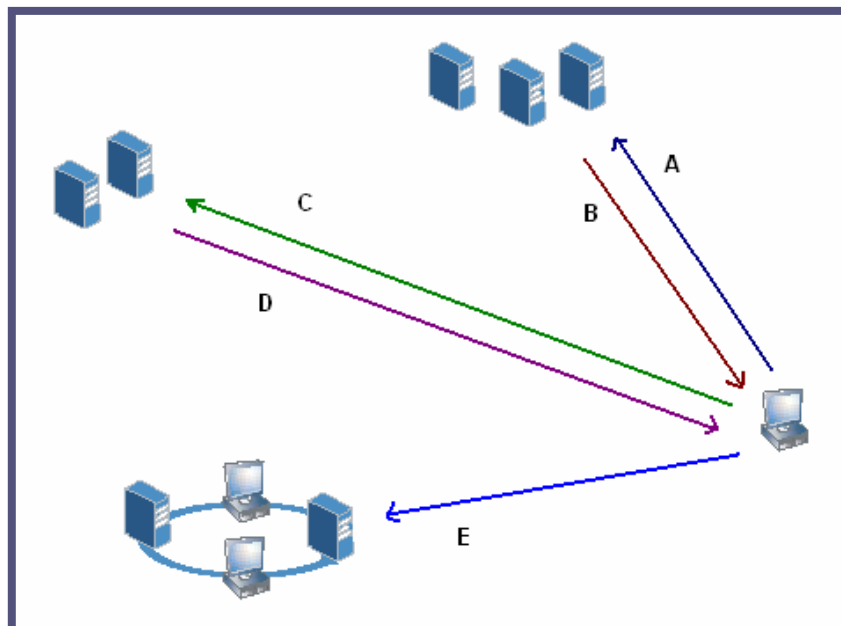
## EdgeDNS Overview

The EdgeDNS module BPR portion of the Edge appliance provides a host of bandwidth management and traffic shaping features. These features include: Traffic Shaping, Route Optimization,



### How DNS Works

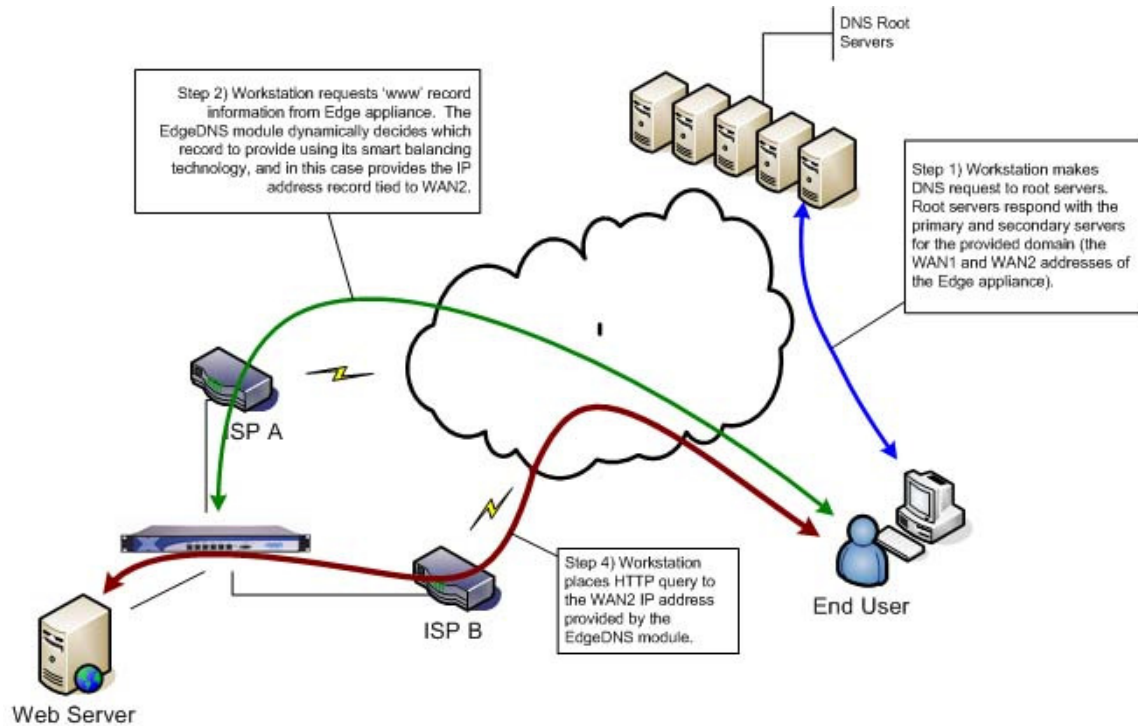
An initial request (A) is sent from a web browser to the root servers. The root servers respond (B) with the authoritative DNS servers for the requested domain. The web browser sends a request (C) to the authoritative DNS servers, which responds (D) with the web server address. The web browser then sends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



