

DrayTek Training

DrayTek WAN Connectivity Options

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18

Table of Contents

1. Introduction	3
2. Types of Routers	3
2.1 xDSL Routers	3
2.2 Broadband Routers	5
2.3 LTE Routers	7
3. WAN Connectivity	8
3.1 xDSL WAN (ADSL2/2+, VDSL2)	8
3.1.1 ADSL	8
3.1.2 VDSL	10
Checking the VDSL Connection Status	12
NBN VDSL Configuration Examples	13
3.2 Ethernet WAN	18
Configuration of Ethernet WAN	18
NBN Configuration Examples	20
3.3 USB Mobile WAN	21
WAN Access Modes	21
Configuration Examples	23
3.4 LTE WAN	24
LTE Configuration	24
Video Demonstration	27
Checking the Status of LTE WAN	27
Configuration Examples	27
3.5 Wireless (Wi-Fi) WAN	28
Configuring Wireless WAN	29
Additional Resources	29
3.6 Fibre WAN	30
4. Hands on Exercises	31
4.1 Configure and Test Vigor LTE Router for LTE WAN Connectivity	31
4.2 Configure and Test Wi-Fi WAN for Vigor2862Lac Router	38

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1. Introduction

The technology for WAN interface has grown from the old dial-up and ADSL, both of which rely on telephony cable pairs that are abundant in the suburbs, to technologies that rely on different media – optic fibre (SFP, FTTP, FTTB, FTTC), mobile broadband (4G/LTE), Fixed Wireless, HFC, Satellite, etc.

DrayTek routers support a variety of WAN connectivity options, and are available in single, dual and multi-WAN versions. In this guide we will go through each WAN connectivity option and the configuration parameters involved.

2. Types of Routers

Before we discuss WAN connectivity options, we will look at the types of DrayTek routers that are available and the options for combinations of multi-WANs.

2.1 xDSL Routers

xDSL routers have either ADSL or VDSL as the primary WAN interface. Some of the Single WAN routers support one or two non-xDSL WAN interfaces, but only one WAN can be active at a time. The dual WAN routers, on the other hand, support two major WAN interface types: xDSL and Ethernet, plus 3G/4G mobile broadband with USB dongles, and can have multi-WANs working at the same time.

ADSL has been the main technology for WAN interface for the last two decades and still performs strongly. VDSL is a newer technology that overtakes ADSL. Due to its performance in shorter distances (up to 1.6km), it has been adopted in FTTB/FTTN applications.

The two tables below list the routers and the type of WAN interfaces they support.

Single WAN Routers – Only one WAN is active			
Router Model	WAN Type		
	WAN 1	WAN 2	WAN 3
Vigor120	ADSL2+	-	-
Vigor130	ADSL2+/VDSL2	-	-
VigorNIC 132F	ADSL2+/VDSL2	SFP	-
Vigor2710ne	ADSL2+	-	-
Vigor2760 Series	ADSL2+/VDSL2	LAN 4 (Gigabit Ethernet)	USB backup



Vigor120



Vigor130



VigorNIC 132F



Vigor2710ne



Vigor2760 Series

Dual WAN Routers – Multiple WANS can be active at same time				
Router Model	WAN Type			
	WAN 1	WAN 2	WAN 3	WAN 4
Vigor2832 Series	ADSL2+	Gigabit Ethernet	USB	USB
Vigor2860 Series	ADSL2+/VDSL2	Gigabit Ethernet	USB	USB
Vigor2862 Series	ADSL2+/VDSL2	Gigabit Ethernet	USB	USB
VigorBX 2000	ADSL2+/VDSL2	Gigabit Ethernet	USB	USB



Vigor2832 Series



Vigor2860 Series



VigorBX 2000 Series



Vigor2862 Series

2.2 Broadband Routers

All broadband routers have an Ethernet WAN as the primary interface. DrayTek's Vigor2120 series Single WAN routers support 3G/4G mobile broadband with USB dongles, but only one WAN can be active at a time. Dual or Multi-WAN broadband routers support one or more Ethernet WANs, plus 3G/4G mobile broadband with USB dongles, and can have multi-WANs working at the same time.

Broadband routers can be connected to a NBN NTU (Network Termination Unit) for services like FTTH/FTTP (Fibre to the Premises), HFC, satellite, or Fixed Wireless – each of these provides an Ethernet interface. Furthermore, if required an Ethernet WAN port can be connected to an xDSL modem.

The tables below list the broadband routers and the types of WAN interfaces they support.

Single WAN Routers – Only one WAN is active			
Router Model	WAN Type		
	WAN 1	WAN 2	WAN 3
Vigor2120 Series	Gigabit Ethernet	USB backup	-
Vigor2132 Series	Gigabit Ethernet	-	-



Vigor2120 Series



Vigor2132ac

Dual WAN Routers – Multiple WANS can be active at same time				
Router Model	WAN Type			
	WAN 1	WAN 2	WAN 3	WAN 4
Vigor2912 Series	Fast Ethernet	Fast Ethernet	USB backup (Shared with WAN 2)	-
Vigor2925 Series	Gigabit Ethernet	Gigabit Ethernet	USB	USB
Vigor2926 Series	Gigabit Ethernet	Gigabit Ethernet	USB	USB
Vigor2952	Gigabit Ethernet	Gigabit Ethernet/SFP	USB	USB
Vigor2960	Gigabit Ethernet	Gigabit Ethernet	USB	USB



Vigor2912 Series



Vigor2925 Series



Vigor2926 Series



Vigor2952



Vigor2960

Multi- WAN Routers – Multiple WANS can be active at same time						
Router Model	WAN Type					
	WAN 1	WAN 2	WAN 3	WAN 4	WAN 5	Additional WAN
Vigor3220	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	USB	-
Vigor3900	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	SFP	2 x USB



Vigor3220



Vigor3900

2.3 LTE Routers

Based on the Dual-WAN xDSL routers and Dual-WAN broadband routers, LTE routers have an embedded 4G LTE modem which supports a mobile broadband SIM card.

The table below lists the two LTE routers and the type of WAN interfaces available.

LTE Routers – Multiple WANS can be active at same time				
Router Model	WAN Type			
	WAN 1	WAN 2	WAN 3	WAN 4
Vigor2862L Series	ADSL2+/VDSL2	Gigabit Ethernet	Embedded LTE	USB
Vigor2926L Series	Gigabit Ethernet	Gigabit Ethernet	Embedded LTE	USB



Vigor2862L Series



Vigor2926L Series

3. WAN Connectivity

As can be seen from the router types, xDSL and broadband Ethernet WAN are the primary types of physical WAN Interfaces, while mobile USB and LTE (SIM card slot) cover only a small percentage of deployments.

In addition to the physical WAN interface in the router, there are a number of different methods of establishing a connection to the service provider, including:

- PPPoE – Point to Point Protocol over Ethernet – Connects the users to Internet through Ethernet with a single medium: DSL, Cable or WLAN
- PPPoA – Point to Point Protocol over ATM – uses PPP dial-up protocol with ATM.
- MPoA - 1483 Bridge IP
-1483 Routed IP

MPoA is a specification that enables ATM services to be integrated with existing LANs, using Ethernet, Token-Ring or TCP/IP protocols. The goal of MPoA is to allow different LANs to send packets to each other via an ATM backbone.

