

DrayTek Training

Multi-WAN and Network Reliability in DrayTek Routers (Part 1)

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Course Outline

Why High Availability is Important

Options for Increasing Network Reliability

Multi-WAN load balance – IP based vs Session Based Load Balance

Load Balance exercise

WAN Failover Modes

WAN Connection Detection

WAN Failover Exercise

1. Multi-WAN and Network Reliability

The paragraph below is an excerpt from Wikipedia about the objectives of reliability engineering:

The objectives of reliability engineering, in decreasing order of priority, are:^[9]

1. *To apply engineering knowledge and specialist techniques **to prevent or to reduce the likelihood or frequency of failures.***
2. *To identify and correct the causes of failures that do occur despite the efforts to prevent them.*
3. ***To determine ways of coping with failures that do occur**, if their causes have not been corrected.*
4. *To apply methods for estimating the likely reliability of new designs, and for analysing reliability data.*

In the modern business world that relies heavily on Internet access for email, website access, VOIP, marketing, Ecommerce, file sharing, cloud services, etc., network reliability involves the ISP connectivity, the hardware (servers, routers, switches, APs, etc.) and all other elements needed for successful system operations (power, software, etc.).

DrayTek have developed multi-WAN routers to tackle the issues of network reliability and to provide maximum up-time for Small to Medium sized Business (SMB). There are three key functions in this regard:

1. Load Balance
2. Failover
3. High Availability

Load Balance refers to the functions of:

- Using a multiple Internet connections, via the same or different ISPs, to increase network capacity, and
- Allocating the total capacity to various applications or section of LANs.

Failover refers to the function of automatic changeover of Internet access when one of these fails. When the failed internet service is fixed and returned, the router will switch back to it automatically.

An additional function of Load Balance and Failover over multi-WAN is VPN Load Balance and Failover which provides extra speed and reliability for VPN connections.

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

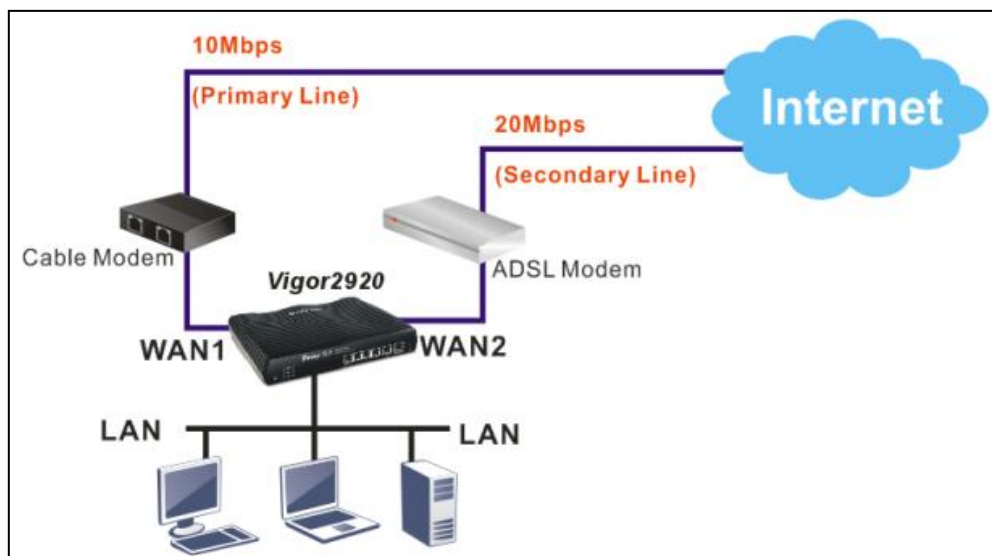
This training module Part 1 deals with Load Balance and Failover with Multi-WAN. High Availability will be covered in Part 2 of this module.

1.1 WAN Load Balance

WAN Load Balance feature can be enabled for Dual WAN and Multi-WAN routers. The benefits of WAN Load Balance include:

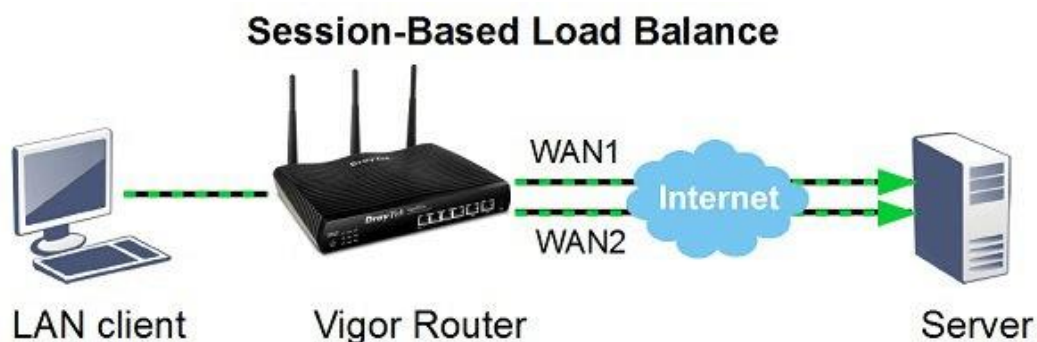
- Reduced reliance on a single service provider
- Increased bandwidth capacity to the Internet
- Increased Internet speed using Session Based Load Balance
- Ability to use VPN Load Balance feature in supported routers

On a network with a large number of users, the Internet bandwidth is effectively increased since Internet traffic from each computer is sent over more than one WAN connection. In the diagram below, the effective Internet bandwidth is 30 Mbps through the primary and secondary lines.



