Technical Tip

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NORTEL

Virtual Hosting

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Introduction:

This document illustrates the operation and sample configuration of virtual hosting on Nortel switches.

Associated Products:

The information in this document is intended to be used with the following product(s) with the indicated software or hardware revisions:

Product Name or Order Number	Revision Information	
	Potentially Affected	*Corrected*
Nortel Web OS and Nortel Application switches: 180e, 180 Plus, 184, AD2, AD3, AD4, 2224, 2424, 2208, 2216, 3408	All	N/A

Overview

Virtual hosting allows multiple organizations to maintain different servers on a single physical machine and distinguish between different servers by their hostname. It is often desirable for different companies sharing a web server to have their own domain names with web servers accessible, for example as `www.company1.com` and `www.company2.com`, without requiring the user to remember any extra path information such as `www.example.com/copmany1` or `www.example.com/company2`.

Another reason for virtual hosting is that it is not desirable for the service providers to dedicate an individual IP address for each page they host, as eventually this practice might exhaust the available pool of unique addresses.

By supporting HTTP 1.1 host extension, Nortel Web and Application switches make it possible for the service providers to create a single virtual server IP address to host multiple web sites per customer, where each customer could own their own domain name.

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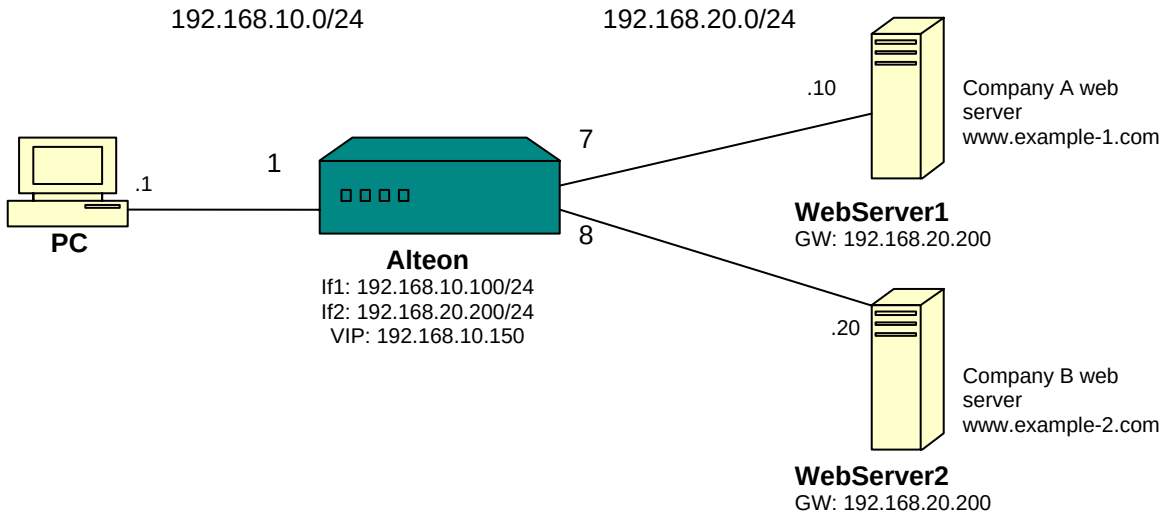
Upon examining the HTTP 1.1 request and extracting the host portion (please refer to sample HTTP request below), a switch makes a forwarding decision and forwards the request to the appropriate server that hosts the web page.

```
Hypertext Transfer Protocol
    GET / HTTP/1.1\r\n
    Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/vnd.ms-
excel, application/vnd.ms-powerpoint, application/msword, application/x-shockwave-
flash, */*\r\n
    Accept-Language: en-us\r\n
    Accept-Encoding: gzip, deflate\r\n
    User-Agent: Mozilla/4.0 (compatible; MSIE 5.5; Windows NT 5.0; T312461; PC SRP
2.0)\r\n
    Host: www.nortelnetworks.com\r\n
    Connection: Keep-Alive\r\n
    Cookie: rmBVuname=5062057; GTSessionID934130107413019=934130107413019266037943;
NNusid=5062057; NGUserID=2ff92083-14370-1048535478-1\r\n
    \r\n
```

The domain names used by users to access different pages are defined as URL strings so that a switch can perform a string matching when inspecting an HTTP request. Once the strings are defined they are assigned to the appropriate real servers that host the page. For that to work all domains configured as a part of virtual hosting should be mapped to the virtual IP of the switch, so all the requests go through the switch inspection mechanism.