3.1 xDSL WAN (ADSL2/2+, VDSL2)

The xDSL WAN uses telephony copper wires to connect to the Internet with ADSL2/2+ or VDSL2 technology. FTTB (Fibre to the Building) or FTTN (Fibre to the Node) are two examples of xDSL WAN using copper wires on VDSL2 technology as the last mile for the Internet connections.

3.1.1 ADSL

ADSL WAN requires setting of ADSL modulation modes and parameters for the DSLAM to provide Internet connectivity. Below is a configuration page from a DrayTek router:

The screenshot shows the 'WAN >> Internet Access' configuration page for 'WAN 1'. The 'Modem Settings (for ADSL only)' section is expanded, showing fields for Multi-PVC channel (Channel 1), VPI (0), VCI (33), Encapsulating Type (LLC/SNAP), Protocol (PPPoE), and Modulation (Multimode). The 'PPPoE Pass-through' section has checkboxes for 'For Wired LAN' and 'For Wireless LAN'. The 'WAN Connection Detection Mode' is set to 'Multimode'.

ADSL Modulation Modes

T1.413 – 1.5 Mb/s downstream

G.Lite - ITU G.992.2 1.5 Mb/s downstream

G.DMT – 8Mb/s downstream, 1Mb/s upstream

ADSL2 (G992.3) 12Mb/s downstream, 1Mb/s Upstream

ADSL2 annex M/J 12Mb/s downstream, 3Mb/s Upstream

ADSL2+ (G992.5) - 24 Mb/s downstream, 1Mb/s Upstream

ADSL2+ annex M/J -24 Mb/s downstream, 3Mb/s Upstream

Multimode – Router will auto-detect line type

The following settings are required for ADSL connections in Australia and New Zealand:

Parameter	In Australia		In New Zealand	
VPI	8		0	
VCI	35		100	
Protocol	PPPoE/PPPoA	MPoA		
Encapsulation	LLC/SNAP	LLC		

ADSL Modem Codes

With DrayTek's customer base globally, they are able to provide optimized modem codes for different ISPs/ IPDSLAMs. Usually the standard modem code will be suitable for most installations, but where stability issues are encountered you can try one of the alternative modem codes.

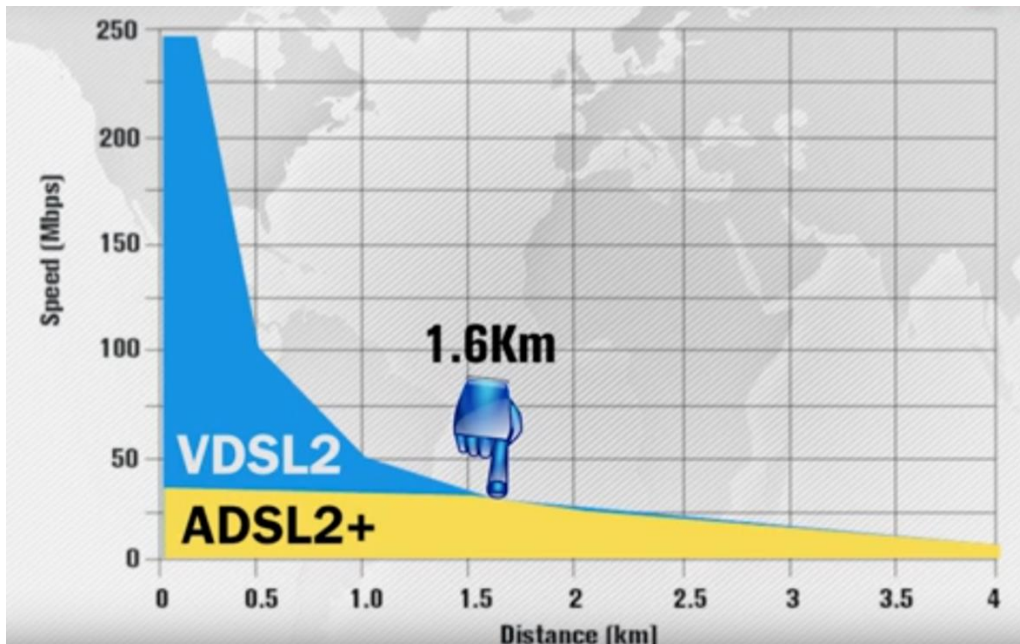
The list below shows the modem codes for the Vigor120 router. The modem codes for other routers are available from our website.

Firmware Downloads

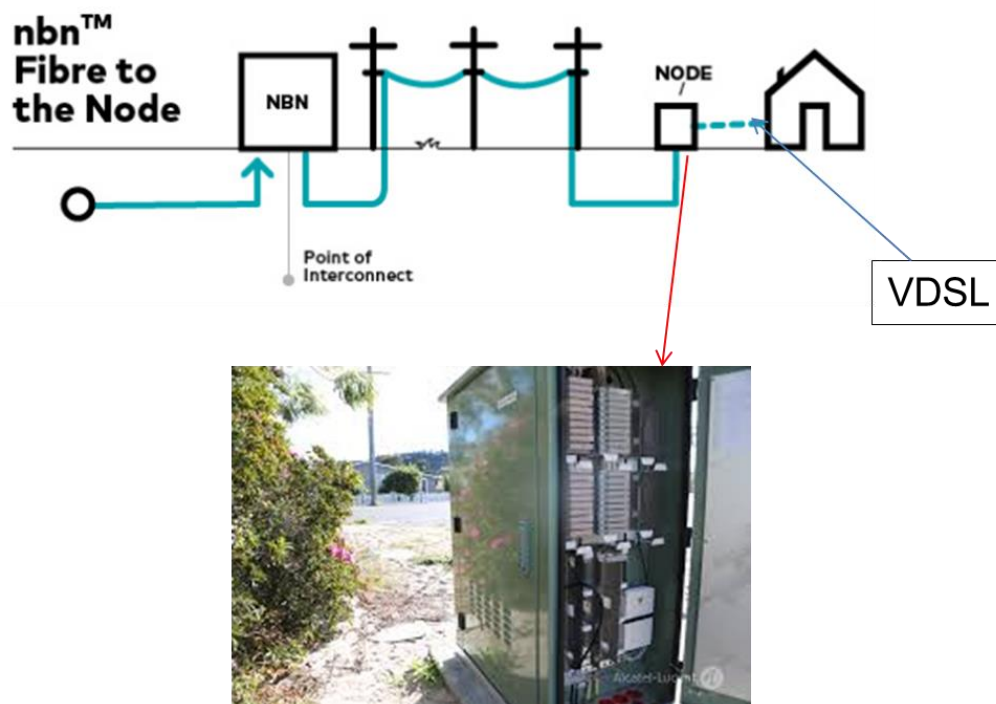
Name	Description
Vigor120+v3.2.4.4+annex+A_STD.zip	Annex A modem code 321311. (Standard)
Vigor120+v3.2.4.4+annex+A_310801.zip	Annex A for modem code 310801
Vigor120+v3.2.4.4+annex+A_310811.zip	Annex A for modem code 310811
Vigor120+v3.2.4.4+annex+A_3211201.zip	Annex A for modem code 3211201
Vigor120+v3.2.4.4+annex+A_2_332201.zip	Annex A_2 for modem code 332201
Vigor120+v3.2.4.4+annex+A_2_3431301.zip	Annex A_2 for modem code 3431301
Vigor120+v3.2.4.4+annex+A_2_343601.zip	Annex A_2 for modem code 343601
Vigor120+v3.2.4.4+annex+A_2_343701.zip	Annex A_2 for modem code 343701
Vigor120+v3.2.4.4+annex+A_2_344001.zip	Annex A_2 for modem code 344001
Vigor120+v3.2.4.4+annex+A_2_344101.zip	Annex A_2 for modem code 344101

3.1.2 VDSL

VDSL2 has a theoretical maximum speed of 350 Mbit/s at the source, 100 Mbit/s at 0.5 km and 50 Mbit/s at 1 km but degrades at a much slower rate from there on. At 1.6 km its performance is equal to ADSL2+ as shown in the diagram below.



