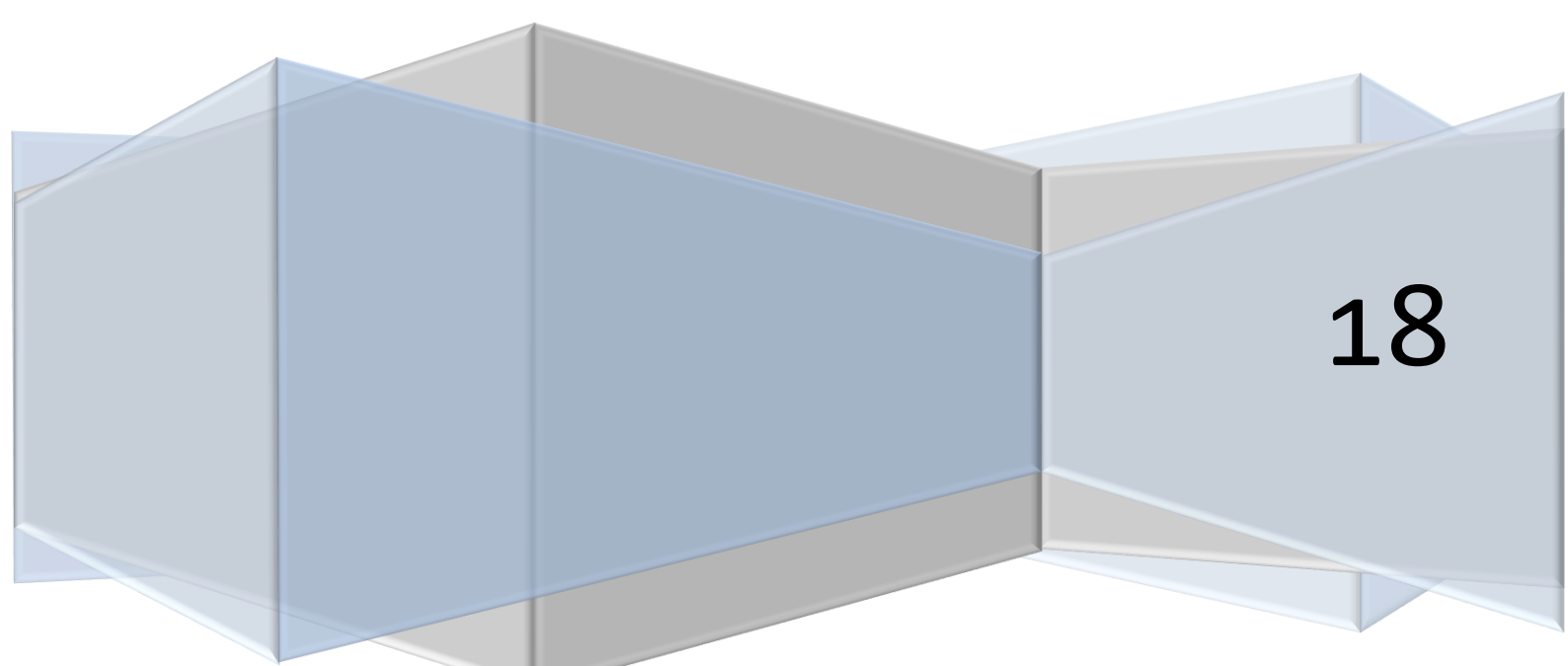


i-LAN Technology Pty Ltd

DrayTek Training

Multi-WAN and Network Reliability in DrayTek Routers (Part 2)

Roy Panetta



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Course Outline

What is High Availability (HA)

Routers Supporting High Availability Mode

How High Availability works

High Availability router requirements

High Availability Modes

1. Hot-Standby Mode
2. Active-Standby Mode

Demonstration

High Availability configuration

Hands on session – Configure and test HA using two Vigor DrayOS routers

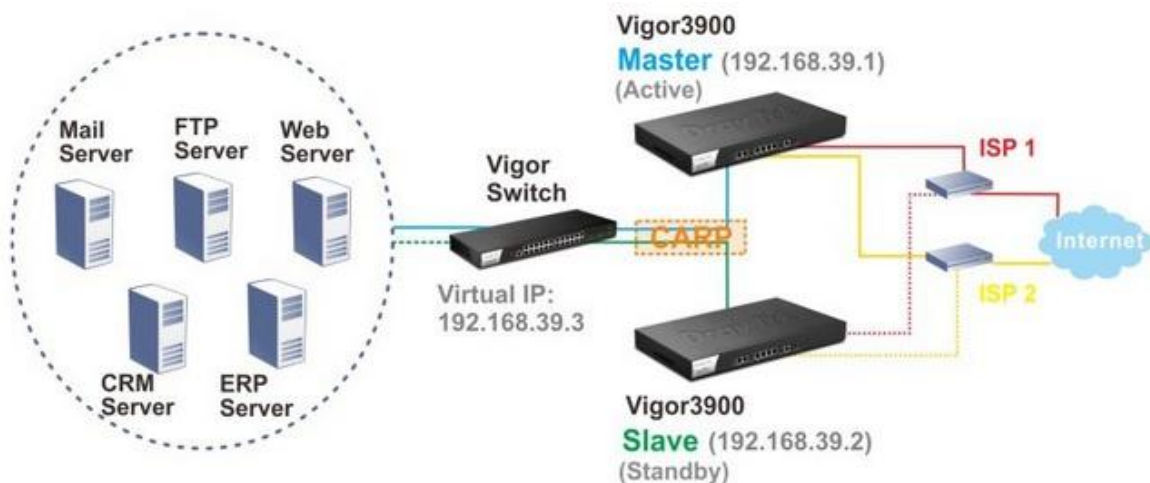
1. High Availability Mode

High Availability, also called hardware redundancy, refers to the function of automatically switching of hardware, e.g. a standby router, when a primary router fails for whatever the reasons (loss of power, hardware failure, etc.).

High Availability is required wherever any networks outage causes significant losses or disruptions to the service level. For example, organisations such as government offices, company headquarters, hospitals, utility companies, data centres, etc., all need their network to be always available and not be affected by network disruptions.

2. DrayTek High Availability

In DrayTek routers the **Common Address Redundancy Protocol (CARP)** is used for High Availability to allow multiple hosts on the same local area network to share a Virtual IP address. Through the Virtual IP address will be used to broadcast the MAC address of the secondary router when the primary router fails.



Below is a list of DrayTek routers supporting High Availability:

- Linux OS Routers: Vigor3900 and Vigor2960
- DrayOS Routers: Vigor2860, Vigor2862, Vigor2925, Vigor2926 Vigor2952 and Vigor3220



An essential requirement for High Availability when using DrayTek routers is that all member routers need to be identical. For example, if the primary router is a Vigor2925n then the secondary router must also be a Vigor2925n.



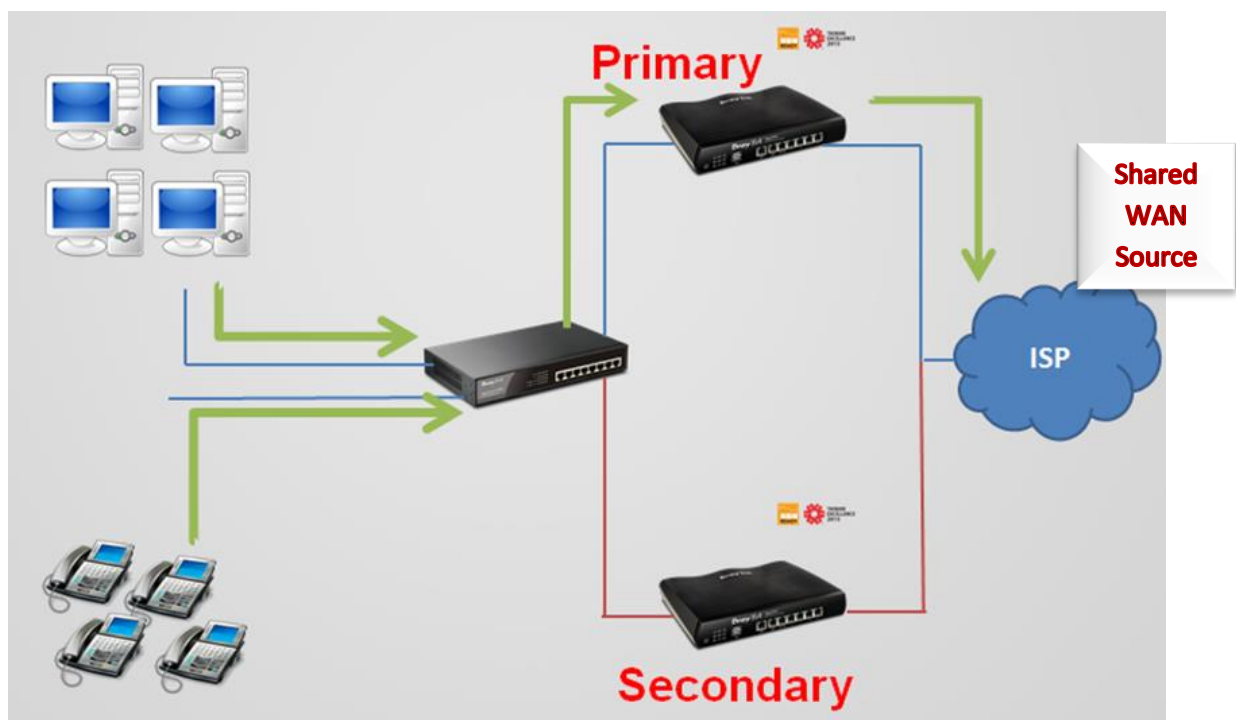
2.1 High Availability Redundancy Modes

There are two redundancy modes available: **Hot-Standby** and **Active-Standby**.

2.1.1 Hot-Standby Mode

With Hot-Standby mode, both primary and secondary routers share the same WAN source. To share the same WAN source, a modem with several Ethernet ports or a hub/switch is required. Normally only the primary router is online, when the Primary router goes down the Secondary router will come up and use the same WAN connection to connect to Internet. The Secondary router is always synchronised to the Primary router.

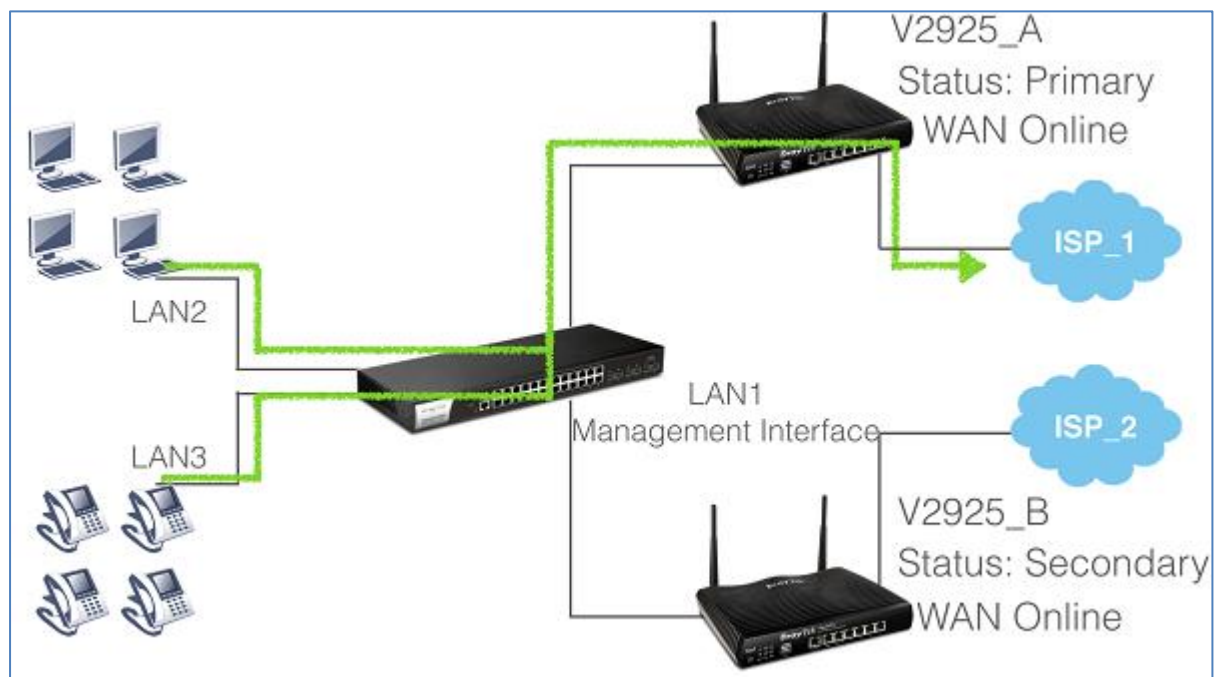
	WAN Source	Online Status	Configuration Sync
Hot-Standby	Primary and Secondary share the same WAN source. To share the same WAN source, a modem with several Ethernet ports or a hub/switch would be required.	Only Primary is online. When Primary goes down, Secondary comes up and use the same WAN line to dial up	Configuration Sync from Primary to Secondary



2.1.2 Active-Standby Mode

For Active-Standby Mode, the Primary and Secondary routers have different WAN sources. Both Primary and Secondary routers are online via their individual WAN connections, and the two routers are not synchronised in all parameters. All traffic is sent via the primary router and then will fail-over to the secondary router when the Primary router goes down.

WAN Source		Online Status	Configuration Sync
Active-Standby	Primary and Secondary have different WAN sources	Both Primary and Secondary are online via their own different WAN lines	No Configuration Sync



2.2 High Availability Group

A High Availability group consists of 1 primary router and 1 or more secondary router for redundancy. There can be up to 10 routers in a group, i.e., 1 primary router and 9 secondary routers. Each member router in the High Availability group has different LAN IP address, and a shared virtual IP address will be provided as gateway for the LAN clients. Only the primary router responds to the virtual IP address.

Routers within the same group must have the same **Group ID** value which can be a number between 1 and 255.