## Dynamic DNS (Failover & Balancing)

The EdgeDNS module works by dynamically changing how its domain name system responds to DNS queries directed to the Edge appliance.

Unlike with standard DNS, dynamic DNS can adjust how it responds to incoming DNS requests on the fly. The EdgeDNS goes one step further by adding various metrics to determine what influences each response. The EdgeDNS takes into account administrative settings, the current load on each WAN interface, and ether any other rules (such as Best Path Routing and application shaping policies) apply.



This diagram shows a client opening a web browser, attempting to connect to the server located behind the Edge appliance.

The entire process occurs in a matter of milliseconds.

### DNS Auto-Failover

Whenever a WAN interface has failed the Vector Routing module informs the EdgeDNS module that the interface is no longer available, and thus the EdgeDNS module will no longer provide associated addresses in DNS responses.

### DNS Load Balancing

Whenever a WAN interface is active, the EdgeDNS module will provide those associated records based on the administratively set load balancing metric and the current load associated with the interface (if smart load balancing is enabled).

## Creating a Domain

The first step in configuring EdgeDNS is to create a domain name. The domain name can be any level in the domain hierarchy (i.e. abc.com, sales.abc.com, zoneA.sales.abc.com, etc).

The screenshot shows a configuration panel for DNS settings. On the left is a dark blue sidebar with menu items: 'Inbound DNS Resolution: ?', 'Authoritative Domains: ?', 'Zone Transfer: ?', and 'Domain Parameters: ?'. The main area is white and contains a 'Domain Settings' dropdown menu. Below it is a text input field with the placeholder '(Enter A Domain Name, Example: abc.com)'. A note states: 'NOTE: The root servers must be redirected to the Edge router in order to enable the DNS functionality.' Underneath is a radio button group for 'Zone Transfer' with 'Enable' and 'Disable' options, and a note: '(Enable zones transfers for this domain.)'. Below that are three input fields for 'TTL' (value 30), 'Refresh' (value 30), and 'Expire' (value 86400), each with a descriptive note. At the bottom are four buttons: 'Reset', 'Add / Update', 'List Domains', and 'Restart DNS'.

The domain could also be a fully qualified URL in those cases where delegation is being used. For more information on delegation, see the [HowToGuide on DNS Delegation](#).

NOTE: The EdgeDNS module WILL ONLY respond to those domains configured in this section. Internal clients should NOT point to the Edge appliance to resolve external domains (i.e. yahoo.com, google.com, etc).

### Domain Name

Enter the domain for which you want the Edge appliance to answer. Make sure not add a '.' dot at the beginning or ending of the domain.

NOTE: The root name server will need to be redirected to Edge appliance for proper domain resolution to occur. See "Changing Registrar Records" section in this guide.

This screenshot shows a close-up of the 'Authoritative Domains' configuration. It features a dark blue header with the text 'Authoritative Domains: ?'. Below the header is a text input field with the placeholder '(Enter A Domain Name, Example: abc.com)'. A note below the field reads: 'NOTE: The root servers must be redirected to the Edge router in order to enable the DNS functionality.'

### Zone Transfer

This field determines whether external DNS servers can obtain and/or transfer domain information from the Edge appliance. Generally this option should be left off.