VDSL2 is used in Fibre to the Node (FTTN) or Fibre to the Basement (FTTB) deployment of NBN connections. In FTTN, optic fibre is installed from the NBN point of Interconnect to a node which is usually a roadside cabinet. From here existing copper cabling is utilised to provide a VDSL2 service to the premises. The distance between the node and the premises can be up to 1km, to ensure the required NBN speeds are provided. In FTTB to multi-dwelling units (MDU) optic fibre is terminated at the communication room, normally in the basement of the MDU.



VDSL Modem Codes

In order to optimize performance for VDSL 2 with vectoring, which is required by NBN, DrayTek has produced two modem codes for Vigor2760 and Vigor2860:

- AnnexA_574307_571801
- Annex A_579C17_573F01

DrayTek VDSL routers are shipped with modem code “AnnexA_574307_571801” pre-installed. This will work with NBN VDSL2 installations as well as ADSL2+ installations. The modem code “Annex A_579C17_573F01” has been developed to improve sync speeds with VDSL2 connections but is not recommended for ADSL+ installations.

For Vigor2862 routers, the modem codes included in the STD firmware work well with VDSL2 connections. (776d07_772801 & 774307_771801)

The modem code is selectable in the General Setup, DSL Modem Code tag, as shown in the diagram below:

WAN >> General Setup

WAN 1

Enable:	Yes
Display Name:	
Physical Mode:	VDSL2
DSL Mode:	Auto
Physical Type:	Auto negotiation
DSL Modem Code:	AnnexA_574307_571801
VLAN Tag insertion (ADSL):	Disable
Tag value:	0 (0~4095)
Priority:	0 (0~7)
VLAN Tag insertion (VDSL2):	Disable
Tag value:	0 (0~4095)
Priority:	0 (0~7)

VLAN Tag

Many service providers require the use of a VLAN tag to access the NBN. The most common VLAN tag is 100.

VLAN Tag insertion (ADSL): Disable (Please configure Internet)

Tag value: 0 (0~4095)

Priority: 0 (0~7)

VLAN Tag insertion (VDSL2): Enable

Tag value: 100 (0~4095)

Priority: 0 (0~7)

Active Mode: Always On Load Balance: ☒

Note:

Checking the VDSL Connection Status

DrayTek routers provide a page, the **Diagnostics>>DSL status**, which gives details of the status including error conditions in case there are issues with the VDSL connection.

Diagnostics >> DSL Status
[Refresh](#)

General

ATU-R Information

Type: ADSL2/2+
Hardware: Annex A
Firmware: 05-04-08-00-00-06
Power Mngt Mode: DSL_G997_PMS_NA
Line State: TRAINING
Running Mode:
Vendor ID: b5004946 544e0000

ATU-C Information

Vendor ID: 00000000 00000000 [unknown]

Line Statistics

	Downstream		Upstream	
Actual Rate	0	Kbps	0	Kbps
Attainable Rate	0	Kbps	0	Kbps
Path Mode	Fast		Fast	
Interleave Depth	0		0	
Actual PSD	0. 0	dB	0. 0	dB
	Near End		Far End	
Trellis	ON		ON	
Bitswap	OFF		OFF	
ReTx	0		0	
SNR Margin	0	dB	0	dB
Attenuation	0	dB	0	dB
CRC	0		0	
FECS	0	s	0	s
ES	0	s	0	s
SES	0	s	0	s
LOSS	0	s	0	s
UAS	0	s	0	s
HEC Errors	0		0	
RS Corrections	0		0	
LOS Failure	0		0	
LOF Failure	0		0	
LPR Failure	0		0	
NCD Failure	0		0	
LCD Failure	0		0	
NFEC	0		0	
RFEC	0		0	
LYSMB	0		0	

NBN VDSL Configuration Examples

The application notes and videos below provide a number of configuration examples and show how to configure VDSL routers for NBN connections.

Application Notes

1. NBN Configuration Application notes –

<https://tinyurl.com/draytek-nbn>

2. How to Connect DrayTek Vigor router to VDSL2 connection on NBN network

This application note describes how to configure DrayTek VDSL2 Vigor routers (Vigor2760 and Vigor2860 series routers) to a VDSL2 connection on the NBN network. It also applies to the Vigor2862 router.

I. Get the firmware

Depending on your Vigor router model, download the firmware from the links below and update the firmware in your router. This official firmware supports VDSL2 Vectoring which is required for VDSL2 connections on the NBN network.

- a) DrayTek Vigor2760 - <https://tinyurl.com/2760series> (VDSL2 Vector-2, Modem code: 574307_571801 & 573807_571701 (AU NBN users recommended))
- b) DrayTek Vigor2860 - <https://tinyurl.com/2860firmware> (VDSL2 Vector-2, Modem code: 574307_571801 & 573807_571701 (AU NBN users recommended))

II. Configure Modem Code

Once the router has the latest firmware, select the modem code supporting vectoring by following the procedures below:

- a) Go to WAN >> General setup page and configure the DSL Modem Code to "AnnexA_574307_571801"

The screenshot shows the 'WAN >> General Setup' configuration page for 'WAN 1'. The 'Enable' checkbox is checked. The 'Physical Mode' is set to 'VDSL2'. The 'DSL Mode' is set to 'Auto'. The 'Physical Type' is set to 'Auto negotiation'. The 'DSL Modem Code' is set to 'AnnexA_574307_571801', which is highlighted with a red box. The 'VLAN Tag insertion (ADSL)' is set to 'Disable'. The 'VLAN Tag insertion (VDSL2)' is also set to 'Disable'. The 'Tag value' and 'Priority' fields are set to 0. A 'Note' section at the bottom provides additional information about WAN interfaces and DSL auto mode. 'OK' and 'Cancel' buttons are at the bottom right.

WAN >> General Setup

WAN 1

Enable: Yes

Display Name:

Physical Mode: VDSL2

DSL Mode: Auto

Physical Type: Auto negotiation

DSL Modem Code: AnnexA_574307_571801

VLAN Tag insertion (ADSL): Disable

Tag value: 0 (0~4095)

Priority: 0 (0~7)

VLAN Tag insertion (VDSL2): Disable

Tag value: 0 (0~4095)

Priority: 0 (0~7)

Note:

1. WAN1 and WAN2 cannot work simultaneously, so when one of the interfaces is enabled, the other will be disabled. WAN3 can only serve as the backup WAN for WAN1 or WAN2, depending on which is active.