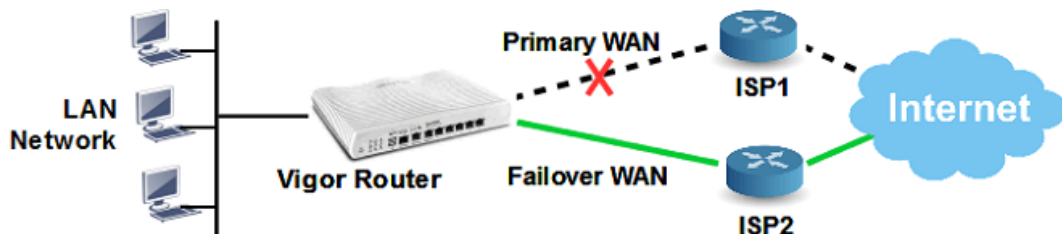
1.1.1 Session Based WAN Load Balance

You can setup Load Balance with the Session Based mode to aggregate the multiple WAN connections and gain greater Internet speed, as shown in the diagram below.



1.2 WAN Failover

With WAN failover the secondary WAN connection is in standby mode and will come online when the primary WAN connection fails. DrayTek's WAN Failover function ensures minimal interruption to network services, and is available on single WAN (with USB mobile 3G/4G access), dual WAN and Multi-WAN routers.



1.3 VPN Load Balance and Failover

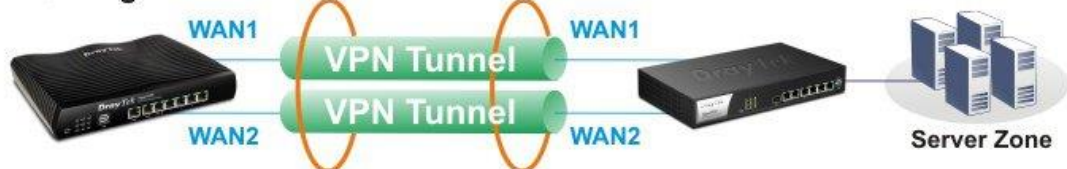
WAN Load Balance supports the setup of VPN tunnels to a remote site over multiple WAN connections. This has the advantage of increased bandwidth over the combined VPN tunnels to the remote site. Besides, the VPN tunnel can keep running should one of the WAN connections fail, so interruption to business activities will be kept to minimum.

The WAN Load Balance and Failover feature is supported by the following Dual WAN and Multi-Wan DrayTek routers: Vigor2832, Vigor2860 series, Vigor2925 Series, , Vigor2952, Vigor2960 and Vigor3900 routers.

VPN Backup



VPN Trunking



2. Multi-WAN Load Balance

WAN Load Balance is supported over any combination of WAN connections. These can be ADSL, VDSL2, Ethernet WAN, and Optic Fibre, 3G/4G via USB 3G/4G modem or LTE connection in the LTE routers.

When using WAN Load Balance, dual WAN and multi-WAN routers allow you to connect each WAN interface to a different service provider. If Internet connectivity through one service provider goes down, the other service provider (or providers) will take over so you will have continuous Internet connectivity. It does not matter that the data connection was through the WAN connection that failed since the session will be re-established through the other WAN connection.

2.1 WAN Load Balance Configuration

Internet traffic is distributed over each WAN connection using one of two algorithms which are based by the line speed of each WAN Internet connection. These are:

- “Auto Weight”
- “According to Line Speed” - the traffic distribution is determined by the pre-configured line speed setting for each WAN connection.

DrayTek Vigor2925 Series

WAN >> General Setup

Load Balance Mode: Auto Weight (dropdown menu open showing Auto Weight, According to Line Speed)

Index	Enable	Mode/Type	Line Speed(Kbps) DownLink/UpLink	Active Mode
WAN1	V	Ethernet/Auto negotiation	0 / 0	Always On
WAN2	V	Ethernet/Auto negotiation	0 / 0	Always On
WAN3	V	USB/-	0 / 0	Always On
WAN4	V	USB/-	0 / 0	Always On

Note: The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

OK

2.1.1 Auto Weight

In Multi-WAN routers, Auto Weight automatically determines the traffic distribution for all active WAN interfaces. The routing decision is made according to the ratio of each WAN's remaining bandwidth, which is calculated by subtracting the bandwidth currently used from the maximum bandwidth.

For example, suppose there are two active WAN interfaces: WAN1 and WAN2. WAN1's maximum bandwidth is 10Mbps, and WAN2 is 20Mbps. If both WAN have 5Mbps traffic at the moment, then the remaining bandwidth of WAN1 is 5Mbps, and WAN2 is 15Mbps, or a ratio of 1:3, and the load balance weight of WAN1 and WAN2 will be 1:3. If there are four new sessions to be setup, one of them will be sent to WAN1, and three of them will be sent to WAN2. The router will keep monitoring the bandwidth used on each WAN interface, and update the load balance weight periodically.

WAN >> General Setup

Load Balance Mode: Auto Weight Auto Weight According to Line Speed

Index	Enable	Physical Mode/Type	Line Speed(Kbps) DownLink/UpLink	Active Mode
WAN1	V	ADSL/-	0 / 0	Always On
WAN2	V	Ethernet/Auto negotiation	0 / 0	Always On
WAN3	V	USB/-	0 / 0	Always On
WAN4	V	USB/-	0 / 0	Always On

Note: The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

OK

Priority: 0 (0~7)
Active Mode: Always On Load Balance: ☒

2.1.2 According to Line Speed

In "According to Line Speed" mode, the maximum bandwidth is the Line Speed value defined by the network administrator on WAN >> General Setup >> WAN index page.