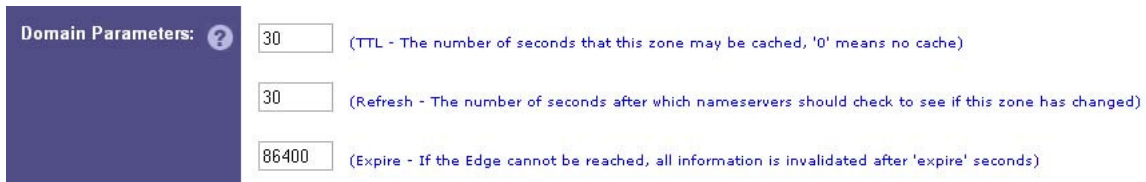
This screenshot shows the 'Zone Transfer' configuration options. It has a dark blue header with 'Zone Transfer: ?'. Below the header are two radio buttons: 'Enable' and 'Disable'. The 'Disable' option is selected. A note to the right says: '(Enable zones transfers for this domain.)'

## Domain Parameters

These parameters determine how the domain will be handled by external DNS servers and DNS caches when they proxy requests for other clients.

INFO: Some service providers setup DNS caching servers to minimize the amount of DNS traffic which originates from their networks. By doing this, the provider essentially transfers the responsibility for storing the DNS information from the individual clients, to the DNS cache servers, located at the service providers facilities.

The settings below assist the DNS cache servers in determining how long they will store the DNS information obtained from the Edge appliance and how often that the information should be updated in order to stay current.



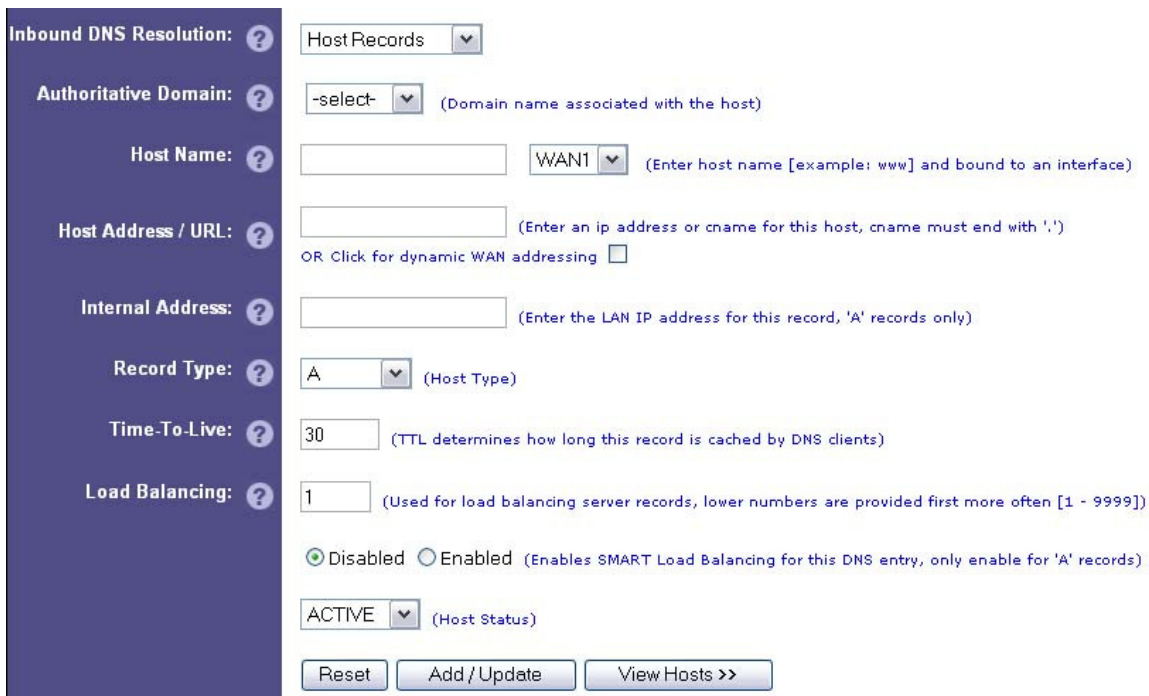
The screenshot shows a configuration panel for 'Domain Parameters'. It contains three input fields with their respective values and descriptions:

- TTL:** 30 (TTL - The number of seconds that this zone may be cached, '0' means no cache)
- Refresh:** 30 (Refresh - The number of seconds after which nameservers should check to see if this zone has changed)
- Expire:** 86400 (Expire - If the Edge cannot be reached, all information is invalidated after 'expire' seconds)

The default numbers, seen above, are the recommended values for any given domain. However some customers may prefer to lower or raise these values depending on their internal environment.