2. In DSL auto mode, the router will reboot automatically while switching between VDSL2 and ADSL lines.

OK Cancel

Configure the VLAN ID on the same page *only if required* by your ISP:

- Enter the VLAN Tag ID into **Tag value** section to match your ISP's requirements.

Service Provider	Connection Type	VLAN Tag
Dodo	FTTP (Ethernet)	100
TPG	VDSL	2
Web Shield	VDSL	100
iPrimus	VDSL	100
Commander	VDSL	100

- Set VLAN Tag insertion (VDSL2) to Enable
- Click **OK** to save

III. Configure WAN Internet Access Mode

There are two common modes for connecting to the internet: **PPPoE / PPPoA** and **IPoE (Static or Dynamic IP)**. Follow the instruction for the mode that your ISP provides. On WAN >> Internet Access page, select the required Access Mode for WAN1 and click on Details Page.

- PPPoE / PPPoA** (Follow this procedure if access mode is PPPoE)

The screenshot shows the 'WAN >> Internet Access' configuration page for 'WAN 1'. The 'PPPoE / PPPoA' tab is selected and highlighted with a red box. Below the tab, the 'Enable' radio button is selected and highlighted with a red box. The 'Modem Settings (for ADSL only)' section includes fields for Multi-PVC channel (Channel 1), VPI (8), VCI (35), Encapsulating Type (VC MUX), Protocol (PPPoA), and Modulation (Multimode). The 'PPPoE Pass-through' section has checkboxes for 'For Wired LAN' and 'For Wireless LAN'. The 'WAN Connection Detection' section includes a Mode dropdown (ARP Detect), Ping IP, and TTL fields. The 'MTU' field is set to 1492 (Max: 1492). The 'ISP Access Setup' section includes a Service Name field, Username (username@isp.com) and Password (masked with dots) fields, both highlighted with a red box. There is a checkbox for 'Separate Account for ADSL'. The 'PPP Authentication' dropdown is set to 'PAP or CHAP'. The 'IP Address From ISP' section has a 'WAN IP Alias' button. The 'Fixed IP' section has radio buttons for 'Yes' and 'No (Dynamic IP)', with 'No (Dynamic IP)' selected. The 'Fixed IP Address' field is empty. The 'MAC Address' section has radio buttons for 'Default MAC Address' (selected) and 'Specify a MAC Address'. The 'MAC Address' field shows a hexadecimal address: 00 . 1D . AA . AA . CA . D9. The 'Index(1-15) in Schedule Setup' section has a dropdown set to 'Schedule' and a field with '=>' and four empty boxes.

- DHCP / IPoE** (Follow this procedure if access mode is DHCP / IPoE)

WAN >> Internet Access

WAN 1

PPPoE / PPPoA **MPoA / Static or Dynamic IP** IPv6

☒ Enable ☐ Disable

Modem Settings (for ADSL only)

Multi-PVC channel Channel 2

Encapsulation 1483 Bridged IP LLC

VPI 8

VCI 88

Modulation Multimode

WAN Connection Detection

Mode ARP Detect

Ping IP

TTL:

MTU 1500 (Max:1500)

RIP Protocol

☐ Enable RIP

Bridge Mode

☐ Enable Bridge Mode

WAN IP Network Settings WAN IP Alias

☒ Obtain an IP address automatically

Router Name Vigor

Domain Name

☒ DHCP Client Identifier *

Username username@isp.com

Password

☐ Specify an IP address

IP Address

Subnet Mask

Gateway IP Address

☒ Default MAC Address

☐ Specify a MAC Address

MAC Address: 00 1D AA CA D9

DNS Server IP Address

Primary IP Address 8.8.8.8

Secondary IP Address 8.8.4.4

IV. Observe VDSL2 Connection

Once the router is connected to the VDSL2 line, check the physical link status and WAN IP address assignment in the Online Status >> Physical Connection page.

- VDSL2 Information (Profile, State, UL/DL Speed, UL/DL SNR). The VDSL2 connection state should be SHOWTIME Vectoring Active.

VDSL2 Information (VDSL2 Firmware Version: 574307_A/B/C with Vectoring support)					
Profile	State	UP Speed	Down Speed	SNR Upstream	SNR Downstream
17A	SHOWTIME Vectoring Active	6,400 (Kbps)	27,998 (Kbps)	24 (dB)	32 (dB)

- On the same page, WAN 1 Status should have IP and GW IP assigned by the ISP.

3. Configuring Vigor130 for VDSL Bridge mode

Before you start, ensure the Vigor130 has the correct firmware installed that supports NBN VDSL2 connection. Go to <https://tinyurl.com/draytek-130-vdsl> for more details.

If required you may need to configure the VLAN ID (only if required by your ISP)

Configuring Bridge Mode

- Go to "Internet Access >> MPoA / Static or dynamic IP" configuration menu
- Select "Enable"
- On the bottom left (Bridge Mode selection), enable the "Enable Bridge Mode"
- Click **OK** to save
- Device will reboot

The screenshot shows the DrayTek Vigor130 web interface. The left sidebar contains navigation menus: Wizards, Online Status, Internet Access (with sub-items: General Setup, PPPoE / PPPoA, **MPoA / Static or dynamic IP**, IPv6, Multi-PVC/VLAN), LAN, NAT, Firewall, Objects Setting, CSM, Applications, System Maintenance, and Diagnostics. Below this is the Support Area with Product Registration. The main content area is titled 'Internet Access >> MPoA / Static or dynamic IP'. It features a 'MPoA (RFC1483/2684)' section with 'Enable' and 'Disable' radio buttons, where 'Enable' is selected. Below this is the 'DSL Modem Settings (for ADSL mode only)' section with fields for Multi-PVC channel (Channel 2), Encapsulation (1483 Bridged IP LLC), VPI (0), VCI (88), and Modulation (Multimode). The 'WAN Connection Detection' section includes Mode (ARP Detect), Ping IP, and TTL. The 'MTU' field is set to 1492 (Max:1500). The 'RIP Protocol' section has an 'Enable RIP' checkbox. At the bottom left, the 'Bridge Mode' section has an 'Enable Bridge Mode' checkbox checked. On the right, the 'WAN IP Network Settings' section includes options for 'Obtain an IP address automatically' and 'Specify an IP address' (selected), with fields for Router Name, Domain Name, DHCP Client Identifier, Username, Password, IP Address, Subnet Mask, Gateway IP Address, Default MAC Address, Specify a MAC Address, and DNS Server IP Address. At the bottom, there is an 'Advanced' section with a note about DHCP client options and an 'OK' button.

