Technical Tip

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NORTEL

VRRP Virtual Interface Router

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Introduction:

This document shows the operation and sample configuration of virtual interface router (VIR) on a Nortel Web and Application 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 Switch OS (formerly known as Alteon WebOS) and Application switches: 180e, 180 Plus, 184, AD2, AD3, AD4, 2224, 2424, 2208, 2216, 3408	All	N/A

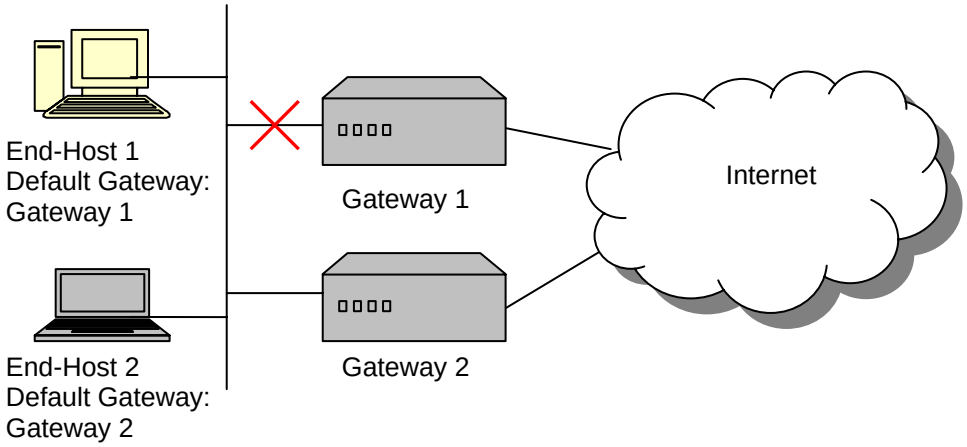
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Overview

One of the most popular methods for a host on a LAN to determine its first hop router to a particular destination is a statically configured default route. Static routing does not require end-host to support dynamic routing or process dynamic updates, default static routes can be pushed to DHCP (Dynamic Host Configuration Protocol) clients, thus minimizing administrative and processing overhead on end-hosts.

The use of static routing, however, creates a single point of failure. When configured on end-host, the default router goes down; the end-host is unable to determine the alternative path available and, therefore, is isolated from the network. Consider a situation shown in Figure 1. End-Host 1 is configured with a Gateway 1 as a default gateway and End-Host 2 is configured with Gateway 2 as a default gateway. When the link between Gateway 1 and a LAN goes down, End-Host 1 configured to use Gateway 1 cannot learn about the alternative path via Gateway 2 and is isolated from the network.

Figure 1

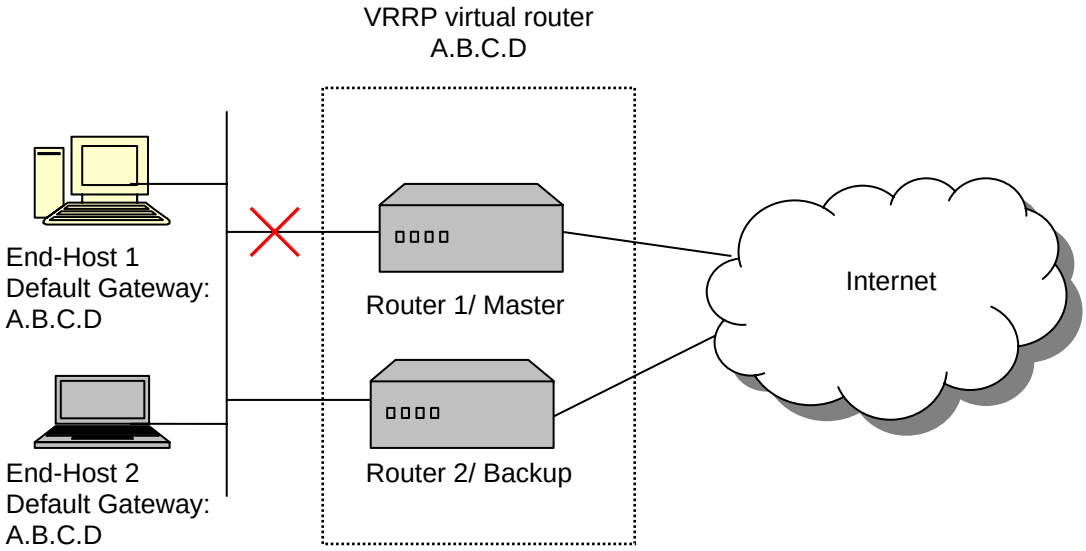


Virtual Router Redundancy Protocol (VRRP) is designed to eliminate a single point of failure inherent in static default routed environment. VRRP specifies an election protocol that dynamically assigns responsibility for the virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address (or addresses) associated with a virtual router is called the “Master”, and forwards packets sent to these IP addresses. The election process provides dynamic fail-over in the forwarding responsibility should the master become unavailable. Any of the virtual router's IP addresses on a LAN can then be used as the default first hop router by end-hosts.

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Consider a situation depicted in Figure 2. Router 1 and 2 are configured to form a VRRP virtual router with a single virtual IP address A.B.C.D (note the IP address does not have to be one of the Router 1 or Router 2 interface addresses). Both End-Hosts are configured to use the virtual IP address as a default gateway. Suppose Router 1 was elected as a VRRP master and, therefore, it has control over virtual interface A.B.C.D. When End-Hosts send traffic using default gateway A.B.C.D, master VRRP router processes the traffic and forwards packets appropriately. If, for some reason, the master router goes down, backup router takes over master's responsibility to forward traffic, and thus a failover is achieved.