Applications >> High Availability

☒ Enable High Availability
 Redundant Method Active-Standby ▾

General Setup	Config Sync	Status	Set to Factory Default
Group ID	1 (1-255)		
Priority ID	10 (1-30)		
Authentication Key	draytek (Max. 31 characters allowed)		
Management Interface	LAN1 ▾		
Update DDNS	☐ Enable		

2.3 How Primary (Master) Router is Determined

Each router within a High Availability group must be configured with a unique **Priority ID** which can be a value from 1 to 30 where 1 is the lowest priority and 30 the highest priority.

The router with the highest priority will be treated as the primary router and routers within the High Availability group with a lower priority setting will become secondary routers.

DrayTek uses **DARP** (DrayTek Address Redundancy Protocol) for negotiation between routers. When multiple routers have the same priority then the router with lower LAN IP address will become the primary router. The LAN IP address is the address corresponding to the LAN selected for the Management Interface. In the example below, we have selected LAN 1 for the management interface so priority will be based on the IP address assigned for LAN 1 in the router.

Applications >> High Availability

☒ Enable High Availability
 Redundant Method Active-Standby ▾

General Setup	Config Sync	Status	Set to Factory Default
Group ID	1 (1-255)		
Priority ID	10 (1-30)		
Authentication Key	draytek (Max. 31 characters allowed)		
Management Interface	LAN1 ▾		
Update DDNS	☐ Enable		
Syslog	☐ Enable		

Index	Enable	Virtual IP
LAN1	☐	0.0.0.0
LAN2	☐	0.0.0.0
LAN3	☐	0.0.0.0
LAN4	☐	0.0.0.0

2.4 Security Setting

Enable security within the High Availability (HA) group by entering a common **Authentication Key** for all members in the High Availability group. This is a string up to a maximum of 31 characters.

The Authentication key encrypts the HA session communication to prevent malicious attacks.

Applications >> High Availability

☒ Enable High Availability

Redundant Method Active-Standby ▼

General Setup	Config Sync	Status	Set to Factory Default
Group ID	1 (1-255)		
Priority ID	10 (1-30)		
Authentication Key	draytek (Max. 31 characters allowed)		
Management Interface	LAN1 ▼		
Update DDNS	☐ Enable		

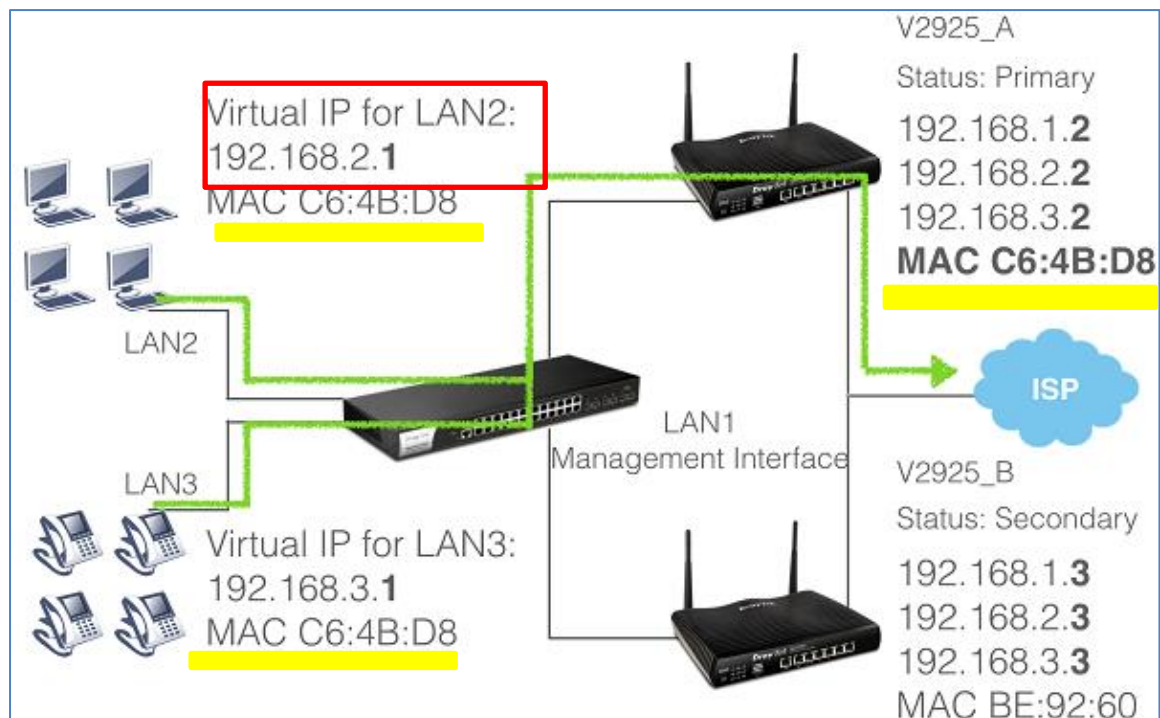
2.5 Virtual IP Address

A virtual IP address (VIP) is an IP address that doesn't correspond to an actual physical network interface (port) and is shared between all the routers in the High Availability group. This virtual IP address is used by all LAN clients in the network as the default gateway and it has the MAC address of the Primary router's LAN.

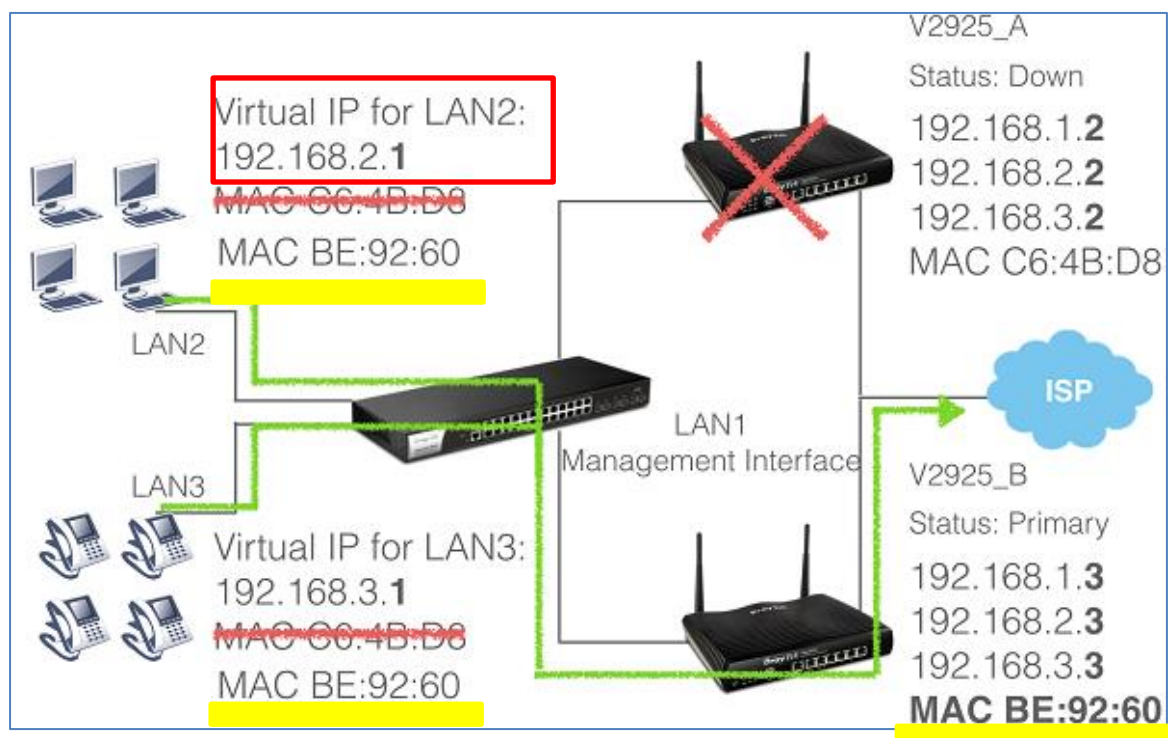
The LAN clients do not have to be re-configured with a new default gateway should the primary router fails. The LAN clients will only see a broadcast from the router to update the MAC address for the default gateway which is the virtual IP address. This results in minimum interruption for LAN clients.

In the diagram below, LAN 2 of the primary router has an IP address of 192.168.1.2 and the secondary router has a LAN 2 IP address of 192.168.2.3. With a Virtual IP address of 192.168.2.1 that is shared by both routers to provide a common gateway for the PC's on LAN 2.

When the Primary router is online, the Virtual IP address has the MAC address of the primary router LAN.



However, once the primary router goes down, the secondary router will become the primary and update the virtual IP address for LAN 2 with its LAN MAC address as shown in the diagram below:



You can check the MAC address for the Virtual IP address by running the command “**arp -a**” in the command prompt on the PC, as shown below. Note that the MAC address for 192.168.1.1 will change to the MAC address of the secondary when it becomes the primary router after failover.

V2925_A is Primary Router

```
DrayTek:~ HATest$ arp -a
? (192.168.1.1) at 0:1d:aa:c6:4b:d8 on en3 ifscope [ethernet]
? (192.168.1.2) at 0:1d:aa:c6:4b:d8 on en3 ifscope [ethernet]
? (192.168.1.3) at 0:1d:aa:be:92:60 on en3 ifscope [ethernet]
? (192.168.1.255) at ff:ff:ff:ff:ff:ff on en3 ifscope [ethernet]
```

Primary

V2925_B becomes Primary router after V2925_A goes down

```
DrayTek:~ HATest$ arp -a
? (192.168.1.1) at 0:1d:aa:be:92:60 on en3 ifscope [ethernet]
? (192.168.1.3) at 0:1d:aa:be:92:60 on en3 ifscope [ethernet]
? (192.168.1.255) at ff:ff:ff:ff:ff:ff on en3 ifscope [ethernet]
```

Primary

Once V2925_A comes online, it will then become the primary again V2925_B will go back to being the secondary router.

2.6 Synchronisation between Routers (Hot-Standby Mode only)

Every configuration or modification made on the primary router will be synchronised to other High Availability group member(s). This ensures that once the secondary router becomes the primary, there will be no disruption to network connectivity.

Below are configuration steps required to synchronise routers:

- Go to **Applications>> High Availability** configuration menu
- Enable “Config Sync” on both the primary and secondary routers. Note this is only supported in Hot-Standby mode.
- Set the “Config Sync Interval” (Day / Hour / Minute). This parameter specifies when the primary router will synchronise its configuration to secondary router.

Applications >> High Availability

☒ Enable High Availability
 Redundant Method Hot-Standby

General Setup | **Config Sync** | [Status](#) | [Set to Factory Default](#)

☒ Enable Config Sync (Max. Sync to 10 routers)
 Config Sync Interval:

Day 0
 Hour 0
 Minute 15

Note: Before ticking Enable Config Sync, do the following setting first.
 - Tick Enable High Availability
 - Set Redundant Method to Hot-Standby

OK Cancel

2.7 DDNS Update

For dynamic WAN IP users, High Availability group members can share the same DDNS account, so when the secondary router becomes the primary, the DDNS profile will also be updated. It allows the network to still be accessible via the same DDNS domain. To activate this feature, select **Enable** in the Update DDNS option, as shown below:

Applications >> High Availability

☒ Enable High Availability
 Redundant Method Hot-Standby

General Setup | **Config Sync** | [Status](#) | [Set to Factory Default](#)

Group ID 1 (1-255)
 Priority ID 10 (1-30)
 Authentication Key draytek (Max. 31 characters allowed)
 Management Interface LAN1

Update DDNS ☒ Enable
 Syslog ☐ Enable

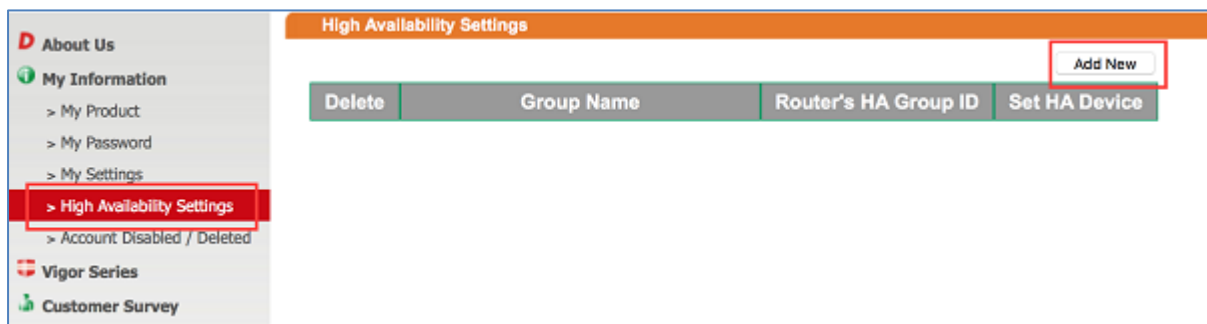
2.8 WCF License share (Hot-Standby only)

A feature of DrayTek's High Availability Hot Standby mode is that a single Web Content Filter (WCF) licence can be shared between all the members of the High Availability group. At any one time, only the primary router can use the licence, but if the primary fails and the secondary router takes over, it will register automatically to MyVigor and continue to provide web content filtering.

Configuration Steps to Share the WCF licence

Below are steps to configure to share a WCF license. You will need to create a group on MyVigor so the routers in the High Availability group can share the WCF license.

- Log into the web site: **myvigor.draytek.com**.
- Select **High Availability Settings** on left hand side and click Add New



- Give a Group Name, select an HA unused Group ID, and select the member routers in the HA Device drop-down menu:

Note: The drop-down menu only lists the devices that are registered to this MyVigor account.

- Save the profile, and you should see the group entry as below:

High Availability Settings			
Add New			
Delete	Group Name	Router's HA Group ID	Set HA Device
	DrayTek Headquarters	001	

2.9 Additional Parameters for Linux Based Routers

Linux based routers such as the Vigor3900, Vigor2960 and Vigor300B have additional parameters for High Availability mode.

2.9.1 Advance Preemption Mode – (Hot-Standby mode only)

The primary router takes back the Master role once it is up again.

- **Automatic:** primary router will take back the Master role once it recovers from the last failure.
- **Automatic Delayed:** Add the delay before the primary router takes back the Master role.
- **Manual:** The primary router won't take back the Master role automatically until administrator re-activates it manually.