For connections using ADSL connections or an external modem, it is recommended to run several speed tests and use the average value to enter in the router WAN configuration menu. Otherwise you may see unexpected results where more traffic is sent over a slower connection.

WAN >> General Setup

WAN 1

Enable: Yes

Display Name:

Physical Mode: ADSL

DSL Mode: ADSL only

Physical Type: Auto negotiation

DSL Modem Code: Default

Line Speed(Kbps):

DownLink: 60000

UpLink: 20000

VLAN Tag insertion (ADSL): Disable (for channel 1)

Tag value: 0 (0~4095)

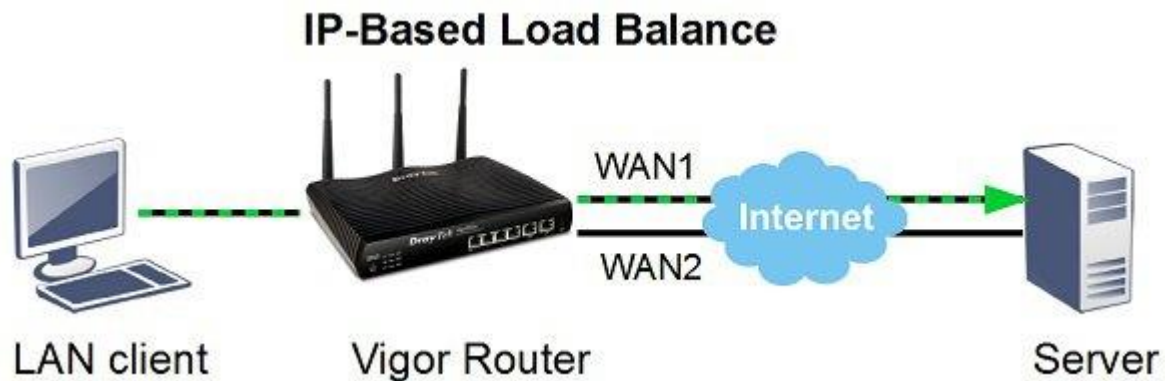
Priority: 0 (0~7)

2.2 WAN Load Balance modes

There are two modes for WAN load balancing over multiple WAN connections: **IP Based** and **Session Based**.

2.2.1 IP Based Load Balance

IP-Based mode means if the destination is the same (e.g., the same server) the session will be routed to the same WAN interface.



Off IPv6

Dashboard
Wizards
Online Status

WAN

General Setup

Internet Access
Multi-VLAN
WAN Budget

LAN

Load-Balance/Route Policy
NAT
Hardware Acceleration
Firewall
User Management
Objects Setting
CSM
Bandwidth Management

WAN >> General Setup

Load Balance Mode: Auto Weight IP Based

Index	Enable	Physical Mode/Type	Line Speed(Kbps) DownLink/UpLink	Active Mode
WAN1	V	Ethernet/Auto negotiation	0 / 0	Always On
WAN2	V	Ethernet/Auto negotiation	0 / 0	Always On
LTE	V	USB/-	0 / 0	Always On
WAN4	V	USB/-	0 / 0	Always On

Note:
The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

OK

2.2.2 Session Based Load Balance

In Session Based mode, Internet traffic having the same destination is routed through multiple WAN connections. This feature is suitable for businesses requiring greater Internet speed by aggregating Internet sessions over multiple WAN connections, and is available on all later dual and multi-WAN routers.

Note: Session based load balance is **NOT** bonding.

- Bonding is done on physical link.
- Session based is done on software layer.
 - Independent with different physical connections (DSL, Ethernet, USB).
 - Not limited to same ISP.



Session Based Configuration menu

The screenshot shows the WAN General Setup configuration menu. The 'Load Balance Mode' dropdown is set to 'Session Based'. The 'WAN1' through 'WAN4' entries are highlighted. A red arrow points from the 'Load Balance' checkbox in the 'Active Mode' section to the 'Session Based' option in the dropdown.

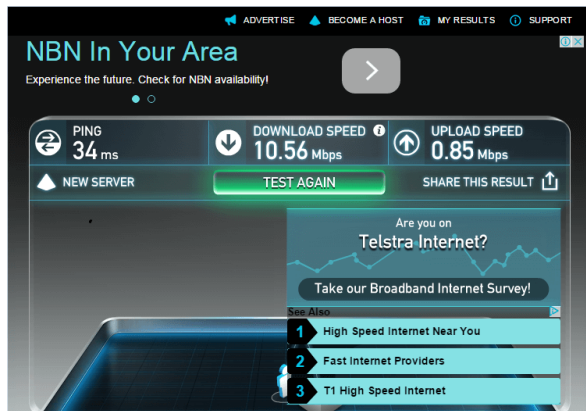
Index	Enable	Mode/Type	Line Speed (Kbps) DownLink/UpLink	Active Mode
WAN1	V	ADSL/-	0 / 0	Always On
WAN2	V	Ethernet/Auto negotiation	0 / 0	Always On
WAN3	V	USB/-	0 / 0	Always On
WAN4	V	USB/-	0 / 0	Always On