Figure 2



Nortel Web and Application switches (formerly knows as Alteon WebOS and Application switches) could be configured to form a VRRP virtual router that acts as a default or a next hop gateway for end-hosts on a LAN. This virtual router is called Virtual Interface Router or VIR.

When multiple switches are configured as a single VIR, only the master switch responds to ARP requests for the virtual router address and processes the packets. In addition, the master sends periodic VRRP advertisements to multicast address 224.0.0.18 assigned by IANA (Internet Assigned Number Authority) for VRRP to let other VRRP routers that form the virtual router know that it is alive and advertises its current priority. In the event that the master fails, one of the backup switches becomes a master and assumes master responsibilities.

The virtual interface router MAC (Media Access Control) address associated with a virtual router is an address in the following format:

`00-00-5E-00-01-XX`

Where:
`00-00-5E` – is IANA assigned Organization Unit Identifier (OUI) for IPv4 multicast;
`00-01` – is an address block assigned for VRRP;
`XX` – is a hex representation of the configured VRID (Virtual Router ID).

For example, if VRID has been set to 8, the virtual router MAC address would be 00-00-5E-00-01-08.

Note: All switches configured as a part of the virtual router use the same MAC address derived from VRID when communicating with end-hosts.

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As mentioned earlier, the master uses VRRP advertisements to communicate its status to the backup switches. Below is shown a sample VRRP advertisement used for such communications:

```
Frame 1 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
    Destination: 01:00:5e:00:00:12 (IETF-VRRP)
    Source: 00:00:5e:00:01:07 (IETF-VRRP-virtual-router-VRID_07)
    Type: IP (0x0800)
    Trailer: 000000000000
Internet Protocol, Src Addr: 192.168.10.100 (192.168.10.100), Dst Addr: 224.0.0.18
(224.0.0.18)
    Version: 4
    Header length: 20 bytes
    Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
    Total Length: 40
    Identification: 0x0131 (305)
    Flags: 0x00
    Fragment offset: 0
    Time to live: 255
    Protocol: VRRP (0x70)
    Header checksum: 0x0f16 (correct)
    Source: 192.168.10.100 (192.168.10.100)
    Destination: 224.0.0.18 (224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
    Virtual Rtr ID: 7
    Priority: 100 (Default priority for a backup VRRP router)
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0xafb7 (correct)
    IP Address: 192.168.10.150 (192.168.10.150)
```

When the virtual interface address for the VIR is one of the real interface IP addresses of one of the switches, the switch that owns that interface becomes the owner of the virtual IP address. Only one switch can be the owner of the virtual interface. Being an owner raises the priority of the switch to the maximum of 255 so if the address owner is available it will always become a master. Note the VRRP advertisement below:

```
Frame 3 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
Internet Protocol, Src Addr: 192.168.10.150 (192.168.10.150), Dst Addr: 224.0.0.18
(224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
    Virtual Rtr ID: 7
    Priority: 255 (This VRRP router owns the virtual router's IP address(es))
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0x14b7 (correct)
    IP Address: 192.168.10.150 (192.168.10.150)
```

The switches that are not the VRRP address owners are known as renters.

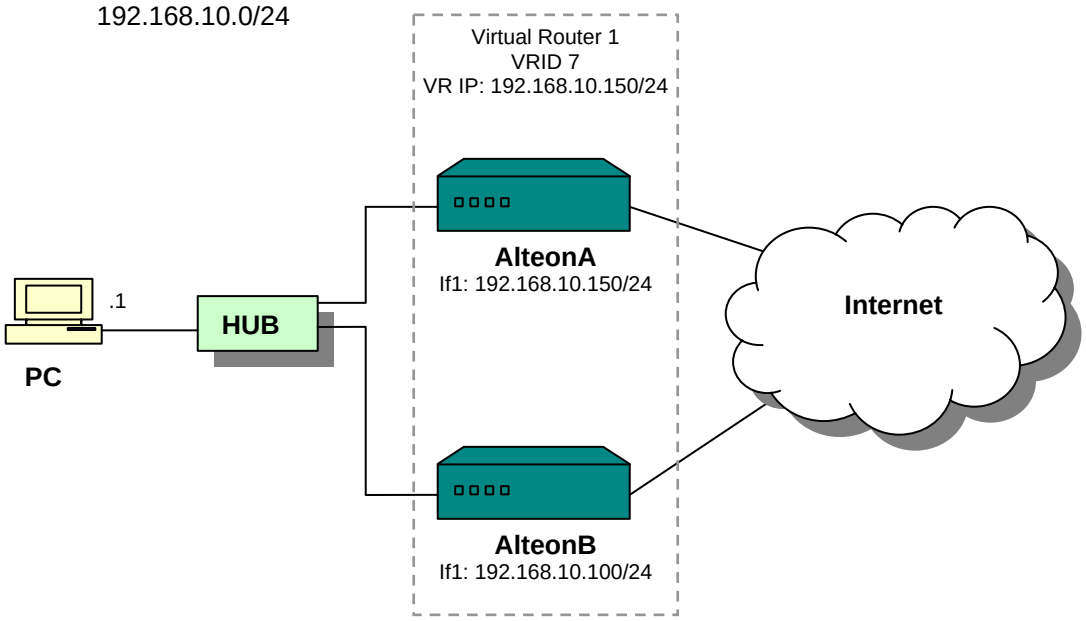
It is not required for any switch to be an owner of the address, and every switch that is part of the VIR can be a renter. Each renter is configured with a priority between 1 and 254. This ensures that the address owner will always be a master as its priority is 255. The VRRP router with the highest priority becomes the master. In case of equal priorities, the switch with the highest interface number wins the bidding for being a master.