The screenshot shows the DrayTek Vigor3900 Series web interface. The left sidebar contains a navigation menu with options like Auto Logout, Quick Start Wizard, Online Status, WAN, LAN, Routing, NAT, Firewall, Objects Setting, User Management, Applications, Dynamic DNS, GVRP, IGMP Proxy, UPnP, and High Availability (highlighted in red). The main content area is titled 'Applications >> High Availability >> High Availability Global Setup'. It features three tabs: 'High Availability Global Setup', 'Hot-Standby Profile Setup', and 'Active-Standby'. The 'High Availability Global Setup' tab is active, showing a configuration form. The form includes a checkbox for 'Enable High Availability' (checked), a 'Redundant Method' dropdown set to 'Hot Standby', an 'Authentication Key' text field containing 'draytek', and an 'Advance Preemption Mode' dropdown set to 'Immediate' (highlighted with a red box). Below these are 'WAN Connection Status Detection' and 'LAN Port Status Detection' dropdowns, both set to 'Immediate'.

2.9.2 LAN Port Detection Mode

The primary (Master) router will detect if there is malfunction on LANs automatically. This function will force the master router to failover to other backups if any failure of LAN is detected.

There are two options for LAN Port Detection:

- **At Least One UP:** The primary router will check if any LAN Port Members in its HA LAN Profiles are up and will go offline and bring up the secondary router if all LAN interfaces are down.
- **All Must Be UP:** The primary router will check if all LAN Port Members in its HA LAN Profiles are up and will go offline and bring up the secondary router if any LAN interface is down.

While selecting this mode, it is necessary to remove any unused LAN port connections otherwise they will trigger the Failover mode.

Applications >> High Availability >> High Availability Global Setup

High Availability Global Setup | Hot-Standby Profile Setup | Active-Standby P

☒ Enable High Availability

Redundant Method : Hot Standby

Authentication Key : draytek

Advance Preemption Mode : Immediate

WAN Connection Status Detection : ☐ Enable ☒ Disable

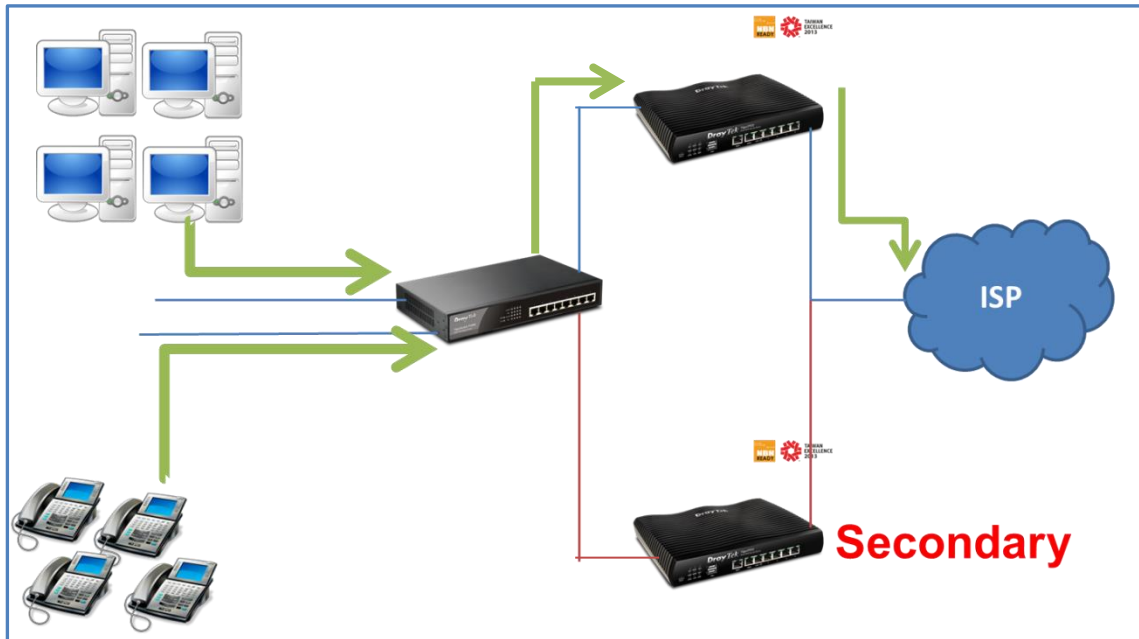
LAN Port Status Detection : At Least One Up

Disable
At Least One Up
All Must Be Up

3. High Availability Demonstration

The video demonstration is available on YouTube at: https://youtu.be/a_Nmg3ACNQg

The topology used in the demonstration is shown in the diagram below. We have setup two Vigor2925 routers and a VigorSwitch G2260 to provide communication between the two routers. The routers share a common Internet WAN connection.



In the demonstration we ping the google DNS and show a line graph monitoring the response time. The Primary router is switched off to simulate a router failure. The secondary router will detect that the primary router has gone down and will take over and maintain network connectivity. The Failover process takes approximately 3 seconds.

Once the primary router returns online, the secondary router will go into Standby mode and network connectivity is restored through the primary router. The recovery process takes proximately one second.

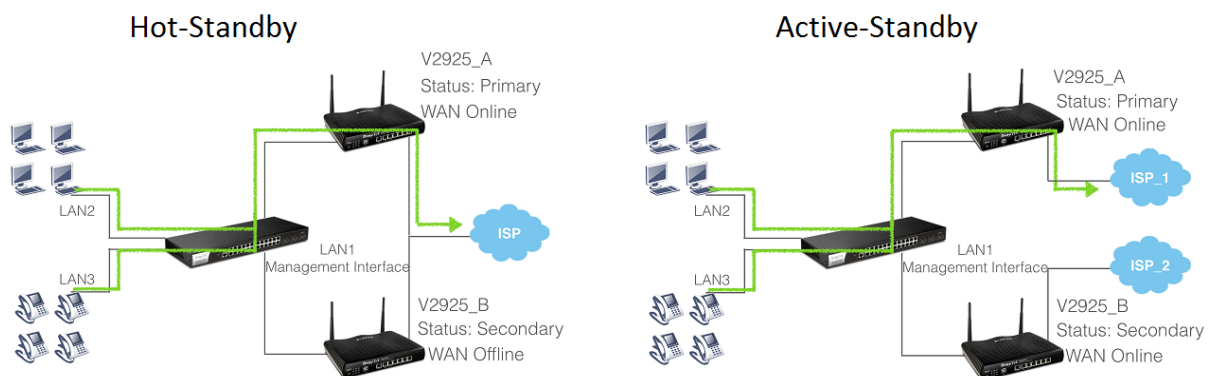
4. Configuring High Availability

The basic steps to configure High Availability on two or more DrayTek routers are:

- Enable High Availability on the primary and secondary routers.
- Set a higher Priority ID number on the primary router and lower numbers for the secondary router(s).
- Set the same Redundancy Method/Group ID/Authentication Key on the primary and secondary routers.
- Set the Management Interface to the same subnet for the primary and secondary routers.
- Enable Virtual IP on the primary and secondary routers for each subnet in use and set the same Virtual IP on each router.

4.1 Configuring High Availability in DrayOS Routers

High Availability provides hardware redundancy to the LAN clients. There are two modes for High Availability modes for DrayTek routers: Hot-Standby and Active-Standby. The instructions below are for Hot-Standby High Availability mode.



1. On the primary router, choose Redundancy Method (Hot Standby), and then configure the following:

- Group ID** is used to identify who are the group members, enter the same ID on all the members. The default value is 1; you can leave it as default.
- Priority ID** is used to decide which router should be the primary one, and 30 is the highest. If 2 or more routers are having the same Priority ID, the lower LAN IP addresses (for management Interface) will have higher priority, e.g., 192.168.1.2 has higher priority than 192.168.1.3.
- Authentication Key**: enter the same authentication key for all the members.
- Management Interface**: the packets for communication (deciding the primary, configuration sync, and some maintenance, etc.) between members will be sent in the Management Interface. Clients in other LAN subnet won't be able to see these packets. You should choose an interface that is least possible to have interruption for the communication (loop/broadcast storm from other LAN clients, etc.). In the example, LAN 1 is reserved for High Availability only, and all other LAN clients are placed in LAN2 ~ LAN5.

- e) **Update DDNS:** for dynamic WAN IP users, enable Update DDNS so once the secondary router becomes primary, it will update its new WAN IP address to the same DDNS profile, so your network will be accessible with the same DDNS domain.
- f) **Syslog:** enable to show all the High Availability related logs in syslog.
- g) Enable the LAN Subnet to join High Availability. Any existing LAN without joining High Availability will not be included for hardware redundancy.
- h) **Virtual IP:** Enter the virtual IP address here for each LAN. Note that the virtual IP can NOT be the same as any other member LAN IP.

Applications >> High Availability

☒ **Enable High Availability**

Redundancy Method Hot-Standby

General Setup | **Config Sync** | **Status** | **Set to Factory Default**

a. Group ID 1 (1-255)

b. Priority ID 15 (1-30)

c. Authentication Key draytek (Max. 31 characters allowed)

d. Management Interface LAN1

e. Update DDNS ☒ Enable

f. Syslog ☒ Enable

g.

Index	Enable	Virtual IP
LAN1	☒	192.168.1.1
LAN2	☒	192.168.2.1
LAN3	☒	192.168.3.1
LAN4	☒	192.168.4.1
LAN5	☒	192.168.5.1
DMZ	☐	0.0.0.0

2. Enable Configuration Sync and set the Sync Interval. Default is every 15 minutes.

General Setup | **Config Sync** | **Status** | **Set to Factory Default**

☒ **Enable Config Sync (Max. Sync to 10 routers)**

Config Sync Interval:

Day 0

Hour 0

Minute 15

5. Configure High Availability on the secondary router. Note that the Priority should be lower than the primary router. Besides priority, all other settings should be the same.

☒ **Enable High Availability**

Redundancy Method Hot-Standby

General Setup | **Config Sync** | **Status** | **Set to Factory Default**

Group ID 1 (1-255)

Priority ID 10 (1-30)

Authentication Key draytek (Max. 31 characters allowed)

Management Interface LAN1

Update DDNS ☒ Enable

Syslog ☒ Enable

Index	Enable	Virtual IP
LAN1	☒	192.168.1.1
LAN2	☒	192.168.2.1
LAN3	☒	192.168.3.1
LAN4	☒	192.168.4.1
LAN5	☒	192.168.5.1
DMZ	☐	0.0.0.0

4. Configure the LAN on the primary router. Set up the LAN IP address to be different from the Virtual IP and the LAN IP of secondary router. Again, for any routers with the same Priority ID, their IP addresses will be compared, so you should use an IP with a lower number for the router with higher priority.

Gateway IP is the same as the LAN IP. The note in parentheses indicates that the gateway IP provided to LAN clients will be replaced by the Virtual IP.

LAN >> General Setup

LAN 1 Ethernet TCP / IP and DHCP Setup | **LAN 1 IPv6 Setup**

Network Configuration
For NAT Usage

IP Address 192.168.1.2 **a.**

Subnet Mask 255.255.255.0

RIP Protocol Control Disable

DHCP Server Configuration

☒ Enable Server ☐ Disable Server

☐ Enable Relay Agent

Start IP Address 192.168.1.10

IP Pool Counts 200

Gateway IP Address 192.168.1.2 **b.**
(Replaced by HA Virtual IP 192.168.1.1)

Lease Time 86400 (s)

☒ Clear DHCP lease for inactive clients periodically

DNS Server IP Address

Primary IP Address 8.8.8.8

Secondary IP Address 8.8.4.4

- 5. Configure LAN on the secondary router. Note that the IP should be different and larger than the one for the primary router.

LAN >> General Setup

LAN 1 Ethernet TCP / IP and DHCP Setup

LAN 1 IPv6 Setup

Network Configuration
For NAT Usage

IP Address192.168.1.3

Subnet Mask255.255.255.0

RIP Protocol ControlDisable

DHCP Server Configuration

Enable Server

Disable Server

Enable Relay Agent

Start IP Address192.168.1.10

IP Pool Counts200

Gateway IP Address192.168.1.3
(Replaced by HA Virtual IP 192.168.1.1)

Lease Time86400(s)

Clear DHCP lease for inactive clients periodically

DNS Server IP Address

Primary IP Address8.8.8.8

Secondary IP Address8.8.4.4

Note: If you have more than one LAN, you should configure the LAN IP address for each LAN on the primary and secondary routers to different IP addresses to avoid IP conflicts. In the example below there are several LANs and a unique LAN IP address is assigned to each LAN for the primary and for the secondary routers.

	Subnet	Primary Router	Secondary Router	Virtual IP
LAN1	192.168.1.0	192.168.1.2	192.168.1.3	192.168.1.1
LAN2	192.168.2.0	192.168.2.2	192.168.2.3	192.168.2.1
LAN3	192.168.3.0	192.168.3.2	192.168.3.3	192.168.3.1
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
LANx	192.168.x.0	192.168.x.2	192.168.x.3	192.168.x.1

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6. Configure the WAN Interface in the primary router.

WAN >> Internet Access

WAN 1

PPPoE	Static or Dynamic IP	PPTP/L2TP	IPv6
☒ Enable ☐ Disable			
Keep WAN Connection ☐ Enable PING to keep alive PING to the IP: PING Interval: 0 minute(s)		WAN IP Network Settings WAN IP Alias ☐ Obtain an IP address automatically Router Name: Vigor * Domain Name: * ☐ DHCP Client Identifier * Username: Password:	
WAN Connection Detection Mode: ARP Detect		☒ Specify an IP address IP Address: 100.100.100.100 Subnet Mask: 255.255.255.0 Gateway IP Address: 100.100.100.1	
MTU 1492 (Max:1500) Path MTU Discovery: Detect			

- Confirm the WAN configuration is correct by checking the online status of the router.

System Information			
Model Name	Vigor2925Vn	System Up Time	0:06:8
Router Name	V2925_A	Current Time	2015 Oct 19 Mon 11:37:19
Firmware Version	3.8.2	Build Date/Time	Oct 14 2015 21:25:18
LAN MAC Address	00-1D-AA-C6-4B-D8		

IPv4 Internet Access				
	Line / Mode	IP Address	MAC Address	Up Time
WAN1	Ethernet / Static IP	100.100.100.100	00-1D-AA-C6-4B-D9	00:04:11
WAN2	Ethernet / Static IP	200.200.200.200	00-1D-AA-C6-4B-DA	00:03:47
WAN3	USB / ---	Disconnected	00-1D-AA-C6-4B-DB	00:00:00
WAN4	USB / ---	Disconnected	00-1D-AA-C6-4B-DC	00:00:00

- Assign the Management Interface LAN so both routers can detect each other.

