Tech Tip
Alteon

Alteon DNS Load Balancing

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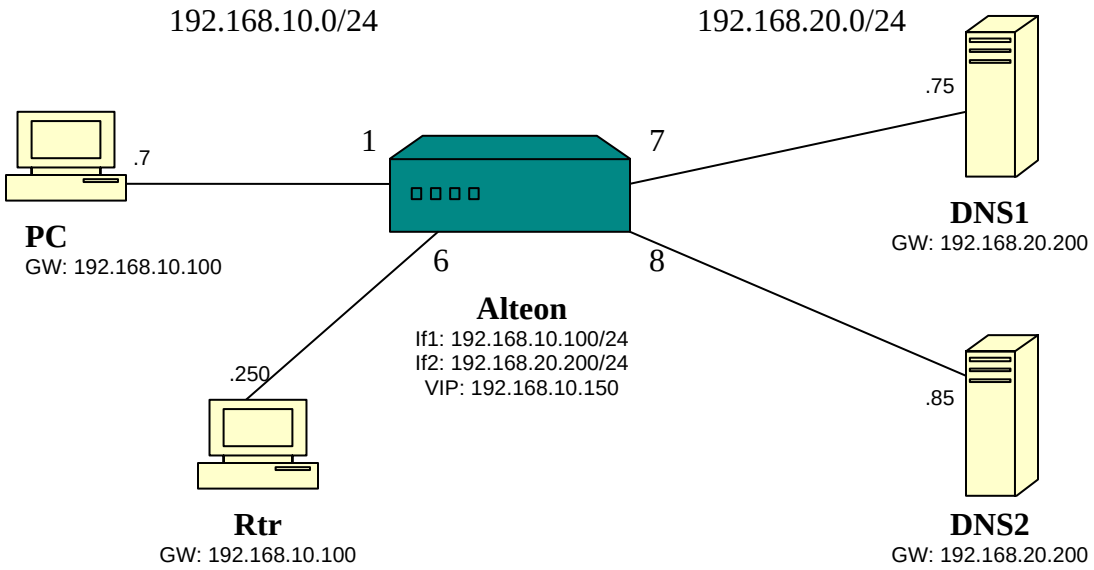
Overview

This document shows a sample DNS load balancing configuration using Alteon WebOS switch. TCP and UDP DNS load balancing scenarios are examined.

Alteon DNS Load Balancing

UDP DNS load balancing

Setup



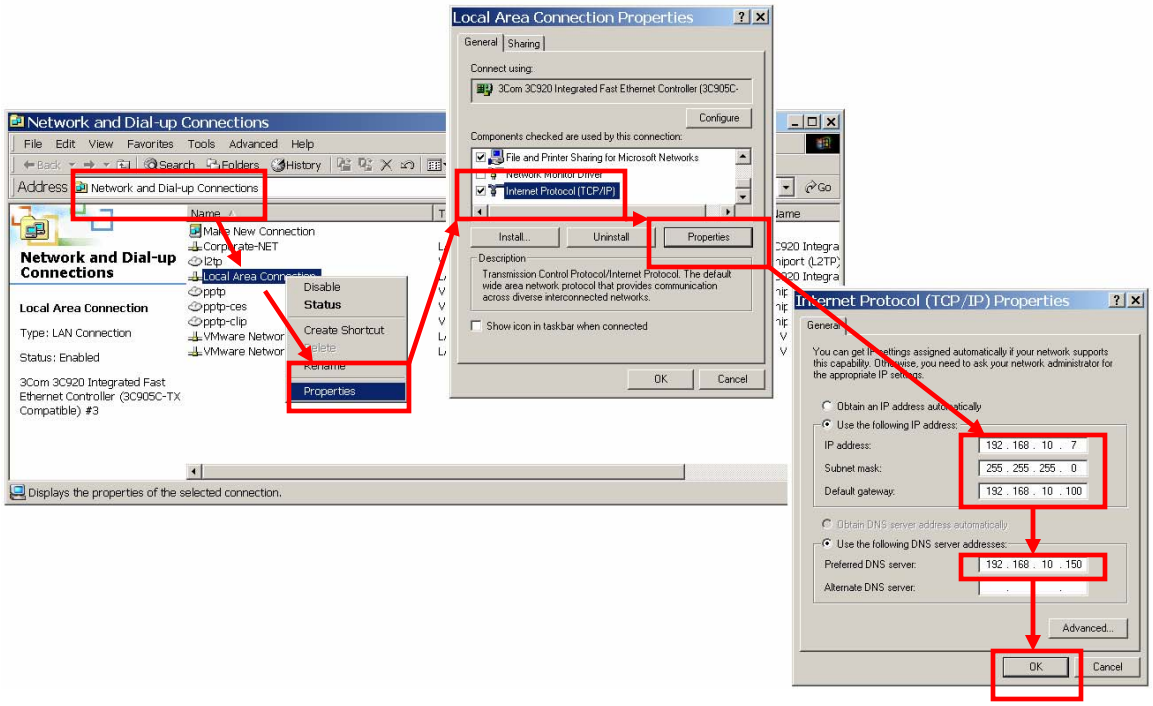
PC - Windows 2000 workstation, IP address 192.168.10.7/24;
Rtr – Nortel Networks 8 port ANH, IP address 192.168.10.250/24;
Alteon – Alteon AD3, code version 10.0.30.7, interface 1 IP 192.168.10.100/24, interface 2 IP 192.168.20.200/24, VIP 192.168.10.150;
DNS1 – RedHat Linux 7.3 with bind-9.2.0 and bindconf-1.6.3 packages installed, IP address 192.168.20.75/24;
DNS2 – RedHat Linux 7.3 with bind-9.2.0 and bindconf-1.6.3 packages installed, IP address 192.168.20.85/24;
HUB – Ethernet HUB.

The goal of the configuration is to setup a UDP DNS load balancing between DNS1 and DNS2 using Alteon WebOS switch.

Alteon DNS Load Balancing

Configuring PC

Configure IP address (192.168.10.7/24) on the PC with a default gateway pointing to Alteon interface 1 (192.168.10.100).
Configure virtual IP (192.168.10.150) as a DNS server for PC:



Verify the settings:

```
C:\>ipconfig/all

Windows 2000 IP Configuration

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        Description . . . . . . . . . . . : 3Com 3C920 Integrated Fast
Ethernet
Controller (3C905C-TX Compatible) #3
        Physical Address. . . . . . . . . : 00-08-74-9A-E5-85
        DHCP Enabled. . . . . . . . . . . : No
        IP Address. . . . . . . . . . . . : 192.168.10.7
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.10.100
        DNS Servers . . . . . . . . . . . : 192.168.10.150
        NetBIOS over Tcpip. . . . . . . . : Disabled
```

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Configuring Rtr

Site Manager or BCC could be used to configure Rtr, BCC is used in this example.

Login to the router. A default Manager user ID was used in this example:

```
Login: Manager
      Welcome to the Backbone Technician Interface
Mounting new volume...
Device label:
Directory: 1:
New Present Working Directory: 1:
[1:1]$
```

Start BCC:

```
[1:1]$ bcc

     Welcome to the Bay Command Console!
     * To enter configuration mode, type config
     * To list all system commands, type ?
     * To exit the BCC, type exit
bcc>
```

Enter the configuration mode:

```
bcc> config
Reading configuration information, please wait . . . done.
box#
```

Configure IP address (192.168.10.250/24) for the Ethernet interface and enable it:

```
box# ethernet 1/1;ip 192.168.10.250/24;state ena
ip/192.168.10.250/255.255.255.0#
```

Configure a static route to direct the traffic to 192.168.20.0 through the Alteon's interface 2 (192.168.10.100):

```
box# ip;static-route 192.168.20.0/255.255.255.0/192.168.10.100;state ena
static-route/192.168.10.0/255.255.255.0/192.168.10.100# box
box#
```

Verify the routing table:

```
box# show ip route
show ip routes                                          Apr 29, 2004
09:15:25 [GMT]

Network/Mask    Proto     Age Slot     Cost  NextHop Address     AS
--------------- ----- ------- ---- --------- ---------------- -----
192.168.10.0/24 Direct  65437    1         0 192.168.10.250
192.168.20.0/24 Static   1663    1         1 192.168.10.100

   Total Networks on Slot 1 = 2
```

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Configure DNS settings on Rtr.

Enter the DNS configuration menu:

```
box# dns
dns#
```

Configure virtual IP (192.168.10.150) as Rtr's DNS server:

```
dns# name-server number 1 address 192.168.10.150
name-server/1# box
box#
```

Configuring DNS1

Root privileges are required to configure DNS1.

```
[user@linux7 user]$ su
Password:
[root@linux7 user]#
```

Configuring network parameters

Configure IP address (192.168.20.75/24) for the DNS1:

```
[root@linux7 user]# /sbin/ifconfig eth0 192.168.20.75 netmask
255.255.255.0
```

Verify interface is configured correctly:

```
[root@linux7 user]# /sbin/ifconfig -a
eth0      Link encap:Ethernet  HWaddr 00:0C:29:4D:F9:8C
          inet addr:192.168.20.75  Bcast:192.168.20.255
Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:192073 errors:0 dropped:0 overruns:0 frame:0
          TX packets:153176 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:11586184 (11.0 Mb)  TX bytes:11552234 (11.0 Mb)
          Interrupt:10 Base address:0x10e0
```

Configure a static route to redirect traffic to 192.168.10.0 network to Alteon's interface 2 (192.168.20.200):

```
[root@linux7 user]# /sbin/route add -net 192.168.10.0/24 gw
192.168.20.200
```

Verify the routing table:

```
[root@linux7 user]# netstat -nr
Kernel IP routing table
Destination  Gateway         Genmask         Flags  MSS Window  irtt Iface
192.168.20.0 0.0.0.0         255.255.255.0   U       40 0          0 eth0
192.168.10.0 192.168.20.200 255.255.255.0   UG      40 0          0 eth0
127.0.0.0    0.0.0.0         255.0.0.0       U       40 0          0 lo
```

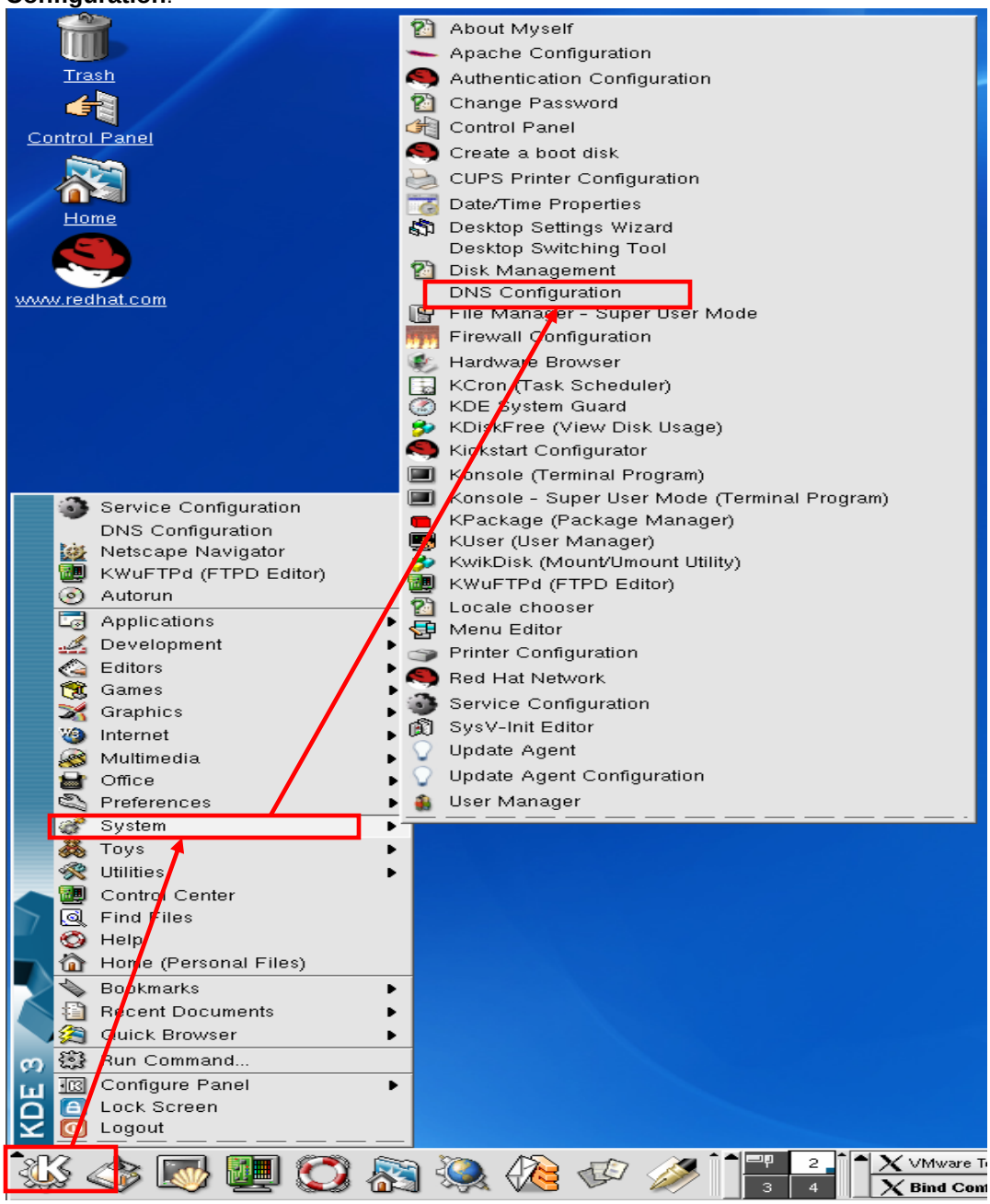
Alteon DNS Load Balancing

Configuring DNS services

Note: This configuration assumes that bind and bindconf packages have been successfully installed on the Linux machine to be used as DNS server.

