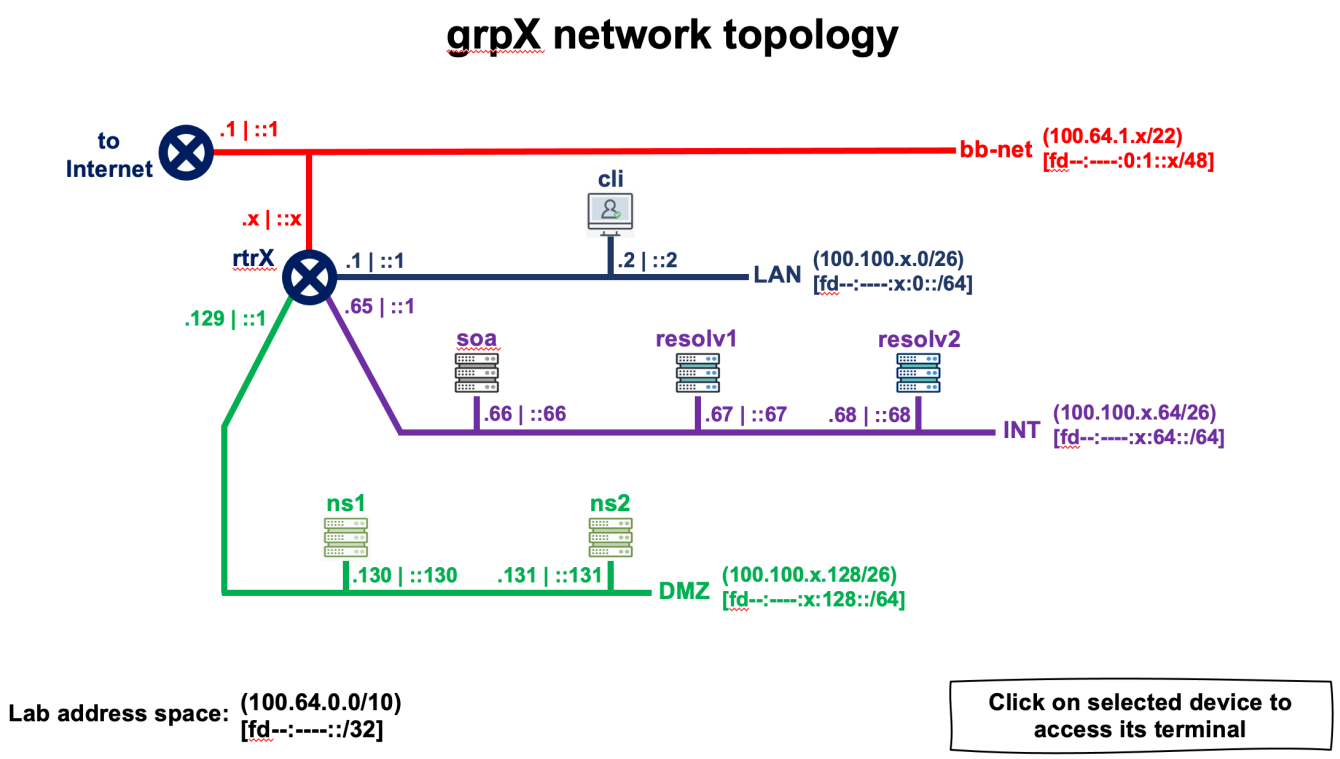
Topología de Red del Laboratorio (Grupo X)




```
  DEVICE NAME        IPv4 ADDRESS                IPv6 ADDRESS
+--------------+-----------------------+-----------------------------+
| grpX-resolv1 | 100.100.X.67 (eth0)   | fd44:975f:X:64::67 (eth0)   |
+--------------+-----------------------+-----------------------------+
| grpX-resolv2 | 100.100.X.68 (eth0)   | fd44:975f:X:64::68 (eth0)   |
+--------------+-----------------------+-----------------------------+
| grpX-rtr     | 100.64.1.X (eth0)     | fd44:975f:X::1 (eth1)       |
|              | 100.100.X.65 (eth2)   | fd44:975f:X:64::1 (eth2)    |
|              | 100.100.X.193 (eth4)  | fd44:975f:X:192::1 (eth4)   |
|              | 100.100.X.129 (eth3)  | fd44:975f:X:128::1 (eth3)   |
|              | 100.100.X.1 (eth1)    | fd44:975f:0:1::X (eth0)     |
+--------------+-----------------------+-----------------------------+
```