Since the routers will communicate via the **Management Interface**, it is necessary to use the ports that belong to the Management Interface LAN (LAN1 in this scenario). This is configured in **LAN >> VLAN Configuration** menu. In this example we use the port 5 on both routers.

- Select the Management Interface (LAN port 5) on each router by UTP Ethernet cable.

LAN >> VLAN Configuration

VLAN Configuration

☒ Enable

	LAN					Wireless LAN				Subnet	VLAN Tag		
	P1	P2	P3	P4	P5	SSID1	SSID2	SSID3	SSID4		Enable	VID	Priority
VLAN0	☒	☒	☒	☒	☒	☒	☐	☐	☐	LAN 1	☐	0	0
VLAN1	☐	☒	☒	☒	☐	☐	☒	☐	☐	LAN 2	☒	200	0
VLAN2	☐	☒	☒	☒	☐	☐	☐	☒	☐	LAN 3	☒	300	0
VLAN3	☐	☒	☒	☒	☐	☐	☐	☐	☒	LAN 4	☒	400	0
VLAN4	☐	☒	☒	☒	☐	☐	☐	☐	☐	LAN 5	☒	500	0
VLAN5	☐	☐	☐	☐	☐	☐	☐	☐	☐	LAN 1	☐	0	0
VLAN6	☐	☐	☐	☐	☐	☐	☐	☐	☐	LAN 1	☐	0	0
VLAN7	☐	☐	☐	☐	☐	☐	☐	☐	☐	LAN 1	☐	0	0

7. Check the High Availability status by visiting the Status page:

Applications >> High Availability

☒ Enable High Availability

Redundancy Method Hot-Standby

General Setup **Config Sync** **Status** **Set to Factory Default**

Group ID	1 (1-255)
Priority ID	15 (1-30)
Authentication Key	draytek (Max. 31 characters allowed)
Management Interface	LAN1
<u>Update DDNS</u>	☒ Enable
Syslog	☒ Enable

The first time the two routers link up, you will notice that they are syncing the configuration from the primary to the secondary (showing "Progressing" on the secondary router).

Diagnostics >> High Availability Status

[Details](#) [HA Setup](#) [Renew](#) [Refresh](#)

Status	Router Name	IPv4	State	Stable	WAN	Config Sync Status	Cached Time
●	V2925_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-
●	V2925_B	192.168.1.3	Secondary	Yes	All WANs Down	Progressing	5 min up

Note: The "Cached Time" indicates the time interval between router synchronisation. Click "Renew" to update the information of remote router, and "Refresh" to update the information of local router.

When the synchronisation is completed or if the routers already have the same configuration, the status will change to "Equal" status.

Diagnostics >> High Availability Status								
Details HA Setup Renew Refresh								
Status	Router Name	IPv4	State	Stable	WAN	Config Sync Status	Cached Time	
	V2925_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-	
	V2925_B	192.168.1.3	Secondary	Yes	All WANs Down	Equal	3 min 6 sec	

Note: The secondary router will re-check if re-synchronisation is required at the end of the cached Time interval. To force to synchronisation, click on the "Sync" button. The secondary router will reboot after synchronising the configuration.

Check if the secondary router received the configuration from the primary router. In this scenario we check the secondary router online status:

System Information			
Model Name	Vigor2925Vn	System Up Time	0:01:13
Router Name	V2925_B	Current Time	2015 Oct 19 Mon 11:40:29
Firmware Version	3.8.2	Build Date/Time	Oct 14 2015 21:25:18
LAN MAC Address	00-1D-AA-BE-92-60		

IPv4 Internet Access				
	Line / Mode	IP Address	MAC Address	Up Time
WAN1	Ethernet / Static IP	Disconnected-HA	00-1D-AA-BE-92-61	00:00:00
WAN2	Ethernet / Static IP	Disconnected-HA	00-1D-AA-BE-92-62	00:00:00
WAN3	USB / ---	Disconnected-HA	00-1D-AA-BE-92-63	00:00:00
WAN4	USB / ---	Disconnected-HA	00-1D-AA-BE-92-64	00:00:00

If WAN 1 or WAN 2 in the secondary router was not configured prior to synchronisation, you should notice the settings changed. e.g., WAN1 and WAN2 will show "Static IP" as in the diagram above.

"Disconnected-HA" means this router is not connecting to the Internet since it is in standby mode.

8. Check the Details page for additional status information, as shown below:

Diagnostics >> High Availability Status >> Details

[Local Router]

Back

HA Setup

Renew

Refresh

V2925_A

192.168.1.2

State	Stable	WAN	Config Sync Status	Cached Time
Primary	Yes	At Least One Up - Eth	Ready Sync	-
MAC	00:1d:aa:c6:4b:d8		HTTPs Port	4430
Model	Vigor2925Vn		Firmware Version	3.8.2
Enable High Availability	On		Redundancy Method	Hot-Standby
Group ID	1		Priority ID	15
Authentication Key	draytek		Management Interface	LAN1
Update DDNS	On			
Virtual IP	On	LAN1	192.168.1.1	
		LAN2	192.168.2.1	
		LAN3	192.168.3.1	
		LAN4	192.168.4.1	
		LAN5	192.168.5.1	
Enable Config Sync	On		Config Sync Interval	0 Day 0 Hour 15 Minute

[Other Router]

Secondary

V2925_B

192.168.1.3

State	Stable	WAN	Config Sync Status	Cached Time
Secondary	Yes	All WANs Down !	Progressing	5 min up
MAC	00:1d:aa:be:92:60		HTTPs Port	4430
Model	Vigor2925Vn		Firmware Version	3.8.2
Enable High Availability	On		Redundancy Method	Hot-Standby
Group ID	1		Priority ID	10
Authentication Key	draytek		Management Interface	LAN1
Update DDNS	Off			
Virtual IP	On	LAN1	192.168.1.1	
		LAN2	192.168.2.1	
		LAN3	192.168.3.1	
		LAN4	192.168.4.1	
		LAN5	192.168.5.1	
Enable Config Sync	On		Config Sync Interval	0 Day 0 Hour 15 Minute

4.2 Configuring High Availability in Vigor3900 (Linux based Router)

For Linux based Draytek routers: Vigor3900, Vigor2960 and Vigor300B, High Availability works as below (for firmware versions 1.2.0 and above):

- Only one device has the HA profile.
- Use Priority ID instead of "Primary" or "Secondary" role. (Priority ID 1 means the device is having the highest priority.)
- While doing firmware upgrade on the Master device, Slave will upgrade to the same firmware version automatically.

Below are steps to set up High Availability using Hot-Standby mode.

Scenario: LAN1 and LAN2 have Internet Access through the Master device. When Master detects LAN or WAN fails, both LAN1 and LAN2 will have Internet Access through the Backup device.

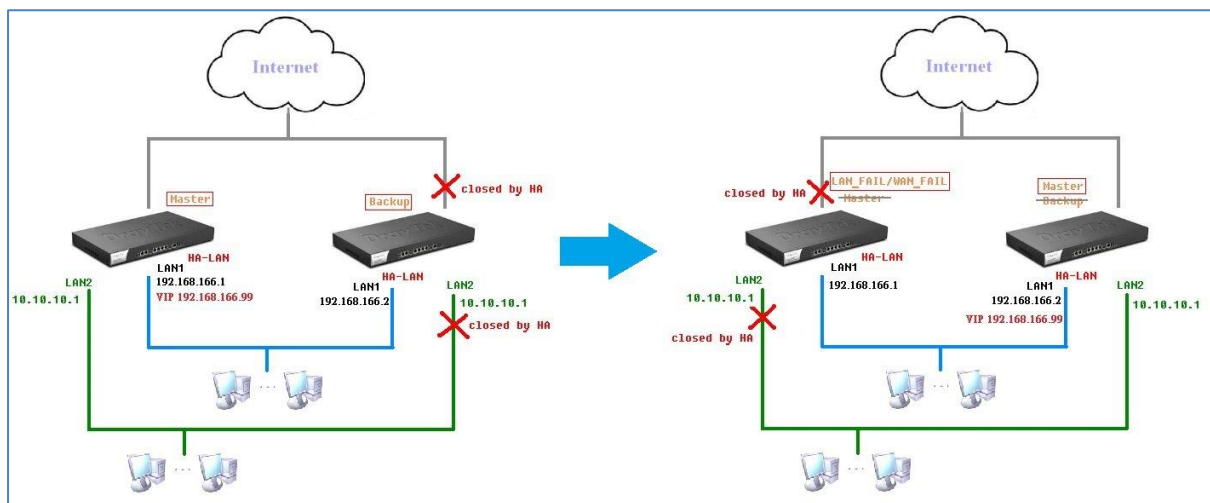
Before configuring High Availability, we need to setup LAN profiles and the LAN VLAN ID configurations on each router by following rules:

3. The LAN profile name and LAN VLAN ID of corresponding LAN between different routers must be the same.
3. The LAN profile IP address of HA LAN on each router must NOT be the same.
3. The LAN profile IP address except HA LAN on each router must be the same.

For example:

Router A: LAN1(HA-LAN)-192.168.166.1 LAN2-10.10.10.1

Router B: LAN1(HA-LAN)-192.168.166.2 LAN2-10.10.10.1



(On Vigor3900 - Master Setup)

1. Go to **Applications >> High Availability >> Hot-Standby Profile Setup** page.
 - a) Select lan1 for HA LAN Profile.
 - b) Input Priority ID as 1 which is the highest priority.
 - c) Input Virtual IP 192.168.166.99 for Gateway. (Virtual IP should be an IP in lan1 network).
 - d) Input Group ID 100. (The other Vigor3900 should have same Group ID), then click Apply.

The screenshot shows the 'Applications >> High Availability >> Hot-Standby Profile Setup' page. It features four tabs: 'High Availability Global Setup', 'Hot-Standby Profile Setup' (selected), 'Active-Standby Profile Setup', and 'HA Status'. The configuration fields are as follows:

HA LAN Profile :	lan1	
Priority ID :	1	1 has highest priority
Virtual IP for Gateway :	192.168.166.99	
Group ID :	100	
HA Status :	Master	

2. Go to **Applications >> High Availability >> Hot-Standby Global Setup** page.

- a) Check Enable High Availability.
- b) Select Hot-Standby as the Redundant Method.
- c) Input Authentication Key (the other Vigor3900 should have the same Authentication Key, otherwise the configuration synchronization will fail.)
- d) Select Immediate as the Advance Preemption Mode.
- e) Select Enable for WAN Connection Status Detection.
- f) Select At Least One Up for LAN Port Status Detection

The screenshot shows the 'Applications >> High Availability >> High Availability Global Setup' page. It features four tabs: 'High Availability Global Setup' (selected), 'Hot-Standby Profile Setup', 'Active-Standby Profile Setup', and 'HA Status'. The configuration fields are as follows:

☒ Enable High Availability	
Redundant Method :	Hot Standby
Authentication Key :	654321
Advance Preemption Mode :	Immediate
WAN Connection Status Detection :	☒ Enable ☐ Disable
LAN Port Status Detection :	At Least One Up

(On Vigor3900 - Slave Setup)

3. Go to **LAN >> General Setup >> lan1 profile** (the HA LAN profile) to change the IP Address. The LAN IP should be different from Vigor3900-Master.

The screenshot shows the 'General Setup' window for the 'lan1' profile. The settings are as follows:

- Profile (max length:7): lan1
- ☒ Enable
- Description: (Optional)
- VLAN ID: 10
- Priority(802.1p): 0
- Default MAC Address: ☒ Enable ☐ Disable
- MAC Address: 00:50:7f:ff:39:12
- IPv4 Protocol: static
- Mode: NAT (Note: If choose ROUTING mode, packets will not do NAT operation at any WAN sides)
- IP Address: 192.168.166.2
- Subnet Mask: 255.255.255.0/24
- Connection Detection Mode: None

Note: Only set the Master and Slave routers to different IP addresses on the LAN of management interface, the IP addresses of the rest of the LANs should be set to the same on both routers. Below is an example list with LAN1 as the Management Interface:

LAN	Subnet	Master Router	Slave Router
LAN1 Management Interface	192.168.1.0	192.168.1.1	192.168.1.2
LAN2	192.168.2.0	192.168.2.1	192.168.2.1
LAN3	192.168.3.0	192.168.3.1	192.168.3.1
.	.	.	.
LANx	192.168.x.0	192.168.x.1	192.168.x.1

6. Go to **Applications >> High Availability >> Hot-Standby Profile Setup** page.

- Select lan1 for HA LAN Profile.
- Enter Priority ID 2 (the other Vigor3900 is already configured with Priority ID 1).
- Enter the Virtual IP address 192.168.166.99 for the Gateway. (Virtual IP should be the same as the Virtual IP set up on the other Vigor3900.)
- Enter Group ID 100 (this should be the same as the Group ID on the Master Vigor3900) and click Apply.

The screenshot shows the 'Applications >> High Availability >> Hot-Standby Profile Setup' page. It contains the following fields and values:

Field	Value	Notes
HA LAN Profile :	lan1	
Priority ID :	2	1 has highest priority
Virtual IP for Gateway :	192.168.166.99	
Group ID :	100	
HA Status :	Backup	

5. Go to **Applications >> High Availability >> Hot-Standby Global Setup** page.

- Check to Enable High Availability.
- Select **Hot-Standby** as the Redundant Method.
- Input Authentication Key. (The Authentication Key should be the same as the other Vigor3900; otherwise the config synchronization will fail.)
- Select **Immediate** as the Advance Preemption Mode.
- Select Disable for WAN Connection Status Detection. (In Hot-Standby mode, Master and Slave router share the same Internet connection, so as to ensure Slave device will keep Inter-LAN working when WAN connection is really failed.)
- Select Disable for LAN Port Status Detection.