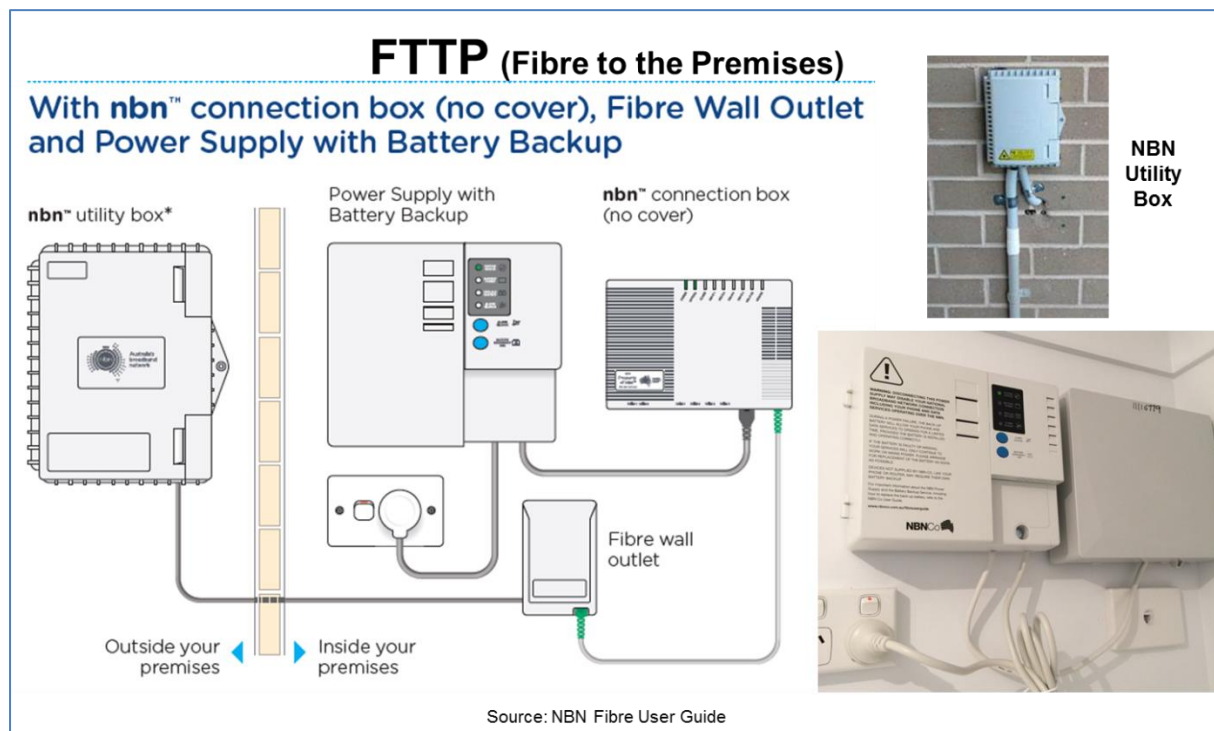
Note: Once the DV130 configured to bridge mode, the DHCP server on DV130 will not function. If you need to configure the device, you will need to configure your PC to have a static IP address 192.168.1.x subnet (for ex. 192.168.1.100).

Videos

1. How to Configure the Vigor2760 Router for NBN VDSL Network -
<https://youtu.be/EMzJxOXeG9U>
2. How to Configure the Vigor2860 Router for VDSL2 Connection on NBN Network -
<https://youtu.be/G2U9M4Vp4as>
3. How to Configure the Vigor130 Router for VDSL2 Bridge Mode -
<https://youtu.be/DFFr3b1Psoo>

3.2 Ethernet WAN

Ethernet WAN uses a twisted pair Ethernet cable to connect a router to the Internet through a modem or an Ethernet termination port. For non-NBN services, xDSL/Cable/Satellite modems are used. For NBN services, including FTTH (Fibre to the Home)/FTTP (Fibre to the Premise), HFC, Satellite, or Fixed Wireless, the Ethernet ports on the NTU are used to connect to the routers.



Configuration of Ethernet WAN

The Ethernet WAN interface can be configured to auto-negotiate for the WAN connection speed. You can also select a fixed connection speed and duplex setting, for instances when auto negotiation does not work. Besides, some NBN connections require a VLAN tag value to be inserted.

WAN >> General Setup

WAN 1

Enable:	Yes ▼
Display Name:	
Physical Mode:	Ethernet
Physical Type:	Auto negotiation ▼
Line Speed(Kbps):	
DownLink	0
UpLink	0
VLAN Tag insertion :	Enable ▼
Tag value:	100 (0~4095)
Priority:	0 (0~7)
Active Mode:	Always On ▼
Load Balance:	☒

Auto negotiation options:
 10M half duplex
 10M full duplex
 100M half duplex
 100M full duplex
 1000M full duplex

WAN Access Mode Settings

There are three modes that can be selected for Internet access: PPPoE, Static or Dynamic IP and PPTP/L2TP.

None
PPPoE
Static or Dynamic IP
PPTP/L2TP

PPoE

WAN >> Internet Access

WAN 1

PPPoE	Static or Dynamic IP	PPTP/L2TP	IPv6
☐ Enable ☒ Disable			
ISP Access Setup Service Name (Optional) Username Password Index(1-15) in <u>Schedule</u> Setup: => , , ,		PPP/MP Setup PPP Authentication PAP or CHAP Idle Timeout -1 second(s) IP Address Assignment Method (IPCP) WAN IP Alias Fixed IP: ☐ Yes ☒ No (Dynamic IP) Fixed IP Address	
WAN Connection Detection Mode ARP Detect		☒ Default MAC Address ☐ Specify a MAC Address MAC Address: 00 1D AA E0 F9 61	
MTU 1500 (Max:1500) Path MTU Discovery Detect			

Note: (Optional) Required for some ISPs. Leave blank if in doubt because the connection request might be denied if "Service Name" is incorrect.

Static or Dynamic IP

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	
WAN Connection Detection Mode ARP Detect		☐ Obtain an IP address automatically Router Name Vigor Domain Name ☐ DHCP Client Identifier * Username Password	
MTU 1500 (Max:1500) Path MTU Discovery Detect		☒ Specify an IP address IP Address 172.16.2.242 Subnet Mask 255.255.255.0 Gateway IP Address 172.16.2.1	
RIP Protocol ☐ Enable RIP		☒ Default MAC Address ☐ Specify a MAC Address MAC Address: 00 1D AA E8 07 B9	
Bridge Mode ☐ Enable Bridge Mode Bridge Subnet LAN 1		DNS Server IP Address Primary IP Address 8.8.8.8 Secondary IP Address 8.8.4.4	

PPTP/L2TP

WAN >> Internet Access

WAN 1

PPPoE	Static or Dynamic IP	PPTP/L2TP	IPv6
☐ Enable PPTP ☐ Enable L2TP ☒ Disable			
Server Address			
Specify Gateway IP Address 192.168.3.1			
ISP Access Setup			
Username			
Password			
Index(1-15) in <u>Schedule</u> Setup:			
=> , , ,			
MTU 1460 (Max:1460)			
Path MTU Discovery Detect			
PPP Setup			
PPP Authentication PAP or CHAP			
Idle Timeout -1 second(s)			
IP Address Assignment Method (IPCP)			
WAN IP Alias			
Fixed IP: ☐ Yes ☒ No (Dynamic IP)			
Fixed IP Address			
WAN IP Network Settings			
☐ Obtain an IP address automatically			
☒ Specify an IP address			
IP Address 192.168.3.53			
Subnet Mask 255.255.255.0			

NBN Configuration Examples

The application notes and video below provide a number of configuration examples and show how to configure DrayTek broadband routers for NBN connections.