## Creating Records

Once a domain has been created, the next step is to populate the domains “zone records” or the individual references to actual servers, etc. EdgeDNS supports various record types, including: A, NS, MX, PTR, and CNAME.



The screenshot shows the 'Inbound DNS Resolution' configuration panel. It includes the following fields and options:

- Host Records:** HostRecords (dropdown)
- Authoritative Domain:** -select (dropdown) (Domain name associated with the host)
- Host Name:** [text input] WAN1 (dropdown) (Enter host name [example: www] and bound to an interface)
- Host Address / URL:** [text input] (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing
- Internal Address:** [text input] (Enter the LAN IP address for this record, 'A' records only)
- Record Type:** A (dropdown) (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])  
 Disabled  Enabled (Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)
- Host Status:** ACTIVE (dropdown)
- Buttons:** Reset, Add/Update, View Hosts >>

## Select a Domain

The first step when adding a host records is to select a domain to which the record will be bound. Select the appropriate domain from the drop-down menu.

**Authoritative Domain:**   (Domain name associated with the host)

## Host Name

The next step is to enter the actual host name. This is equivalent to the server name or the first part of the URL. Example: For the URL [www.abc.com](http://www.abc.com), you would enter the www as the host name in this field.

NOTE: To create a global record which responds when no other record is matched, leave the host name blank.

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

## Host Address

An IP address should only be entered for 'A' and 'PTR' records, when entering 'MX' and 'NS' records, leaving this field blank. A 'CNAME' record may also be created by entering the alias name in this field, however make sure to add a '.' at the end. Finally, instead of entering an IP address, you may click the dynamic checkbox, which would automatically use the actual WAN address for this record.

**Host Address / URL:**   (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing

## Internal Address

This field is used to assist in resolving internal DNS lookups. When a DNS request is made from the LAN network, the Edge appliance will provide this address instead of the external WAN address. This ensures proper connectivity for internal clients.

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

## Record Type

This is selection field determines the type of the record being created. The options are 'A', 'NS', 'MX', 'PTR' and are used to determine how the Edge appliance responds to queries. The 'NS' and 'MX' records are general "global" records, where as the 'A' and 'PTR' records point to a specific address and/or server.

**Record Type:**   (Host Type)

## Time-To-Live

This setting is used to determine how long a DNS cache will hold this information prior to refreshing its information. The default for this field is 30 seconds.

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

## Load Balancing

This setting is used to determine how the record is weighted when multiple Host Name of the same name are created (when there are several 'www' records), or when an 'MX' record is created.

NOTE: The higher the number, the less often this record is provided.

When the SMART load balancing is enabled, this record will be included when weight changes are automatically updated based on the current traffic utilization.

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)

## Active / Inactive

Determines whether the record is ACTIVE or in backup mode.

(Host Status)

## Listing Records

The VIEW HOSTS button actually shows a list of the current records/domains.

abc.com.  (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
<input type="radio"/>	.abc.com.	NS	ns1.abc.com.	BACKUP	wan1	0	
<input type="radio"/>	.abc.com.	MX	mail1.abc.com.	BACKUP	wan1	0	
<input type="radio"/>	mail1.abc.com.	A	10.20.20.50	BACKUP	wan1	0	192.168.168.50
<input type="radio"/>	ns1.abc.com.	A	D	BACKUP	wan1	0	

## EdgeDNS Verification

When creating and changing the DNS records it is important to ensure that the DNS has been setup properly. If the DNS is not setup properly the domain information will not be provided by the EdgeDNS module.

### Verify Records

The easiest method to determine the status of the DNS information is to click the 'Verify' button. Doing this will produce a response, the response will be either: "XRoads Edge DNS Verified" or "A problem(s) has been found, please review configuration". If the later message appears then there is a problem with how the DNS records have been configured.