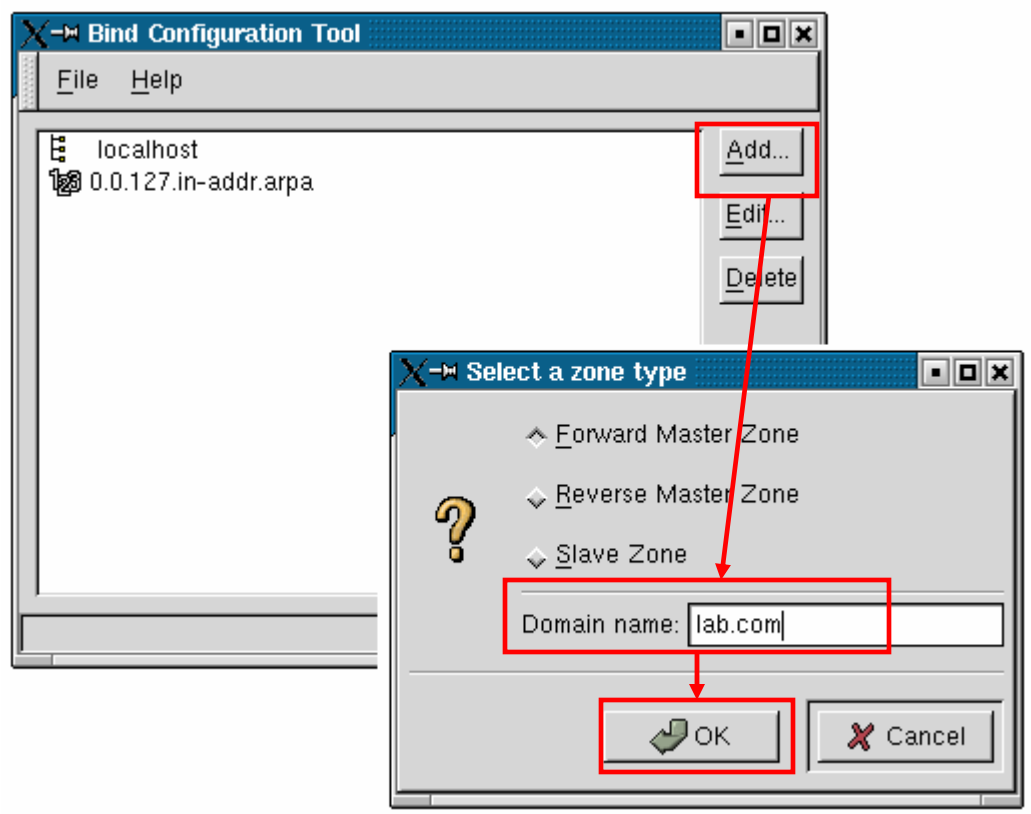
Bind Configuration Tool is used in this example to configure DNS services.

Start Bind Utility Configuration tool by navigating **Start Application (K)→System→DNS Configuration**:



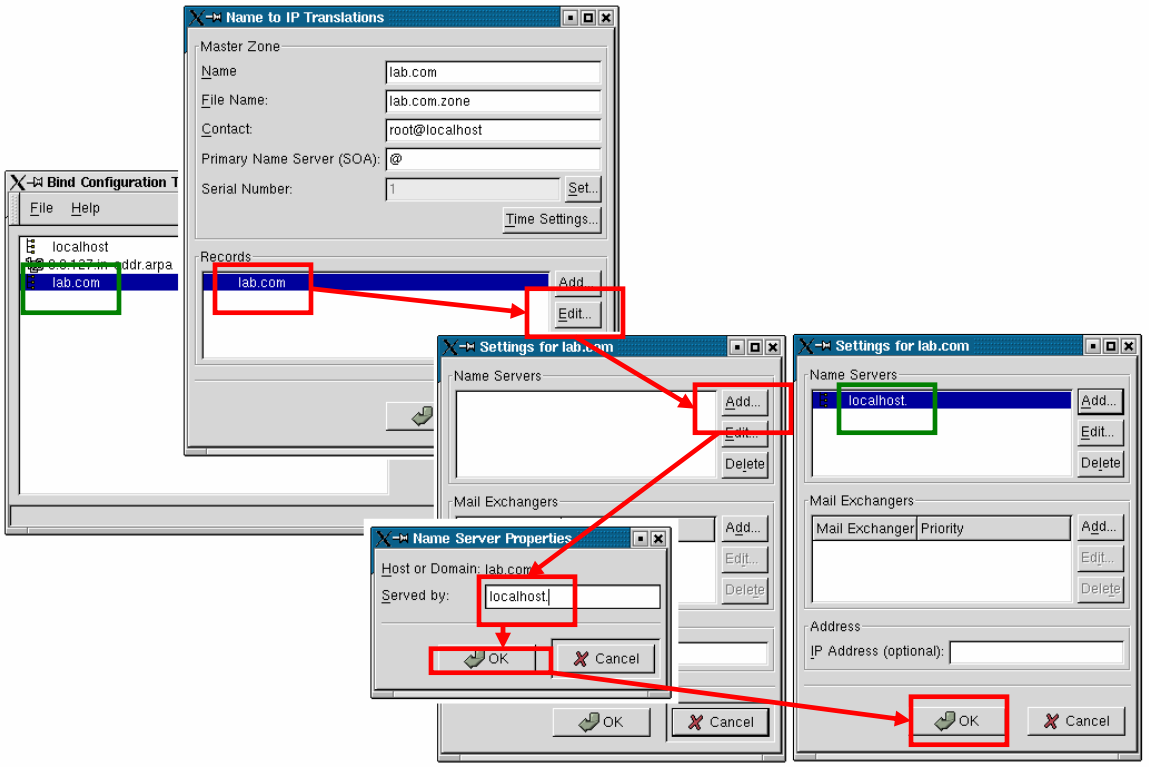
Alteon DNS Load Balancing

The **Bind Configuration Tool** window appears.
Click **Add**.
The **Select a zone type** window appears.
Leave the default zone selection and enter a **Domain name** for the zone (lab.com in this example).
Click **OK**:



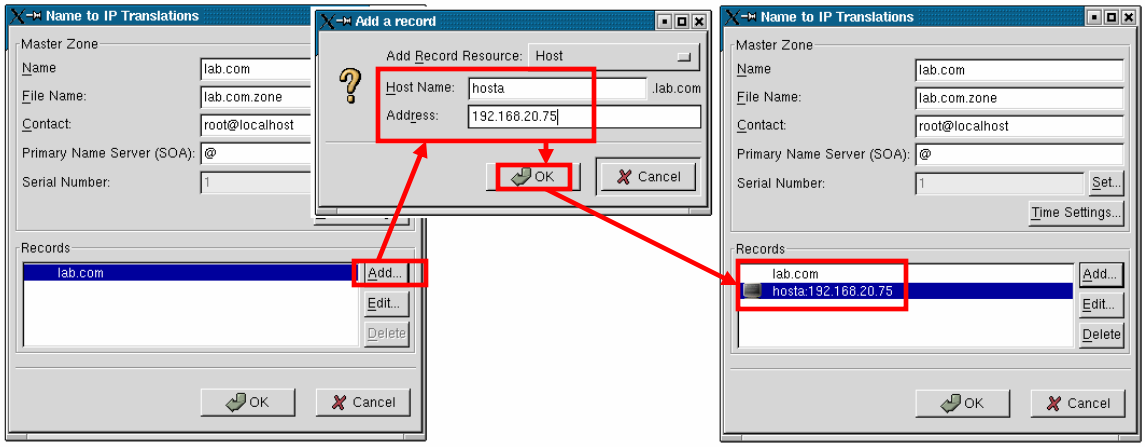
Alteon DNS Load Balancing

The created domain is listed in the **Bind Configuration Tool** and **Name to IP Translations window** appears.
Highlight the created domain and click **Edit**.
The **Settings for lab.com** window appears.
Click **Add** next to the **Name Servers** section.
The **Name Server Properties** window appears.
Enter the name server name for this domain, **localhost.** (with a dot at the end) in this example.
Click **OK**.
The **Settings for lab.com** window reappears with the localhost as a name server.
Click **OK** to return to the **Name to IP Translations** window:

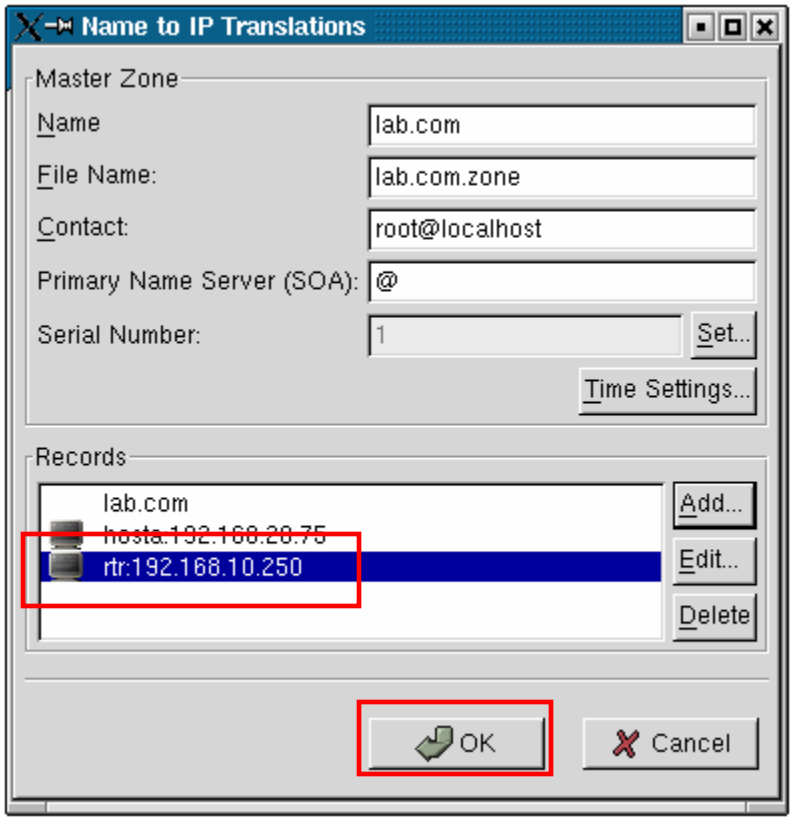


Alteon DNS Load Balancing

Click **Add** on the **Name to IP Translations** window.
The **Add a record** window appears.
Enter a **Host Name** (hosta), the domain name will be added automatically.
Enter an **Address** to be associated with the hostname (192.168.20.75, in this example).
Click **OK**.
The created record will appear under the **Records** section of the **Name to IP Translations** window:

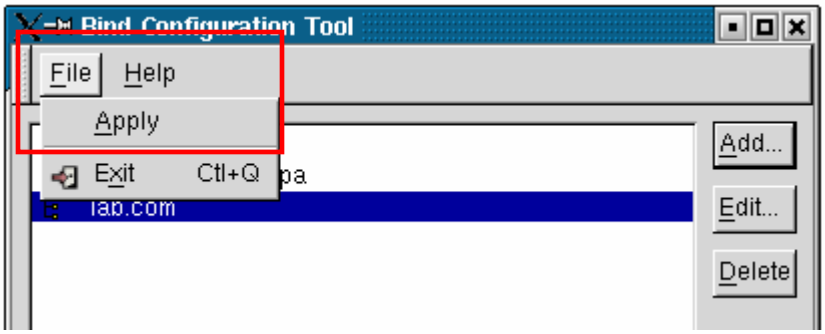


In the same manner add a host record for the Rtr (192.168.10.250).
Click **OK** to close the window:



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Navigate **File→Apply** from the top menu of the **Bind Configuration Tool** window:



Restart the named daemon:

```
[root@linux7 user]# /etc/init.d/named restart
Stopping named:                                            [  OK  ]
Starting named:                                            [  OK  ]
```

Configuring DNS2

Root privileges are required to configure DNS2.

```
[user@linux7 user]$ su
Password:
[root@linux7 user]#
```

Configuring network parameters

Configure IP address (192.168.20.85/24) for the DNS2:

```
[root@linux7 user]# /sbin/ifconfig eth0 192.168.20.85 netmask
255.255.255.0
```

Verify interface is configured correctly:

```
[root@localhost named]# /sbin/ifconfig -a
eth0      Link encap:Ethernet  HWaddr 00:0C:29:7C:F7:00
          inet addr:192.168.20.85  Bcast:192.168.20.255
Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:36345 errors:0 dropped:0 overruns:0 frame:0
          TX packets:33396 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:2217116 (2.1 Mb)  TX bytes:1985670 (1.8 Mb)
          Interrupt:10 Base address:0x1080
```

Configure a static route to redirect traffic to 192.168.10.0 network to Alteon's interface 2 (192.168.20.200):

```
[root@linux7 user]# /sbin/route add -net 192.168.10.0/24 gw
192.168.20.200
```

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Verify the routing table:

```
[root@linux7 user]# netstat -nr
Kernel IP routing table
Destination  Gateway         Genmask         Flags MSS Window  irtt Iface
192.168.20.0 0.0.0.0         255.255.255.0   U      40 0          0 eth0
192.168.10.0 192.168.20.200 255.255.255.0   UG     40 0          0 eth0
127.0.0.0    0.0.0.0         255.0.0.0       U      40 0          0 lo
```

Configuring DNS services

Note: This configuration assumes that bind and bindconf packages has been successfully installed on the Linux machine to be used as DNS server.