Sample Configuration

Setup



PC – Windows 2000 workstation, IP address 192.168.10.1/24;
Alteon – Web Switch AD3, code version 10.0.30.7, interface 1 IP 192.168.10.100/24, interface 2 IP 192.168.20.200/24, Virtual IP 192.168.10.150, port 1 – client port, ports 7, 8 – server ports;
WebServer1 – Linux Red Hat 7.3 server with apache software installed, IP address 192.168.20.10/24, hosts company A web server;
WebServer2 – Linux Red Hat 7.3 server with apache software installed, IP address 192.168.20.20/24, hosts company B web server.

The goal of the configuration is to configure virtual hosting to host two different web sites, one per company.

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Configuring PC

1. Configure IP address (192.168.10.1/24) on PC:

```
C:\>ipconfig

Windows 2000 IP Configuration
Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.10.1
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . :
```

Note: It is required for the virtual web hosting that both web sites be mapped to the same IP address – the virtual IP of the Alteon. For this sample configuration, windows hosts file will be edited to contain the required mapping. In a real scenario, the DNS server must be configured appropriately to resolve web sites names to the virtual IP address of the Alteon.

2. Modify Windows hosts file (**C:\WINNT\system32\drivers\etc\hosts**) to contain name to address mapping:

```
192.168.10.150  www.example-1.com
192.168.10.150  www.example-2.com
```

3. Save the hosts file.

Configuring WebServer1

1. Configure IP address (192.168.20.10/24) on WebServer1:

```
[root@linux7 user]# /sbin/ifconfig eth0 192.168.20.10 netmask 255.255.255.0
```

2. Configure Alteon's interface 2 IP (192.168.20.200) as a default gateway:

```
[root@linux7 user]# /sbin/route add default gw 192.168.20.200
```

3. Replace the default index.html file in the root directory with a sample html file that will allow you to distinguish between two web sites, for example:

```
<HTML>
 <HEAD>
  <TITLE>www.example-1.com</TITLE>
 </HEAD>
 <BODY>
  <H1 ALIGN="CENTER">www.example-1.com</H1>
 </BODY>
</HTML>
```

4. Start HTTP server:

```
[root@linux7 user]# /etc/init.d/httpd start
Starting httpd:                                            [  OK  ]
```

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Configuring WebServer2

1. Configure IP address (192.168.20.20/24) on WebServer2:

```
[root@linux7 user]# /sbin/ifconfig eth0 192.168.20.20 netmask 255.255.255.0
```

2. Configure Alteon's interface 2 IP (192.168.20.200) as a default gateway:

```
[root@linux7 kristina]# /sbin/route add default gw 192.168.20.200
```

3. Replace the default index.html file in the root directory with a sample html file that will allow you to distinguish between two web sites, for example:

```
<HTML>
 <HEAD>
  <TITLE>www.example-2.com</TITLE>
 </HEAD>
 <BODY>
  <H1 ALIGN="CENTER">www.example-2.com</H1>
 </BODY>
</HTML>
```

4. Start HTTP server:

```
[root@linux7 user]# /etc/init.d/httpd start
Starting httpd:                                            [  OK  ]
```

Configuring Alteon

Note: Configuration of Alteon has been started from factory default settings.

1. Log into the switch:

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

2. 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

1. Configure IP address (192.168.10.100/24) for interface 1 and enable interface:

```
>> Main# /cfg/ip/if 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
```

2. Configure IP address (192.168.20.200/24) for interface 2 and enable interface:

```
>> IP Interface 1# /cfg/ip/if 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
```

3. 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.
```

Defining strings to be used for URL load balancing

Define web site's domain names as URL strings.

1. Enter layer 7 SLB configuration menu:

```
>> IP Interface 2# /cfg/slb/layer7/slb/
------------------------------------------------------------
[Server Loadbalance Resource Menu]
      message - Set HTTP error message
      add     - Add SLB string for load balance
      rename  - Rename SLB string for load balance
      rem     - Remove SLB string for load balance
      cur     - Display current configuration
```

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2. View the current settings. Note, only one default string “any” is defined:

```
>> Server Loadbalance Resource# cur
Error message:
No available server to handle this request

Number of entry: 1
1: any
```

3. Add company A domain name (www.example-1.com) as a URL string to match requests against:

```
>> Server Loadbalance Resource# add "www.example-1.com"
```

4. Add company B domain name (www.example-2.com) as a URL string to match requests against:

```
>> Server Loadbalance Resource# add "www.example-2.com"
```

5. Apply the changes:

```
>> Server Loadbalance Resource# apply
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
```

6. View the current configuration. Note the entry numbers for “www.example-1.com” and “www.example-2.com” strings:

```
>> Server Loadbalance Resource# cur
Error message:
No available server to handle this request

Number of entries: 3
1: any
2: www.example-1.com
3: www.example-2.com
```

Configuring real servers

1. Configure real server 1. Enter real server 1 configuration menu, set real server 1 IP address (192.168.20.10) and enable the real server:

```
>> Server Loadbalance Resource# /cfg/slb/real 1/rip 192.168.20.10/ena
Current real server IP address:     0.0.0.0
New pending real server IP address: 192.168.20.10
Current status: disabled
New status:     enabled
```

2. Assign the appropriate string to the real server as requests for www.example-1.com need to be forwarded to real server 1. As www.example-1.com string was added as entry number 2, this entry is assigned to real server:

```
>> Real server 1 # layer7/addlb 2
SLB string ID 2 added to server 1.
```

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3. Configure real server 2. Enter real server 2 configuration menu, set real server 2 IP address (192.168.20.20) and enable the real server:

```
>> Real server 1 # /cfg/slb/real 2/rip 192.168.20.20/ena
Current real server IP address:     0.0.0.0
New pending real server IP address: 192.168.20.20
Current status: disabled
New status:     enabled
```

4. Assign www.example-2.com string matching (string entry number 3) to real server 2:

```
>> Real server 2 # layer7/addlb 3
SLB string ID 3 added to server 2.
```

Assigning real servers to a group

Define a real servers group, place real servers into this group, define appropriate metric (round robin is used in this example), and define appropriate health check mechanism (TCP in this example):

```
>> Real Server 2 Layer 7 Commands# /cfg/slb/group 1/add 1/add 2/metric round/health
tcp
Real server 1 added to real server group 1.
Real server 2 added to real server group 1.
Current metric:         leastconns
New pending metric:     roundrobin
Current health check type:      tcp
New pending health check type:  tcp
```

Creating virtual server

1. Configure virtual server, server 1 in this example. Set IP address for the virtual server and enable virtual server:

```
>> Real server group 1# /cfg/slb/virt 1/vip 192.168.10.150/ena
Current virtual server IP address:     0.0.0.0
New pending virtual server IP address: 192.168.10.150
Current status: disabled
New status:     enabled
```

2. Assign HTTP service to virtual server and assign the created group 1 to the server:

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

3. Enable delayed binding:

```
>> Virtual Server 1 http Service# dbind ena
Current delayed binding: disabled
New delayed binding:     enabled
```

4. Enable virtual hosting:

```
>> Virtual Server 1 http Service# httpslb host
```

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Enabling client/server processing on ports
Enable client/server processing on appropriate ports. In this configuration client is connected to port 1, server 1 is connected to port 7 and server 2 to port 8, therefore client processing should be enabled on port 1 and server processing should be enabled on port 7 and 8:

```
>> Virtual Server 1 http Service# /cfg/slb/port 1/client e
Current client processing: disabled
New client processing:     enabled

>> SLB port 1# /cfg/slb/port 7/server e
Current server processing: disabled
New server processing:     enabled

>> SLB port 7# /cfg/slb/port 8/server e
Current server processing: disabled
New server processing:     enabled
```

Enabling direct access mode
Enable direct access mode (DAM):

```
>> SLB port 1# /cfg/slb/adv/direct e
Current Direct Access Mode: disabled
New Direct Access Mode:     enabled
```

Note: Alternatively Proxy IP addresses could be assigned to every port and direct access mode be disabled.

Enabling SLB globally
1. Enable SLB globally:

```
>> Layer 4 Advanced# /cfg/slb/on
Current status: OFF
New status:     ON
```

2. 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.
```

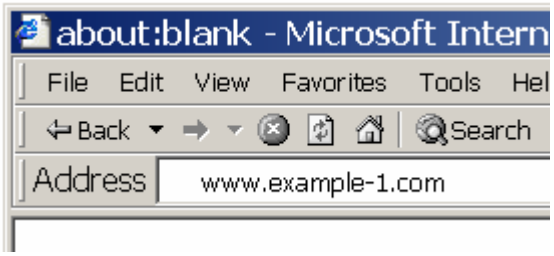
Note as soon as changes are applied, the following messages appear on the console indicating the real servers and virtual server are up and operational:

```
Jun 10 17:09:22 NOTICE  slb: real service 192.168.20.10:80 operational
Jun 10 17:09:22 NOTICE  slb: real server 192.168.20.10 operational
Jun 10 17:09:22 NOTICE  slb: Services are available for Virtual Server
1:192.168.10.150
Jun 10 17:09:23 NOTICE  slb: real service 192.168.20.20:80 operational
Jun 10 17:09:23 NOTICE  slb: real server 192.168.20.20 operational
```