Note: The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

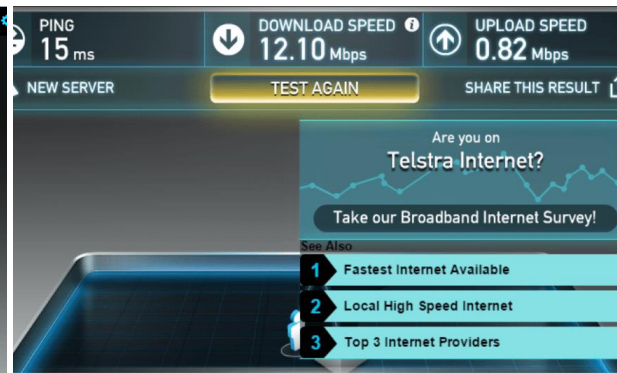
OK

Priority: 0 (0~7)
Active Mode: Always On
Load Balance: ☒

The speed test results below show that the speed using Session Based Load Balance is the sum of the individual speed test results from WAN 1 and WAN 2 (10.56 Mbps + 12.10 Mbps ~ 22.58Mbps; 0.85 Mbps + 0.82 Mbps ~ 1.68Mbps).



WAN 1 Speed



WAN 2 Speed



Aggregated (Session Based) WAN1+WAN2 speed

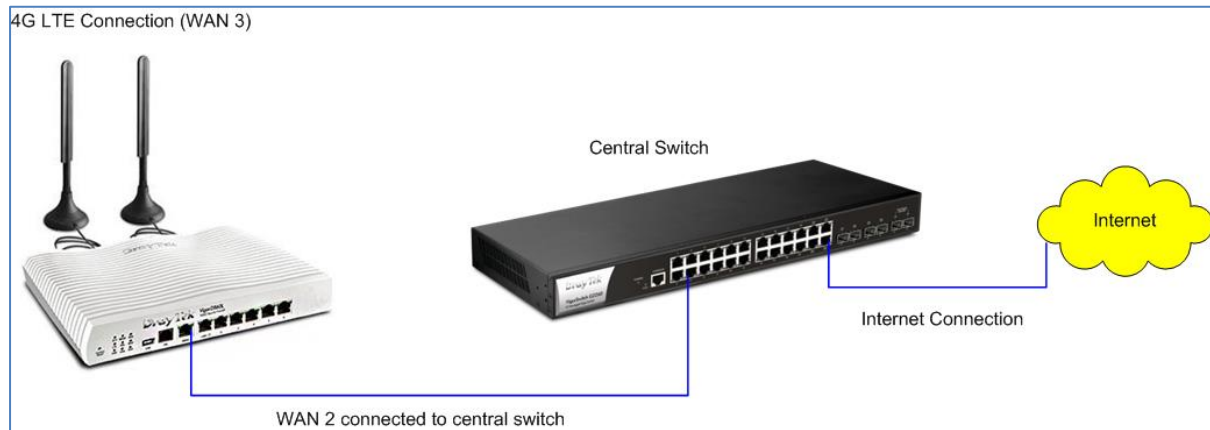
2.2.3 Video Demonstration of Session Based Load Balance

Video demonstration of Session based load balance is available on YouTube at:

<https://youtu.be/mWUoKHf7IpU>

2.3 Exercise - Set up and test WAN Aggregation

Configure a dual WAN Vigor router with one WAN connected to ADSL or Ethernet WAN and second WAN connected via USB 4G modem as shown in the diagram below.



For LTE WAN configuration instructions refer to exercise 4.1 in WAN Connectivity Options training guide.

Refer to the instructions below for configuring WAN 2 connection to the central switch.

Go to **WAN >> Internet Access** configuration menu in the router. Select **Static or Dynamic IP** for “Access Mode” from the pull down menu and click on the **Details Page** tab.

Auto Logout

Dashboard
Wizards
Online Status

WAN
General Setup
Internet Access
Multi-PVC/VLAN
WAN Budget

LAN
Hotspot Web Portal
Load-Balance/Route Policy
NAT
Hardware Acceleration
Firewall
User Management

WAN >> Internet Access

Internet Access

Index	Display Name	Physical Mode	Access Mode	Details Page	IPv6
WAN1		ADSL / VDSL2	PPPoE / PPPoA	Details Page	IPv6
WAN2		Ethernet	Static or Dynamic IP	Details Page	IPv6
LTE		USB	3G/4G LTE Modem(DHCP mode)	Details Page	IPv6
WAN4		USB	None	Details Page	IPv6

Note:
Device on USB port applies WAN4 configuration.

Advanced You can configure DHCP client options here.

Enable WAN 2 and select “Obtain IP address automatically”

WAN >> Internet Access

WAN 2

☒ Enable
 ☐ Disable

☐ Static or Dynamic IP
 ☐ PPTP/L2TP
 ☐ IPv6

☒ Obtain an IP address automatically

Router Name

Domain Name

☐ DHCP Client Identifier *

Username

Password

☐ Specify an IP address

IP Address

Subnet Mask

Gateway IP Address

Keep WAN Connection

☐ Enable PING to keep alive

PING to the IP

PING Interval 0 minute(s)

WAN Connection Detection

Mode ARP Detect

MTU 1500 (Max:1500)

Path MTU Discovery Detect

RIP Protocol

☐ Enable RIP

Go to **WAN General Setup** Configuration menu and select “Session Based” for the Load Balance mode.