XRoads Edge DNS Verified.

Host Records ▾

abc.com. ▾ View Domain (Select A Domain)

Select	Host Name	Type	Address	L.B.	Interface	Status	Internal
<input type="radio"/>	 www.abc.com.	 A	 10.20.20.40	BACKUP	 wan1	0	192.168.168.40

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

### Potential Problems

When a problem is found with the DNS records, here are a few places to check and confirm that the information provided is correct:

- Host addresses are generally the primary cause for a problem. If an address is entered incorrectly, it will need to be corrected.
- Name server records, or 'NS' records, are not configured or configured incorrectly. Name record host address fields should be blank.
- Mail server records, or 'MX' records, are not configured or configured incorrectly. Mail record host address fields should be blank.
- CNAME's are sometimes used incorrectly, where the CNAME does not end with a period.
- Sub-domains are sometimes used incorrectly, again where they are not terminated properly with a period.

## Testing Your DNS Records

Once you have created the domains and records, and verified that the DNS is setup correctly, the next step is to test the DNS service by performing DNS queries directly to the EdgeDNS module.

NOTE: This testing should ALWAYS be done from the WAN side of the Edge appliance, as internal based requests will respond differently depending on the addressing provided during the setup process.

### NSLOOKUP

One of the easiest tools to use to confirm the information provided by the EdgeDNS module is called NSLOOKUP. It is a software package which is installed by default on most Windows and UNIX systems.

It works by generating a DNS query to a directed DNS server. The commands are as follows:

- nslookup (starts the application)
- server xxx.xxx.xxx.xxx (directs the requests, the WAN address of the Edge appliance should be entered here)
- set type = (this can be set to 'any', 'ns', 'mx', or 'ptr' and will respond accordingly)
- URL (enter the server/host name you wish to lookup, or the IP address in the case of a PTR record)

Here is an example using the XROADSNETWORKS.COM domain, which runs through an Edge appliance at XRoads Networks.

```
C:\>nslookup
Default Server: vnscl-bak.sys.gtei.net
Address: 4.2.2.2

> server 216.73.107.49
Default Server: 216-73-107-49.oc
Address: 216.73.107.49

> set type=any
> xroadsnetworks.com
Server: 216-73-107-49.oc
Address: 216.73.107.49

xroadsnetworks.com
primary name server = ns1.xroadsnetworks.com.xroadsnetworks.com
responsible mail addr = mvi.net
serial = 1057431097
refresh = 3600 (1 hour)
retry = 86400 (1 day)
expire = 86400 (1 day)
default TTL = 0 (0 secs)
xroadsnetworks.com MX preference = 10, mail exchanger = XROADSNETWORKS.COM

xroadsnetworks.com nameserver = ns1.xroadsnetworks.com
xroadsnetworks.com nameserver = ns2.xroadsnetworks.com
xroadsnetworks.com internet address = 216.73.10
xroadsnetworks.com internet address = 217.160.2
ns1.xroadsnetworks.com internet address = 216.73.10
ns2.xroadsnetworks.com internet address = 217.160.2
>
> www.xroadsnetworks.com
Server: 216-73-107-49.oc
Address: 216.73.107.49

www.xroadsnetworks.com internet address = 217.160.2
www.xroadsnetworks.com internet address = 216.73.10
xroadsnetworks.com nameserver = ns1.xroadsnetworks.com
xroadsnetworks.com nameserver = ns2.xroadsnetworks.com
ns1.xroadsnetworks.com internet address = 216.73.10
ns2.xroadsnetworks.com internet address = 217.160.2
>
> set type=ns
> xroadsnetworks.com
Server: 216-73-107-49.oc
Address: 216.73.107.49

xroadsnetworks.com nameserver = ns1.xroadsnetworks.com
xroadsnetworks.com nameserver = ns2.xroadsnetworks.com
ns1.xroadsnetworks.com internet address = 216.73.10
ns2.xroadsnetworks.com internet address = 217.160.2
>
> set type=mx
> xroadsnetworks.com
Server: 216-73-107-49.oc
Address: 216.73.107.49

xroadsnetworks.com MX preference = 10, mail exchanger = XROADSNETWORKS.COM

xroadsnetworks.com nameserver = ns1.xroadsnetworks.com
xroadsnetworks.com nameserver = ns2.xroadsnetworks.com
ns1.xroadsnetworks.com internet address = 216.73.10
ns2.xroadsnetworks.com internet address = 217.160.2
>
```