The screenshot shows the 'Applications >> High Availability >> High Availability Global Setup' page. It contains the following fields and values:

Field	Value
☒ Enable High Availability	
Redundant Method :	Hot Standby
Authentication Key :	654321
Advance Preemption Mode :	Immediate
WAN Connection Status Detection :	☐ Enable ☒ Disable
LAN Port Status Detection :	Disable

6. After completing above configuration, we can connect Vigor3900 Slave's LAN to Vigor3900 Master's LAN, then configure synchronization will start. Slave will backup and restore the whole Master configurations except for LAN IP, HA configurations, Administrator Password, and Router Name. Do not connect the WAN on the Vigor3900 Slave at this stage.

7. After configuration is synchronized, Slave will restart. Check the HA Status in the **Applications >> High Availability >> HA Status** page.

Applications >> High Availability >> HA Status

High Availability Global Setup Hot-Standby Profile Setup Active-Standby Profile Setup HA Status

Auto Refresh: 10 Seconds Renew

	Group ID	Priority ID	IP	Router Name	Redundant Method	HA Status	Detail
1	100	1	192.168.166.1	2960_vivian_1	Hot-Standby	Master	
2	100	2	192.168.166.2	2960_vivian2	Hot-Standby	Backup	

By clicking the Detail button, you can see more device information.

Applications >> High Availability >> HA Status

High Availability Global Setup Hot-Standby Profile Setup Active-Standby Profile Setup HA Status

Auto Refresh: 10 Seconds Renew

	Group ID	Priority ID	IP	Router Name	Redundant Method	HA Status	Detail
1	100	1			Hot-Standby	Master	
2	100	2			Hot-Standby	Backup	

Detail

Group ID : 100
Priority ID : 2
IP : 192.168.166.2
Router Name : 2960_vivian2
Redundant Method : Hot-Standby
HA Status : Backup
MAC : 00:50:7f:ff:39:12
Firmware Revision : 5616
HA-LAN Profile : lan1
Virtual IP : 192.168.166.99
Sync Status : Equal
WAN Status : All WANs Down

OK

8. In the event of a WAN or LAN Fail event, or if the Master Vigor3900 is powered off, the Vigor3900 with Priority ID 2 will become the Master.

Applications >> High Availability >> HA Status

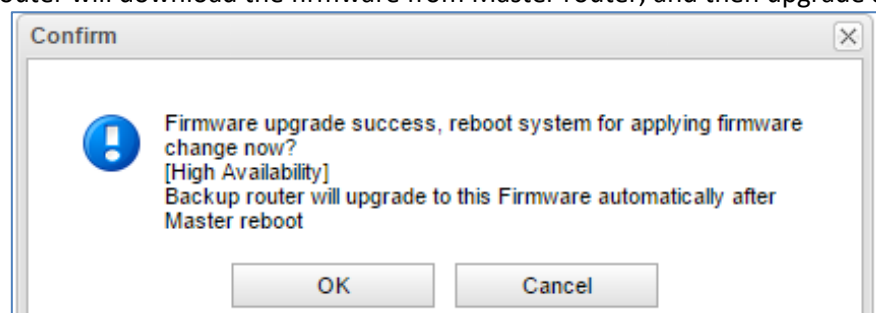
High Availability Global Setup Hot-Standby Profile Setup Active-Standby Profile Setup HA Status

Auto Refresh: 10 Seconds Renew

	Group ID	Priority ID	IP	Router Name	Redundant Method	HA Status	Detail
1	100	1	192.168.166.1	2960_vivian_1	Hot-Standby	WAN_Failed	
2	100	2	192.168.166.2	2960_vivian_2	Hot-Standby	Master	

9. When upgrading the firmware version of the Master Vigor3900, the Backup router will upgrade to the same firmware version automatically. The process is:

- Master reboots for applying new firmware.
- Master is up and exchanges HA information with the backup router.
- Backup router finds firmware version is not equal.
- Backup router will download the firmware from Master router, and then upgrade automatically.



4.3 Checking High Availability Status

4.3.1 DrayOS Routers

All of the routers within the same High Availability Group - DARP (DrayTek Address Resolution Protocol) - can be monitored within the High Availability Status menu page.

For the routers to be displayed they need to be part of the same DARP group conforming to the conditions below:

- HA enabled.
- Use the same Redundancy method.
- Have the same Group ID.
- Have the same Authentication Key.
- Have the same Management Interface.

To check the High Availability status, go to **Diagnostics >> High Availability Status** menu, or click on the Status link in **Applications>>High Availability** configuration page.

Applications >> High Availability

☒ Enable High Availability

Redundancy Method Hot-Standby

General Setup **Config Sync** **Status** **Set to Factory Default**

Group ID 1 (1-255)

Priority ID 15 (1-30)

Authentication Key draytek (Max. 31 characters allowed)

Management Interface LAN1

Update DDNS ☒ Enable

Syslog ☒ Enable

The first time the two routers link up, you will notice that they are syncing the configuration from the primary to the secondary (showing "Progressing" on the secondary router).

Diagnostics >> High Availability Status

[Details](#) [HA Setup](#) [Renew](#) [Refresh](#)

Status	Router Name	IPv4	State	Stable	WAN	Config Sync Status	Cached Time
O	V2925_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-
O	V2925_B	192.168.1.3	Secondary	Yes	All WANs Down	Progressing	5 min up

Note: The "Cached Time" indicates the time interval between router synchronisation. Click "Renew" to update the information of remote router or click "Refresh" to update the information of local router.

When the synchronisation is completed or if the routers already have the same configuration, the status will change to "Equal" status.

Diagnostics >> High Availability Status								
Details HA Setup Renew Refresh								
Status	Router Name	IPv4	State	Stable	WAN	Config Sync Status	Cached Time	
	V2925_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-	
	V2925_B	192.168.1.3	Secondary	Yes	All WANs Down	Equal	3 min 6 sec	

Note: The secondary router will re-check if re-synchronisation is required at the end of the cached Time interval. To force to synchronisation, click on the "Sync" button. The secondary router will reboot after synchronising the configuration.

To check if the secondary router received the configuration from the primary router, go to the secondary router's online status page:

System Information			
Model Name	Vigor2925Vn	System Up Time	0:01:13
Router Name	V2925_B	Current Time	2015 Oct 19 Mon 11:40:29
Firmware Version	3.8.2	Build Date/Time	Oct 14 2015 21:25:18
LAN MAC Address	00-1D-AA-BE-92-60		

IPv4 Internet Access				
	Line / Mode	IP Address	MAC Address	Up Time
WAN1	Ethernet / Static IP	Disconnected-HA	00-1D-AA-BE-92-61	00:00:00
WAN2	Ethernet / Static IP	Disconnected-HA	00-1D-AA-BE-92-62	00:00:00
WAN3	USB / ---	Disconnected-HA	00-1D-AA-BE-92-63	00:00:00
WAN4	USB / ---	Disconnected-HA	00-1D-AA-BE-92-64	00:00:00

If WAN 1 or WAN 2 in the secondary router is not configured prior to synchronisation, you should notice the settings changed. e.g., WAN1 and WAN2 will show "Static IP" as in the diagram above.

"Disconnected-HA" means this router is not connecting to the Internet since it is in Standby mode.

4.3.1.1 Checking High Availability Status Details (DrayOS Routers)

Go to **Diagnostics >> High Availability** Status page in the router and click on the **Details** link to view the High Availability Status details of the routers.

Diagnostics >> High Availability Status >> Details

[Local Router]		Back HA Setup Renew Refresh		
V2925_A		192.168.1.2		
State	Stable	WAN	Config Sync Status	Cached Time
Primary	Yes	At Least One Up - Eth	Ready Sync	-
MAC	00:1d:aa:c6:4b:d8		HTTPs Port	4430
Model	Vigor2925Vn		Firmware Version	3.8.2
Enable High Availability	On		Redundancy Method	Hot-Standby
Group ID	1		Priority ID	15
Authentication Key	draytek		Management Interface	LAN1
Update DDNS	On			
Virtual IP	On	LAN1	192.168.1.1	
		LAN2	192.168.2.1	
		LAN3	192.168.3.1	
		LAN4	192.168.4.1	
		LAN5	192.168.5.1	
Enable Config Sync	On		Config Sync Interval	0 Day 0 Hour 15 Minute

[Other Router]				
Secondary				
V2925_B		192.168.1.3		
State	Stable	WAN	Config Sync Status	Cached Time
Secondary	Yes	All WANs Down !	Progressing	5 min up
MAC	00:1d:aa:be:92:60		HTTPs Port	4430
Model	Vigor2925Vn		Firmware Version	3.8.2
Enable High Availability	On		Redundancy Method	Hot-Standby
Group ID	1		Priority ID	10
Authentication Key	draytek		Management Interface	LAN1
Update DDNS	Off			
Virtual IP	On	LAN1	192.168.1.1	
		LAN2	192.168.2.1	
		LAN3	192.168.3.1	
		LAN4	192.168.4.1	
		LAN5	192.168.5.1	
Enable Config Sync	On		Config Sync Interval	0 Day 0 Hour 15 Minute

4.3.2 Checking High Availability Status for Linux based Routers

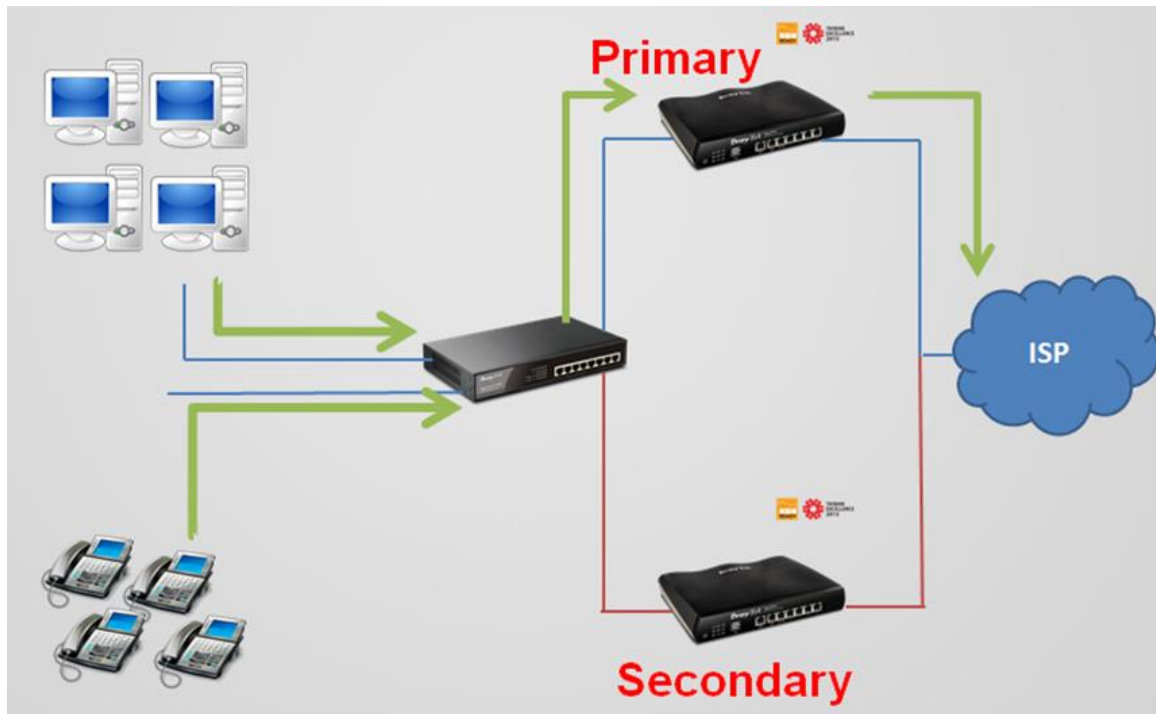
For Linux based routers, i.e. Vigor2960 and Vigor3900 check the High Availability Status in **Applications >> High Availability >> HA Status** page.

High Availability Global Setup Hot-Standby Profile Setup Active-Standby Profile Setup HA Status							
Auto Refresh : 10 Seconds Renew							
	Group ID	Priority ID	IP	Router Name	Redundant Method	HA Status	Detail
1	100	1	192.168.166.1	2960_vivian_1	Hot-Standby	WAN_Failed	
2	100	2	192.168.166.2	2960_vivian_2	Hot-Standby	Master	

5.0 Exercises

5.1 Configure High Availability using DrayOS Routers

For this exercise we will use two identical routers: Vigor2926 series routers.



Configure the Primary Router

Plug-in one of the LAN ports to your computer to setup the WAN1 and the IP address of the router for the High Availability configuration



(Note: Diagram is for Vigor2925 but also applies to Vigor2926 router)

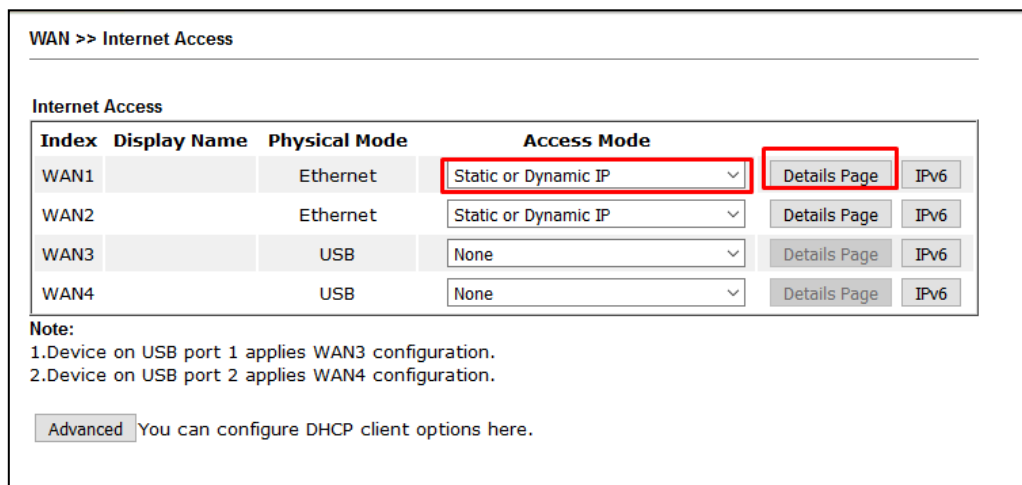
Using your web browser, login to the router using its default IP address 192.168.1.1



The image shows the login page for a DrayTek Vigor2926 Series router. At the top, there is a red banner with the DrayTek logo and the text "Vigor2926 Series". Below the banner, the word "Login" is displayed in a black box. The login form consists of two input fields: "Username" with the value "admin" and "Password" with four dots. A "Login" button is located below the password field. At the bottom, there is a copyright notice: "Copyright © 2000-2017 DrayTek Corp. All Rights Reserved."