WAN >> General Setup

Load Balance Mode: Auto Weight Session Based

Setup

Index	Enable	Physical Mode/Type	Line Speed(Kbps) DownLink/UpLink	Active Mode
<u>WAN1</u>	V	ADSL/-	0 / 0	Always On
<u>WAN2</u>	V	Ethernet/Auto negotiation	0 / 0	Always On
<u>LTE</u>	V	USB/-	0 / 0	Always On
<u>WAN4</u>	V	USB/-	0 / 0	Always On

Now run speed tests to check WAN Aggregation using the steps below:

1. Disable each WAN and run speed test through online WAN connection.
2. Run Speed test with both WAN connections running and compare results.

You should notice that with WAN aggregation enabled the speed of the Internet connection is the combined total of both WAN 2 and WAN 3 connections.

3. Multi-WAN Failover

WAN failover is used to ensure that when a (primary) Internet connection fails, a secondary Internet service, such as another ADSL line or a 3G/4G USB modem, will take over and maintain the Internet connection. For example a prepaid 4G modem which have no ongoing costs, can be attached to the router in standby mode as a safeguard for unplanned Internet outages.

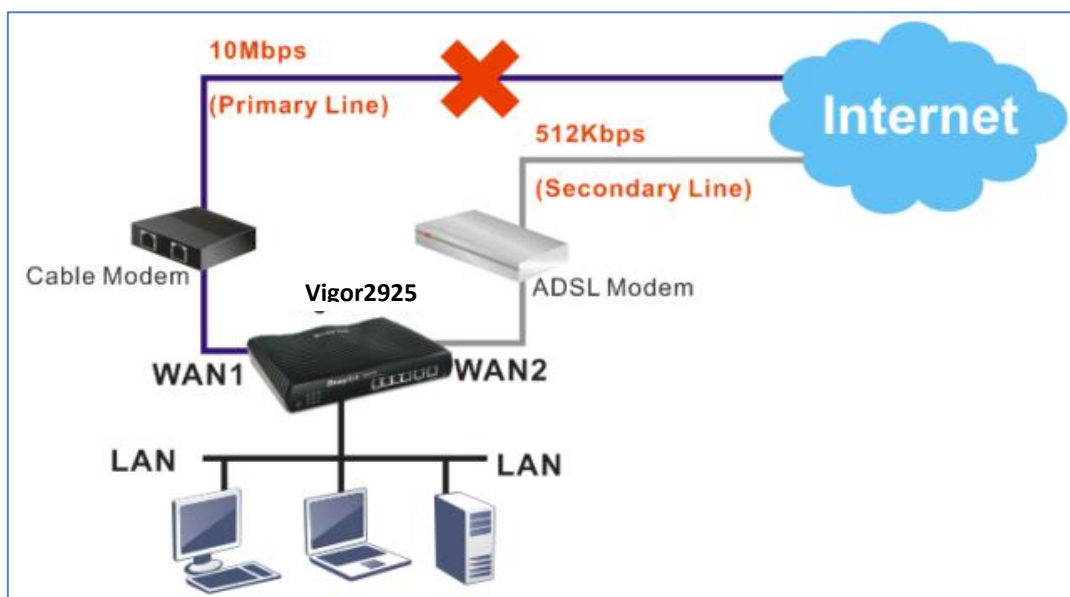
It can take up to 10 seconds for the backup link to come on-line so there will be a brief interruption during this process. This is a little longer than when using WAN Load Balance mode where all WAN connections are active.

On multi-WAN routers you can select when you want the backup WAN to come on-line. The options are to failover when:

- Any of the selected WANs are disconnected
- All of the selected WANs are disconnected

Single WAN routers such as the Vigor2760 and Vigor2120 only have the option of WAN failover to a 3G/4G USB modem.

The diagram below shows the Vigor2925 router with the secondary line being the backup connection. This scenario will also apply to other dual WAN and multi-WAN routers.



3.1 Traffic Threshold “Failover” Mode

Available in the Vigor2860 router running the latest firmware, this feature allows a failover WAN connection to come on line if the pre-configured threshold is reached on the primary WAN. When demand for increased Internet bandwidth falls below the threshold, the failover WAN will shut down. In this way it helps the network to perform through busy periods when there is a need for increased bandwidth. Below is a configuration page for Traffic Threshold Failover.

DrayTek Vigor2860 Series

Auto Logout | IP6

Dashboard
Wizards
Online Status

WAN
General Setup
Internet Access
Multi-PVC/VLAN
WAN Budget

LAN
Load-Balance/Route Policy
NAT
Hardware Acceleration
Firewall
User Management
Objects Setting
CSM
Bandwidth Management
Applications
VPN and Remote Access
Certificate Management
VoIP
Wireless LAN (2.4 GHz)
Wireless LAN (5 GHz)
SSL VPN

WAN >> General Setup

WAN 4

Enable: Yes
Display Name: Overload WAN
Physical Mode: USB
Line Speed(Kbps):
DownLink: 0
UpLink: 0