Durante esta práctica vamos a utilizar solamente los siguientes equipos:

- **grpX-resolv1** & **grpX-resolv2** : servidores DNS recursivos (resolvers)

Configurar servidor recursivo (BIND)

Para esto vamos a utilizar el servidor "Resolv 1" (resolver) [**grpX-resolv1**].

Este ya tiene pre instalado BIND9, sin ninguna configuración adicional más que la que viene por defecto con la instalación.

Utilizaremos el usuario root:

```
$ sudo su -
```

Vamos al directorio /etc/bind:

```
# cd /etc/bind
```

En este punto debemos configurar algunas opciones de BIND9.
Para ello editamos el archivo /etc/bind/named.conf.options:

```
# nano named.conf.options
```

Ahora agregamos las opciones para indicar (al resolver) cuáles son las direcciones IP que podrán enviar consultas DNS y al mismo tiempo a qué direcciones IP escuchará nuestro servidor en el puerto 53 (en este caso ambos prefijos son idénticos). El archivo debe ser el siguiente:

```
options {
  directory "/var/cache/bind";

  // If there is a firewall between you and nameservers you want
  // to talk to, you may need to fix the firewall to allow multiple
  // ports to talk. See http://www.kb.cert.org/vuls/id/800113

  // If your ISP provided one or more IP addresses for stable
  // nameservers, you probably want to use them as forwarders.
  // Uncomment the following block, and insert the addresses replacing
  // the all-0's placeholder.

  // forwarders {
  //  0.0.0.0;
  // };

  //========================================================================
  // If BIND logs error messages about the root key being expired,
  // you will need to update your keys. See https://www.isc.org/bind-keys
  //========================================================================
  dnssec-validation auto;
```

```
  listen-on port 53 { any; };                                    <--- Add this
  listen-on-v6 port 53 { any; };                                 <--- Add this

  allow-query { localhost; 100.100.0.0/16; fd44:975f::/32; };    <--- Add this

  recursion yes;                                                 <--- Add this
};
```

Una vez que terminamos de editar el archivo de configuración, ejecutamos un comando que nos permite comprobar rápidamente si la configuración es semánticamente correcta (si el comando no devuelve nada, significa que no encontró errores en los archivos de configuración):

```
# named-checkconf
```

Finalmente reiniciamos el servidor para que tome los cambios de configuración:

```
# systemctl restart bind9
```

Y comprobamos el estado del proceso bind9:

```
# systemctl status bind9
```

Deberíamos obtener una salida similar a la siguiente:

```
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
  Drop-In: /etc/systemd/system/service.d
           └─lxc.conf
   Active: **active (running)** since Thu 2021-05-13 01:38:27 UTC; 4s ago
    Docs: man:named(8)
  Main PID: 849 (named)
   Tasks: 50 (limit: 152822)
   Memory: 103.2M
   CGroup: /system.slice/named.service
           └─849 /usr/sbin/named -f -u bind

May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: **command
channel listening on ::1#953**
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: managed-keys-
zone: loaded serial 6
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: zone 0.in-
addr.arpa/IN: loaded serial 1
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: zone 127.in-
addr.arpa/IN: loaded serial 1
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: zone
localhost/IN: loaded serial 2
```

```
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: zone 255.in-addr.arpa/IN: loaded serial 1
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: **all zones loaded**
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: **running**
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: managed-keys-zone: Key 20326 for zone . is now trusted (acceptance timer>
May 13 01:38:27 resolv1.grpX.<lab_domain>.te-labs.training named[849]: resolver priming query complete
```