WAN Configuration

- Go to **WAN >> Internet Access** and for Access Mode select "Static or Dynamic IP" from the pull-down menu. Then click on "Details Page" button.



The image shows the "WAN >> Internet Access" configuration page. It features a table with columns: Index, Display Name, Physical Mode, Access Mode, and buttons for "Details Page" and "IPv6". The "Access Mode" for WAN1 and WAN2 is set to "Static or Dynamic IP", while WAN3 and WAN4 are set to "None". A "Note" section provides additional information about USB ports. An "Advanced" button is also present.

Index	Display Name	Physical Mode	Access Mode	Details Page	IPv6
WAN1		Ethernet	Static or Dynamic IP	Details Page	IPv6
WAN2		Ethernet	Static or Dynamic IP	Details Page	IPv6
WAN3		USB	None	Details Page	IPv6
WAN4		USB	None	Details Page	IPv6

Note:
1. Device on USB port 1 applies WAN3 configuration.
2. Device on USB port 2 applies WAN4 configuration.

Advanced You can configure DHCP client options here.

- In the Details Page, select
 - Enable
 - "Obtain an IP address automatically".
- Click **OK** to apply the settings

WAN >> Internet Access

WAN 1

PPPoE	Static or Dynamic IP	PPTP/L2TP	IPv6
☒ Enable ☐ Disable		WAN IP Network Settings WAN IP Alias	
Keep WAN Connection ☐ Enable PING to keep alive PING to the IP: PING Interval: 0 minute(s)		☒ Obtain an IP address automatically	
WAN Connection Detection Mode: ARP Detect ▼		Router Name: Vigor Domain Name:	
MTU 1500 (Max:1500) Path MTU Discovery: Detect		☐ DHCP Client Identifier * Username: Password:	
RIP Protocol ☐ Enable RIP		☐ Specify an IP address IP Address: Subnet Mask: Gateway IP Address:	
Bridge Mode ☐ Enable Bridge Mode Bridge Subnet: LAN 1 ▼		☒ Default MAC Address ☐ Specify a MAC Address MAC Address: 00 · 1D · AA : 64 · A9 · 81	
TTL Change the TTL value: Enable ▼		DNS Server IP Address Primary IP Address: 8.8.8.8 Secondary IP Address: 8.8.4.4	

*: Required for some ISPs

Note:

1. If enable firewall in bridge mode, IPv6 connection type would be change to DHCPv6 mode.
2. Bridge Subnet cannot be selected by Multi-WAN Interface at the same time.
3. If both Bridge Mode and Firewall are enabled, the settings under User Management will be ignored.

OK Cancel

LAN Configuration

Go to **LAN>>General Setup>> LAN1** page and change the IP address of the router to 192.168.1.2

- Change Gateway IP address to 192.168.1.2
- Click **OK** to save

LAN >> General Setup

LAN 1 Ethernet TCP / IP and DHCP Setup	LAN 1 IPv6 Setup
Network Configuration For NAT Usage IP Address: 192.168.1.2 Subnet Mask: 255.255.255.0 RIP Protocol Control: Disable	DHCP Server Configuration ☐ Disable ☒ Enable Server ☐ Enable Relay Agent Start IP Address: 192.168.1.10 IP Pool Counts: 200 (max. 1021) Gateway IP Address: 192.168.1.2 Lease Time: 86400 (s) ☒ Clear DHCP lease for inactive clients periodically
DNS Server IP Address Primary IP Address: Secondary IP Address:	

Note: Change IP Address or Subnet Mask in Network Configuration will also change **HA** LAN1 Virtual IP to the same domain IP.

Configure Router as Primary

This configuration will setup the router as the Primary for the High Availability setup.

Go to **Applications >> High Availability** menu and Use the settings shown in the diagram below.

Applications >> High Availability

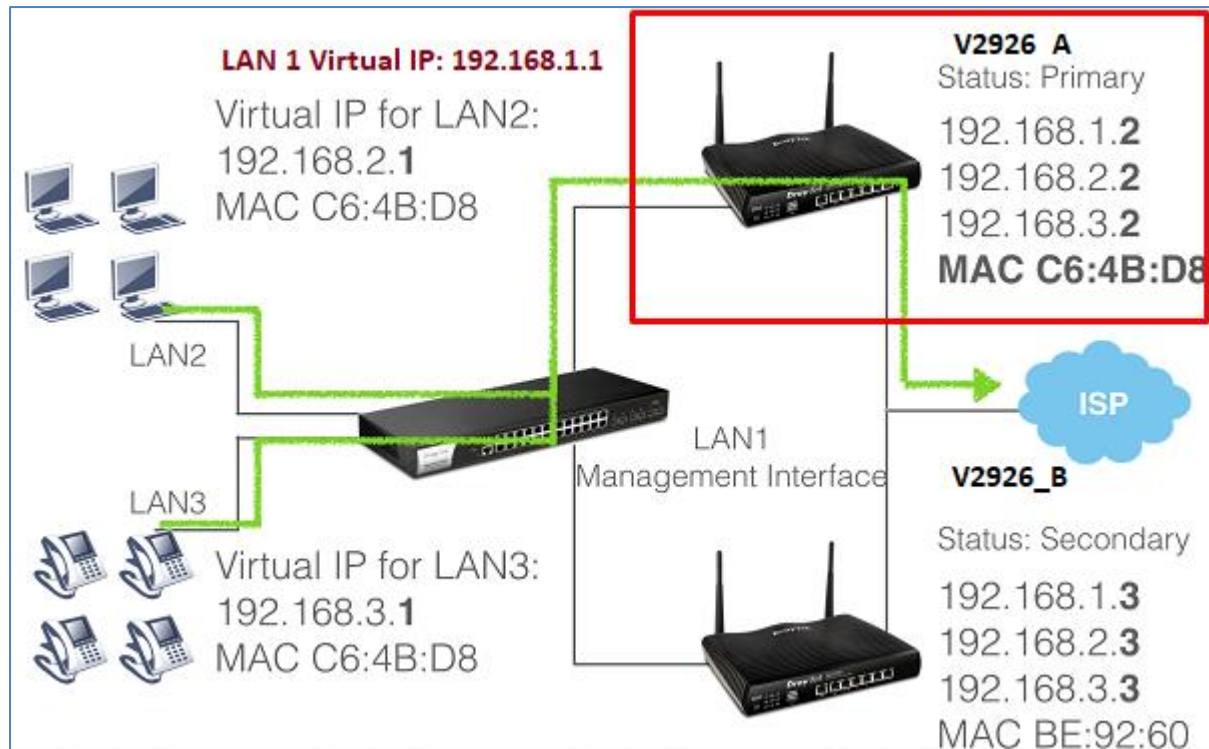
☒ Enable High Availability

Redundancy Method:

General Setup	Config Sync	Status	Set to Factory Default
Group ID: 1 (1-255) Priority ID: 15 (1-30, 30 is highest priority) Authentication Key: draytek (Max. 31 characters allowed) Protocol: IPv4 Management Interface: LAN1 Update DDNS: ☒ Enable Syslog: ☒ Enable			

IPv4	IPv6
Index	Enable
LAN1	☒
LAN2	☐
LAN3	☐
LAN4	☐
LAN5	☐
DMZ	☐

Index	Virtual IP
LAN1	192.168.1.1
LAN2	0.0.0.0
LAN3	0.0.0.0
LAN4	0.0.0.0
LAN5	0.0.0.0
DMZ	0.0.0.0



Network Topology

Explanation of the Settings Used

For this router, choose **Hot Standby** for the **Redundancy Method**

Group ID is used to identify group members, enter the same ID on all the members. The default value is 1.

Priority ID is used to decide which router should be the primary. Value of 30 is the highest. If 2 or more routers are having the same Priority ID, their LAN IP addresses (for management Interface) will be used, eg 192.168.1.2 has higher priority than 192.168.1.3..., etc.

Authentication Key: enter the same authentication key on all the members.

Management Interface: used for communication (including deciding the primary, configuration sync, and some maintenance..., etc) between members. Clients in other LAN subnets cannot see these packets. In order to have best communication and for security purpose, we recommend to choose an interface that is less likely to be interrupted by data traffic (loop/broadcast storm from other LAN clients...).

Update DDNS: for dynamic WAN IP users, enable this function so once the secondary router becomes primary and dials up the WAN, it will also update its new WAN IP address to the same DDNS profile, so your network will be accessible with the same DDNS domain.

Syslog: enable to show all the High Availability related logs in syslog.

Enable the **LAN Subnet** to join High Availability. Any existing LAN without joining High Availability will not be served with hardware redundancy.

Virtual IP: Enter the virtual IP address here. Please note that the virtual IP address can NOT be the same as any other member LAN IP.

Enable Configuration Sync and set the **Sync Interval**. Default is every 15 minutes.

Applications >> High Availability

☒ Enable High Availability
Redundancy Method Hot-Standby ▼

General Setup

Config Sync

| [Status](#) | [Set to Factory Default](#) |

☒ Enable Config Sync (Max. Sync to 10 routers)

Config Sync Interval:

Day0 ▼

Hour0 ▼

Minute15 ▼

Exclude the following settings from config sync:
☐ WAN Settings

Note:
This feature requires that both routers are the same series, and the High Availability must be enabled for Config Sync to operate.

OK

Cancel

- Go to the **System Maintenance >> Management** to name the router as 2926_A for easy identification.
- Tick Default: Disable Auto-logout
- Click **“OK”** to save the settings.

The router will restart to save the settings.

System Maintenance >> Management ?

IPv4 Management Setup	IPv6 Management Setup	LAN Access Setup																																	
Router Name 2926_A																																			
☒ Default: Disable Auto-Logout ☐ Enable Validation Code in Internet/LAN Access Internet Access Control ☐ Allow management from the Internet Domain name allowed ☐ FTP Server ☐ HTTP Server ☐ Enforce HTTPS Access ☒ HTTPS Server ☐ Telnet Server ☐ TR069 Server ☐ SSH Server ☐ SNMP Server ☒ Disable PING from the Internet Access List from the Internet <table border="1"> <thead> <tr> <th>List</th> <th>index in IP Object</th> <th>IP / Mask</th> </tr> </thead> <tbody> <tr><td>1</td><td> </td><td> </td></tr> <tr><td>2</td><td> </td><td> </td></tr> <tr><td>3</td><td> </td><td> </td></tr> <tr><td>4</td><td> </td><td> </td></tr> <tr><td>5</td><td> </td><td> </td></tr> <tr><td>6</td><td> </td><td> </td></tr> <tr><td>7</td><td> </td><td> </td></tr> <tr><td>8</td><td> </td><td> </td></tr> <tr><td>9</td><td> </td><td> </td></tr> <tr><td>10</td><td> </td><td> </td></tr> </tbody> </table>	List	index in IP Object	IP / Mask	1			2			3			4			5			6			7			8			9			10			Management Port Setup ☒ User Define Ports ☐ Default Ports Telnet Port 23 (Default: 23) HTTP Port 80 (Default: 80) HTTPS Port 443 (Default: 443) FTP Port 21 (Default: 21) TR069 Port 8069 (Default: 8069) SSH Port 22 (Default: 22) Brute Force Protection ☐ Enable brute force login protection ☐ FTP Server ☐ HTTP Server ☐ HTTPS Server ☐ Telnet Server ☐ TR069 Server ☐ SSH Server Maximum login failures 0 times Penalty period 0 seconds Blocked IP List TLS/SSL Encryption Setup ☒ Enable TLS 1.2 ☒ Enable TLS 1.1 ☒ Enable TLS 1.0 ☐ Enable SSL 3.0 CVM Access Control ☐ CVM Port 8000 (Default: 8000) ☐ CVM SSL Port 8443 (Default: 8443) AP Management ☒ Enable AP Management ☒ Device Management ☐ Respond to external device	
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10																																			
OK																																			

Configure the Secondary Router



(Note: Diagram is for Vigor2925 but also applies to Vigor2926 router)

Plug-in one of the LAN ports to access the router Web Interface to configure the IP address of the router and the High Availability.

Using your web browser, login to the second router using its default IP address 192.168.1.1

WAN Configuration

- Go to **WAN >> Internet Access>>WAN1** and for Access Mode
- Select **“Static or Dynamic IP”** from the pull-down menu.
- Click on **“Details Page”** button.

WAN >> Internet Access

Internet Access

Index	Display Name	Physical Mode	Access Mode		
WAN1		Ethernet	Static or Dynamic IP	Details Page	IPv6
WAN2		Ethernet	Static or Dynamic IP	Details Page	IPv6
WAN3		USB	None	Details Page	IPv6
WAN4		USB	None	Details Page	IPv6

Note:
 1.Device on USB port 1 applies WAN3 configuration.
 2.Device on USB port 2 applies WAN4 configuration.

Advanced You can configure DHCP client options here.

- In the Details Page, select **“Obtain an IP address automatically”**.
- Click **OK** to save the settings.

WAN >> Internet Access

WAN 1

PPPoE Static or Dynamic IP PPTP/L2TP IPv6

☒ Enable ☐ Disable

Keep WAN Connection
☐ Enable PING to keep alive
 PING to the IP
 PING Interval minute(s)

WAN Connection Detection
 Mode ARP Detect

MTU 1500 (Max:1500)
 Path MTU Discovery Detect

RIP Protocol
☐ Enable RIP

Bridge Mode
☐ Enable Bridge Mode
 Bridge Subnet LAN 1

TTL
 Change the TTL value Enable

WAN IP Network Settings **WAN IP Alias**

☒ Obtain an IP address automatically

Router Name Vigor

Domain Name

☐ DHCP Client Identifier *

Username

Password

☐ Specify an IP address

IP Address

Subnet Mask

Gateway IP Address

☒ Default MAC Address

☐ Specify a MAC Address

MAC Address: 00 1D AA 64 A9 81

DNS Server IP Address

Primary IP Address 8.8.8.8

Secondary IP Address 8.8.4.4

*: Required for some ISPs

Note:
 1. If enable firewall in bridge mode, IPv6 connection type would be change to DHCPv6 mode.
 2. Bridge Subnet cannot be selected by Multi-WAN Interface at the same time.
 3. If both Bridge Mode and Firewall are enabled, the settings under User Management will be ignored.