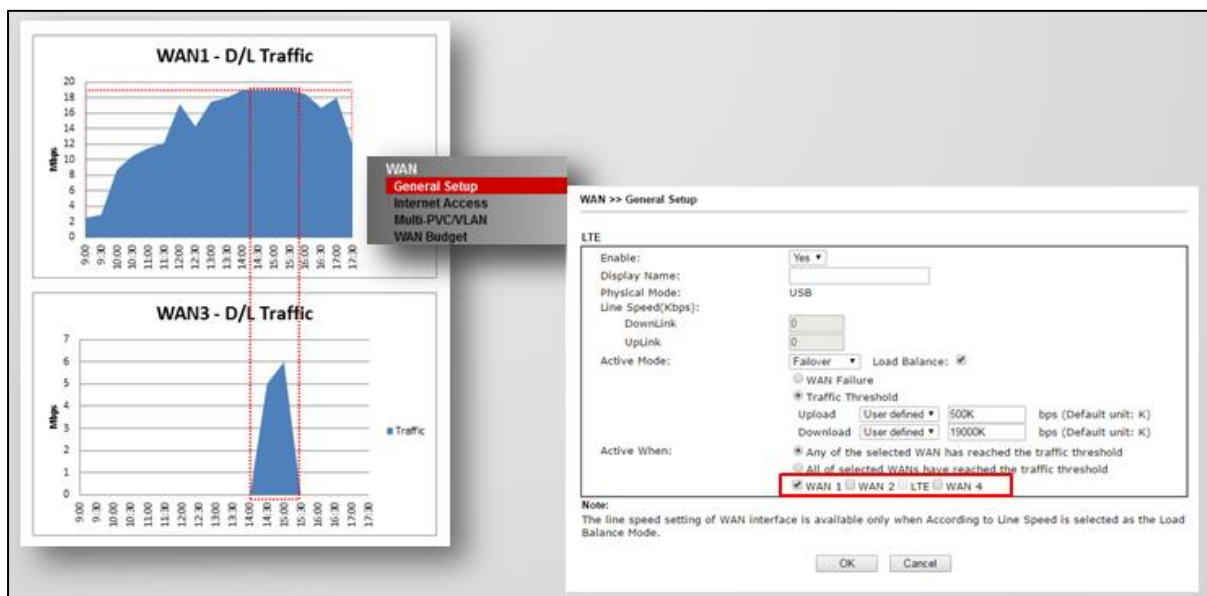
Active Mode: Failover Load Balance: ☒
☐ WAN Failure
☒ Traffic Threshold

Upload: User defined 800K bps (Default unit: K)
Download: User defined 15000K bps (Default unit: K)

Active When:
☒ Any of the selected WAN has reached the traffic threshold
☐ All of selected WANs have reached the traffic threshold
☒ WAN 1 ☐ WAN 2 ☐ WAN 3 ☐ WAN 4

Note:
The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

The diagram below shows WAN 3 comes online when the download traffic threshold of 19000Kbps is reached on WAN1.



The failover WAN can be either another ADSL/Ethernet connection or a 3G/4G connection. You will be able to weigh up the costs variations among xDSL, Ethernet and 3G/4G connections and setup Failover accordingly.

3.2 Configuration for DrayOS Routers

3.2.1 Single WAN routers

For single WAN routers such as the Vigor2120 and Vigor2760, you can use a 3G/4G USB modem on the USB port to provide the backup connection. The configuration process is as below:

- Go to **WAN >> General Setup** configuration menu.
- Select **Backup** in the Vigor2120, or **Failover** in the Vigor2760.

The screenshot shows the DrayTek Vigor2120 Series WAN >> General Setup configuration page. The left sidebar contains a menu with options: Dashboard, Wizards, Online Status, WAN (selected), General Setup (highlighted), Internet Access, Multi-VLAN, LAN, NAT, Firewall, Objects Setting, CSM, Bandwidth Management, Applications, VPN and Remote Access, Certificate Management, and Wireless LAN (2.4GHz). The main content area is titled 'WAN >> General Setup' and contains two sections: WAN1 and WAN2. WAN1 has fields for Enable (Yes), Display Name, Physical Mode (Ethernet), Physical Type (Auto negotiation), VLAN Tag insertion (Disable), Tag value (0), and Priority (0). WAN2 has fields for Enable (Yes), Display Name, Physical Mode (USB), and Active Mode (Backup). A red box highlights the WAN2 section. An OK button is at the bottom right.

The screenshot shows the DrayTek Vigor2760 Series WAN >> General Setup configuration page. The left sidebar contains a menu with options: Dashboard, Wizards, Online Status, WAN (selected), General Setup (highlighted), Internet Access, Multi-PVC/VLAN, LAN, Route Policy, NAT, Firewall, Objects Setting, CSM, and Wireless LAN (2.4GHz). The main content area is titled 'WAN >> General Setup' and contains a section for WAN 3. WAN 3 has fields for Enable (Yes), Display Name, Physical Mode (USB), and Active Mode (Failover). A red box highlights the WAN 3 section. A Note at the bottom states: 'The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.' OK and Cancel buttons are at the bottom right.

3.2.2 Dual and Multi-WAN routers

For routers including the Vigor2832, Vigor2860/LTE, Vigor2925/LTE, Vigor2952, VigorBX2000 and Vigor3220, any available WAN (DSL connection, Ethernet, USB or LTE SIM) can be selected as the backup WAN. The configuration process is as below:

- Go to **WAN >> General Setup** configuration menu as shown below.
- Select the required WAN interface for failover and when to failover.