If at any time a backup switch determines that it has a higher priority than the master, it can pre-empt the master and become a master itself, unless it is configured not to do so. If pre-emption is enabled (enabled by default) and the backup sees that its priority is higher than the master's, it begins to send out its own advertisements with its priority specified in it. Once the master sees an advertisement with a higher priority it reverts to being a backup.

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Sample Configuration

Setup



PC – Windows 2000 workstation, IP address 192.168.10.1/24;
AlteonA – Alteon AD3 (now known as Web Switch AD3), code version 10.0.3.7, interface 1 IP 192.168.10.150/24, interface 2 IP 192.168.20.100/24;
AlteonB – Alteon AD3 (now known as Web Switch AD3), code version 10.0.3.7, interface 1 IP 192.168.10.100/24, interface 2 IP 192.168.20.200/24;
HUB – Ethernet HUB.

The goal of the configuration is to configure a virtual interface router to act as a default gateway for PC.

Configuring PC1

Configure IP address (192.168.10.1) on PC1 with VR IP address (192.168.10.150) as a default router:

```
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 . . . . . . . . . : 192.168.10.150
```

Configuring AlteonA

1. Log in to the switch. The default admin credentials are used in this example.

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```
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
```

Configuring interfaces

1. Configure IP address (192.168.10.150/24) for interface 1 of AlteonA. Enable the interface:

```
>> Main# /cfg/ip/if 1/mask 255.255.255.0/addr 192.168.10.150/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: 192.168.10.150
Pending new broadcast address:  192.168.10.255
Current status: disabled
New status:     enabled
```

2. Configure any other required interfaces that lead out to the Internet.

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.
```

Configuring VRRP

1. Enable VRRP globally:

```
>> IP Interface 2# /cfg/vrrp/on
Current status: OFF
New status:     ON
```

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2. Configure Virtual Router (VR) 1. Enter VR menu:

```
>> Virtual Router Redundancy Protocol# vr 1
------------------------------------------------------------
[VRRP Virtual Router 1 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

3. Enable virtual router 1:

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

4. Set Virtual Router ID (VRID) to, for example, 7:

```
>> VRRP Virtual Router 1# vrid 7
Current virtual router ID:     1
New pending virtual router ID: 7
```

5. Set virtual router address to 192.168.10.150, note as this is AlteonA's interface 1 IP address it makes AlteonA a master as long as it's healthy:

```
>> VRRP Virtual Router 1# addr 192.168.10.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.10.150
```

6. Apply and save the changes:

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

As soon as changes are applied the following message appears indicating that AlteonA is now a master:

```
Jun  4  9:01:39 NOTICE  vrrp: virtual router  192.168.10.150 is now MASTER
```

7. Check the current VR 1 configuration, note the default configured priority 100. Also note pre-emption is enabled by default:

```
>> VRRP Virtual Router 1# cur
Current VRRP virtual router 1:
    vrid 7, 192.168.10.150, if 1, prio 100, adver 1
    enabled, preem enabled, share enabled
    track nothing
```

8. Check VRRP information, check the current priority. With AlteonA being the owner of the address, its priority has been raised to 255:

```
>> VRRP Virtual Router 1# /info/vrrp
```

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```
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, owner,  prio 255, master
```

Configuring AlteonB

1. Log in to the switch. The default admin credentials are used in this example.

```
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
```

Configuring interfaces

1. Configure IP address (192.168.10.100/24) for interface 1 of AlteonB. Enable the 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 any other required interfaces that lead out to the Internet.

3. Apply and save the changes:

```
>> IP Interface 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.
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.
```

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Configuring VRRP

1. Enable VRRP globally:

```
>> IP Interface 2# /cfg/vrrp/on
Current status: OFF
New status:     ON
```

2. Configure Virtual Router 1. Enter VR 1 configuration menu:

```
>> Virtual Router Redundancy Protocol# /cfg/vrrp/vr 1
------------------------------------------------------------
[VRRP Virtual Router 1 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

3. Enable virtual router:

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

4. Set VRID to the same VRID as AlteonA, VRID 7 in this example:

```
>> VRRP Virtual Router 1# vrid 7
Current virtual router ID:     1
New pending virtual router ID: 7
```

5. Set virtual router address to the same address as AlteonA, 192.168.10.150 in this example:

```
>> VRRP Virtual Router 1# addr 192.168.10.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.10.150
```

6. Apply and save the changes:

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

As soon as changes are applied the following message appears indicating that AlteonB is a now backup:

```
Jun  4  9:11:01 NOTICE  vrrp: virtual router  192.168.10.150 is now BACKUP
```

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7. Check the current VRRP configuration. Note the default priority and enabled by default preemption:

```
>> VRRP Virtual Router 1# cur
Current VRRP virtual router 1:
    vrid 7, 192.168.10.150, if 1, prio 100, adver 1
    enabled, preem enabled, share enabled
```

8. Check VRRP information. Note as AlteonB does not own an IP address it is a renter and its priority is set to the configured 100. With priority 100 being less than 255 AlteonB becomes a backup:

```
>> VRRP Virtual Router 1# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, renter, prio 100, backup
```

Testing the configuration

1. Ping from PC1 (192.168.10.1) its default gateway (virtual router's IP address 192.168.10.150):

```
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
```

Take a look at the traffic captured with Ethereal during ping.

Before pinging default gateway 192.168.10.150, PC sends out an ARP request for 192.168.10.150 to find out the physical (MAC) address of IP address 192.168.10.150:

```
Frame 28 (42 bytes on wire, 42 bytes captured)
Ethernet II, Src: 00:08:74:9a:e5:85, Dst: ff:ff:ff:ff:ff:ff
Address Resolution Protocol (request)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (0x0001)
    Sender MAC address: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Sender IP address: 192.168.10.1 (192.168.10.1)
    Target MAC address: 00:00:00:00:00:00 (00:00:00_00:00:00)
    Target IP address: 192.168.10.150 (192.168.10.150)
```

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AlteonA being a master responds to the ARP request with a VRRP virtual router MAC address (00-00-5E-00-01-07)

```
Frame 31 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 00:08:74:9a:e5:85
    Destination: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Source: 00:00:5e:00:01:07 (IETF-VRRP-virtual-router-VRID_07)
    Type: ARP (0x0806)
    Trailer: 000000000000000000000000000000000...
Address Resolution Protocol (reply)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (0x0002)
    Sender MAC address: 00:00:5e:00:01:07 (IETF-VRRP-virtual-router-VRID_07)
    Sender IP address: 192.168.10.150 (192.168.10.150)
    Target MAC address: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Target IP address: 192.168.10.1 (192.168.10.1)
```

PC uses the learnt MAC address to send the ICMP messages:

```
Frame 32 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:08:74:9a:e5:85, Dst: 00:00:5e:00:01:07
    Destination: 00:00:5e:00:01:07 (IETF-VRRP-virtual-router-VRID_07)
    Source: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Type: IP (0x0800)
Internet Protocol, Src Addr: 192.168.10.1 (192.168.10.1), Dst Addr: 192.168.10.150
(192.168.10.150)
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x495c (correct)
    Identifier: 0x0300
    Sequence number: 0x0100
    Data (32 bytes)
```

AlteonA replies to the pings:

```
Frame 362 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:60:cf:46:53:60, Dst: 00:08:74:9a:e5:85
Internet Protocol, Src Addr: 192.168.10.150 (192.168.10.150), Dst Addr: 192.168.10.1
(192.168.10.1)
Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x495c (correct)
    Identifier: 0x0300
    Sequence number: 0x0900
    Data (32 bytes)
```

2. Check the ARP table. Note the MAC address for the 192.168.10.150, note the last octet 07 corresponding to the configured VRRID 7:

```
C:\>arp -a

Interface: 192.168.10.1 on Interface 0x3
  Internet Address      Physical Address      Type
  192.168.10.150        00-00-5e-00-01-07     dynamic
```

3. Disconnect the cable the between PC and AlteonA.

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4. Check VRRP information. As soon as AlteonB stopped receiving VRRP advertisements it entered an initialization stage:

```
>> Information# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, renter, prio 100, init
```

5. Check the messages on AlteonB. AlteonB has detected changes and, in the absence of a master, has become a master itself:

```
Jun  4  9:39:58 NOTICE  vrrp: virtual router  192.168.10.150 is now MASTER
```

Once AlteonB becomes a master it starts sending out its own advertisements:

```
Frame 15 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
Internet Protocol, Src Addr: 192.168.10.100 (192.168.10.100), Dst Addr: 224.0.0.18
(224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
        0010 .... = VRRP protocol version: 2
        .... 0001 = VRRP packet type: Advertisement (1)
    Virtual Rtr ID: 7
    Priority: 100 (Default priority for a backup VRRP router)
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0xafb7 (correct)
    IP Address: 192.168.10.150 (192.168.10.150)
```

6. Check VRRP information:

```
>> Information# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, renter, prio 100, master
```

7. Ping default gateway again:

```
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
```

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8. Check the ARP cache again; note the same MAC address:

```
C:\>arp -a

Interface: 192.168.10.1 on Interface 0x3
  Internet Address      Physical Address      Type
  192.168.10.150        00-00-5e-00-01-07     dynamic
```

9. Reconnect the cable between AlteonA and PC again.

10. Check the VRRP information on AlteonA. Note the initialization stage:

```
>> Main# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, owner,  prio 255, init
```

With pre-emption being enabled, once AlteonA sees an advertisement with a lower priority than its own, it starts sending out its VRRP advertisements with a higher priority and eventually becomes a master:

```
Frame 50 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
Internet Protocol, Src Addr: 192.168.10.150 (192.168.10.150), Dst Addr: 224.0.0.18
(224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
        0010 .... = VRRP protocol version: 2
        .... 0001 = VRRP packet type: Advertisement (1)
    Virtual Rtr ID: 7
    Priority: 255 (This VRRP router owns the virtual router's IP address(es))
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0x14b7 (correct)
    IP Address: 192.168.10.150 (192.168.10.150)
```

11. Note the message on the console screen indicating that AlteonA has become a master:

```
Jun  4  9:53:52 NOTICE  vrrp: virtual router  192.168.10.150 is now MASTER
```

12. Check VRRP information

```
>> Information# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.150,  if  1, owner,  prio 255, master
```

Note, from the user level point of view, the default gateway has never been down and was operational at all times.

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Testing scenario when both switches are renters

1. Change the virtual address on AlteonA and AlteonB to, for example, 192.168.10.111:

```
>> Main # /cfg/vrrp/vr 1/addr 192.168.10.111
Current IP address:     192.168.10.150
New pending IP address: 192.168.10.111
```

2. Apply the changes:

```
>> VRRP Virtual Router 1# apply
------------------------------------------------------------------
Apply complete; don't forget to "save" updated configuration.
```

Note: If one at a time the address is changed (first on one switch, then later on the other), and applied while VRRP virtual router is being enabled, the following message appears on the console screen, stating that an incorrect address is received:

```
Jun  4 10:46:24 ALERT   vrrp: received incorrect addresses from 192.168.10.100
```

This alert message appears when two switches configured to form a single virtual router have different virtual router addresses configured and both of the switches advertise different IP addresses to each other.

3. Set priority for AlteonA to 101:

```
>> Configuration# /cfg/vrrp/vr 1/prio 101
Current router priority:     100
New pending router priority: 101
```

4. Apply and save the changes:

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

5. Change the default gateway on PC to 192.168.10.111:

```
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 . . . . . . . . . : 192.168.10.111
```

6. Check VRRP information on AlteonA:

```
>> Information# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.111,  if  1, renter, prio 101, master
```

7. Check VRRP information on AlteonB:

```
>> Configuration# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.111,  if  1, renter, prio 100, backup
```

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8. Ping default gateway from PC:

```
C:\>ping 192.168.10.111

Pinging 192.168.10.111 with 32 bytes of data:

Reply from 192.168.10.111: bytes=32 time=10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.10.111:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  10ms, Average =  2ms
```

Once again, PC sends out an ARP for the physical address of 192.168.10.111:

```
Frame 8 (42 bytes on wire, 42 bytes captured)
Ethernet II, Src: 00:08:74:9a:e5:85, Dst: ff:ff:ff:ff:ff:ff
Address Resolution Protocol (request)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (0x0001)
    Sender MAC address: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Sender IP address: 192.168.10.1 (192.168.10.1)
    Target MAC address: 00:00:00:00:00:00 (00:00:00_00:00:00)
    Target IP address: 192.168.10.111 (192.168.10.111)
```

Master AlteonA answers with an ARP reply providing virtual router MAC address:

```
Frame 11 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 00:08:74:9a:e5:85
Address Resolution Protocol (reply)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (0x0002)
    Sender MAC address: 00:00:5e:00:01:07 (IETF-VRRP-virtual-router-VRID_07)
    Sender IP address: 192.168.10.111 (192.168.10.111)
    Target MAC address: 00:08:74:9a:e5:85 (DellComp_9a:e5:85)
    Target IP address: 192.168.10.1 (192.168.10.1)
```

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PC uses the received MAC to ping its default gateway:

```
Frame 12 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:08:74:9a:e5:85, Dst: 00:00:5e:00:01:07
Internet Protocol, Src Addr: 192.168.10.1 (192.168.10.1), Dst Addr: 192.168.10.111
(192.168.10.111)
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x3d5c (correct)
    Identifier: 0x0300
    Sequence number: 0x0d00
    Data (32 bytes)
```

AlteonA responds to pings:

```
Frame 13 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:60:cf:46:52:80, Dst: 00:08:74:9a:e5:85
Internet Protocol, Src Addr: 192.168.10.111 (192.168.10.111), Dst Addr: 192.168.10.1
(192.168.10.1)
Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x455c (correct)
    Identifier: 0x0300
    Sequence number: 0x0d00
    Data (32 bytes)
```

9. Disconnect cable between AlteonA and PC.

10. Note the message on AlteonB console:

```
Jun  4 10:55:53 NOTICE  vrrp: virtual router  192.168.10.111 is now MASTER
```

11. Check VRRP information on AlteonB:

```
>> Information# /info/vrrp
VRRP information:
   1: vrid   7, 192.168.10.111,  if  1, renter, prio 100, master
```

With AlteonB becoming a master it starts sending out VRRP advertisements:

```
Frame 345 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
Internet Protocol, Src Addr: 192.168.10.100 (192.168.10.100), Dst Addr: 224.0.0.18
(224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
    Virtual Rtr ID: 7
    Priority: 100 (Default priority for a backup VRRP router)
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0xafde (correct)
    IP Address: 192.168.10.111 (192.168.10.111)
```

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12. Ping default gateway (192.168.10.111) again :

```
C:\>ping 192.168.10.111

Pinging 192.168.10.111 with 32 bytes of data:

Reply from 192.168.10.111: bytes=32 time<10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255
Reply from 192.168.10.111: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.10.111:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

PC has sent the ICMP request to the default gateway:

```
Frame 215 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:08:74:9a:e5:85, Dst: 00:00:5e:00:01:07
Internet Protocol, Src Addr: 192.168.10.1 (192.168.10.1), Dst Addr: 192.168.10.111
(192.168.10.111)
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x395c (correct)
    Identifier: 0x0300
    Sequence number: 0x1100
    Data (32 bytes)
```

AlteonB being now the master responds with ICMP reply:

```
Frame 216 (74 bytes on wire, 74 bytes captured)
Ethernet II, Src: 00:60:cf:46:53:60, Dst: 00:08:74:9a:e5:85
Internet Protocol, Src Addr: 192.168.10.111 (192.168.10.111), Dst Addr: 192.168.10.1
(192.168.10.1)
Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x415c (correct)
    Identifier: 0x0300
    Sequence number: 0x1100
    Data (32 bytes)
```

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13. Reconnect AlteonA back to the hub.

    Once AlteonA has received AlteonB advertisements and calculated that its priority is higher than advertised and with pre-emption being enabled assumes the master's responsibility and starts sending out its advertisements:

```
Frame 346 (60 bytes on wire, 60 bytes captured)
Ethernet II, Src: 00:00:5e:00:01:07, Dst: 01:00:5e:00:00:12
Internet Protocol, Src Addr: 192.168.10.150 (192.168.10.150), Dst Addr: 224.0.0.18
(224.0.0.18)
Virtual Router Redundancy Protocol
    Version 2, Packet type 1 (Advertisement)
    Virtual Rtr ID: 7
    Priority: 101 (Non-default backup priority)
    Count IP Addrs: 1
    Auth Type: No Authentication (0)
    Adver Int: 1
    Checksum: 0xaede (correct)
    IP Address: 192.168.10.111 (192.168.10.111)
```