Application Notes

1. NBN Configuration Application notes – <https://tinyurl.com/draytek-nbn>
2. How to Connect a DrayTek Vigor2925 router to DODO NBN – <https://tinyurl.com/draytek-nbn-dodo>
3. How to Connect a DrayTek Vigor2860 Router to TPG NBN – <https://tinyurl.com/draytek-nbn-tpg>
4. How to Connect a DrayTek Vigor2860 router to AAPT NBN – <https://tinyurl.com/draytek-nbn-aapt>

Video

1. How to Configure the DrayTek Vigor2860 for TPG NBN - <https://youtu.be/hX9Ow0TN0g>

3.3 USB Mobile WAN

USB broadband modem and LTE SIM card based mobile devices are two of the main devices used for 3G/4G mobile broadband. USB Mobile WAN uses USB broadband modem (i.e. USB mobile dongle) to access 3G/4G mobile broadband, and can be used alone or in multi-WAN Load Balance or Failover.

Supported USB mobile dongles are listed on our web site:

<http://www.draytek.com.au/support/3g-4g-modem-compatibility>

WAN Access Modes

There are two access modes available for 3G/4G USB modems. These are PPP mode and DHCP mode.

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
WAN3		USB	None	Details Page	IPv6
WAN4		USB	None	Details Page	IPv6

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

PPP Mode

For this mode enter the APN Name (Access Point Name) for the service provider that you will be connecting to. The APN is a gateway between a GSM, GPRS, 3G or 4G mobile networks and the Internet.

For some service providers you may also need to enter a username and password for authentication.

WAN >> Internet Access

WAN 3

3G/4G USB Modem(PPP mode) 3G/4G USB Modem(DHCP mode) IPv6

[Modem Support List](#)

3G/4G USB Modem(PPP mode) ☒ Enable ☐ Disable

SIM PIN code

Modem Initial String
(Default:AT&FE0V1X1&D2&C1S0=0)

APN Name

Modem Initial String2

Modem Dial String
(Default:ATDT*99#, CDMA:ATDT#777, TD-SCDMA:ATDT*98*1#)

Service Name (Optional)

PPP Username (Optional)

PPP Password (Optional)

PPP Authentication PAP or CHAP ▼

Index(1-15) in [Schedule](#) Setup:
=> , , ,

WAN Connection Detection
Mode ▼

DHCP Mode

For DHCP mode you just need to select enable and enter the APN Name.

WAN >> Internet Access

WAN 3

3G/4G USB Modem(PPP mode) 3G/4G USB Modem(DHCP mode) IPv6

[Modem Support List](#)

3G/4G USB Modem(DHCP mode) ☒ Enable ☐ Disable

SIM PIN code

Network Mode ▼ (Default:4G/3G/2G)

APN Name

MTU (Default:1380)

Path MTU Discovery

LTE hardware version ---

WAN Connection Detection
Mode ▼

Note: Please note that in some case USB port connection will be terminated temporarily to activate the new configuration.

Notes:

1. Most service providers only allocate a private IP address for the 3G/4G WAN connection. This can cause problems for incoming VPN connections. It is possible however with some service providers to request a public IP address for the WAN connection.
2. Most modern 3G/4G USB modems are running NAT so the router will always see a private IP address on the WAN connection. If a public IP address has been assigned to the 3G/4G modem you will need to enable port forwarding in the modem so you can access services on the LAN from the Internet. For example port forward port 5060 for SIP services from the Internet to a server on the LAN.

Configuration Examples

The applications notes and videos listed below provide a number of configuration examples and show how to configure DrayTek routers for 3G/4G connections:

Application Notes

1. 3G/4G Application notes - <https://tinyurl.com/draytek-3g4g>
2. Configure 4G Netgear 320U on Draytek Vigor2830 – <https://tinyurl.com/draytek2830-320u>
3. Vigor2960 / 3900 / 300B 4G Configuration - <https://tinyurl.com/draytek2960-4g>

Videos

1. How to Configure the DrayTek Vigor2860 and Vigor2925 Routers for 4G USB WAN Connections - <https://youtu.be/k9b37S7cGIA>
2. Vigor2960 / 3900 / 300B 4G Configuration - <https://youtu.be/A8DM5-nPZMw>

3.4 LTE WAN

LTE WAN uses a LTE SIM card inserted in the device to access the mobile broadband access. DrayTek provides two LTE routers, Vigor2862L and Vigor2926L series. Each of these models supports a 4G LTE connection in addition to the xDSL or Ethernet WAN connections.



LTE routers are unlocked and accept SIM cards from major providers:

- Australia: Telstra, Optus, Vodafone, etc.
- New Zealand: Spark, 2Degrees and Vodafone

Have a built in SIM card slot with cover protection.

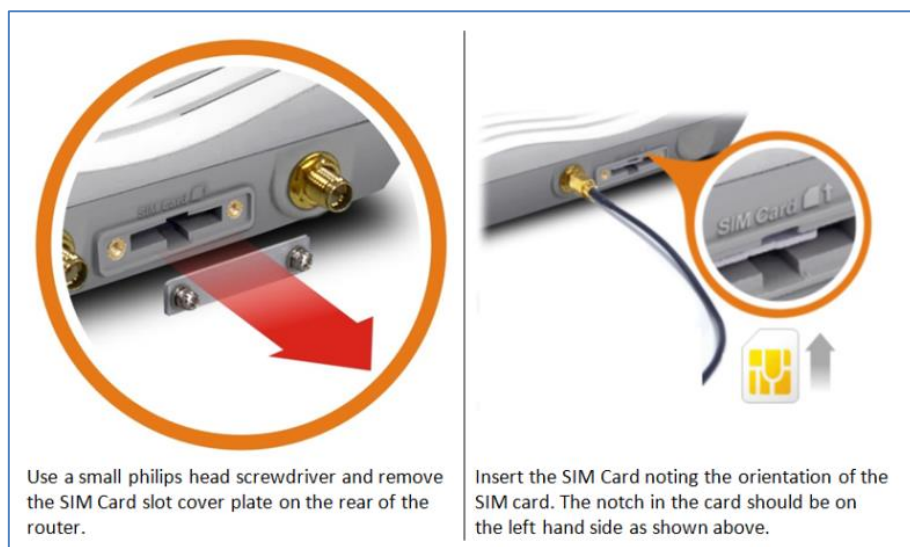
Supported 4G LTE bands are:

- B3 (1800MHz)
- B5 (850MHz)
- B7 (2600MHz)
- B8 (900MHz)
- B20 (800MHz)
- B28 (700MHz)

The maximum data rate for downlink is 150Mbps and the data rate for uplink is 50Mbps.

LTE Configuration

Ensure the SIM card is inserted into the SM card slot as shown in the diagram above paying attention to the notch in the SIM card.



Attach the two black coloured antennas to the router as shown in the diagram below. The primary antenna socket is the one nearest the SIM card slot.



If only one antenna is going to be used ensure that it is attached to the socket nearest the SIM card slot

LTE Access Mode configuration is only available for DHCP mode.

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
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.

Enter the relevant details including the APN Name.

