5. Inverse Resolution

5.1 Introduction

In most connections through the Internet, machine names are used instead of their IP addresses. Obviously, names are easier to remember than numbers. However, Internet connections between computers connected to this network shall be made using numbers. Therefore, before the connection begins, the computer's name is translated to its IP address. This process is known as direct DNS Resolution, i.e., converting names into IP addresses.

Frequently it is also necessary to perform the inverse operation, known as Inverse Resolution.

This conversion attempts to find the name associated to a computer's IP address.

Inverse resolution is only possible with the use of a pseudo−domain, "in−addr.arpa", abbreviation historically used for Arpanet Inverse Address.

DNS delegation of this pseudo−domain is responsibility of Internet Registries, as they are responsible for allocating IP addresses.

5.2 DNS Server Registration

All allocated address space must have an associated DNS server, which shall be responsible for inverse resolution. In the case of the area covered by LACNIC, these servers must be registered with LACNIC, which in turn is responsible for the inverse resolution of blocks administered by this organization.

LACNIC may use inverse resolution information as an indicator of address block usage by those receiving allocations.

DNS server registration for the address space administered by LACNIC shall vary according to the size (prefix) of the allocated space.

Blocks allocated by LACNIC with prefixes shorter than or equal to /16, shall have the DNS servers responsible for inverse resolution registered at LACNIC. Information shall be entered in relation to /16 blocks. Any suballocation of blocks with longer prefixes within these blocks, shall have their DNS servers registered at the organizations that received the blocks with prefixes shorter than or equal to /16 directly from LACNIC.

Blocks allocated by LACNIC with prefixes longer than /16 shall register at LACNIC the DNS servers responsible for the inverse resolution of all blocks with the prefix /24 that account for the total address space allocated by LACNIC. Thus, suballocations with prefixes of up to /24 that are performed within that block must have the DNS servers registered at LACNIC.

Example:

*) ISP−A receives from LACNIC a /15 block (200.0.0.0/15). It must report to LACNIC which DNS servers shall be responsible for the inverse resolution of each one of the /16 blocks that make up the allocated block, i.e., blocks 200.0.0.0/16 and 200.1.0.0/16. The DNS servers of suballocations of longer prefixes made within this block shall be registered at the DNS servers of ISP−A, which in turn are registered at LACNIC's DNS servers as responsible for the inverse resolution of blocks 200.0.0.0/16 and 200.1.0.0/16.

*) ISP−B receives from LACNIC a /20 block (200.2.0.0/20). It must report to LACNIC which DNS servers shall be responsible for the inverse resolution of blocks 200.2.0.0 to 200.2.15.0. If ISP−B suballocates a block with a prefix longer than /21 and shorter than or equal to /24, it must register at LACNIC's servers the new DNS servers responsible for the inverse resolution of the suballocated block.

Thus, within LACNIC's IP address administration system, it shall not be possible to register DNS servers for suballocations made in blocks with prefixes shorter than or equal to /16 that have been directly allocated by LACNIC. The organization receiving the allocation shall maintain the registry of DNS servers responsible for the inverse resolution of those suballocations made within that block.

This shall also be reflected on the WHOIS database server. In other words, for suballocations within blocks with prefixes shorter than or equal to /16 directly allocated by LACNIC, the DNS servers responsible for the inverse resolution of those suballocations shall not be visible through WHOIS. This is because these servers are not registered at LACNIC, and therefore LACNIC does not have this information.

It is recommended that, if it is necessary to identify the DNS servers of suballocations made within these blocks, DNS consulting tools be used.

This condition does not exist for allocations with prefixes longer than /16 made by LACNIC. In this case, suballocations of prefixes of up to /24 made within blocks allocated by LACNIC and having prefixes longer than /16 may have a DNS server delegated through LACNIC's address administration system.

LACNIC's IP address administration system does not accept the delegation of DNS servers for blocks with prefixes longer than /24. For these cases the adoption of BCP 20 is recommended.