DNS services for the DNS2 are configured exactly the same as for the DNS1, please refer to the DNS1 DNS services configuration.

Configuring Alteon

Note, this sample configuration is started from factory default settings.
Login to the switch. The default admin credentials were used in this example.

```
Enter password:
System Information at 11:05:11 Wed Apr 21, 2004
Alteon AD3
sysName:
sysLocation:
. . .
```

Select **n** to not run the setup script:

```
The switch is booted with factory default configuration.
  To ease the configuration of the switch, a "Set Up" facility which
  will prompt you with those configuration items that are essential
  to the operation of the switch is provided.
Would you like to run "Set Up" to configure the switch? [y/n] n
```

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Configuring interfaces

Configure Interface 1.
Enter interface 1 configuration menu:

```
>> Main# /cfg/ip/if 1
------------------------------------------------------------
[IP Interface 1 Menu]
      addr    - Set IP address
      mask    - Set subnet mask
      broad   - Set broadcast address
      vlan    - Set VLAN number
      relay   - Enable/disable BOOTP relay
      ena     - Enable IP interface
      dis     - Disable IP interface
      del     - Delete IP interface
      cur     - Display current interface configuration
```

Set mask (255.255.255.0), address (192.168.10.100) and enable the interface.

Note: If address is specified before the mask, a broadcast address must be entered using **broad** command.

```
>> IP Interface 1# mask 255.255.255.0/addr 192.168.10.100/ena
Current subnet mask:     0.0.0.0
New pending subnet mask: 255.255.255.0
Current IP address:     0.0.0.0
New pending IP address: 192.168.10.100
Pending new broadcast address:  192.168.10.255
Current status: disabled
New status:     enabled
```

Enter interface 2 configuration menu:

```
>> IP Interface 1# /cfg/ip/if 2
------------------------------------------------------------
[IP Interface 2 Menu]
      addr    - Set IP address
      mask    - Set subnet mask
      broad   - Set broadcast address
      vlan    - Set VLAN number
      relay   - Enable/disable BOOTP relay
      ena     - Enable IP interface
      dis     - Disable IP interface
      del     - Delete IP interface
      cur     - Display current interface configuration
```

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Set the mask (255.255.255.0) and address (192.168.20.200) for the interface.
Enable the interface:

```
>> IP Interface 2# mask 255.255.255.0/addr 192.168.20.200/ena
Current subnet mask:     0.0.0.0
New pending subnet mask: 255.255.255.0
Current IP address:     0.0.0.0
New pending IP address: 192.168.20.200
Pending new broadcast address:  192.168.20.255
Current status: disabled
New status:     enabled
```

Disable spanning tree protocol:

```
>> Main# cfg/stp 1/off
Current Spanning Tree 1 setting: ON
New Spanning Tree 1 setting:     OFF
```

Apply and save the changes:

```
>> IP Interface 2# apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
Confirm saving to FLASH [y/n]: y
New config successfully saved to FLASH.
Switch is currently set to use factory default config block on next
boot.
Do you want to change that to the active config block? [y/n] y
Next boot will use active config block.
```

Verify connectivity to DNS servers by pinging DNS1 and DNS2:

```
>> IP Interface 2# ping 192.168.20.75
[host 192.168.20.75, max tries 5, delay 1000 msec]
192.168.20.75: #1 ok, RTT 0 msec.
192.168.20.75: #2 ok, RTT 1 msec.
192.168.20.75: #3 ok, RTT 1 msec.
192.168.20.75: #4 ok, RTT 1 msec.
192.168.20.75: #5 ok, RTT 1 msec.
Ping finished.

>> IP Interface 2# ping 192.168.20.85
[host 192.168.20.85, max tries 5, delay 1000 msec]
192.168.20.85: #1 ok, RTT 1 msec.
192.168.20.85: #2 ok, RTT 1 msec.
192.168.20.85: #3 ok, RTT 1 msec.
192.168.20.85: #4 ok, RTT 1 msec.
192.168.20.85: #5 ok, RTT 1 msec.
Ping finished.
```

Verify connectivity to Rtr and the PC using ping:

```
>> IP Interface 2# ping 192.168.10.250
[host 192.168.10.250, max tries 5, delay 1000 msec]
192.168.10.250: #1 ok, RTT 1 msec.
```

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```
192.168.10.250: #2 ok, RTT 0 msec.
192.168.10.250: #3 ok, RTT 1 msec.
192.168.10.250: #4 ok, RTT 1 msec.
192.168.10.250: #5 ok, RTT 1 msec.
Ping finished.

>> IP Interface 2# ping 192.168.10.7
[host 192.168.10.7, max tries 5, delay 1000 msec]
192.168.10.7: #1 ok, RTT 2 msec.
192.168.10.7: #2 ok, RTT 1 msec.
192.168.10.7: #3 ok, RTT 1 msec.
192.168.10.7: #4 ok, RTT 1 msec.
192.168.10.7: #5 ok, RTT 1 msec.
Ping finished.
```

Configuring real servers

Configure real servers on Alteon.
Enter real server configuration menu for the real server 1:

```
>> Main# /cfg/slb/real 1
------------------------------------------------------------
[Real server 1  Menu]
      layer7  - Layer 7 Command Menu
      rip     - Set IP addr of real server
      name    - Set server name
      weight  - Set server weight
      maxcon  - Set maximum number of connections
      tmout   - Set minutes inactive connection remains open
      backup  - Set backup real server
      inter   - Set interval between health checks
      retry   - Set number of failed attempts to declare server DOWN
      restr   - Set number of successful attempts to declare server UP
      addport - Add real port to server
      remport - Remove real port from server
      remote  - Enable/disable remote site operation
      proxy   - Enable/disable client proxy operation
      submac  - Enable/disable source MAC address substitution
      ena     - Enable real server
      dis     - Disable real server
      del     - Delete real server
      cur     - Display current real server configuration
```

Set real IP (192.168.20.75) for the real DNS server DNS1:

```
>> Real server 1 # rip 192.168.20.75
Current real server IP address:     0.0.0.0
New pending real server IP address: 192.168.20.75
```

Enable real server 1:

```
>> Real server 1 # ena
Current status: disabled
New status:     enabled
```

Alteon DNS Load Balancing

Enter configuration menu for the real server 2:

```
>> Real server 1 # ../real 2
------------------------------------------------------------
[Real server 2  Menu]
      layer7  - Layer 7 Command Menu
      rip     - Set IP addr of real server
      name    - Set server name
      weight  - Set server weight
      maxcon  - Set maximum number of connections
      tmout   - Set minutes inactive connection remains open
      backup  - Set backup real server
      inter   - Set interval between health checks
      retry   - Set number of failed attempts to declare server DOWN
      restr   - Set number of successful attempts to declare server UP
      addport - Add real port to server
      remport - Remove real port from server
      remote  - Enable/disable remote site operation
      proxy   - Enable/disable client proxy operation
      submac  - Enable/disable source MAC address substitution
      ena     - Enable real server
      dis     - Disable real server
      del     - Delete real server
      cur     - Display current real server configuration
```

Set the real IP address (192.168.20.85) for the real server DNS2:

```
>> Real server 2 # rip 192.168.20.85
Current real server IP address:     0.0.0.0
New pending real server IP address: 192.168.20.85
```

Enable the real server:

```
>> Real server 2 # ena
Current status: disabled
New status:     enabled
```

Apply and save the changes:

```
>> Real server 2 # apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
Confirm saving to FLASH [y/n]: y
New config successfully saved to FLASH.
```

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Creating a real servers group

Add real servers to a group.

Create a group 1 on the Alteon and enter group configuration mode:

```
>> Main # /cfg/slb/group 1
------------------------------------------------------------
[Real server group 1 Menu]
      metric  - Set metric used to select next server in group
      content - Set health check content
      health  - Set health check type
      backup  - Set backup real server or group
      name    - Set real server group name
      realthr - Set real server failure threshold
      viphlth - Enable/disable VIP health checking in DSR mode
      add     - Add real server
      rem     - Remove real server
      del     - Delete real server group
      cur     - Display current group configuration
```

Add real server 1 to a group:

```
>> Real server group 1# add 1
Real server 1 added to real server group 1
```

Add real server 2 to a group:

```
>> Real server group 1# add 2
Real server 2 added to real server group 1.
```

Set the round robin metric for the group. **Note**: Setting metric to round robin forces Alteon to distribute connections to the real servers in turn, first connection to the first server, second to the second, third to the third, etc. In this sample configuration only two real servers are used, so the third connection would be issued to the first server again, and so forth. For more information on selecting a metric, please consult the *Server Load Balancing* chapter of the *Application Guide*.

```
>> Real server group 1# metric round
Current metric:         leastconns
New pending metric:     roundrobin
```

Set the health check type to `udpdns`, this will send health checks to DNS UDP port, insuring UDP port is operational and accepts connections from a client.

```
>> Real server group 1# health udpdns
Current health check type:      tcp
New pending health check type:  udpdns
```

Apply and save the changes:

```
>> Real server group 1# apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
```

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```
Confirm saving to FLASH [y/n]: y
New config successfully saved to FLASH.
```

Configuring virtual IP

Configure the virtual IP for the clients to send requests for the service to.
Enter virtual interface 1 configuration mode:

```
>> Real server group 1# /cfg/slb/virt 1
------------------------------------------------------------
[Virtual Server 1 Menu]
      service - Virtual Service Menu
      vip     - Set IP addr of virtual server
      dname   - Set domain name of virtual server
      layr3   - Enable/disable layer 3 only balancing
      ena     - Enable virtual server
      dis     - Disable virtual server
      del     - Delete virtual server
      cur     - Display current virtual configuration
```

Set the virtual IP address (192.168.10.150) for the virtual interface:

```
>> Virtual Server 1# vip 192.168.10.150
Current virtual server IP address:     0.0.0.0
New pending virtual server IP address: 192.168.10.150
```

Enable the virtual interface:

```
>> Virtual Server 1# ena
Current status: disabled
New status:     enabled
```

Assign a protocol (DNS in this example) to the created virtual interface to listen for requests on:

```
>> Virtual Server 1# service dns
------------------------------------------------------------
[Virtual Server 1 dns Service Menu]
      group   - Set real server group number
      rport   - Set real port
      hname   - Set hostname
      httpslb - Set HTTP SLB processing
      pbind   - Set persistent binding type
      rcount  - Set multi response count
      dbind   - Enable/disable delayed binding
      udp     - Enable/disable UDP balancing
      frag    - Enable/disable remapping UDP server fragments
      nonat   - Enable/disable only substituting MAC addresses
      dnsslb  - Enable/disable DNS query load balancing
      ftpp    - Enable/disable FTP SLB parsing for virtual server
      del     - Delete virtual service
      cur     - Display current virtual service configuration
```

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Set the real server group (group 1) to be associated with the service on virtual interface:

```
>> Virtual Server 1 http Service# group 1
Current real server group:     1
New pending real server group: 1
```

Enable UDP balancing:

```
>> Virtual Server 1 dns Service# udp enabled
Current udp balancing for vport dns: disabled
New udp balancing for vport dns:     enabled
```

Disable delayed binding as it is not required since UDP does not use a 3-way handshake for session establishment. Delayed binding is disabled by default:

```
>> Virtual Server 1 dns Service# dbind d
Current delayed binding: disabled
New delayed binding:     disabled
```

Apply and save the changes:

```
>> Virtual Server 1 http Service# apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
Confirm saving to FLASH [y/n]: y
New config successfully saved to FLASH.
```