WAN >> Internet Access

LTE

3G/4G LTE Modem(DHCP mode) | IPv6

3G/4G LTE Modem(DHCP mode) ☒ Enable ☐ Disable

SIM PIN code

Network Mode (Default: 4G/3G/2G)

APN Name

Username (Optional)

Password (Optional)

Authentication ▼

MTU (Default: 1380)

Path MTU Discovery

LTE hardware version

WAN Connection Detection

Mode ▼

Notes

1. Most service providers now only allocate a private IP address for the 3G/4G WAN connection. This can cause problems for incoming VPN connections. It is possible however with some service providers to request a public IP address for the WAN connection.
2. In some instances when using 4G modems the assigned public IP address may not be sent to the modem via DHCP. To overcome this DrayTek have added a CLI command to manually assign an IP address for the WAN connection. For example to manually assign a fixed IP address for the LTE WAN use the command:

E.g. wan lte set fixed 1.1.1.1

Video Demonstration

Configuring the Vigor2860L and Vigor2925L for LTE Internet Access

<https://youtu.be/iLWPmZyen6g>

Checking the Status of LTE WAN

The **LTE >> Status** page shows the status of the LTE WAN connection and details such as the LTE band used, signal strength, etc.

LTE >> Status	
Refresh	
LTE Modem	
Status:	Operational
IMEI:	358522060640100
IMSI:	466924131102363
Access Tech:	LTE
Band:	E-UTRA Op Band 3
Operator:	Chunghwa
Mobile Country Code:	466
Mobile Network Code:	92
Location Area Code:	65534
Cell ID:	80439841
Signal:	-52 dBm
Active Channel:	1725
Interference with 2.4GHz WLAN:	No
Max Channel TX Rate:	50 Mbps
Max Channel RX Rate:	100 Mbps
LTE SMS	
SMS Centre Number:	+886932400821
SMS Service Status:	Ready
SMS Loading:	Ready
New SMS:	0

Configuration Examples

There are a number of configuration examples available on the Internet showing how to configure DrayTek routers for LTE connections. Below is a list of useful resources:

Application Notes

1. Configuring the Vigor2860L and Vigor2925L for LTE Internet access - <https://tinyurl.com/draytek2860l-lte>
2. Troubleshooting LTE Connectivity Issues with DrayTek LTE Routers - <https://tinyurl.com/draytek-lte-troubleshooting>
3. How to check if the DrayTek Vigor2860/2925 LTE Router Frequency Bands are supported on your Area - <https://tinyurl.com/draytek-lte-bands>

Video

1. Configuring the Vigor2860L and Vigor2925L for LTE Internet Access – <https://tinyurl.com/draytek2860l-lte-video>

3.5 Wireless (Wi-Fi) WAN

Wireless WAN (Wi-Fi WAN) is a new feature that has been added to the Vigor2862n/ac and Vigor2926n/ac routers. It allows the user to connect the router to any Wi-Fi hotspot or Wi-Fi tethering from a mobile device. This function is useful during an emergency when all wired connections are dropped and no 4G USB dongle is available.



The WAN 2 port of both Vigor2862n/ac and Vigor2926n/ac can be configured to use the Gigabit Ethernet WAN port to use the router's Wireless connection.

The screenshot shows the 'Vigor2862 Series' web interface. The top navigation bar is red with the title 'Vigor2862 Series' and several icons. Below the bar, the breadcrumb 'WAN >> General Setup' is visible. The main content area is titled 'WAN 2' and contains a configuration table. The 'Enable' field is set to 'Yes'. The 'Display Name' field is empty. The 'Physical Mode' dropdown is set to 'Ethernet'. The 'Physical Type' dropdown is set to 'Wireless 2.4G'. The 'Line Speed(Kbps)' section has 'DownLink' set to 0 and 'UpLink' set to 0. The 'Active Mode' dropdown is set to 'Always On'. The 'Load Balance' checkbox is checked.

Enable:	Yes ▼
Display Name:	
Physical Mode:	Ethernet ▼
Physical Type:	Ethernet ▼
Line Speed(Kbps):	Wireless 2.4G
DownLink	0
UpLink	0
Active Mode:	Always On ▼
Load Balance:	☒

Configuring Wireless WAN

After enabling Wireless WAN for WAN 2 in **WAN >> General Setup** configuration menu, go to **WAN >> Internet Access>>WAN2** details page.

- Use the AP Discovery tool to search for available Wi-Fi Hotspots.
- Select the required Hotspot and add it to Universal Repeater Parameters section on this page.

The screenshot shows the 'WAN >> Internet Access' configuration window for 'WAN 2'. It contains several sections:

- Static or Dynamic IP:** Radio buttons for 'Enable' (selected) and 'Disable'. Below are radio buttons for 'Obtain an IP address automatically' (selected) and 'Specify an IP address'. If 'Specify an IP address' is selected, there are input fields for 'IP Address', 'Subnet Mask', and 'Gateway IP Address'.
- WAN Connection Detection:** A 'Mode' dropdown menu set to 'ARP Detect'.
- MTU:** An input field set to '1500' with '(Max:1500)' next to it.
- Universal Repeater Parameters:** Fields for 'SSID' (set to 'DrayTek'), 'MAC Address (Optional)' (set to '00:1D:AA:38:AA:60'), 'Channel :' (set to 'Channel 6, 2437MHz'), 'Security Mode' (set to 'WPA2/PSK'), 'Encryption Mode' (set to 'AES'), and 'Pass Phrase' (masked with asterisks). There is an 'AP Discovery' button to the right of the SSID field.

At the bottom, there is a note: 'Note: If Channel is modified, the Channel setting of wireless 2.4G would be also modified.' and 'OK' and 'Cancel' buttons.

Additional Resources

Application note:

<https://tinyurl.com/draytek-wireless-wan-setup>

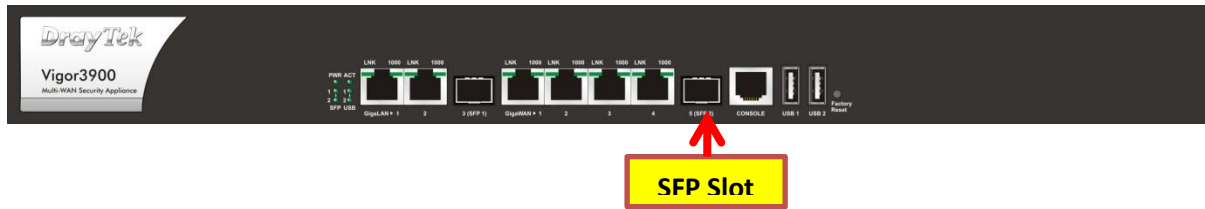
Video

How to set up a wireless WAN in Vigor Router

<https://youtu.be/hRw4AtdVAgM>

3.6 Fibre WAN

Fibre WAN uses fibre connections directly to access the Internet. Vigor3900 and Vigor2952 routers have a Small Form factor Pluggable (SFP) slot that will accept a SFP fibre module to allow connection to the Internet.



Configuration of the WAN Interface is similar to that of the Ethernet WAN Interface.

4. Hands on Exercises

4.1 Configure and Test Vigor LTE Router for LTE WAN Connectivity.

In this exercise we will configure a Vigor2862Lac router for LTE WAN connectivity.

You may find it helpful to review the tutorial on YouTube covering the configuration process. The URL for the video is: <https://youtu.be/iLWPmZyen6g>

The supplied SIM cards for this exercise will be for:

1. Optus
2. Vodafone
3. Telstra

Step 1: Insert SIM Card into the Router



- (a) Use a small philips head screwdriver and remove the SIM Card slot cover plate on the rear of the router.