WAN >> General Setup

WAN 2

Enable:	Yes ▾
Display Name:	
Physical Mode:	Ethernet ▾
Physical Type:	Auto negotiation ▾
Line Speed(Kbps):	
DownLink	0
UpLink	0
VLAN Tag insertion :	Disable ▾ (Please configure Internet Access setting first)
Tag value:	0 (0~4095)
Priority:	0 (0~7)
Active Mode:	Failover ▾ Load Balance: ☒
Active When:	☒ Any of the selected WAN disconnect ☐ All of the selected WAN disconnect ☒ WAN 1 ☐ WAN 2 ☒ WAN 3 ☒ WAN 4

Note:
The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

3.3. Configuring Failover for Linux Based Routers

DrayTek's Linux based routers include the Vigor3900, Vigor2960 and Vigor300B. Assuming that a Vigor3900 WAN 1 is the primary WAN interface, and a USB WAN as the secondary WAN, the configuration process is as below:

1. Go to **Routing >> Load Balance Pool**, and click Add
 - a) Give a profile name and select Backup mode.
 - b) Select Primary WAN, which is WAN 1 in this example
 - c) Select Backup WAN, which is the USB WAN in this example
 - d) Click Apply to save

Routing >> Load Balance Pool

Load Balance Pool

Add Edit Delete Refresh

Profile	Mode	Interface	Primary Profile
Load Balance Pool			

Profile : failover

Mode : Backup

Primary Profile : wan1

Backup Profile : usb1

Apply Cancel

2. Go to **Routing >> Default Route**, select the backup pool as the Load Balance Pool created in the previous step and click Apply to save.

Routing >> Default Route

Default Route

WAN Profile/Loadbalance Pool Name : failover

Auto Failover to Active WANs : ☒ Enable ☐ Disable

Load Balance Mode : IP Based

3. When WAN1 goes down, USB1 will come up automatically.

Profile	Connecti...	Descripti...	Up Time	Mac	Protocol	IP	Gateway	DNS	RX Rate ...	TX Rate ...	RX Bytes	TX Bytes	Operation
lan1	up		0 days 0:1...	00:50:7f:7...	Static(NAT)	192.168.1.1			142	156	2.00 (MB)	10.33 (MB)	
usb1	up		0 days 0:0...	0c:5b:8f:2...	4G	10.121.58...	10.121.58...	168.95.1.1...	101	66	31.79 (KB)	45.64 (KB)	
wan1	down		0 days 0:0:0	00:50:7f:7...	dhcp(NAT)	192.168.9...	192.168.9...	8.8.8.8,8.8...	0	0	0	0	

4. Once WAN1 come back online, USB1 will shut down automatically.

Profile	Conne...	Descripti...	Up Time	Mac	Protocol	IP	Gateway	DNS	RX Rate ...	TX Rate ...	RX Bytes	TX Bytes	Operation
lan1	up		0 days 0:1...	00:50:7f:7...	Static(NAT)	192.168.1.1			74	82	2.89 (MB)	11.69 (MB)	
usb1	down		0 days 0:0:0	0c:5b:8f:2...	4G				0	0	0	0	
wan1	up		0 days 0:0...	00:50:7f:7...	dhcp(NAT)	192.168.9...	192.168.9...	8.8.8.8,8.8...	0	0	8.03 (KB)	9.37 (KB)	

3.4 WAN Connection Detection

In order for failover to occur the router will need to detect when the primary WAN goes down.

There are three options in DrayOS routers for WAN connection detection:

1. ARP Detect.
2. Ping Detect.
3. Always On (This mode will not check if the WAN connection has gone down, and is used only for diagnostic purposes).

Dashboard
Wizards
Online Status

WAN
General Setup
Internet Access
Multi-VLAN
LAN
NAT
Firewall
Objects Setting
CSM
Bandwidth Management
Applications
VPN and Remote Access
Certificate Management
Wireless LAN (2.4 GHz)
Wireless LAN (5 GHz)
SSL VPN
USB Application

Static or Dynamic IP

Access Control

Broadband Access ☒ Enable ☐ Disable

Keep WAN Connection

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

WAN Connection Detection

Mode
MTU
RIP Protocol

3.4.1 ARP Detect

In ARP Detect mode, the Router sends an ARP request every 5 seconds, if there is no ARP response within 30 seconds, the WAN interface will be flagged as off-line. In this way a connection is deemed broken when the ADSL, Ethernet connection or NTU connection is lost or disconnected for over 30 seconds.

This configuration option will work most of the time. However, it will not detect if loss of internet connectivity is due to a failure external to the local network as the router will still see that WAN connection as being online. For this scenario you can use the Ping Detect mode.

3.4.2 Ping Detect

This mode will detect if a WAN connection has gone down by monitoring the ping response from a gateway IP address or other external IP address. You can set the number of times to retry the ping before the WAN connection is flagged as off-line and the router will switch to the backup connection.

In some models (e.g. Vigor2860, Vigor2925) with the latest firmware, network administrator may enter up to two IP addresses and select a Gateway IP as a target. When none of the target IP addresses responds, the WAN interface will be flagged as off-line.

The interval between each ping request can be set to a number from 1 to 3600 seconds, and retry times can be set to a number from 1 to 255.

WAN Connection Detection	
Mode	Ping Detect ▼
Primary Ping IP	8.8.8.8
Secondary Ping IP	8.8.8.4
☒ Ping Getaway IP	
TTL	255
Ping Interval	1 second(s)
Ping Retry	10 times

It is recommend setting Ping retries for 5 or more to avoid flapping of the WAN connections.

With a Ping Retry set to 5, it will take about 10 seconds for the backup WAN to come online after the primary WAN fails.

3.4.3 Linux Based Routers – HTTP Detect

In addition to ARP and PING detect modes; Linux based routers such as the Vigor3900, Vigor2960 and Vigor300B also include HTTP for WAN Connection detection. This mode will send a HTTP GET request to the designated site and the router will check for a response.