Enabling Client/Server processing

Enable Client port processing.
Enter the SLB port 1 configuration menu:

```
>> Main # /cfg/slb/port 1
------------------------------------------------------------
[SLB port 1 Menu]
      client  - Enable/disable client processing
      server  - Enable/disable server processing
      rts     - Enable/disable RTS processing
      hotstan - Enable/disable hot-standby processing
      intersw - Enable/disable inter-switch processing
      proxy   - Enable/disable use of PIP for ingress traffic
      pip     - Set Proxy IP address for port
      filt    - Enable/disable filtering
      add     - Add filter to port
      rem     - Remove filter from port
      idslb   - Enable/disable intrusion detection server load balancing
      cur     - Display current port configuration
```

Alteon DNS Load Balancing

Enable Client processing on port:

```
>> SLB port 1# client e
Current client processing: disabled
New client processing:     enabled
```

Enter SLB port 6 configuration menu :

```
SLB port 1#/cfg/slb/port 6
------------------------------------------------------------
[SLB port 1 Menu]
      client  - Enable/disable client processing
      server  - Enable/disable server processing
      rts     - Enable/disable RTS processing
      hotstan - Enable/disable hot-standby processing
      intersw - Enable/disable inter-switch processing
      proxy   - Enable/disable use of PIP for ingress traffic
      pip     - Set Proxy IP address for port
      filt    - Enable/disable filtering
      add     - Add filter to port
      rem     - Remove filter from port
      idslb   - Enable/disable intrusion detection server load balancing
      cur     - Display current port configuration
```

Enable Client processing on port 6:

```
>> SLB port 6# client e
Current client processing: disabled
New client processing:     enabled
```

Enter SLB port 7 configuration menu:

```
>> SLB port 1# /cfg/slb/port 7
------------------------------------------------------------
[SLB port 7 Menu]
      client  - Enable/disable client processing
      server  - Enable/disable server processing
      rts     - Enable/disable RTS processing
      hotstan - Enable/disable hot-standby processing
      intersw - Enable/disable inter-switch processing
      proxy   - Enable/disable use of PIP for ingress traffic
      pip     - Set Proxy IP address for port
      filt    - Enable/disable filtering
      add     - Add filter to port
      rem     - Remove filter from port
      idslb   - Enable/disable intrusion detection server load balancing
      cur     - Display current port configuration
```

Enable Server processing on the port:

```
>> SLB port 7# server e
Current server processing: disabled
New server processing:     enabled
```

Alteon DNS Load Balancing

Enter port 8 configuration menu:

```
>> SLB port 7# /cfg/slb/port 8
------------------------------------------------------------
[SLB port 8 Menu]
      client  - Enable/disable client processing
      server  - Enable/disable server processing
      rts     - Enable/disable RTS processing
      hotstan - Enable/disable hot-standby processing
      intersw - Enable/disable inter-switch processing
      proxy   - Enable/disable use of PIP for ingress traffic
      pip     - Set Proxy IP address for port
      filt    - Enable/disable filtering
      add     - Add filter to port
      rem     - Remove filter from port
      idslb   - Enable/disable intrusion detection server load balancing
      cur     - Display current port configuration
```

Enable Server processing on the port:

```
>> SLB port 8# server e
Current server processing: disabled
New server processing:     enabled
```

Enabling Server Load Balancing globally

Enable server load balancing (SLB) globally:

```
>> Spanning Tree Group 1# /cfg/slb/on
Current status: OFF
New status:     ON
```

Apply and save the changes:

```
>> Layer 4# apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
Confirm saving to FLASH [y/n]:y
New config successfully saved to FLASH.
```

Testing the configuration

Check the current SLB configuration:

```
>> Layer 4# /cfg/slb/cur
Current Layer 4 settings:
  ON, direct disabled, matrix enabled, grace disabled, submac disabled
  fastage 0, slowage 0, tpcp disabled, aphttp disabled, minter 10
  imask 255.255.255.255, pmask 255.255.255.255
  mnet 0.0.0.0, mmask 255.255.255.255, idslb g1
  pgarp disabled, dsfail disabled

Current health scripts settings:
SYN attack detection check interval: 2 seconds
```

Alteon DNS Load Balancing

```
SYN attack detection alarm threshold: 1000 new half-open sessions/second

LDAP version 2

Current real servers settings:
  1: 192.168.20.75, enabled, name , weight 1, timeout 10 mins, maxcon
200000
    backup none, inter 2, retry 4, restr 8
    remote disabled, proxy enabled, submac disabled
    cookie assignment server: disabled
    exclusionary string matching: disabled
    real ports:
      dns: vport dns, group 1, UDP
          virtual server:  1, 192.168.10.150,  enabled
  2: 192.168.20.85, enabled, name , weight 1, timeout 10 mins, maxcon
200000
    backup none, inter 2, retry 4, restr 8
    remote disabled, proxy enabled, submac disabled
    cookie assignment server: disabled
    exclusionary string matching: disabled
    real ports:
      dns: vport dns, group 1, UDP
          virtual server:  1, 192.168.10.150,  enabled

Current virtual servers settings:
  1: 192.168.10.150, enabled
    virtual ports:
      dns: rport dns, group 1, UDP, frags
          real servers:
             1: 192.168.20.75,   weight 1,  enabled, backup none
             2: 192.168.20.85,   weight 1,  enabled, backup none

Current filters:

Current port settings:
  1: client enabled, server  disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  2: client disabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  3: client disabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  4: client disabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  5: client disabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  6: client enabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  7: client  disabled, server enabled, rts disabled
```

Alteon DNS Load Balancing

```
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  8: client  disabled, server enabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty
  9: client disabled, server disabled, rts disabled
     hotstan disabled, intersw disabled, idslb disabled
     proxy disabled, 0.0.0.0
     filt disabled, filters: empty

Current Global SLB settings:
  OFF, dns enabled, ttl 60, local disabled, one disabled, alway disabled
  http enabled, usern disabled, mincon 1024, inter 1, weight 1, geo
enabled
  norem disabled, encrypt enabled

Current remote site settings:

Current Lookup settings:
  lookups disabled, host lookups disabled, dname none

Current internet network preference settings:

Current sync settings:
  filt enabled, ports enabled, prios enabled, pips disabled
  state disabled, update 30

Current peer switch settings:
```

Check the SLB status:

```
>> Layer 4# /info/slb/dump
Real server state:
  1: 192.168.20.75, 00:0c:29:4d:f9:8c, vlan 1, port 7, health 4, up
  2: 192.168.20.85, 00:0c:29:7c:f7:00, vlan 1, port 8, health 4, up

Virtual server state:
  1: 192.168.10.150,  00:60:cf:46:53:6e
    virtual ports:
    dns: rport dns, group 1, backup none, UDP
        real servers:
          1: 192.168.20.75, backup none, 0 ms, up
          2: 192.168.20.85, backup none, 30 ms, up

Redirect filter state:

Port state:
  1: 0.0.0.0, client
  2: 0.0.0.0
  3: 0.0.0.0
  4: 0.0.0.0
  5: 0.0.0.0
  6: 0.0.0.0, client
  7: 0.0.0.0, server
  8: 0.0.0.0, server
  9: 0.0.0.0
```

Alteon DNS Load Balancing

Check connectivity from PC to virtual IP:

```
C:\>ping 192.168.10.150
Pinging 192.168.10.150 with 32 bytes of data:
Reply from 192.168.10.150: bytes=32 time<10ms TTL=255
Reply from 192.168.10.150: bytes=32 time<10ms TTL=255
Reply from 192.168.10.150: bytes=32 time<10ms TTL=255
Reply from 192.168.10.150: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.10.150:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

Ping hosta.lab.com from PC:

```
C:\>ping hosta.lab.com

Pinging hosta.lab.com [192.168.20.75] with 32 bytes of data:

Reply from 192.168.20.75: bytes=32 time<10ms TTL=254
Reply from 192.168.20.75: bytes=32 time<10ms TTL=254
Reply from 192.168.20.75: bytes=32 time<10ms TTL=254
Reply from 192.168.20.75: bytes=32 time<10ms TTL=254

Ping statistics for 192.168.20.75:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

Note, hosta.lab.com has been resolved to 192.168.20.75 and PC was able to ping it.

Check sessions on Alteon:

```
>> Session Table Information# /i/slb/sess/dump
 6,3:  192.168.10.7 0 -> 192.168.20.75 53  age 10  E
```

DNS request from 192.168.10.7 has been forwarded to the DNS1 (192.168.20.75).

Ping rtr.lab.com from PC:

```
C:\>ping rtr.lab.com

Pinging rtr.lab.com [192.168.10.250] with 32 bytes of data:

Reply from 192.168.10.250: bytes=32 time=50ms TTL=30
Reply from 192.168.10.250: bytes=32 time<10ms TTL=30
Reply from 192.168.10.250: bytes=32 time<10ms TTL=30
Reply from 192.168.10.250: bytes=32 time<10ms TTL=30

Ping statistics for 192.168.10.250:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  50ms, Average =  12ms
```

Note, rtr.lab.com has been resolved to 192.168.10.250 and PC was able to ping it.

Alteon DNS Load Balancing

Ping hosta.lab.com from the Rtr:

```
box# ping hosta.lab.com
IP ping: 192.168.20.75 is alive (size = 16 bytes)
```

Check the sessions on Alteon:

```
>> Session Table Information# /i/slb/sess/dump
 1,3:  192.168.10.250 0 -> 192.168.20.85 53  age 2  E
 6,3:  192.168.10.7 0 -> 192.168.20.75 53  age 10  E
```

Request from Rtr has been redirected by Alteon to DNS2 (192.168.20.85).

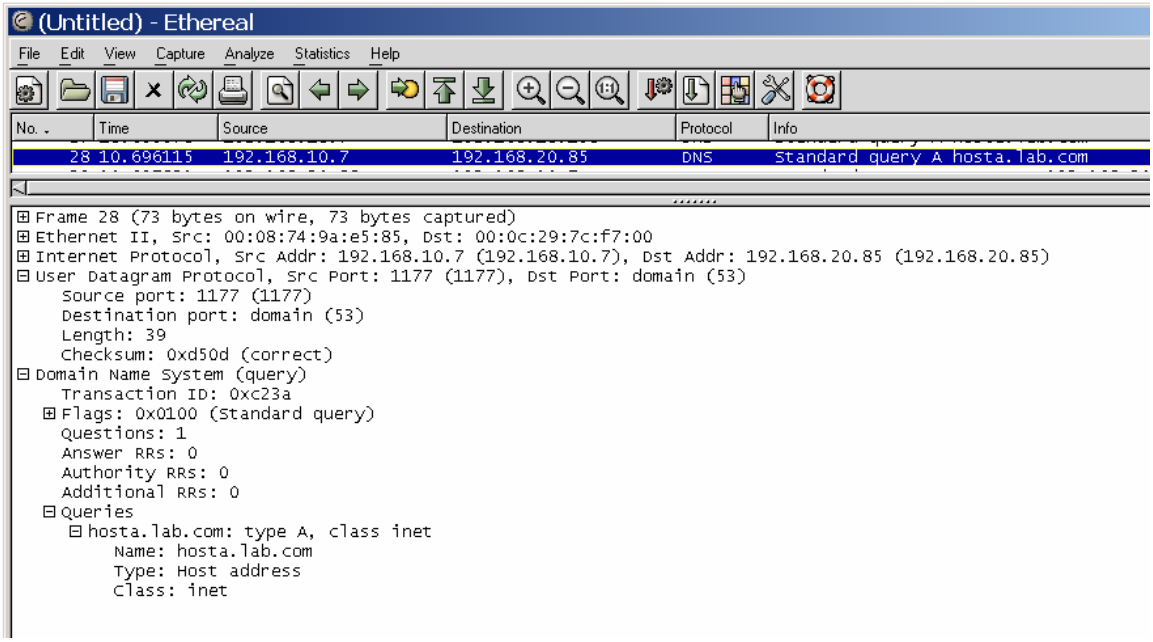
To clear sessions information:

```
>> Session Table Information# /oper/slb/clear
Session table cleared.
```

Sample sniffer traces

Below are sample sniffer traces based on the configuration illustrated in the example above.