14. Note the message on AlteonA:

```
Jun  4 11:05:32 NOTICE  vrrp: virtual router  192.168.10.111 is now MASTER
```

15. Note the message on AlteonB:

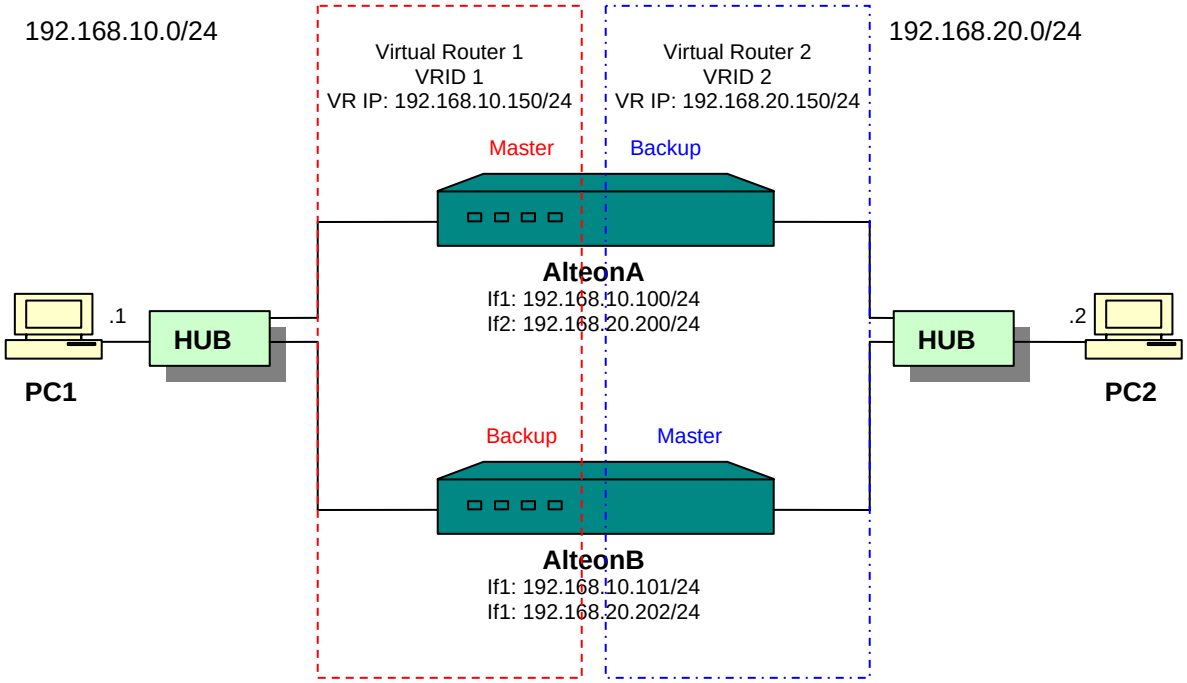
```
Jun  4 11:05:32 NOTICE  vrrp: virtual router  192.168.10.111 is now BACKUP
```

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Active-Standby sample configuration

The previous example described the traditional hot-standby configuration, where backup router functions only when the master has failed. VRRP can also be used to implement active-standby configuration. In active-standby both Nortel switches support active traffic, but are configured so they do not support the same service simultaneously. A sample configuration below shows such a scenario.

Setup



PC1 – Windows 2000 workstation, IP address 192.168.10.1/24;
PC2 – Windows 2000 workstation, IP address 192.168.20.2/24;
AlteonA – Alteon AD3 (now known as Web Switch AD3), code version 10.0.3.7, interface 1 IP 192.168.10.100/24, interface 2 IP 192.168.20.200/24;
AlteonB – Alteon AD3 (now known as Web Switch AD3), code version 10.0.3.7, interface 1 IP 192.168.10.101/24, interface 2 IP 192.168.20.202/24;
HUB – Ethernet HUB.

The goal of the configuration is to configure an active-standby failover, where AlteonA is a master for the virtual router 1 but a backup for virtual router 2 and AlteonB is a master for virtual router 2 but a backup for virtual router 1. This way both switches are utilized and a failover is achieved.

Configuring PC1

Configure IP address (192.168.10.1) on PC1 with VR 1 IP address (192.168.10.150) as a default gateway:

```
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 . . . . . . . . . : 192.168.10.150
```

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Configuring PC2

Configure IP address (192.168.20.2) on PC2 with VR 2 IP address (192.168.20.150) as a default router:

```
C:\>ipconfig

Windows 2000 IP Configuration
Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.20.2
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.20.150
```

Configuring AlteonA

1. Log in to the switch. The default admin credentials are used in this example.

```
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
```

Configuring interfaces

1. Configure IP address (192.168.10.100/24) for interface 1, enable the 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, enable the 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
```

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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.
```

Configuring VRRP

1. Enable VRRP globally:

```
>> IP Interface 2# /cfg/vrrp/on
Current status: OFF
New status:     ON
```

2. Configure virtual router 1.
   a) Enter VR1 configuration menu:

```
>> Virtual Router Redundancy Protocol# /cfg/vrrp/vr 1
------------------------------------------------------------
[VRRP Virtual Router 1 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

   b) Set appropriate VRID (1 was used in this example for VR1, the default setting):

```
>> VRRP Virtual Router 1# vrid 1
Current virtual router ID:     1
New pending virtual router ID: 1
```

   c) Set virtual router address (192.168.10.150):

```
>> VRRP Virtual Router 1# addr 192.168.10.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.10.150
```

   d) Set priority to, for example, 101 (priority greater than priority for AlteonB for this virtual router):

```
>> VRRP Virtual Router 1# prio 101
Current router priority:     100
New pending router priority: 101
```

   e) Enable virtual router 1:

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

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3. Configure virtual router 2.
    a) Enter VR2 configuration menu:

```
>> VRRP Virtual Router 1# /cfg/vrrp/vr 2
------------------------------------------------------------
[VRRP Virtual Router 2 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

    b) Set VRID to 2:

```
>> VRRP Virtual Router 2# vrid 2
Current virtual router ID:     1
New pending virtual router ID: 2
```

    c) Set virtual router address to 192.168.20.150:

```
>> VRRP Virtual Router 2# addr 192.168.20.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.20.150
```

    d) Set interface to 2:

```
>> VRRP Virtual Router 2# if 2
Current interface number:     1
New pending interface number: 2
```

    e) Leave priority to default 100.
    f) Enable virtual router 2:

```
>> VRRP Virtual Router 2# ena
Current status: disabled
New status:     enabled
```

4. Apply and save the changes:

```
>> VRRP Virtual Router 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.
```

Note as soon as changes are applied the following messages appear stating that virtual router 192.168.10.150 and 192.168.20.150 changed state from to backup and from backup to master. As AlteonB has not been configured yet, AlteonA is acting as a master for both virtual routers:

```
Jun  8 10:32:53 NOTICE  vrrp: virtual router  192.168.10.150 is now BACKUP
Jun  8 10:32:53 NOTICE  vrrp: virtual router  192.168.20.150 is now BACKUP
Jun  8 10:32:56 NOTICE  vrrp: virtual router  192.168.10.150 is now MASTER
Jun  8 10:32:56 NOTICE  vrrp: virtual router  192.168.20.150 is now MASTER
```

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5. Check the current VRRP configuration:

```
>> VRRP Virtual Router 2# ../cur
Current VRRP settings: ON, hotstan disabled

Current VRRP Tracking settings:
   vrs 2, ifs 2, ports 2, l4pts 2, reals 2, hsrp 10 hsrv 10

Current VRRP Virtual Router Group:
    vrid 1, if 1, prio 100, adver 1
    disabled, preem enabled, share enabled
    track nothing

Current VRRP virtual router settings:
  1: vrid 1, 192.168.10.150, if 1, prio 101, adver 1
    enabled, preem enabled, share enabled
    track nothing
  2: vrid 2, 192.168.20.150, if 2, prio 100, adver 1
    enabled, preem enabled, share enabled
    track nothing
```

6. Check the VRRP information:

```
>> Virtual Router Redundancy Protocol# /info/vrrp
VRRP information:
   1: vrid   1, 192.168.10.150,  if  1, renter, prio 101, master
   2: vrid   2, 192.168.20.150,  if  2, renter, prio 100, master
```

Configuring AlteonB

1. Log in to the switch. The default admin credentials are used in this example.

```
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
```

Configuring interfaces

1. Configure IP address (192.168.10.101/24) for interface 1, enable the interface:

```
>> Main# /cfg/ip/if 1/mask 255.255.255.0/addr 192.168.10.101/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: 192.168.10.101
Pending new broadcast address:  192.168.10.255
Current status: disabled
New status:     enabled
```

2. Configure IP address (192.168.20.202/24) for interface 2, enable the interface:

```
>> IP Interface 1# /cfg/ip/if 2/mask 255.255.255.0/addr 192.168.20.202/ena
```

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```
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: 192.168.20.202
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.
```

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Configuring VRRP

1. Enable VRRP globally:

```
>> IP Interface 2# /cfg/vrrp/on
Current status: OFF
New status:     ON
```

2. Configure virtual router 1.
   a) Enter VR1 configuration menu:

```
>> Virtual Router Redundancy Protocol# vr 1
------------------------------------------------------------
[VRRP Virtual Router 1 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

   b) Set VRID to 1:

```
>> VRRP Virtual Router 1# vrid 1
Current virtual router ID:     1
New pending virtual router ID: 1
```

   c) Set address (192.168.10.150) for virtual router 1:

```
>> VRRP Virtual Router 1# addr 192.168.10.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.10.150
```

   d) Leave priority to default 100, as AlteonA with the configured priority of 101 will be a master for the virtual router 1.

   e) Enable virtual router:

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

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3. Configure virtual router 2.
    a) Enter VR 2 configuration menu:

```
>> VRRP Virtual Router 1# /cfg/vrrp/vr 2
------------------------------------------------------------
[VRRP Virtual Router 2 Menu]
      track   - Priority Tracking Menu
      vrid    - Set virtual router ID
      addr    - Set IP address
      if      - Set interface number
      prio    - Set renter priority
      adver   - Set advertisement interval
      preem   - Enable/disable preemption
      share   - Enable/disable sharing
      ena     - Enable virtual router
      dis     - Disable virtual router
      del     - Delete virtual router
      cur     - Display current VRRP virtual router configuration
```

    b) Set VRID to 2:

```
>> VRRP Virtual Router 2# vrid 2
Current virtual router ID:     1
New pending virtual router ID: 2
```

    c) Set interface to interface number 2:

```
>> VRRP Virtual Router 2# if 2
Current interface number:     1
New pending interface number: 2
```

    d) Set virtual router 2 address to 192.168.20.150:

```
>> VRRP Virtual Router 2# addr 192.168.20.150
Current IP address:     0.0.0.0
New pending IP address: 192.168.20.150
```

    e) Set priority to 101, higher than AlteonA priority for virtual router 2:

```
>> VRRP Virtual Router 2# prio 101
Current router priority:     100
New pending router priority: 101
```

    f) Enable virtual router 2:

```
>> VRRP Virtual Router 2# ena
Current status: disabled
New status:     enabled
```

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4. Apply and save the changes:

```
>> VRRP Virtual Router 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.
```