The screenshot displays the DrayTek Vigor3900 Series web interface. The left sidebar shows the navigation menu with 'General Setup' selected. The main content area shows the 'General Setup' page for WAN connection detection. The 'Connection Detection Mode' dropdown is open, showing options: None, PING, and HTTP. The 'Connection Detection Interval' and 'Connection Detection Retry' dropdowns are also open, showing options: None, ARP, PING, and HTTP. The 'Connection Detection Host' field is set to 192.168.99.1. The 'Connection Detection Interval' is set to 10 and the 'Connection Detection Retry' is set to 3.

For HTTP WAN connection mode you need to enter the IP address for a HTTP site for Connection Detection Host.

The screenshot shows a detailed view of the 'Connection Detection Host' field. The 'Connection Detection Mode' is set to HTTP. The 'Connection Detection Host' field is set to 192.168.99.1. The 'Connection Detection Interval' is set to 10 and the 'Connection Detection Retry' is set to 3. The 'Profile Number Limit' is 8.

3.5 Exercise – Configure and test each WAN failover mode

Test failover using ARP detect and Ping Detect

Use the same configuration as for Exercise 1

Configure a Vigor2860 or Vigor2925 router with WAN2 as the primary WAN connection and the USB 3G/4G connection as the backup.

Step 1: Go to **WAN>>General Setup** menu and select Failover mode for WAN 3 (USB)

WAN >> General Setup

LTE

Enable:

Display Name:

Physical Mode: USB

Line Speed(Kbps):

DownLink:

UpLink:

Active Mode: Load Balance: ☐

☒ WAN Failure

☐ Traffic Threshold

Upload: bps (Default unit: K)

Download: bps (Default unit: K)

Active When:

☒ Any of the selected WAN disconnect

☐ All of the selected WAN disconnect

☐ WAN 1 ☒ WAN 2 ☐ LTE ☐ WAN 4

Note:

Step 2: WAN>> General Setup page should appear as shown below:

WAN >> General Setup

Load Balance Mode:

Setup

Index	Enable	Physical Mode/Type	Line Speed(Kbps) DownLink/UpLink	Active Mode
<u>WAN1</u>	V	ADSL/-	0 / 0	Always On
<u>WAN2</u>	V	Ethernet/Auto negotiation	0 / 0	Always On
<u>LTE</u>	V	USB/-	0 / 0	Failover(WAN2)
<u>WAN4</u>	V	USB/-	0 / 0	Always On

Note:

The line speed setting of WAN interface is available only when According to Line Speed is selected as the Load Balance Mode.

Test using ARP Detect

- Step 3: Go to WAN >> Internet Access configuration menu.
- For WAN 2 Select **Static or Dynamic IP** Access Mode
 - Click on **Details** button

WAN >> Internet Access

Internet Access

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
LTE		USB	3G/4G LTE Modem(DHCP mode)	Details Page	IPv6
WAN4		USB	None	Details Page	IPv6

Note:
Device on USB port applies WAN4 configuration.

Advanced You can configure DHCP client options here.

- Step 4: Configure WAN2 to use ARP detect for **WAN Connection Detection** mode.

Static or Dynamic IP

Access Control

Broadband Access ☒ Enable ☐ Disable

Keep WAN Connection

☒ Enable PING to keep alive

PING to the IP 0.0.0.0

PING Interval 0 minute(s)

WAN Connection Detection

Mode ARP Detect

MTU 1500

RIP Protocol Always On

- Step 5 : From your PC set up continuous ping to an external IP address on Internet (8.8.8.8)
- Step 6 : Remove WAN 2 connection and check that the 3G/4G connection comes on line – You will notice ping response failure until backup WAN comes on line.
- Step 7: Connect WAN 2 of the router to the Internet via a switch.
- Step 8 : Run continuous ping

Wait here for the Course presenter to disconnect WAN 2

- Step 9: Remove Internet connection from Internet side of the classroom switch (done by instructor) . (The router will still detect that WAN 2 is still on line and will not fail over.

Test using Ping Detect

- Step 10 : Configure WAN2 to use Ping Detect for WAN Connection Detection mode.
Step 11: Select Mode to Ping Detect – Ping 8.8.8.8, 5 retries and 1 second between retries

The screenshot shows the 'WAN >> Internet Access' configuration page for 'WAN 2'. The 'Static or Dynamic IP' tab is selected. Under 'Keep WAN Connection', the 'Enable PING to keep alive' checkbox is unchecked. The 'PING to the IP' field is empty, and the 'PING Interval' is set to 0 minutes. In the 'WAN Connection Detection' section, the 'Mode' is set to 'Ping Detect'. The 'Primary Ping IP' is set to '8.8.8.8', and the 'Secondary Ping IP' is empty. The 'Ping Gateway IP' checkbox is unchecked. The 'TTL' is set to 255, the 'Ping Interval' is 1 second, and the 'Ping Retry' is 5 times.

- Step 12 : From PC set up continuous ping to an external IP address on Internet (8.8.8.8)

Wait here for the Course presenter to disconnect WAN 2

- Step 13 : Remove WAN 2 connection of classroom Router (done by Instructor) and check that the 3G/4G connection comes on line – You will notice ping response failure until backup WAN comes on line.
Step 14 : Connect WAN 2 of the router to the Internet via a switch.
Step 15: Run continuous ping
Step 16: Remove Internet connection from Internet side of the switch. (The router will detect loss of ping response and failover to the USB WAN)