

CDNS-Geo

Authoritative DNS Delivery
Management

through
Global Server Load Balancing
with CommunityDNS



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What is Global Server Load Balancing?

For a very large web site, it is common for the site to be run on multiple machines at multiple geographic locations. So what an organisation will want to do is balance the load on those servers with sensitivity to the physical location of the visitor to the site. This is Global Server Load Balancing.

Does CommunityDNS support GSLB, if so how?

Yes, CommunityDNS can support geo-sensitive DNS – allowing you to make different DNS replies to clients in different locations based on their country of origin. CommunityDNS does not support making decisions about which servers are receiving the most load and giving different DNS responses based on the server load.

How it works

The CommunityDNS GSLB works by using the DNS CNAME Resource Record to tell you which country the DNS request has come from. Using this information you can decide what answer you wish to respond to the user with.

Note, it is perfectly valid that, to some countries, you may wish to respond with valid data, while to others you can respond with NXDOMAIN (host does not exist). The way the system works is that our servers will look for a CNAME that starts

“--.gslb.<domain>” and will substitute the leading “--” for the two character ISO3166 country code.

Note, true ISO3166 country code are used, so (for example) Greece is “GR” and the United Kingdom is “GB”. For more information in ISO3166 codes please go to :-

http://www.iso.org/iso/support/country_codes/iso_3166_code_lists/

The database of IP Address to ISO code translation is obtained from MaxMind. A “lite” version of the database can be obtained from :-

<http://www.maxmind.com/download/geoip/database/GeoIPCountryCSV.zip>

For corrections, please refer to MaxMind directly.

An example

The easiest way to understand the system is by way of an example, so lets say we have the web site “www.exmample.com” which has one server in the US and one in the UK. The server in the UK is to serve clients in the Europe Union and the server in the US is to serve the rest of the world.

in the zone file for “example.com” we have :-

```
www IN CNAME --.gslb
BE.gslb IN CNAME www.eu
BG.gslb IN CNAME www.eu
CZ.gslb IN CNAME www.eu
DK.gslb IN CNAME www.eu
DE.gslb IN CNAME www.eu
EE.gslb IN CNAME www.eu
IE.gslb IN CNAME www.eu
GR.gslb IN CNAME www.eu
ES.gslb IN CNAME www.eu
FR.gslb IN CNAME www.eu
IT.gslb IN CNAME www.eu
CY.gslb IN CNAME www.eu
LV.gslb IN CNAME www.eu
LT.gslb IN CNAME www.eu
LU.gslb IN CNAME www.eu
HU.gslb IN CNAME www.eu
MT.gslb IN CNAME www.eu
NL.gslb IN CNAME www.eu
AT.gslb IN CNAME www.eu
PL.gslb IN CNAME www.eu
PT.gslb IN CNAME www.eu
RO.gslb IN CNAME www.eu
SI.gslb IN CNAME www.eu
SK.gslb IN CNAME www.eu
FI.gslb IN CNAME www.eu
SE.gslb IN CNAME www.eu
GB.gslb IN CNAME www.eu
*.gslb IN CNAME www.us
www.eu IN A 1.2.3.4
www.us IN A 5.6.7.8
```

When the request comes to us for “www.exmample.com” we will see that the answer is a CNAME and it starts with “--.gslb.” and we will automatically substitute the user's ISO country code.

So, say the request came from Russia, then the answer to that request would be exactly

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equivalent to the static record :-

```
www IN CNAME RU.gslb
```

At no time will the end user see any name containing “gslb”, all CNAME records are automatically translated by the resolver they are using, so all their web client will end up seeing is the appropriate IP Address.

Other issues

If the country code is returned as “00” (<zero><zero>) this means we have been unable to determine the country of origin of the user's IP Address. It is most likely this is because the IP Address in question is not in the database.

Multi-national ISPs and Hosting companies often move their IP Address blocks around their network – including from one country to another. Therefore all IP Address based Geo-Location databases will have some degree of inaccuracy to them. Please contact MaxMind directly to have these issues corrected.

The source IP Address of the DNS request we see will not be that of the end user's PC itself, but will be the source IP Address of resolver they are using. This will usually be automatically provided by the ISP. Therefore the country of origin will be determined according to the IP Address of the resolver the end user is using. This is unavoidable and common to all DNS based GSLB solutions.

Efforts are under way to provide a standard for passing the end user's IP Address through the resolver to the DNS server, however, this is still work in progress and has significant issues associated with it.

FAQ

What if I also use a different DNS provider?

Currently there is no standard for providing GSLB information. The technique we have used, although widely documented, is by no means the only method. To make your zone file compatible with a DNS provider who does not provide any geo-location services, all you need to do is create an address or CNAME record for the unlikely hostname “--” and users who hit the non-geo-location DNS service will be directed according to that record.

Alternatively, as in our example above, create a wild-card record. This is always useful as ISO country codes do change and it will give your zone a “catch-all” to ensure everybody always gets the name resolved.

Note, we will **never** give out the answer “--”. If we are unsure of their country of origin we will give their resolver the answer “00” (<zero><zero>). Therefore you can be sure, if

they have been directed to the IP Address given by your “--” record it was because their DNS request was resolved by a server other than one of ours.

What happens if I sign my zone?

In order to be able to substitute the country code into the answer of a DNS request we have to be able to modify the DNS results data. This means, if that data had been signed, it would fail verification.

Therefore, if your zone is signed, it is necessary for you to define “gslb” as an unsigned subdomain.

In our example above, the resulting IP addresses which are sent to the end user, tied to the names “www.eu” and “www.us”, would still be in the parent zone and therefore signed and subject to DNSSEC verification.

Note also, it is only necessary for us to host the zone that contains the “--.gslb.” record – therefore, if “gslb” as been defined as a sub-domain, we only need to host that one subdomain. It is not necessary for us to host the parent zone itself.

How can I test this service?

We have set up the test host “www.geoip.cdns.net” - if you request this name from one of our servers, the reply you get will indicate to you what we think the country of origin of your IP Address is. For example :-

```
$ dig @194.0.1.1 www.geoip.cdns.net  
GB.gslb.geoip.cdns.net.
```

In this example test we ran the “dig” command from the UK.

Note, because you are talking directly to one of our servers, the answer you get will be determined according to your own IP Address, as opposed to the IP Address of the resolver you are using. This is not normally what would happen (see above).

If you run the command again, but this time targeted at your default resolver, but asking for a TXT record you should get a description of the country of origin of your resolver.

```
$ dig +short www.geoip.cdns.net txt  
GB.gslb.geoip.cdns.net.  
"UNITED KINGDOM"
```

Again, example was run from the UK.

On a Windows PC, the same test can be done using the command “nslookup” :-

```
c:\> nslookup -type=txt www.geoip.cdns.net
```

To create this result, because “cdn.net” is a signed zone, we created the sub-domain “geoip.cdn.net”, which is unsigned, then within it created the records :-

```
www in cname -- gslb
GB.gslb IN TXT "UNITED KINGDOM"
```

Note, although “dig” and “nslookup” will show us the “gslb” records, an end user would not normally be aware of them.