PC pings hosta.lab.com.
PC (192.168.10.7) sends a DNS query to the DNS server at 192.168.10.150 UDP port 53:

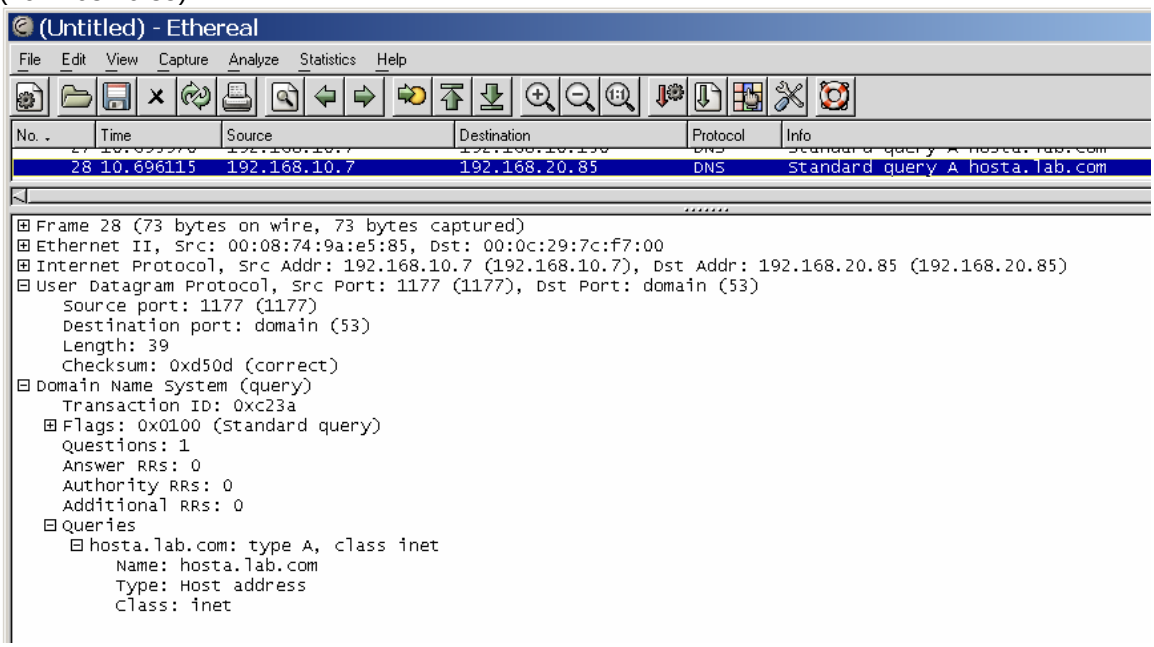


Alteon DNS Load Balancing

Alteon receives DNS query on its port and checks whether port has been enabled for client processing. With client processing being enabled, Alteon checks whether real servers are available. With real servers being available, Alteon selects a real server to forward the request to based on the configured metric algorithm:

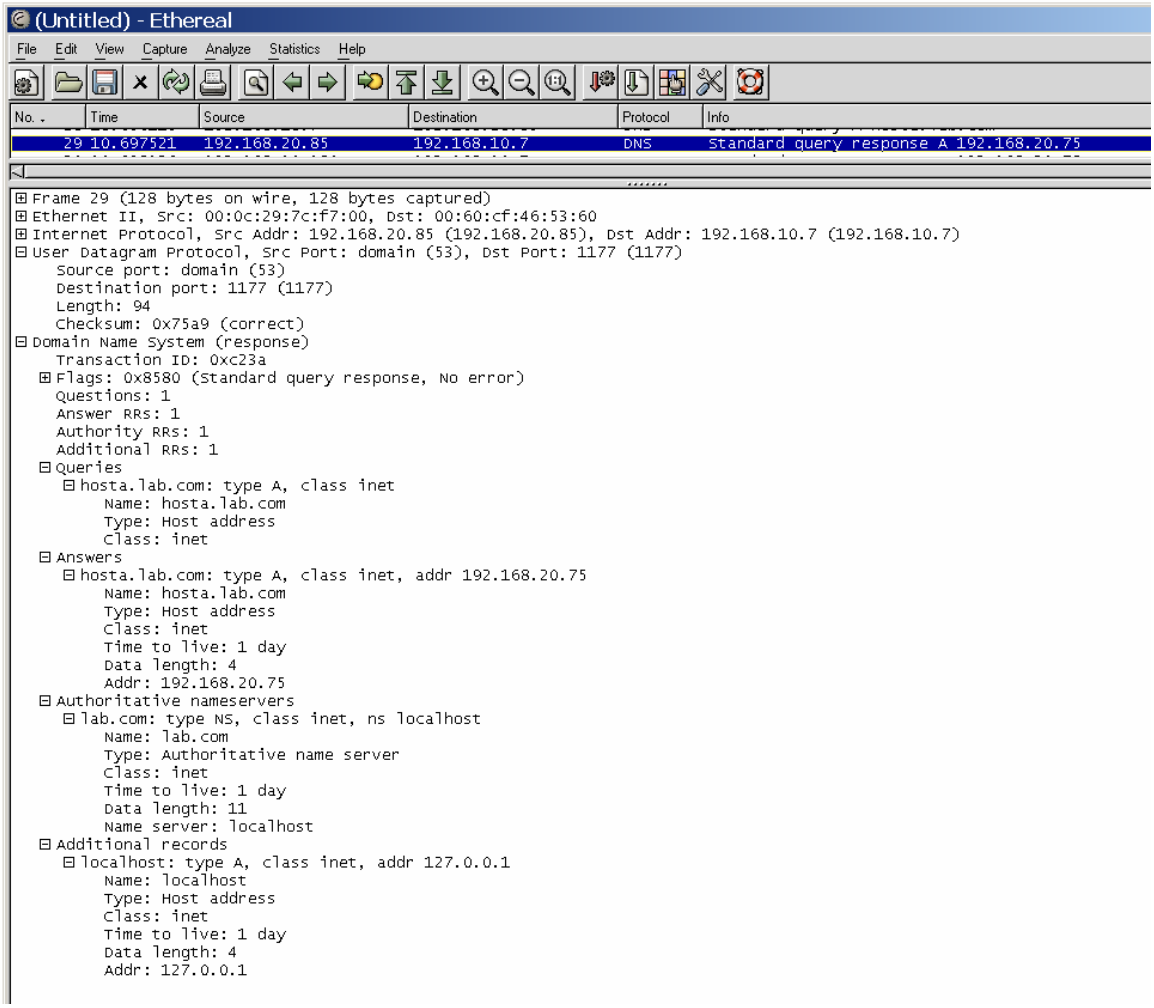
```
6,4:  192.168.10.7 0 -> 192.168.20.85 53  age 10  E
```

Once a real server has been selected, Alteon forwards DNS request to the real server (192.168.20.85):



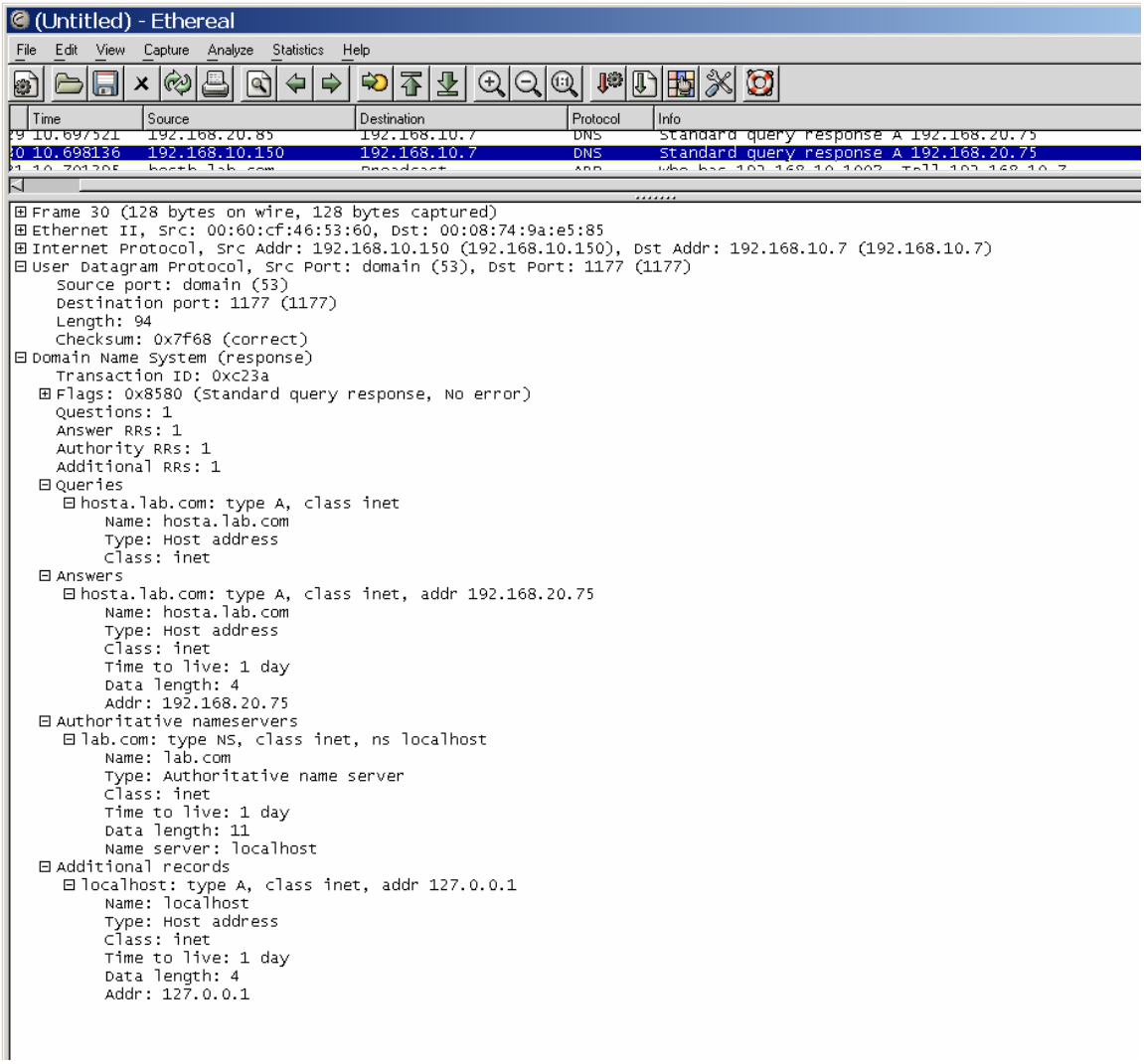
Alteon DNS Load Balancing

DNS server receives DNS query, looks up its database and replies to the PC with DNS name to IP mapping:

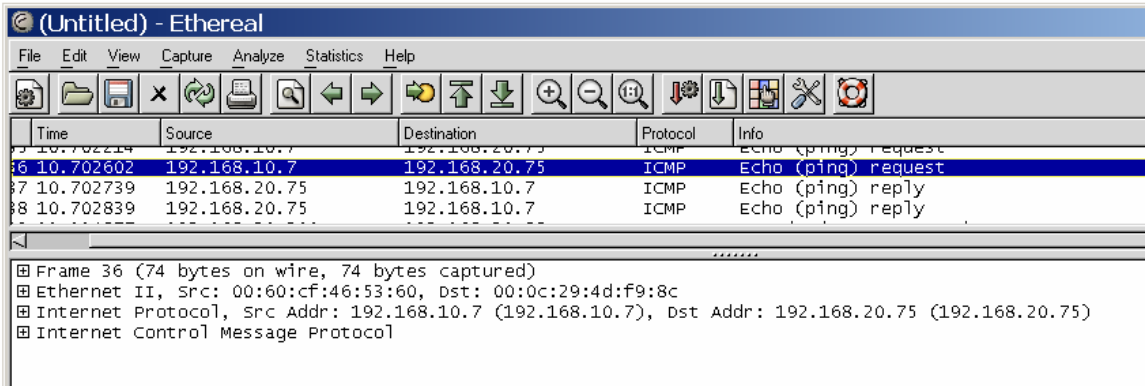


Alteon DNS Load Balancing

Alteon forwards response to PC:



PC uses the received information to ping hosta.lab.com:



Alteon DNS Load Balancing

TCP DNS load balancing

The setup from UDP DNS load balancing example is used.

The goal of configuration is to configure TCP DNS load balancing between DNS1 and DNS2.

Configuring PC, Rtr, DNS1, DNS2

Configuration of PC, Rtr, DNS1 and DNS2 is done exactly as in the example with UDP DNS load balancing.

Configuring Alteon.

Configuration of the Alteon is based on the configuration of Alteon in the UDP DNS load balancing example. Only differences are noted.