As soon as changes are applied the following message appears on the console screen showing VRRP routers status. Virtual router 1(192.168.10.150) and 2 (192.168.20.150) both started as backup routers, but once virtual router 2 (192.168.20.150) has detected that it has higher priority (101) than AlteonA advertised priority of 100 it becomes a master for virtual router 2:

```
Jun  8 14:13:05 NOTICE  vrrp: virtual router  192.168.10.150 is now BACKUP
Jun  8 14:13:05 NOTICE  vrrp: virtual router  192.168.20.150 is now BACKUP
Jun  8 14:13:09 NOTICE  vrrp: virtual router  192.168.20.150 is now MASTER
```

5. Check current VRRP configuration:

```
>> VRRP Virtual Router 2# ../cur
Current VRRP settings: ON, hotstan disabled

Current VRRP Tracking settings:
   vrs 2, ifs 2, ports 2, l4pts 2, reals 2, hsrp 10 hsrv 10

Current VRRP Virtual Router Group:
    vrid 1, if 1, prio 100, adver 1
    disabled, preem enabled, share enabled
    track nothing

Current VRRP virtual router settings:
  1: vrid 1, 192.168.10.150, if 1, prio 100, adver 1
    enabled, preem enabled, share enabled
    track nothing
  2: vrid 2, 192.168.20.150, if 2, prio 101, adver 1
    enabled, preem enabled, share enabled
    track nothing
```

6. Check VRRP information:

```
>> Virtual Router Redundancy Protocol# /info/vrrp
VRRP information:
   1: vrid   1, 192.168.10.150,  if  1, renter, prio 100, backup
   2: vrid   2, 192.168.20.150,  if  2, renter, prio 101, master
```

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Testing the configuration

1. Ping from PC1 to PC2:

```
C:\>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:
Reply from 192.168.20.1: bytes=32 time<10ms TTL=63
Reply from 192.168.20.1: bytes=32 time<10ms TTL=63
Reply from 192.168.20.1: bytes=32 time<10ms TTL=63
Reply from 192.168.20.1: bytes=32 time<10ms TTL=63

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

2. Check the ARP table on PC1, note MAC address of default gateway 192.168.10.150, the last octet represents the configured VRID (1) for the virtual router 1:

```
C:\>arp -a

Interface: 192.168.10.1 on Interface 0x3
  Internet Address      Physical Address      Type
  192.168.10.150        00-00-5e-00-01-01     dynamic
```

3. Check the ARP table on PC2, note MAC address of default gateway 192.168.20.150, the last octet represents the configured VRID (2) for the virtual router 2:

```
C:\>arp -a

Interface: 192.168.20.1 on Interface 0x3
  Internet Address      Physical Address      Type
  192.168.20.150        00-00-5e-00-01-02     dynamic
```

4. Check VRRP information on AlteonA. Note AlteonA is a master for virtual router 1 (192.168.10.150) and a backup for virtual router 2 (192.168.20.150):

```
>> Main# /info/vrrp
VRRP information:
   1: vrid   1, 192.168.10.150,  if  1, renter, prio 101, master
   2: vrid   2, 192.168.20.150,  if  2, renter, prio 100, backup
```

5. Check VRRP information on AlteonB. Note AlteonB is a master for virtual router 2 (192.168.20.150) and backup for virtual router 1 (192.168.10.150):

```
>> Virtual Router Redundancy Protocol# /info/vrrp
VRRP information:
   1: vrid   1, 192.168.10.150,  if  1, renter, prio 100, backup
   2: vrid   2, 192.168.20.150,  if  2, renter, prio 101, master
```

Thus both switches are utilized, backing up each other for different virtual routers.

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Appendix A: AlteonA configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 15:24:55 Fri Jun  4, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:52:80
/c/sys
        idle 60
/c/ip/if 1
        ena
        addr 192.168.10.150
/c/vrrp/on
/c/vrrp/vr 1
        ena
        vrid 7
        if 1
        addr 192.168.10.150
/
script end  /**** DO NOT EDIT THIS LINE!
```

Appendix B: AlteonB configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 15:19:45 Fri Jun  4, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:53:60
/c/sys
        idle 60
/c/ip/if 1
        ena
        addr 192.168.10.100
/c/vrrp/on
/c/vrrp/vr 1
        ena
        vrid 7
        if 1
        addr 192.168.10.150
/
script end  /**** DO NOT EDIT THIS LINE!
```

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Appendix C: Active standby AlteonA configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 14:46:27 Tue Jun  8, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:52:80
/c/sys
        idle 60
/c/ip/if 1
        ena
        addr 192.168.10.100
/c/ip/if 2
        ena
        addr 192.168.20.200
/c/vrrp/on
/c/vrrp/vr 1
        ena
        vrid 1
        if 1
        prio 101
        addr 192.168.10.150
/c/vrrp/vr 2
        ena
        vrid 2
        if 2
        addr 192.168.20.150
/
script end  /**** DO NOT EDIT THIS LINE!
```

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Appendix D. Active-standby AlteonB configuration

```
script start "Alteon AD3" 4  /**** DO NOT EDIT THIS LINE!
/* Configuration dump taken 14:41:23 Tue Jun  8, 2004
/* Version 10.0.30.7,  Base MAC address 00:60:cf:46:53:60
/c/sys
        idle 60
/c/ip/if 1
        ena
        addr 192.168.10.101
/c/ip/if 2
        ena
        addr 192.168.20.202
/c/vrrp/on
/c/vrrp/vr 1
        ena
        vrid 1
        if 1
        addr 192.168.10.150
/c/vrrp/vr 2
        ena
        vrid 2
        if 2
        prio 101
        addr 192.168.20.150
/
script end  /**** DO NOT EDIT THIS LINE!
```

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If after following this guide you are still having problems, please ensure you have carried out the steps exactly as in this document. If problems still persist, please contact Nortel Technical Support (contact information is available online at:

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