Pruebas del servidor recursivo

```
# dig @localhost
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> @localhost
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 55915
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 27

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 8740b0c9dd1815aa0100000061659efc472f899125a594b4 (good)
;; QUESTION SECTION:
;.        IN  NS

;; ANSWER SECTION:
.     518400  IN  NS  g.root-servers.net.
.     518400  IN  NS  m.root-servers.net.
.     518400  IN  NS  e.root-servers.net.
.     518400  IN  NS  b.root-servers.net.
.     518400  IN  NS  d.root-servers.net.
.     518400  IN  NS  c.root-servers.net.
.     518400  IN  NS  j.root-servers.net.
.     518400  IN  NS  f.root-servers.net.
.     518400  IN  NS  h.root-servers.net.
.     518400  IN  NS  i.root-servers.net.
.     518400  IN  NS  a.root-servers.net.
.     518400  IN  NS  k.root-servers.net.
.     518400  IN  NS  l.root-servers.net.
```

```
;; ADDITIONAL SECTION:
m.root-servers.net. 518400  IN  A 202.12.27.33
l.root-servers.net. 518400  IN  A 199.7.83.42
k.root-servers.net. 518400  IN  A 193.0.14.129
j.root-servers.net. 518400  IN  A 192.58.128.30
i.root-servers.net. 518400  IN  A 192.36.148.17
h.root-servers.net. 518400  IN  A 198.97.190.53
g.root-servers.net. 518400  IN  A 192.112.36.4
f.root-servers.net. 518400  IN  A 192.5.5.241
e.root-servers.net. 518400  IN  A 192.203.230.10
d.root-servers.net. 518400  IN  A 199.7.91.13
c.root-servers.net. 518400  IN  A 192.33.4.12
b.root-servers.net. 518400  IN  A 199.9.14.201
a.root-servers.net. 518400  IN  A 198.41.0.4
m.root-servers.net. 518400  IN  AAAA  2001:dc3::35
l.root-servers.net. 518400  IN  AAAA  2001:500:9f::42
k.root-servers.net. 518400  IN  AAAA  2001:7fd::1
j.root-servers.net. 518400  IN  AAAA  2001:503:c27::2:30
i.root-servers.net. 518400  IN  AAAA  2001:7fe::53
h.root-servers.net. 518400  IN  AAAA  2001:500:1::53
g.root-servers.net. 518400  IN  AAAA  2001:500:12::d0d
f.root-servers.net. 518400  IN  AAAA  2001:500:2f::f
e.root-servers.net. 518400  IN  AAAA  2001:500:a8::e
d.root-servers.net. 518400  IN  AAAA  2001:500:2d::d
c.root-servers.net. 518400  IN  AAAA  2001:500:2::c
b.root-servers.net. 518400  IN  AAAA  2001:500:200::b
a.root-servers.net. 518400  IN  AAAA  2001:503:ba3e::2:30

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:43:08 -03 2021
;; MSG SIZE  rcvd: 851
```

```
# dig @localhost nic.mx
```

```
;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:43:08 -03 2021
;; MSG SIZE  rcvd: 851

root@resolv1:~# dig @localhost nic.mx

; <<>> DiG 9.16.1-Ubuntu <<>> @localhost nic.mx
; (2 servers found)
;; global options: +cmd
```

```
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3299
;; flags: qr rd ra; QUERY: 1, ANSWER: 4, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 0fcfbbd2121bbef90100000061659f22310637fc9df339a1 (good)
;; QUESTION SECTION:
;nic.mx.        IN  A

;; ANSWER SECTION:
nic.mx.     300 IN  A 200.94.180.58
nic.mx.     300 IN  A 200.94.180.60
nic.mx.     300 IN  A 200.94.180.59
nic.mx.     300 IN  A 200.94.180.61

;; Query time: 1072 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:43:46 -03 2021
;; MSG SIZE  rcvd: 127
```