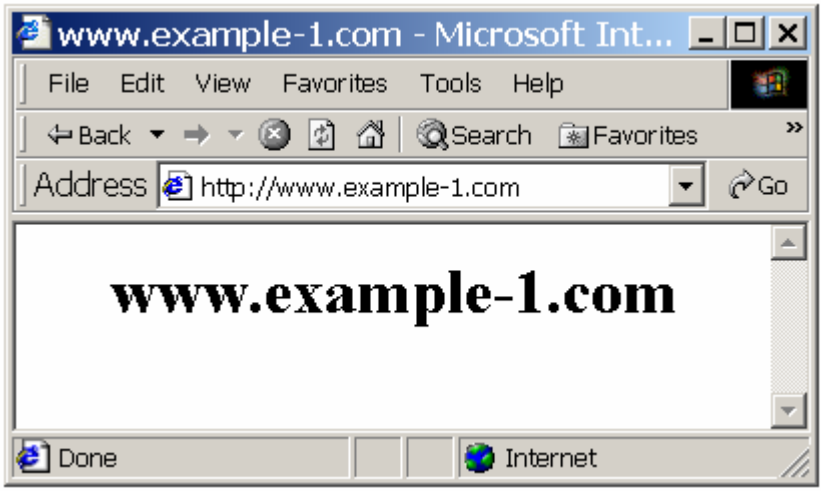
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Testing the configuration

1. Open web browser on PC and enter the address of the company A web site– www.example-1.com. Hit Enter:



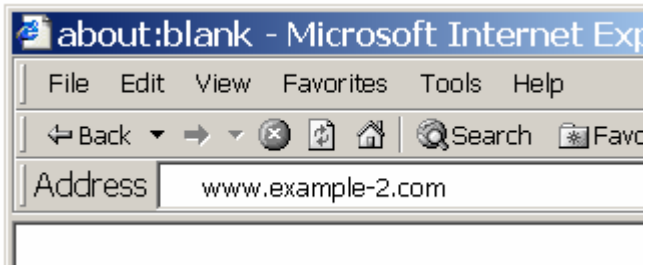
2. The www.example-1.com page is displayed:



3. Check the sessions dump on the Alteon. HTTP request containing www.example-1.com string was forwarded to the WebServer1 (192.168.20.10):

```
>> Session Table Information# /info/slb/sess/dump
 4,22:  192.168.10.1 2246, 192.168.10.150 80 -> 4118 192.168.20.10 80  age 10
```

4. Enter the URL of the company B – www.example-2.com. Hit Enter:



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5. The second company's web site appears:



6. Check the session table on the Alteon. HTTP request containing www.example-2.com string has been forwarded to WebServer2 (192.168.20.20):

```
>> Session Table Information# /info/slb/sess/dump
 4,24:  192.168.10.1 2249, 192.168.10.150 80 -> 4120 192.168.20.20 80  age 10
```

7. Check URL string matching statistics, note one hit for the www.example-1.com request and one hit for www.example-2.com request:

```
>> Session Table Information# /stats/slb/layer7/str
------------------------------------------------------------------
SLB String stats:
  ID SLB String                                        Hits
   1 any                                                  0
   2 www.example-1.com                                    1
   3 www.example-2.com                                    1
```

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Appendix A. Alteon configuration file

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 17:32:24 Thu Jun 10, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:53:60
/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 192.168.20.10
/c/slb/real 2
        ena
        rip 192.168.20.20
/c/slb/group 1
        metric roundrobin
        add 1
        add 2
/c/slb/port 1
        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 http
        group 1
        dbind ena
/c/slb/layer7/slb
        ren 2 "www.example-1.com"
        ren 3 "www.example-2.com"
/c/slb/real 1/layer7
        addlb 2
/c/slb/real 2/layer7
        addlb 3
/c/slb/virt 1/service http
        httpslb host
/
script end  /**** DO NOT EDIT THIS LINE!
```

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