To summarize:

Prefix of the block allocated by LACNIC	DNS server for suballocations made by LACNIC must be registered at:
/16 or shorter	ISP that received the block
/17 or longer	LACNIC

Appendix A

A.1 BCP 20 (Best Current Practice 20 – RFC2317)

This document was prepared as a proposal to solve the problem of delegating DNS servers for blocks with prefixes longer than /24 (smaller blocks).

As IP version 4 addresses are made up of four 8−bit groups, inverse domains created to allow inverse resolution are also organized in 8−bit groups.

For example, IP number 200.0.0.1 shall have the following inverse domain: 1.0.0.200.in−add.arpa.

With the use of CIDR notation (Classless Inter−Domain Routing) [2], the representation of an IP number will not always be within the same 8−bit group boundary. This is the case, for example, of IP address blocks with prefixes longer than /24.

The IP address administration system does not accept DNS delegation for blocks with prefixes longer than /24. This delegation must be made at the server responsible for the inverse resolution of the block with the /24 prefix. At this server, DNS delegation for blocks with prefixes longer than /24 can be registered in two different manners:

− Treating the entire DNS zone of the /24 block as only one zone where the organization possessing the /24 block is responsible for recording the information for all the addresses that make up that block, or

− Using BCP 20 and transferring the responsibility for the information on each suballocation with a prefix longer than /24 to the organization receiving it. This guarantees both the ISP and the client greater autonomy.

LACNIC recommends the use of BCP 20.

For this, all IP addresses that make up the /24 block must be registered at the DNS server responsible for the inverse resolution of the /24 block, but instead of specifying the name associated to each IP number (through PTR Resource Record), a Canonical Name (CNAME) is specified for that same IP number within another subdomain. In addition, administration of this new subdomain is transferred to the client that was suballocated a block with a prefix longer than /24.

Example:

ISP−A wants to assign /29 blocks to their clients. These designations shall be made within the 200.1.0.0/24 block. At the DNS server responsible for the block's inverse resolution, which is registered at LACNIC, a zone containing all the numbers of this block must be generated in the following manner:

```
$ORIGIN 0.1.200.in−addr.arpa.
@ IN SOA ns.isp−a.domain. hostmaster.isp−a.domain. (..)

1 CNAME 1.0/29.0.1.200.in−addr.arpa.
2 CNAME 2.0/29.0.1.200.in−addr.arpa.
3 CNAME 3.0/29.0.1.200.in−addr.arpa.
4 CNAME 3.0/29.0.1.200.in−addr.arpa.
5 CNAME 3.0/29.0.1.200.in−addr.arpa.
6 CNAME 3.0/29.0.1.200.in−addr.arpa.
9 CNAME 9.8/29.0.1.200.in−addr.arpa
?
254 CNAME 1.248/29.0.1.200.in−addr.arpa.

0/29.0.1.200.in−addr.arpa. ns ns.cliente−a.domain.
8/29.0.1.200.in−addr.arpa ns ns.cliente−b.domain.
?
248/29.0.1.200.in−addr.arpa. ns ns.cliente−zz.domain.
```

Note that address 1 has a CNAME for address 1 within another domain, which in this example is 0/29.0.1.200.in−addr.arpa.

This is because the DNS server for that subdomain is a server under the responsibility of the client that has received the suballocation of block 200.1.0.0/29.

Thus, the client is responsible for administrating the part of the /24 block he was allocated.

In order to simplify administration, it is recommended that subdomains are created based on the suballocated prefix. As in the aforementioned example, block 200.1.0.0/29 would have been assigned to client A and the subdomain created would be 0/29.0.1.200.in−addr.arpa.

Although the examples and explanations here included may help to understand the scheme proposed by BC20, the reading of the document is recommended.

References

[1]RFC2317 – ftp://ftp.isi.edu/in–notes/rfc2317.txt
[2]RFC1519 – ftp://ftp.isi.edu/in–notes/rfc1519.txt