Probando DNSSEC

```
# dig @localhost nic.br +dnssec +multi
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> @localhost nic.br +dnssec +multi
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15259
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 4096
; COOKIE: 191c41a103551a480100000061659f8b67a5400faa328bae (good)
;; QUESTION SECTION:
;nic.br.      IN A

;; ANSWER SECTION:
nic.br.     86400 IN A 200.160.4.6
nic.br.     86400 IN RRSIG A 13 2 86400 (
        20211111003007 20210902000957 47828 nic.br.
        T1t0WmNTQlHt8MNGoAk450qLwXo3uOBOzLVwzBJV8dLR
        /GbQ3JQ2bKn+NuJFhYpkYJXYefE28tquuO8c7mFWUA== )

;; Query time: 128 msec
```

```
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:45:31 -03 2021
;; MSG SIZE  rcvd: 181
```

Verificando los Resource Records asociados a DNSSEC

```
# dig @localhost nic.br DNSKEY +dnssec +multi
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> @localhost nic.br DNSKEY +dnssec +multi
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24669
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 4096
; COOKIE: 4e1d3c3d95de4fbf010000006165a02423650ab53677792d (good)
;; QUESTION SECTION:
;nic.br.      IN DNSKEY

;; ANSWER SECTION:
nic.br.     86247 IN DNSKEY 257 3 13 (
        sx7bpmRgLGo1UkU4RGsUrC4pHTzZg00brXcuvA2VtxpR
        MzskwyO6jE7U1vSmZ2JM8oALXpBZVTMcGpMxC43Z4g==
        ) ; KSK; alg = ECDSAP256SHA256 ; key id = 47828
nic.br.     86247 IN RRSIG DNSKEY 13 2 86400 (
        20211122020702 20210913012826 47828 nic.br.
        QIkq+BDIrgk80VMBXMFakL7TE2f+dvmO50sONqo/ryOe
        6bwhm3gXQ+HC2kp0SKHuBf5gd+CA7FC382xPq1xH0g== )

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:48:04 -03 2021
;; MSG SIZE  rcvd: 245
```

```
# dig @localhost nic.br DS +multi
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> @localhost nic.br DS +multi
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46272
```

```
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: d64cacc54d19278b010000006165a0710daca9d1ebf2cd42 (good)
;; QUESTION SECTION:
;nic.br.      IN DS

;; ANSWER SECTION:
nic.br.     3370 IN DS 47828 13 2 (
        B9BEC0EAC0F064929C8586DB185537787015EC3A48F0
        894BEA74DEEA452F3060 )

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:49:21 -03 2021
;; MSG SIZE  rcvd: 111
```

Generando una excepcion para DNSSEC

Primero realizamos una consulta por un dominio que tiene una firma inválida (sirve para realizar pruebas):

```
# dig @localhost dnssec-failed.org
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> @localhost dnssec-failed.org
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: SERVFAIL, id: 58931
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 63d65947da7897cb010000006165a11dd39404eb647487aa (good)
;; QUESTION SECTION:
;dnssec-failed.org.   IN  A

;; Query time: 2672 msec
;; SERVER: 127.0.0.1#53(127.0.0.1)
;; WHEN: Tue Oct 12 11:52:13 -03 2021
;; MSG SIZE  rcvd: 74
```

En BIND debemos ingresar la excepción utilizando la herramienta de línea de comando "***rndc nta***"

```
# rndc nta dnssec-failed.org
```

Podemos visualizar una lista de todos los NTA (excepciones) configurados

```
# rndc nta -dump
```

Ahora volvemos a realizar la consulta, luego de ingresar la excepción:

```
# dig @localhost dnssec-failed.org
```

¿Qué sucede?

Configurando Hyperlocal de la Zona Raíz

Agregamos la siguiente configuración al final del archivo /etc/bind/named.conf

```
# nano named.conf.options
```

```
zone "." {
  type mirror;
};
```

Una vez que terminamos de editar el archivo de configuración, ejecutamos un comando que nos permite comprobar rápidamente si la configuración es semánticamente correcta (si el comando no devuelve nada, significa que no encontró errores en los archivos de configuración):

```
# named-checkconf
```

Finalmente reiniciamos el servidor para que tome los cambios de configuración:

```
# systemctl restart bind9
```

Y comprobamos el estado del proceso bind9:

```
# systemctl status bind9
```