Enter group configuration menu and change health check to **dns**:

```
>> Main# /c/slb/group 1
------------------------------------------------------------
[Real server group 1 Menu]
      metric  - Set metric used to select next server in group
      content - Set health check content
      health  - Set health check type
      backup  - Set backup real server or group
      name    - Set real server group name
      realthr - Set real server failure threshold
      viphlth - Enable/disable VIP health checking in DSR mode
      add     - Add real server
      rem     - Remove real server
      del     - Delete real server group
      cur     - Display current group configuration

>> Real server group 1# health dns
Current health check type:      udpdns
New pending health check type:  dns
```

Enter DNS service configuration menu for virtual IP 1 (192.168.10.150):

```
>> Real server group 1# /cfg/slb/virt 1/service dns
------------------------------------------------------------
[Virtual Server 1 dns Service Menu]
      group   - Set real server group number
      rport   - Set real port
      hname   - Set hostname
      httpslb - Set HTTP SLB processing
      pbind   - Set persistent binding type
      rcount  - Set multi response count
      dbind   - Enable/disable delayed binding
      udp     - Enable/disable UDP balancing
      frag    - Enable/disable remapping UDP server fragments
      nonat   - Enable/disable only substituting MAC addresses
      dnsslb  - Enable/disable DNS query load balancing
      ftpp    - Enable/disable FTP SLB parsing for virtual server
```

Alteon DNS Load Balancing

```
      del     - Delete virtual service
      cur     - Display current virtual service configuration

>> Virtual Server 1 dns Service#
```

Enable delayed binding:

```
>> Virtual Server 1 dns Service# dbind e
Current delayed binding: disabled
New delayed binding:     enabled
```

Disable UDP balancing:

```
>> Virtual Server 1 dns Service# udp d
Current udp balancing for vport dns: enabled
New udp balancing for vport dns:     disabled
```

Enable direct access mode (DAM):

```
>> Virtual Server 1 dns Service# /cfg/slb/adv/direct e
Current Direct Access Mode: disabled
New Direct Access Mode:     enabled
```

Apply and save the changes:

```
>> Layer 4 Advanced# apply/save
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
Request will first copy the FLASH "active" config to "backup",
 then overlay FLASH "active" with new config.
Confirm saving to FLASH [y/n]:y
New config successfully saved to FLASH.
```

Testing the configuration

Check SLB status:

```
>> Configuration# /info/slb/dump
Real server state:
  1: 192.168.20.75, 00:0c:29:4d:f9:8c, vlan 1, port 7, health 4, up
  2: 192.168.20.85, 00:0c:29:7c:f7:00, vlan 1, port 8, health 4, up

Virtual server state:
  1: 192.168.10.150,  00:60:cf:46:53:6e
    virtual ports:
    dns: rport dns, group 1, backup none, dbind
        real servers:
          1: 192.168.20.75, backup none, 4 ms, up
          2: 192.168.20.85, backup none, 1 ms, up

Redirect filter state:

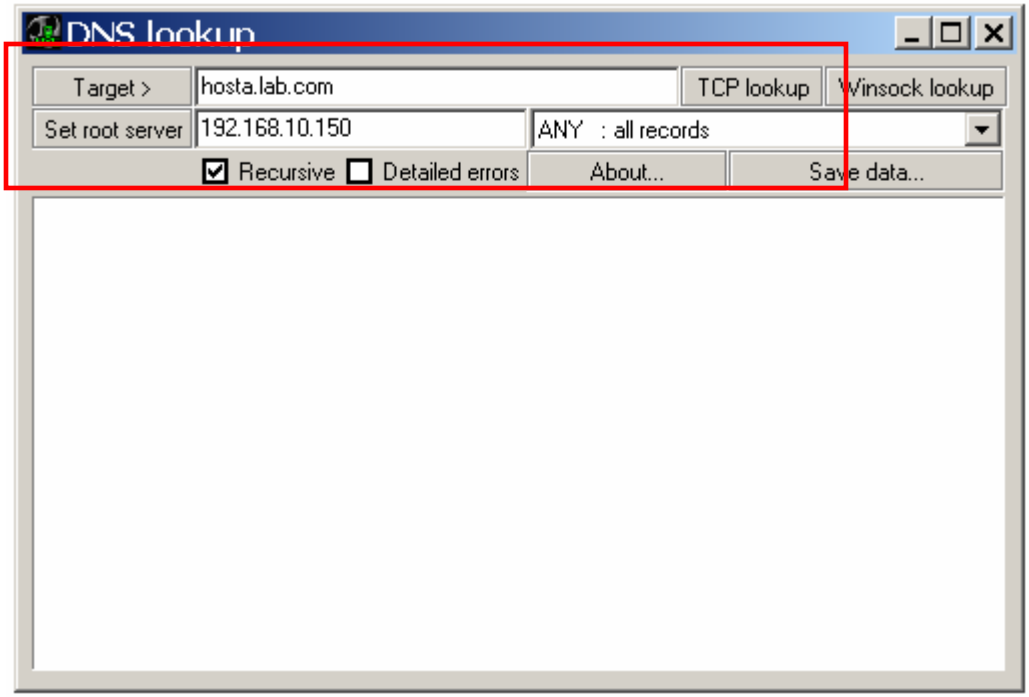
Port state:
  1: 0.0.0.0, client
  2: 0.0.0.0
  3: 0.0.0.0
```

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```
4: 0.0.0.0
5: 0.0.0.0
6: 0.0.0.0, client
7: 0.0.0.0, server
8: 0.0.0.0, server
9: 0.0.0.0
```

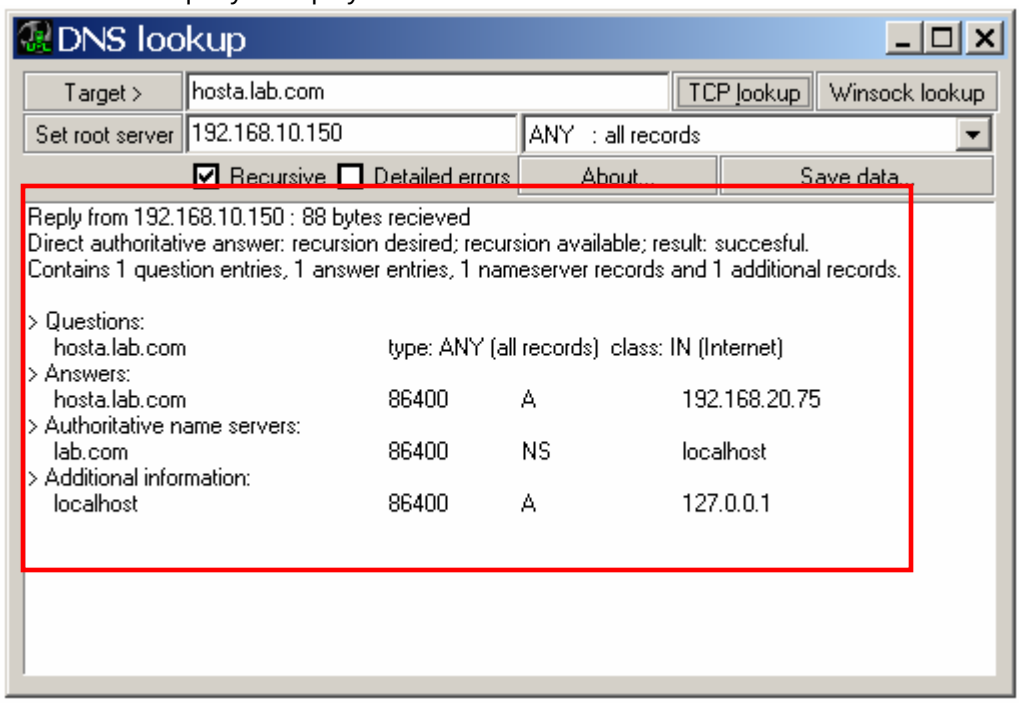
Necrosoft DIG version 0.4 (available from http://www.nscan.org/?index=dns) tool is used to run TCP DNS query from PC in this example.

Launch **DIG DNS lookup** tool.
Enter hosta.lab.com in the **Target>** field.
Set 192.168.10.150 as a **root server**.
Click **TCP lookup**:



Alteon DNS Load Balancing

The result of a query is displayed:



Note, PC sent a TCP query to the DNS server at 192.168.10.150 and received a response with IP information about hosta.lab.com.

Check sessions on Alteon:

```
>> Session Table Information# /info/slb/sess/dump
 6,20:  192.168.10.7 1483, 192.168.10.150 53 -> 4116 192.168.20.75 53
age 10
```

Session has been forwarded to the DNS1 (192.168.20.75).

Click TCP lookup again to send another request and check sessions:

```
>> Session Table Information# /info/slb/sess/dump
 6,22:  192.168.10.7 1484, 192.168.10.150 53 -> 4118 192.168.20.85 53
age 10
```

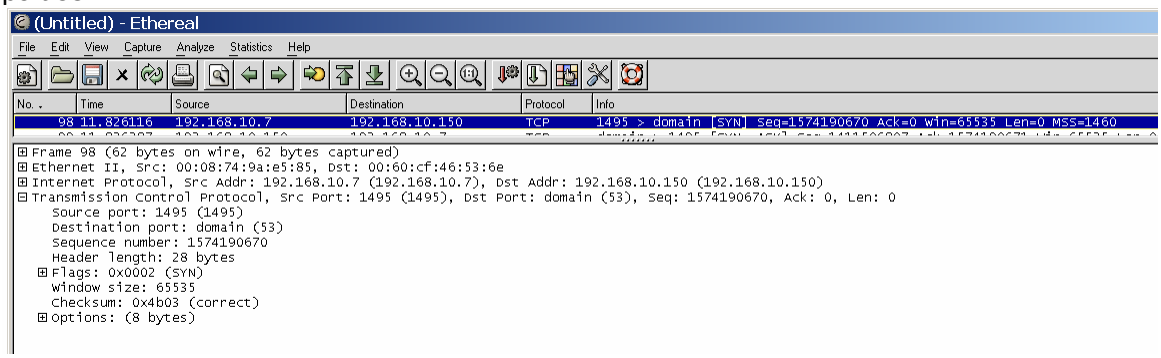
Session has been forwarded to DNS2 (192.168.20.85).

Alteon DNS Load Balancing

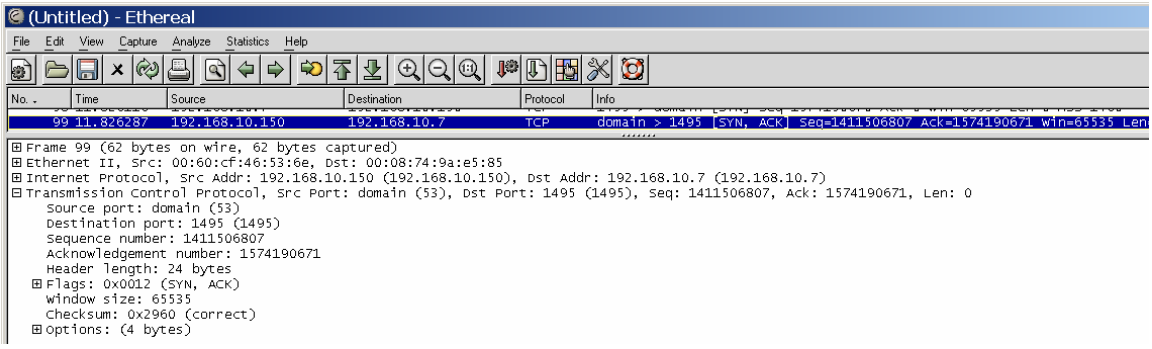
Sample sniffer traces

Below are sample sniffer traces taken during testing TCP DNS load balancing in the example above.

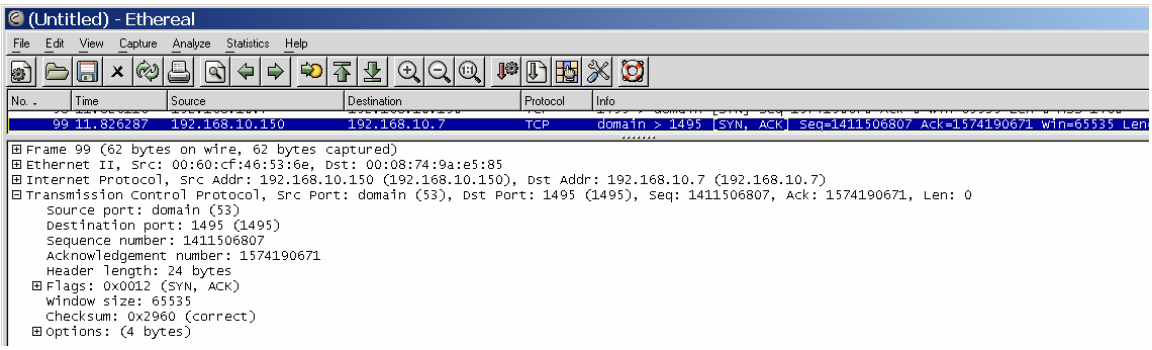
PC issues a DNS TCP lookup.
PC (192.168.10.7) sends a TCP SYN request from port 1495 to virtual IP (192.168.10.150) TCP port 53:



Alteon receives SYN on its port, checks if client processing is enabled on the port. With client processing being enabled, Alteon process the request.
As delayed binding has been enabled, Alteon negotiates TCP connection with PC prior to forwarding it to the real server.
Alteon responds to the PC with SYN ACK:

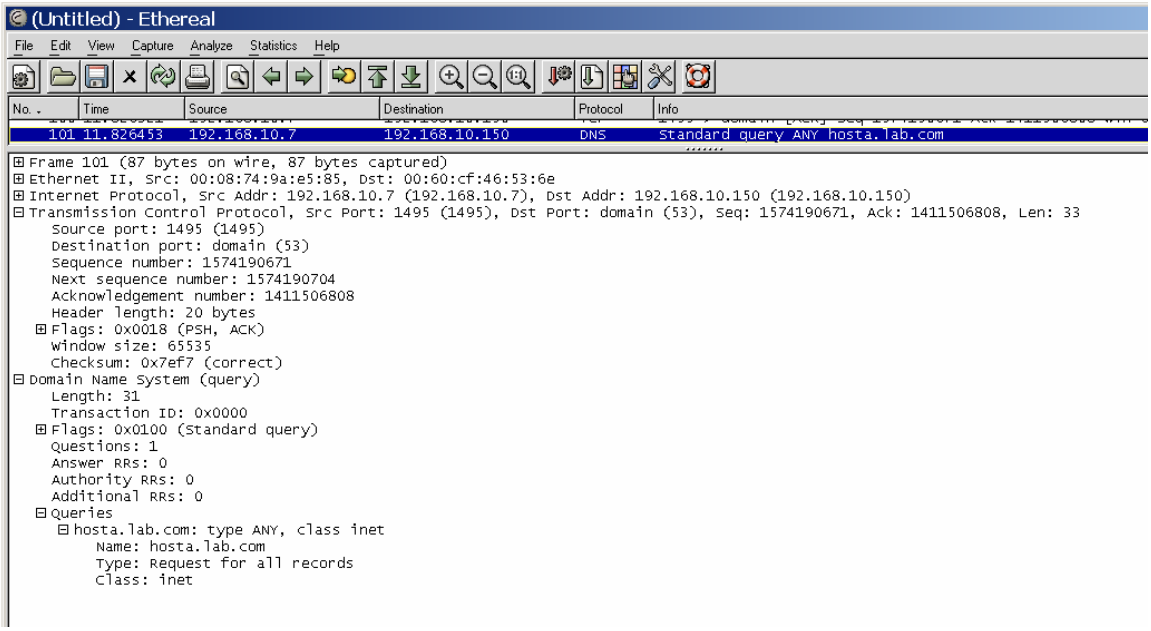


PC receives the SYN ACK and responds with ACK to the Alteon:



Alteon DNS Load Balancing

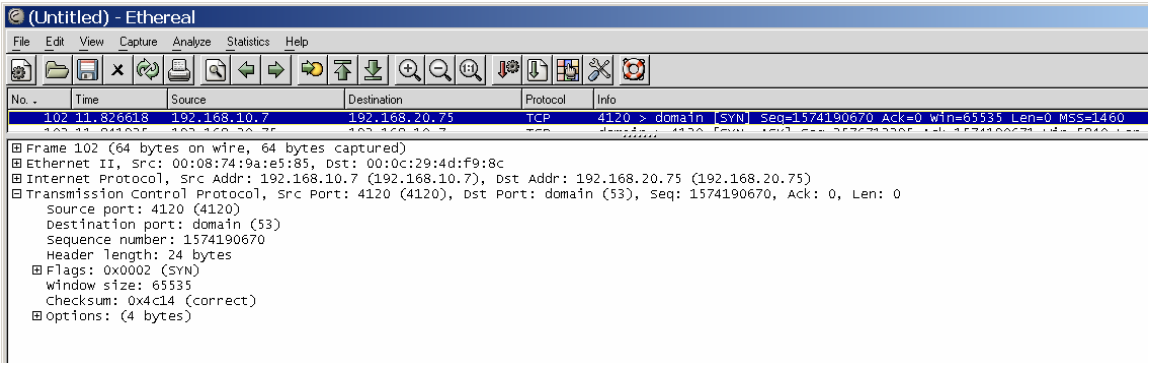
Once TCP connection to port 53 has been established between PC and Alteon, PC sends DNS query for the hosta.lab.com to Alteon:



Once a 3-way hand shake is complete and a query has been received by the Alteon, it decides on which real server to use, allocates a session and starts TCP negotiation to TCP port 53 on the real server on behalf of the PC.

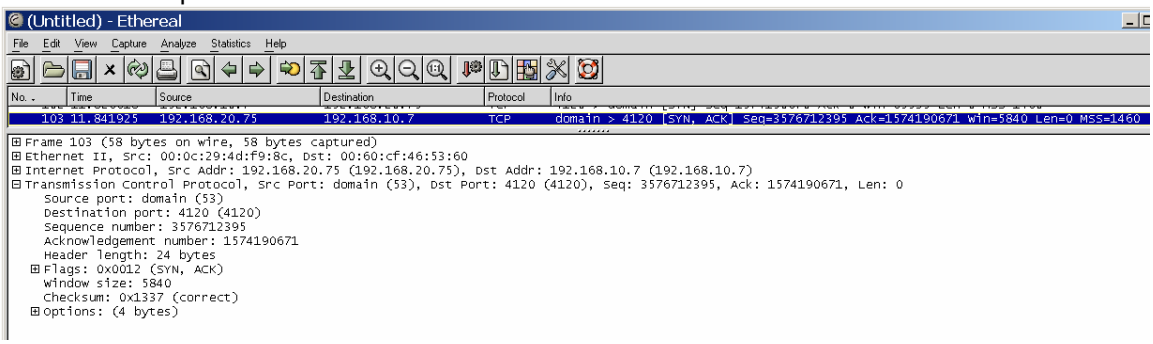
Alteon sends a SYN to the chosen real server (192.168.20.75).
Alteon leaves client's MAC and IP as a source of the request, changes source port to allocated for the session port 4120, changes destination IP to real server IP (192.168.20.75).

Note: From the real server point of view connection has been initiated form PC:

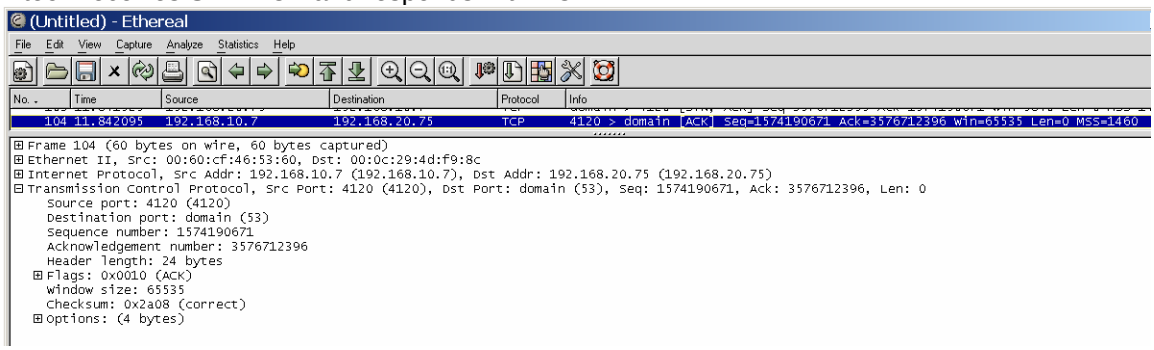


Alteon DNS Load Balancing

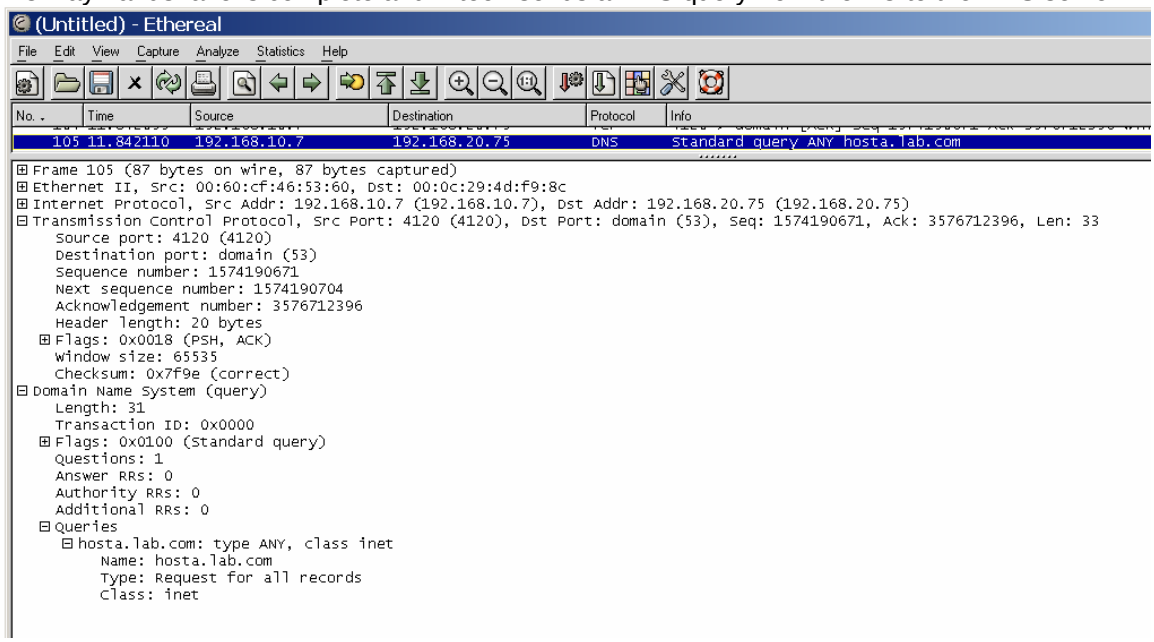
Real server responds with a SYN ACK:



Alteon receives SYN ACK and responds with ACK:

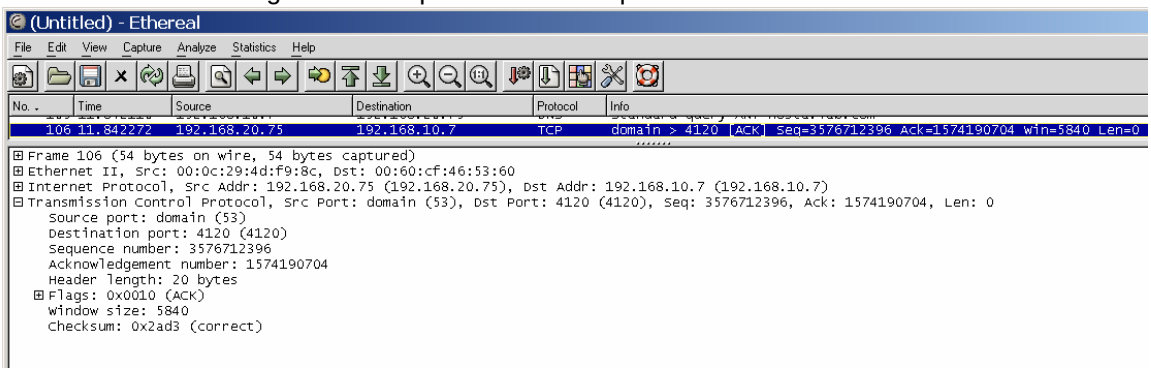


A 3-way handshake is complete and Alteon sends a DNS query from the PC to the DNS server:

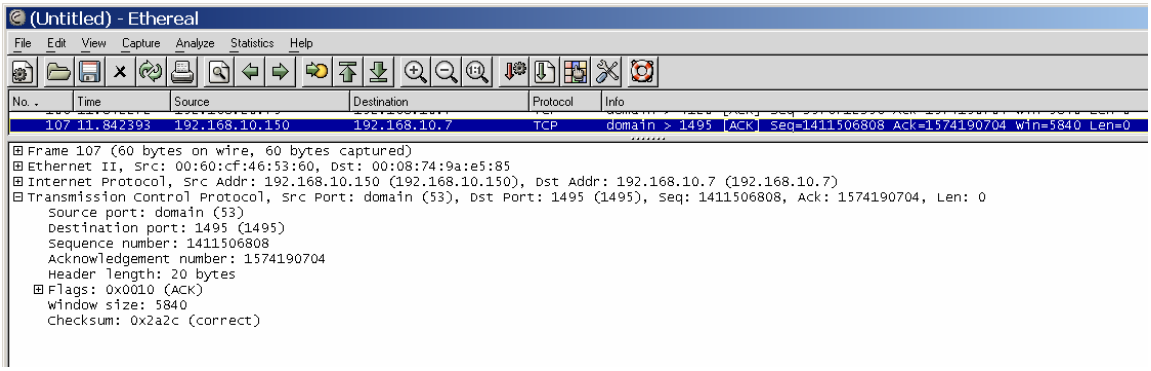


Alteon DNS Load Balancing

Real server acknowledges the receipt of the DNS request and sends back ACK:

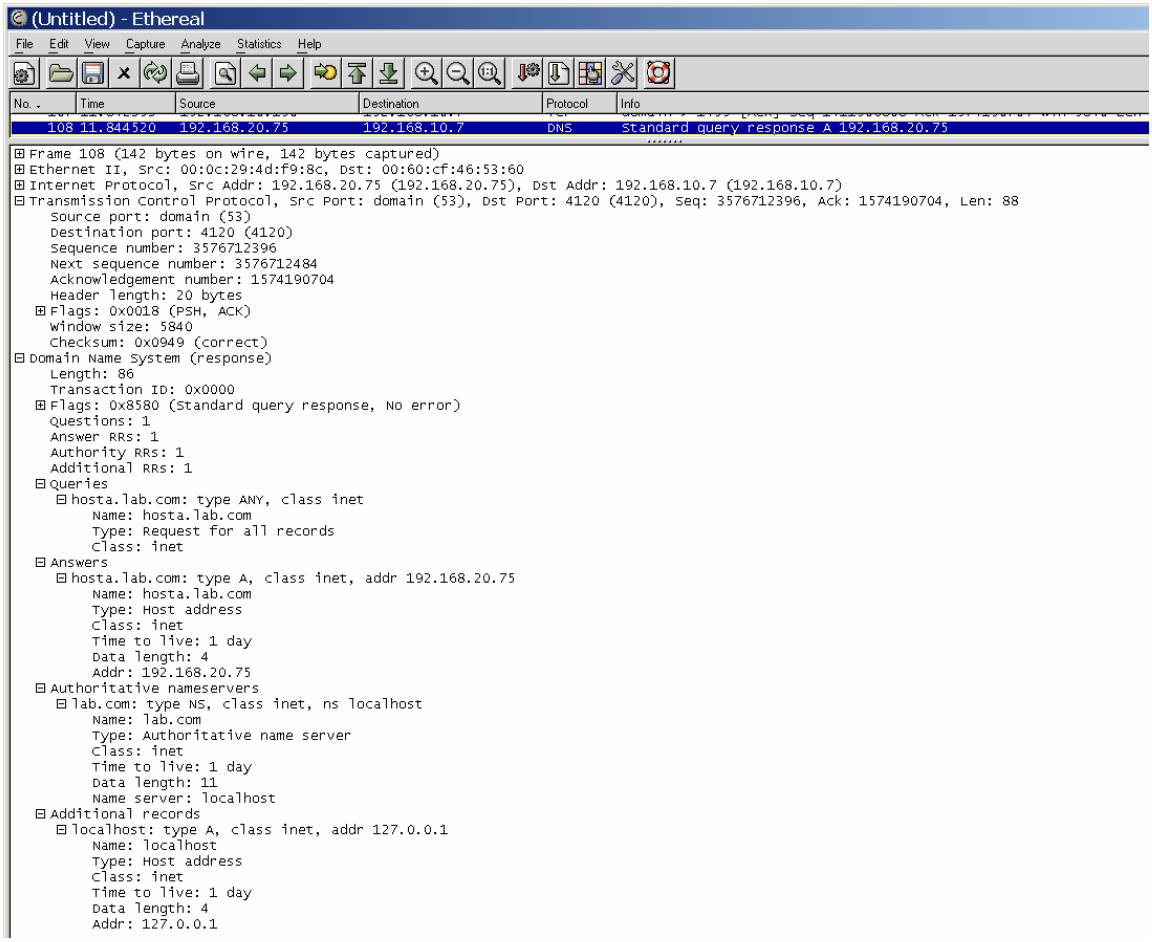


Upon receiving an acknowledgment for the DNS request, Alteon forwards the ACK to the PC, changing the source IP from real server IP (192.168.20.75) to virtual IP (192.168.10.150), changing destination port (4120) to PC port (1495):



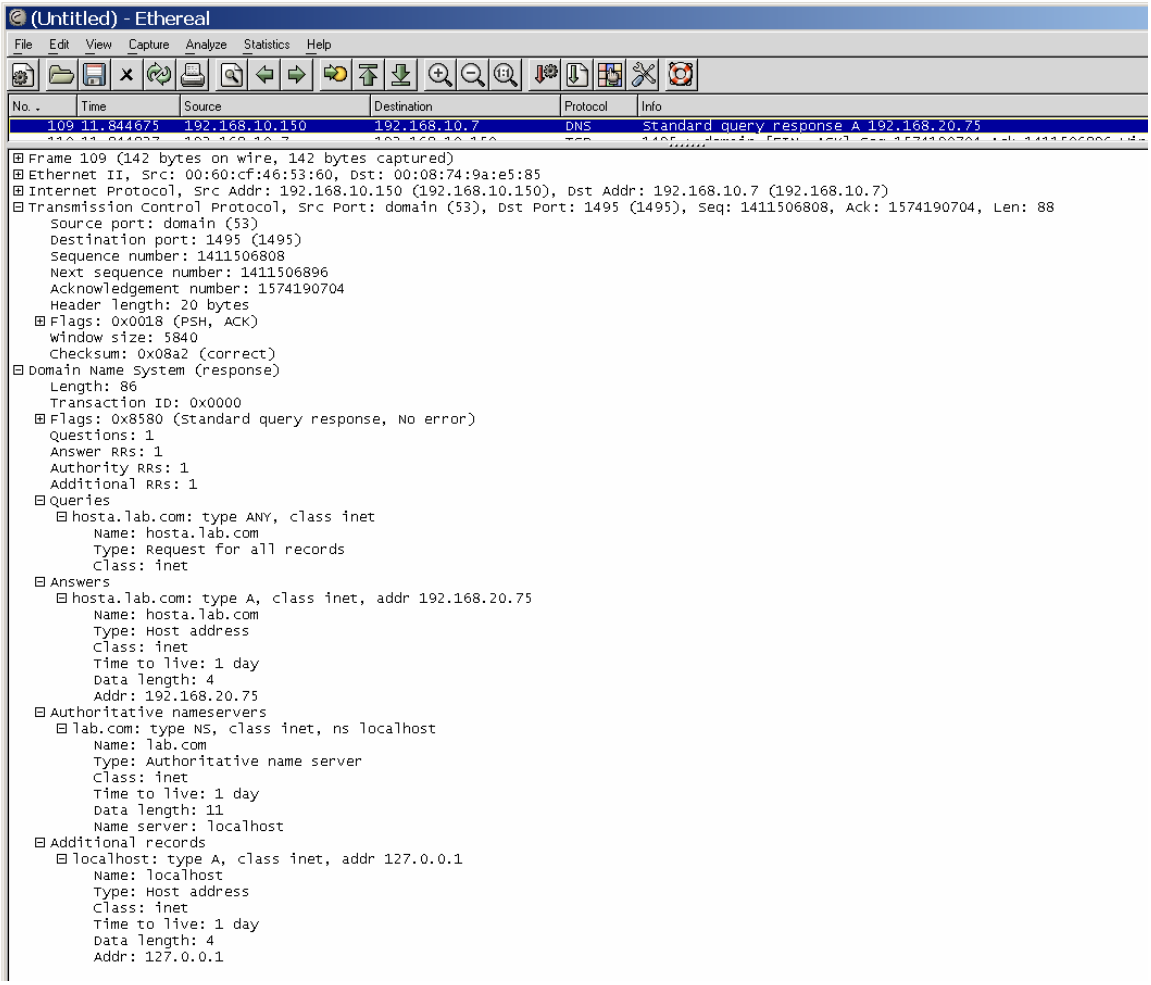
Alteon DNS Load Balancing

Real server does a lookup of the request against its database and responds with a DNS query response:

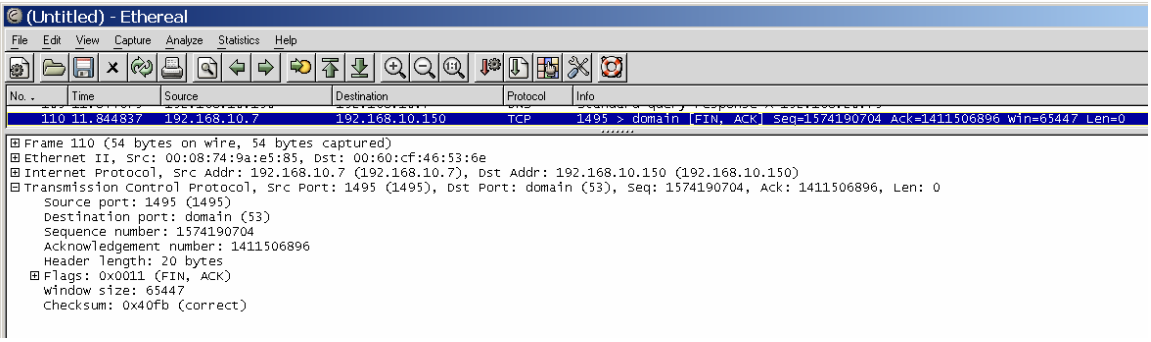


Alteon DNS Load Balancing

Alteon receives DNS response on its server enabled port and substitutes source real IP to virtual IP, substitutes ports and sends the response to the PC:

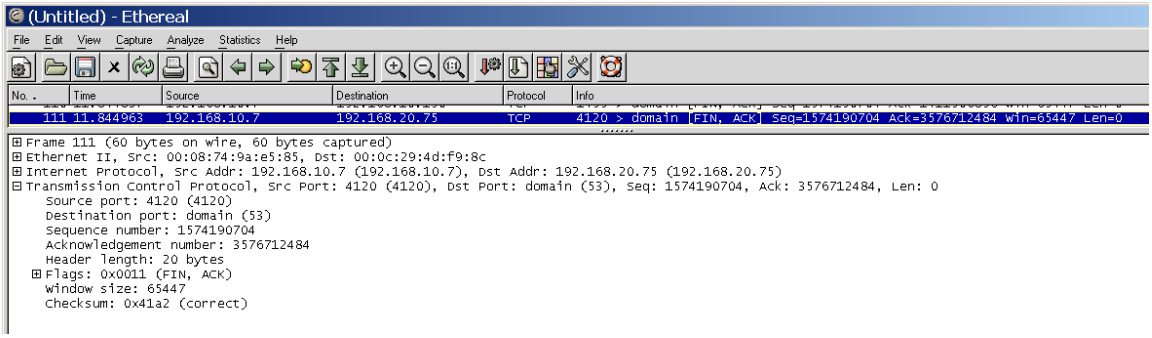


Once a response has been received by the PC, it closes the TCP connection by sending FIN ACK to the virtual server:



Alteon DNS Load Balancing

Virtual server changes source port to its allocated port, changes destination IP to real IP address and forwards the FIN ACK to the real server:



Client and server proceed in the same manner with a graceful closure of a TCP connection.