## Changing Registrar Records

Determining whether it is easier to move the primary and secondary DNS servers for your domain to the Edge appliance over delegating the DNS from your existing zone files depends on many variables, too many to list here, so it is really up to each administrator to determine which is the best method to use.

NOTE: In general, if you have a smaller domain, with only a handful of servers, it is usually easier to perform a registrar change, then having to submit delegation change requests to your DNS zone maintainer.

### Who Is A Registrar?

A registrar is an organization which submits and management domain information to and for the Internet root servers. The ROOT servers are the primary servers contacted by all workstations on the Internet when a DNS lookup is performed. The root servers respond with the primary and secondary name servers that are authoritative for the domain in question.

Network Solution, among many others, is a registrar of domain names.



### How to Make That Change?

The process is different from registrar to registrar, but in general, it requires that the owner of the domain contact and/or submit a change request for the domain in question.

The change request says, change my primary and secondary name server to the following IP addresses:

- PRIMARY SERVER = xxx.xxx.xxx.xxx (WAN1 of the Edge appliance)
- SECONDARY SERVER = yyy.yyy.yyy.yyy (WAN2 of the Edge appliance)
- etc

## Example NS Record Creation

The following is a two step procedure for creating an NS record. Keep in mind that the NS record actually requires two record entries. Generally an NS record is required for WAN1 and WAN2+, so at least four (4) records will need to be created.

NOTE: If the WAN ports are active at the time of DOMAIN configuration, the NS records will be generated automatically by the Edge appliance.

### Example:

This first screen shows how to create the NS record.

The screenshot shows a configuration interface for creating an NS record. On the left is a dark blue sidebar with a list of fields: Inbound DNS Resolution, Authoritative Domain, Host Name, Host Address / URL, Internal Address, Record Type, Time-To-Live, and Load Balancing. Each field has a question mark icon. The main area contains the following settings:

- Inbound DNS Resolution:** Host Records (dropdown)
- Authoritative Domain:** abc.com (dropdown) (Domain name associated with the host)
- Host Name:** ns1 (text input) WANI (dropdown) (Enter host name [example: www] and bound to an interface)
- Host Address / URL:** (empty text input) (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing
- Internal Address:** (empty text input) (Enter the LAN IP address for this record, 'A' records only)
- Record Type:** NS (dropdown) (Host Type)
- Time-To-Live:** 30 (text input) (TTL determines how long this record is cached by DNS clients)
- Load Balancing:** 1 (text input) (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:** ACTIVE (dropdown)

At the bottom are three buttons: Reset, Add / Update, and View Hosts >>

This screen shows how to create the A record portion of the NS record.

The screenshot shows a configuration interface for creating an A record. It is identical to the NS record screen, but with the following differences:

- Record Type:** A (dropdown) (Host Type)
- Host Address / URL:** (empty text input) (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing

At the bottom are three buttons: Reset, Add / Update, and View Hosts >>

## Example MX Record Creation

When creating an MX record, two EdgeDNS records are actually required. These records include the MX record and a matching A record.

NOTE: When entering the MX record, make sure to enter the appropriate load balancing number for this record, generally MX records are balanced using 10, 20, 30, etc, for each mail server.

### Example:

This first screen shows how to create the MX record, balancing can be 1 or 10.