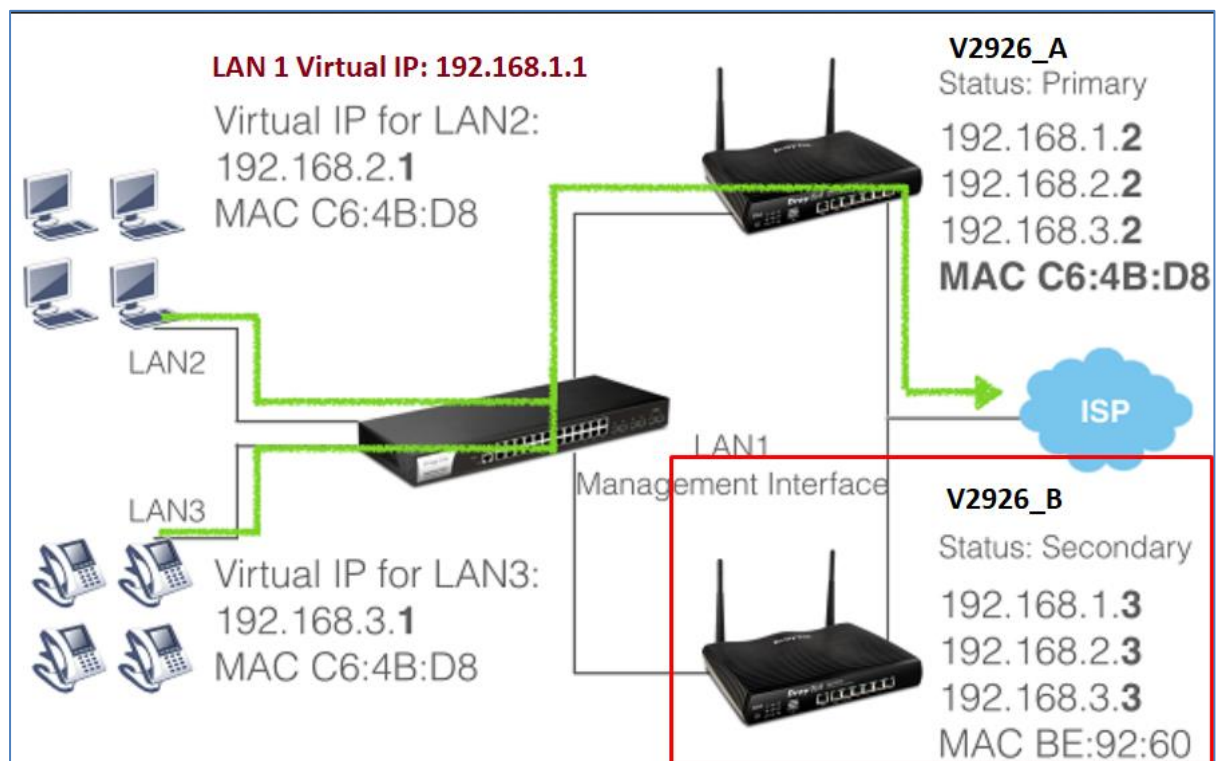
OK Cancel

LAN Configuration

Go to **LAN>>General Setup>> LAN1** page and change the IP address of the router to 192.168.1.3

LAN >> General Setup

LAN 1 Ethernet TCP / IP and DHCP Setup	LAN 1 IPv6 Setup
Network Configuration For NAT Usage IP Address: 192.168.1.3 Subnet Mask: 255.255.255.0 RIP Protocol Control: Disable ▾	DHCP Server Configuration ☒ Enable Server ☐ Disable Server ☐ Enable Relay Agent Start IP Address: 192.168.1.10 IP Pool Counts: 200 Gateway IP Address: 192.168.1.3 Lease Time: 86400 (s) ☒ Clear DHCP lease for inactive clients periodically
DNS Server IP Address Primary IP Address: Secondary IP Address:	
Note: Change IP Address or Subnet Mask in Network Configuration will also change <u>HA</u> LAN1 Virtual IP to the same domain IP. OK	



Configure Router as Secondary

Go to **Applications >> High Availability** menu.

- Use the same settings as the primary router but set **Priority ID** to be **10** as shown below. (Lower Priority ID value makes this router secondary)

Applications >> High Availability

☒ Enable High Availability

Redundancy Method: Hot-Standby

General Setup | **Config Sync** | [Status](#) | [Set to Factory Default](#)

Group ID: 1 (1-255)

Priority ID: 10 (1-30, 30 is highest priority)

Authentication Key: draytek (Max. 31 characters allowed)

Protocol: IPv4

Management Interface: LAN1

Update DDNS ☒ Enable

Syslog ☒ Enable

Index	Enable	Virtual IP
LAN1	☒	192.168.1.1
LAN2	☐	192.168.2.2
LAN3	☐	192.168.3.2
LAN4	☐	192.168.4.2
LAN5	☐	192.168.5.2
LAN6	☐	192.168.6.2
LAN7	☐	192.168.7.2
LAN8	☐	192.168.8.2
DMZ	☐	192.168.17.2

- Select **Enable Config Sync** and leave Sync Interval at 15 minutes.
- Click **OK** to save the settings.

Applications >> High Availability

☒ Enable High Availability

Redundancy Method: Hot-Standby

General Setup | **Config Sync** | [Status](#) | [Set to Factory Default](#)

☒ Enable Config Sync (Max. Sync to 10 routers)

Config Sync Interval:

Day: 0

Hour: 0

Minute: 15

Exclude the following settings from config sync:

☐ WAN Settings

Note:
This feature requires that both routers are the same series, and the High Availability must be enabled for Config Sync to operate.

OK Cancel

- Go to System Maintenance >> Management and name the secondary router **2926_B** for identification and tick **Default: Disable Auto-Logout** then click “Ok” to save the settings.

System Maintenance >> Management

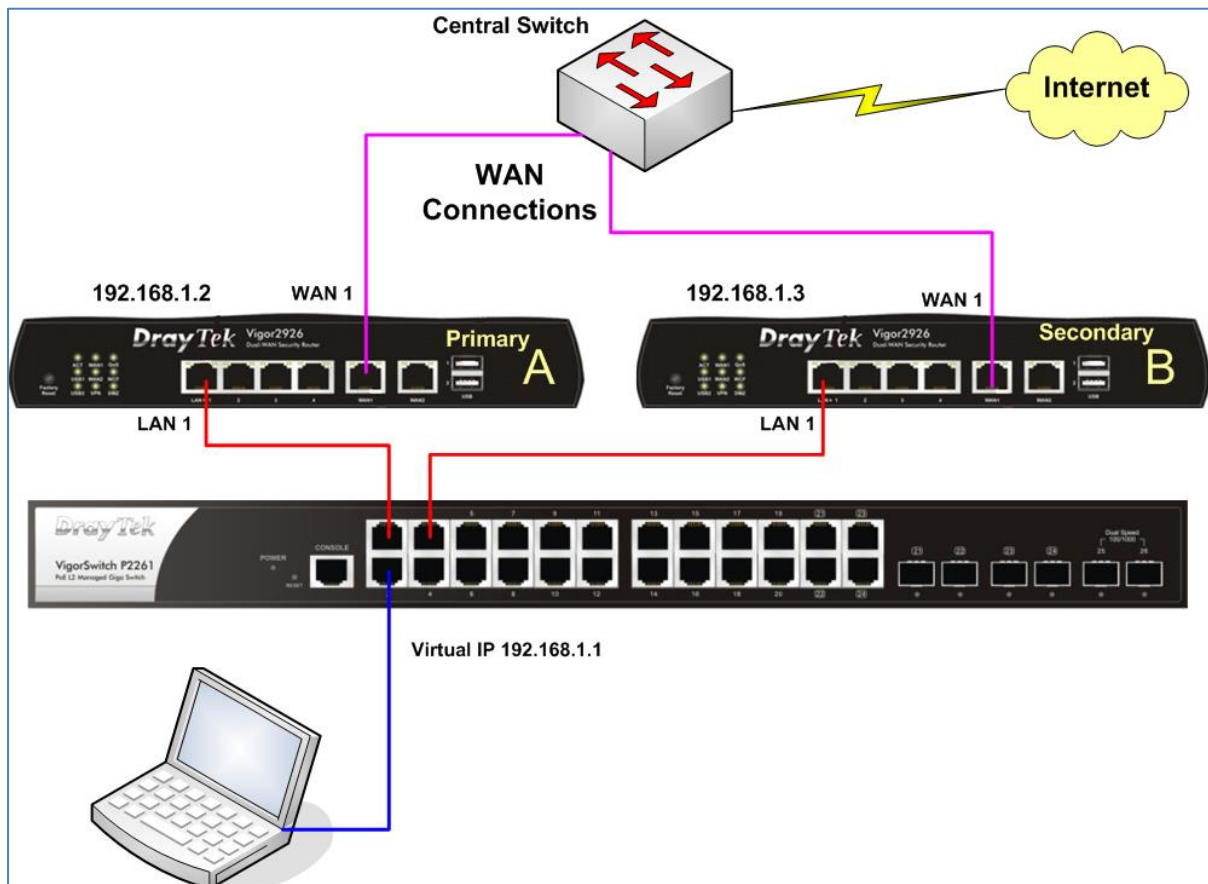
IPv4 Management Setup		IPv6 Management Setup	LAN Access Setup																																	
Router Name		2926_B																																		
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Internet Access Control ☐ Allow management from the Internet Domain name allowed: ☐ FTP Server ☐ HTTP Server ☐ Enforce HTTPS Access ☒ HTTPS Server ☐ Telnet Server ☐ TR069 Server ☐ SSH Server ☐ SNMP Server ☒ Disable PING from the Internet		Brute Force Protection ☐ Enable brute force login protection ☐ FTP Server ☐ HTTP Server ☐ HTTPS Server ☐ Telnet Server ☐ TR069 Server ☐ SSH Server Maximum login failures: 0 times Penalty period: 0 seconds																																		
Access List from the Internet <table border="1"> <thead> <tr> <th>List</th> <th>index in IP Object</th> <th>IP / Mask</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td></tr> </tbody> </table>		List	index in IP Object	IP / Mask	1			2			3			4			5			6			7			8			9			10			Blocked IP List TLS/SSL Encryption Setup ☒ Enable TLS 1.2 ☒ Enable TLS 1.1 ☒ Enable TLS 1.0 ☐ Enable SSL 3.0 CVM Access Control ☐ CVM Port: 8000 (Default: 8000) ☐ CVM SSL Port: 8443 (Default: 8443) AP Management ☒ Enable AP Management ☒ Device Management ☐ Respond to external device	
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7																																				
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10																																				

OK

Connect the all Equipment and Test

Connect all the equipment as shown in the diagram below.

- Connect LAN 1 of each router to the switch on your desk.
- Connect WAN 1 of each router to the WAN cables supplied which are connected to the training room network which will provide the Internet connection.
- Connect your laptop to the switch on your desk.



Now that the High Availability configuration is complete and all the equipment is connected, you can now check that High Availability is working and run some tests.

- On your laptop connected use your web browser and log into the virtual IP address 192.168.1.1. *(This IP address is the virtual IP address for the routers)*
- Go to **Diagnostics >> High Availability Status** menu and check that you see the status of both routers as shown here.

Diagnostics >> High Availability Status

[Details](#) | [HA Setup](#) | [Renew](#) | [Refresh](#) |

Status	Router Name	IP	Role	Stable	WAN	Sync Status	Cached Time
O	2926_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-
!	DrayTek	192.168.1.3	Secondary	Yes	All WANs Down	Progressing	21 sec

Note:

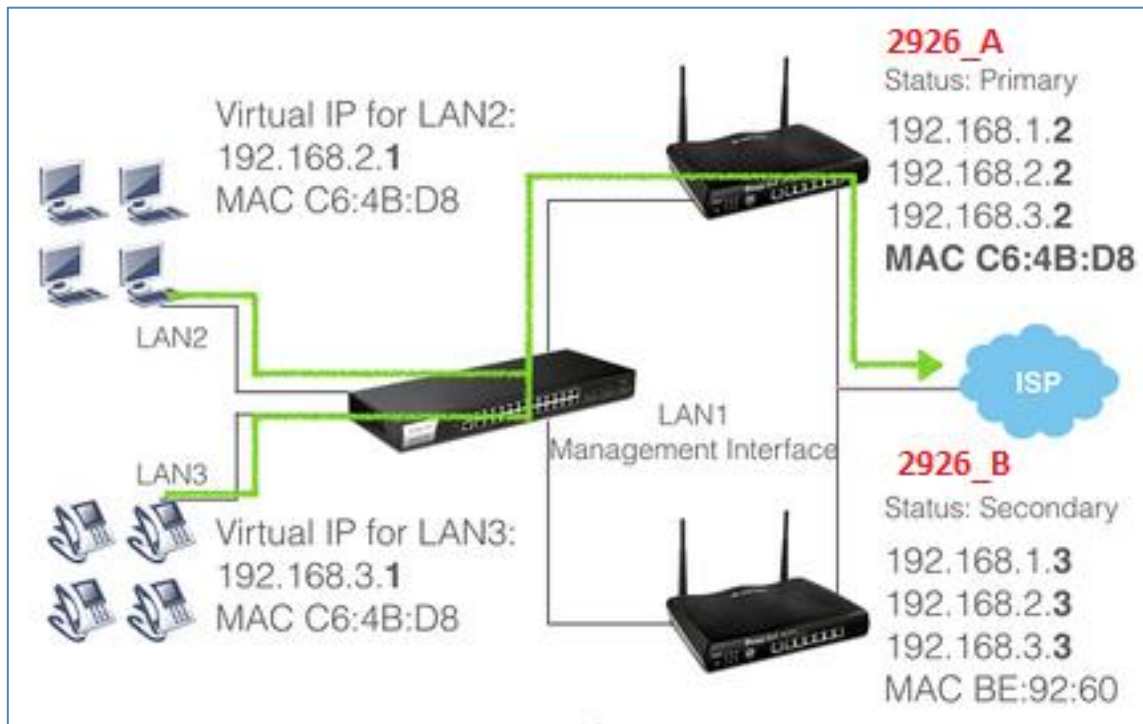
1. High Availability Status table displays 10 routers maximum. The local router will always show in the first row of this table.
2. A Status of "!" indicates that an error has occurred, refer to the [Details](#) page for more information.