```
110 11.844837   192.168.10.7     192.168.10.150   TCP   1495 > domain [FIN, ACK] Seq=1574190704 Ack=1411506896 Win=65447 Len=0
111 11.844963   192.168.10.7     192.168.20.75    TCP   4120 > domain [FIN, ACK] Seq=1574190704 Ack=3576712484 Win=65447 Len=0
112 11.849767   192.168.20.75    192.168.10.7     TCP   domain > 4120 [FIN, ACK] Seq=3576712484 Ack=1574190705 Win=5840 Len=0
113 11.849903   192.168.10.150   192.168.10.7     TCP   domain > 1495 [FIN, ACK] Seq=1411506896 Ack=1574190705 Win=5840 Len=0
114 11.849963   192.168.10.7     192.168.10.150   TCP   1495 > domain [ACK] Seq=1574190705 Ack=1411506897 Win=65447 Len=0
115 11.850126   192.168.10.7     192.168.20.75    TCP   4120 > domain [ACK] Seq=1574190705 Ack=3576712485 Win=65447 Len=0
```

From the PC point of view, it has obtained DNS information from the DNS server at 192.168.10.150 and has no knowledge of real servers behind Alteon.

Alteon DNS Load Balancing

Appendix A. UDP DNS load balancing configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 16:00:22 Thu Apr 29, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:53:60
/c/sys
        idle 60
        tnet ena
/c/stp 1/off
/c/ip/if 1
        ena
        addr 192.168.10.100
/c/ip/if 2
        ena
        addr 192.168.20.200
/c/slb
        on
/c/slb/real 1
        ena
        rip 192.168.20.75
/c/slb/real 2
        ena
        rip 192.168.20.85
/c/slb/group 1
        metric roundrobin
        health udpdns
        add 1
        add 2
/c/slb/port 1
        client ena
/c/slb/port 6
        client ena
/c/slb/port 7
        server ena
/c/slb/port 8
        server ena
/c/slb/virt 1
        ena
        vip 192.168.10.150
/c/slb/virt 1/service dns
        group 1
        udp enabled
/
script end  /**** DO NOT EDIT THIS LINE!
```

Alteon DNS Load Balancing

Appendix B. TCP DNS load balancing configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 16:00:22 Thu Apr 29, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:53:60
/c/sys
        idle 60
        tnet ena
/c/stp 1/off
/c/ip/if 1
        ena
        addr 192.168.10.100
/c/ip/if 2
        ena
        addr 192.168.20.200
/c/slb
        on
/c/slb/adv
        direct ena
/c/slb/real 1
        ena
        rip 192.168.20.75
/c/slb/real 2
        ena
        rip 192.168.20.85
/c/slb/group 1
        metric roundrobin
        health dns
        add 1
        add 2
/c/slb/port 1
        client ena
/c/slb/port 6
        client ena
/c/slb/port 7
        server ena
/c/slb/port 8
        server ena
/c/slb/virt 1
        ena
        vip 192.168.10.150
/c/slb/virt 1/service dns
        group 1
        dbind ena
/
script end  /**** DO NOT EDIT THIS LINE!
```

Tech Tip
Alteon

Alteon DNS Load Balancing

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