The screenshot shows a web-based DNS configuration interface. On the left is a dark blue sidebar with labels for each field: Inbound DNS Resolution, Authoritative Domain, Host Name, Host Address / URL, Internal Address, Record Type, Time-To-Live, and Load Balancing. The main area contains the following fields and controls:

- Inbound DNS Resolution:** HostRecords (dropdown)
- Authoritative Domain:** abc.com (dropdown) (Domain name associated with the host)
- Host Name:** ns1 (text input) WAN1 (dropdown) (Enter host name [example: www] and bound to an interface)
- Host Address / URL:** (empty text input) (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing
- Internal Address:** (empty text input) (Enter the LAN IP address for this record, 'A' records only)
- Record Type:** NS (dropdown) (Host Type)
- Time-To-Live:** 30 (text input) (TTL determines how long this record is cached by DNS clients)
- Load Balancing:** 1 (text input) (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:** ACTIVE (dropdown)
- Buttons: Reset, Add / Update, View Hosts >>

This screen shows how to create the A record portion of the MX record.

This screenshot is identical to the previous one, but with the following changes:

- Record Type:** A (dropdown) (Host Type)
- Host Address / URL:** (empty text input) (Enter an ip address or cname for this host, cname must end with '.')  
OR Click for dynamic WAN addressing

## Example PTR Record Creation

The purpose of a PTR record, or a reverse record, is to result the IP address into a name. Generally this is only used if your service provider has made you responsible for your own IP space. In most cases, PTR records do not apply.

### Example:

The first step is to create an *'IN-ADDR.ARPA'* domain name, then enter the corresponding record information.

The screenshot shows a configuration page for DNS resolution. On the left is a dark blue sidebar with menu items: 'Inbound DNS Resolution: ?', 'Authoritative Domains: ?', 'Zone Transfer: ?', and 'Domain Parameters: ?'. The main content area has a 'Domain Settings' dropdown menu. Below it, the 'Authoritative Domains' section contains a text input field with '168.168.192.in-addr.arpa' and a help link '(Enter A Domain Name, Example: abc.com)'. A note states: 'NOTE: The root servers must be redirected to the Edge router in order to enable the DNS functionality.' The 'Zone Transfer' section has radio buttons for 'Enable' and 'Disable', with 'Disable' selected and a note '(Enable zones transfers for this domain.)'. The 'Domain Parameters' section has three text input fields: '30' (TTL - The number of seconds that this zone may be cached, '0' means no cache), '30' (Refresh - The number of seconds after which nameservers should check to see if this zone has changed), and '86400' (Expire - If the Edge cannot be reached, all information is invalidated after 'expire' seconds). At the bottom are four buttons: 'Reset', 'Add / Update', 'List Domains', and 'Restart DNS'.

This is a screen shot of a PTR record being created. Notice that both the name and the address are entered in on the same screen, no secondary 'A' records are required for PTR records to work properly.

The screenshot shows a configuration page for host records. On the left is a dark blue sidebar with menu items: 'Inbound DNS Resolution: ?', 'Authoritative Domain: ?', 'Host Name: ?', 'Host Address / URL: ?', 'Internal Address: ?', 'Record Type: ?', 'Time-To-Live: ?', and 'Load Balancing: ?'. The main content area has a 'Host Records' dropdown menu. Below it, the 'Authoritative Domain' section contains a dropdown menu with '168.168.192.in-addr.arpa' and a note '(Domain name associated with the host)'. The 'Host Name' section has a text input field with '1' and a dropdown menu with 'EXT', and a note '(Enter host name [example: www] and bound to an interface)'. The 'Host Address / URL' section has a text input field with 'www.test.com.' and a note '(Enter an ip address or a cname, TXT, or SRV record, see '?' help for more)', and a checkbox for 'OR Click for dynamic WAN addressing'. The 'Internal Address' section has a text input field and a note '(Enter the LAN IP address for this record, 'A' records only)'. The 'Record Type' section has a dropdown menu with 'PTR' and a note '(Host Type)'. The 'Time-To-Live' section has a text input field with '30' and a note '(TTL determines how long this record is cached by DNS clients)'. The 'Load Balancing' section has a text input field with '1' and a note '(Used for load balancing server records, lower numbers are provided first more often [1 - 9999])', and radio buttons for 'Disabled' (selected) and 'Enabled' with a note '(Enables SMART Load Balancing for this DNS entry, only enable for 'A' records)'. At the bottom are three buttons: 'Reset', 'Add / Update', and 'View Hosts >>'. The 'Host Status' dropdown menu is set to 'ACTIVE'.