Check the secondary router by accessing its IP address 192.168.1.3 under WAN IP Address you can see “**Disconnected-HA**” for the WAN indicating that the secondary router is communicating with the primary router.

The screenshot shows the DrayTek Vigor2926 Series web interface. The left sidebar contains navigation menus for Dashboard, WAN, LAN, Hotspot Web Portal, Routing, NAT, Hardware Acceleration, Firewall, User Management, Objects Setting, CSM, Bandwidth Management, Applications, VPN and Remote Access, Certificate Management, SSL VPN, USB Application, System Maintenance, Diagnostics, Central Management, VPN, AP, Switch, and External Devices. The main content area displays the router's status and configuration. The 'IPv4 Internet Access' table is highlighted, showing the status of WAN1, WAN2, WAN3, and WAN4. WAN2 is highlighted with a green box, showing a status of 'Disconnected-HA'.

Line / Mode	IP Address	MAC Address	Up Time
WAN1 Ethernet / DHCP Client	Disconnected-HA	0-1D-AA-64-A5-31	00:00:00
WAN2 Ethernet / DHCP Client	Disconnected-HA	0-1D-AA-64-A5-32	00:00:00
WAN3 USB / ---	Disconnected-HA	0-1D-AA-64-A5-33	00:00:00
WAN4 USB / ---	Disconnected-HA	0-1D-AA-64-A5-34	00:00:00

Simulate High Availability Failover



Before we start we need to setup monitoring by ICMP ping.

```
C:\WINDOWS\system32\cmd.exe - ping 8.8.8.8 -t

Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Edward>ping 8.8.8.8 -t

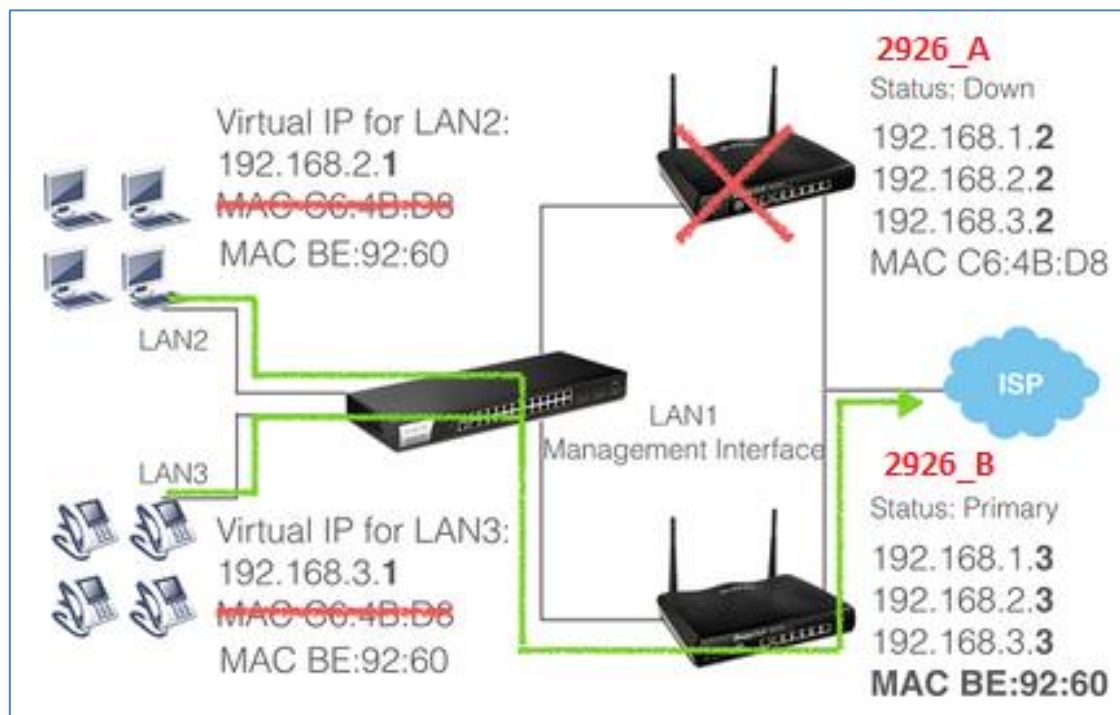
Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=30ms TTL=58
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=58
Reply from 8.8.8.8: bytes=32 time=20ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
```

For windows you need to open the command prompt and type ping 8.8.8.8 -t

For Mac iOS open the terminal and type ping 8.8.8.8

For Linux open terminal and type ping 8.8.8.8

- Now power off the Primary router



```
C:\WINDOWS\system32\cmd.exe - ping 8.8.8.8 -t

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=18ms TTL=57
Reply from 8.8.8.8: bytes=32 time=30ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=18ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=18ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Request timed out.
Request timed out.
Request timed out.
Reply from 8.8.8.8: bytes=32 time=18ms TTL=57
Reply from 8.8.8.8: bytes=32 time=26ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=30ms TTL=57
```

It only takes 3 “request time-out” in order for the secondary to take over as the primary.

Check the High Availability status by accessing the 192.168.1.1 and verify that router **2926_B** is taking over.

DrayTek Vigor2926 Series

Off ☐ IP6

Dashboard
Wizards
Online Status

WAN
LAN
Hotspot Web Portal
Routing
NAT
Hardware Acceleration
Firewall
User Management
Objects Setting
CSM
Bandwidth Management
Applications
VPN and Remote Access
Certificate Management
SSL VPN
USB Application
System Maintenance
Diagnostics

Central Management
VPN
AP
Switch
External Devices

Support Area

System Information

Model Name	Vigor2926	System Up Time	0:0:42
Router Name	2926_B	Current Time	2018 Mar 8 Thu 4:40:58
Firmware Version	3.8.7	Build Date/Time	Oct 27 2017 10:38:02
LAN MAC Address	00-1D-AA-64-A5-30		

IPv4 Internet Access

	Line / Mode	IP Address	MAC Address	Up Time
WAN1	Ethernet / DHCP Client	192.168.101.32	00-1D-AA-64-A5-31	0:00:16
WAN2	Ethernet / DHCP Client	Disconnected	00-1D-AA-64-A5-32	00:00:00
WAN3	USB / ---	Disconnected	00-1D-AA-64-A5-33	00:00:00
WAN4	USB / ---	Disconnected	00-1D-AA-64-A5-34	00:00:00

Interface

WAN	Connected: 1, ☒ WAN1 ☐ WAN2 ☐ WAN3 ☐ WAN4
LAN	Connected: 0, ☒ Port1 ☐ Port2 ☐ Port3 ☐ Port4
USB	Connected: 0, ☐ USB 1 ☐ USB 2

Quick Access

- System Status
- Dynamic DNS
- TR-069
- User Management
- IM/P2P Block
- Schedule
- SysLog / Mail Alert
- LDAP
- RADIUS
- Firewall Object Setting
- Data Flow Monitor

- Check **Diagnostics >> High Availability Status**

Vigor2926 Series

Diagnostics >> High Availability Status

[Details](#) | [HA Setup](#) | [Renew](#) | [Refresh](#)

Status	Router Name	IP	Role	Stable	WAN	Sync Status	Cached Time
O	2926_B	192.168.1.3	Primary	Yes	At Least One Up - Eth	Ready Sync	-

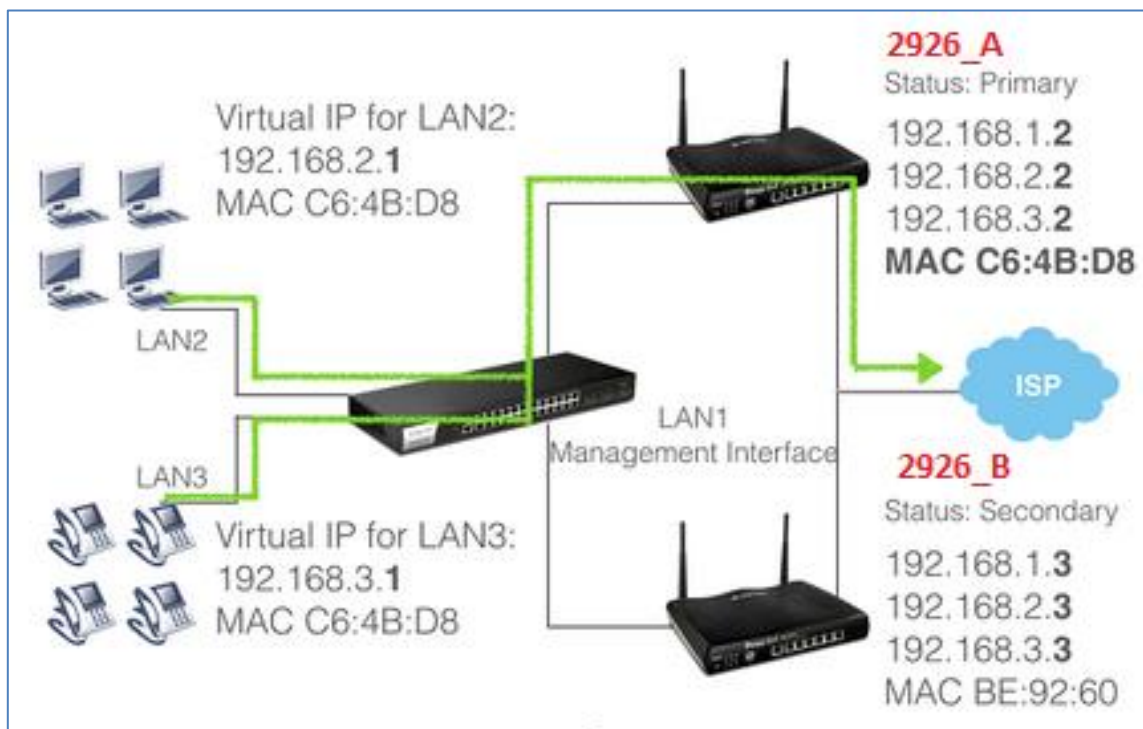
Note:

1. High Availability Status table displays 10 routers maximum. The local router will always show in the first row of this table.
2. A Status of "!" indicates that an error has occurred, refer to the [Details](#) page for more information.

Router **2926_B** is now the Primary.

Simulate Restoration of “2926_A” Primary Router

- Switch on the primary router (**2926_A**)



You will notice there is no disconnection in the ICMP ping the highlighted red box is the failback process HA point but there is no dropping of packets.

```

C:\WINDOWS\system32\cmd.exe - ping 8.8.8.8 -t
Reply from 8.8.8.8: bytes=32 time=47ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=30ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=57
Reply from 8.8.8.8: bytes=32 time=30ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=57
Reply from 8.8.8.8: bytes=32 time=30ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=19ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=192ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=65ms TTL=57
Reply from 8.8.8.8: bytes=32 time=164ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=21ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=16ms TTL=57
Reply from 8.8.8.8: bytes=32 time=17ms TTL=57
Reply from 8.8.8.8: bytes=32 time=31ms TTL=57
  
```

- Check the HA status by accessing 192.168.1.1

Vigor2926 Series

DrayTek Vigor2926
Dual-WAN Security Router

ACT WAN1 QoS
USB1 WAN2 WCF
USB2 VPN DMZ
Factory Reset

LAN 1 2 3 4 WAN1 WAN2 USB

System Information			
Model Name	Vigor2926	System Up Time	0:2:15
Router Name	2926_A	Current Time	2018 Mar 8 Thu 4:50:55
Firmware Version	3.8.7	Build Date/Time	Oct 27 2017 10:38:02
LAN MAC Address	00-1D-AA-64-A9-80		

IPv4 Internet Access				
	Line / Mode	IP Address	MAC Address	Up Time
WAN1	Ethernet / DHCP Client	192.168.101.36	00-1D-AA-64-A9-81	0:01:48
WAN2	Ethernet / DHCP Client	Disconnected	00-1D-AA-64-A9-82	00:00:00
WAN3	USB / ---	Disconnected	00-1D-AA-64-A9-83	00:00:00
WAN4	USB / ---	Disconnected	00-1D-AA-64-A9-84	00:00:00

Quick Access			
System Status			
Dynamic DNS			
TR-069			
User Management			
IM/P2P Block			
Schedule			
SysLog / Mail Alert			
LDAP			
RADIUS			
Firewall Object Setting			
Data Flow Monitor			

- Check **Diagnostics >> High Availability Status**

Diagnostics >> High Availability Status

| [Details](#) | [HA Setup](#) | [Renew](#) | [Refresh](#) |

Status	Router Name	IP	Role	Stable	WAN	Sync Status	Cached Time
O	2926_A	192.168.1.2	Primary	Yes	At Least One Up - Eth	Ready Sync	-
!	DrayTek	192.168.1.3	Secondary	Yes	All WANs Down	Progressing	21 sec

Note:

1. High Availability Status table displays 10 routers maximum. The local router will always show in the first row of this table.
2. A Status of "!" indicates that an error has occurred, refer to the [Details](#) page for more information.

In the HA status router **2926_A** is now the Primary and router **2926_B** is the secondary.

5.2 Exercise using Linux Based routers (Demonstration)

For this exercise High availability will be configured using two Linux based routers. The exercise is based on the application note in section 4.2 Configuring High Availability in Vigor3900 (Linux based Router).

Use the LAN IP subnets as described in the application note. For this exercise you only need to configure LAN 1 on each router and enable DHCP. (Router 1: 192.168.1.2, Router 2: 192.168.1.3)

- Configure virtual LAN IP to be in LAN 1 (192.168.1.1)
- Select LAN 1 for Management Interface.

Connect the LAN port from each router to a switch and connect your PC or laptop to the switch.

You should see that the PC or laptop has obtained an IP address in LAN subnet and also the gateway should point to the virtual IP address 192.168.1.1.

Test High Availability by shutting down the primary router and check that the secondary router comes on line. Then bring up the primary router and check that it now takes over.