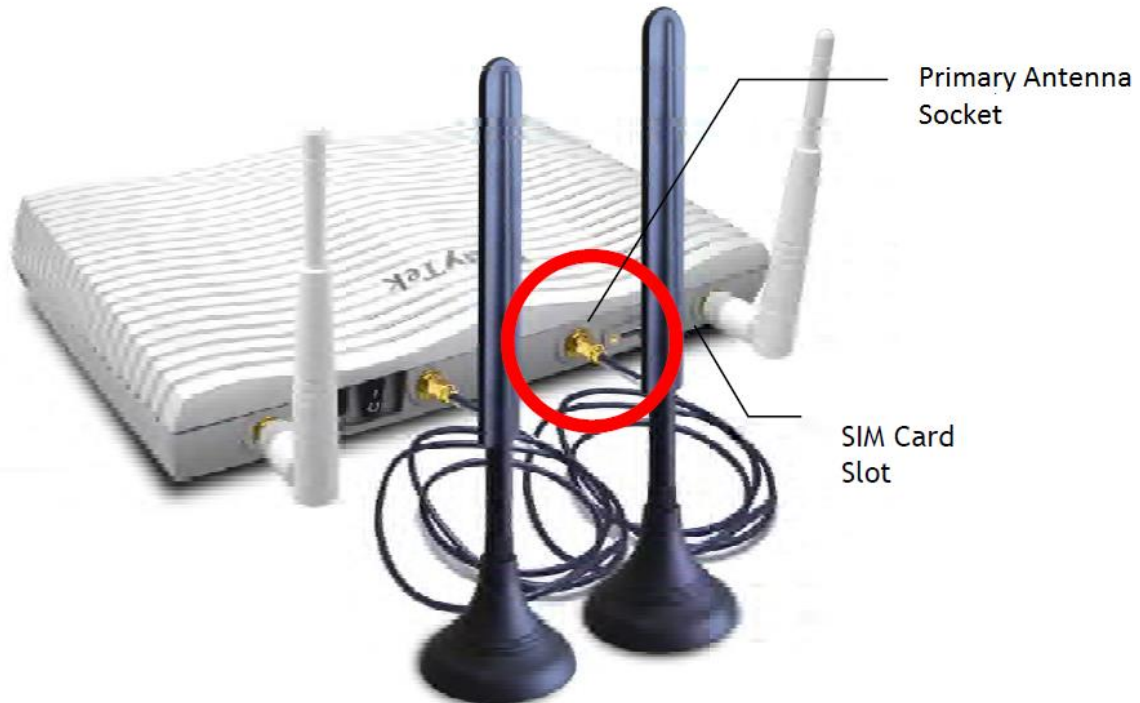


- (b) Insert the SIM Card noting the orientation of the SIM card. The notch in the card should be on the left hand side as shown above.

Once the SIM card is installed you can install the cover plate on the SIM card slot to prevent accidental removal of the SIM card.

Step 2: Attach Antennas onto the Router

Attach the two black coloured antennas to the router as shown in the diagram below. The primary antenna socket is the one nearest the SIM card slot.



If only one antenna is going to be used ensure that it is attached to the socket nearest the SIM card slot

Step 3 – Enable LTE WAN

Go to **WAN >> General Setup** configuration menu.

Here we select **LTE** and set **Active Mode** to **Always On**. (LTE corresponds to WAN3).

To do this, click on **LTE** to go to LTE configuration menu.

- Select **Yes** for Enable
- Set Active mode to **Always On**
- Click on **OK** to save

DrayTek Vigor2862 Series

Auto Logout | IR6

Dashboard
Wizards
Online Status

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

LAN
Hotspot Web Portal
Routing
NAT
Hardware Acceleration
Firewall
User Management
Objects Setting
CSM

WAN >> General Setup

Load Balance Mode: Auto Weight | IP Based

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
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

DrayTek Vigor2862 Series

Auto Logout | IR6

Dashboard
Wizards
Online Status

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

LAN
Hotspot Web Portal
Load-Balance/Route Policy
NAT
Firewall
User Management
Objects Setting
CSM
Bandwidth Management

WAN >> General Setup

LTE

Enable: ☒ Yes

Display Name: 4G Connection

Physical Mode: USB

Line Speed(Kbps):
DownLink: 0
UpLink: 0

Active Mode: Always On | Load Balance: ☐

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

OK Cancel

Step 4 – Enable LTE WAN port

Go to **WAN >> Internet Access** configuration menu and click on the “Details Page” button.

For Index labelled “LTE”, click on the pulldown menu for **Access Mode** and select **3G/4G LTE Modem(DHCP mode)**.

- Click on **Details Page** to configure the LTE connection.
- Select “**Enable**” to enable this profile.

WAN >> Internet Access

Internet Access

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

Note:

Device on USB port applies WAN4 configuration.

Advanced You can configure DHCP client options here.

Select the required Network Mode. Options are:

4G/3G/2G

4G Only

3G Only

2G Only

Network Mode	4G/3G/2G ▼ (Default:4G/3G/2G)
APN Name	4G/3G/2G
MTU	4G Only (Default:1380)
LTE software version	3G Only
LTE hardware version	2G Only

We have selected the default setting 4G/3G/2G Network Modes.

Now enter the APN Name to correspond to the 4G modem being used and the ISP that you will be connecting to.

4.1 Optus 4G Configuration

Enter the APN Name: **connect** or **yesinternet**

WAN >> Internet Access

LTE

3G/4G LTE Modem(DHCP mode)	IPv6
3G/4G LTE Modem(DHCP mode)	☒ Enable ☐ Disable
SIM PIN code	
Network Mode	4G/3G/2G ▼ (Default:4G/3G/2G)
APN Name	connect
Username	(Optional)
Password	(Optional)
Authentication	None ▼
MTU	1380 (Default:1500)
Path MTU Discovery	Choose IP
LTE hardware version	20002
WAN Connection Detection	
Mode	ARP Detect ▼

Note:

Please note that in some case USB port connection will be terminated temporarily to activate the new configuration.

Click OK to save.

4.2 Vodafone 4G Configuration

Enter the APN Name: **live.vodafone.com**

WAN >> Internet Access

LTE

3G/4G LTE Modem(DHCP mode)	IPv6
3G/4G LTE Modem(DHCP mode)	☒ Enable ☐ Disable
SIM PIN code	
Network Mode	4G/3G/2G ▼ (Default:4G/3G/2G)
APN Name	live.vodafone.com
Username	(Optional)
Password	(Optional)
Authentication	None ▼
MTU	1380 (Default:1500)
Path MTU Discovery	Choose IP
LTE hardware version	20002
WAN Connection Detection	
Mode	ARP Detect ▼

Note:

Please note that in some case USB port connection will be terminated temporarily to activate the new configuration.

Click **OK** to save.

4.3 Telstra 4G Configuration

Enter the **APN Name**: *telstra.internet*

WAN >> Internet Access

LTE

3G/4G LTE Modem(DHCP mode)	IPv6
3G/4G LTE Modem(DHCP mode)	☒ Enable ☐ Disable
SIM PIN code	
Network Mode	4G/3G/2G ▼ (Default:4G/3G/2G)
APN Name	telstra.internet
Username	(Optional)
Password	(Optional)
Authentication	None ▼
MTU	1380 (Default:1500)
Path MTU Discovery	Choose IP
LTE hardware version	20002
WAN Connection Detection	
Mode	ARP Detect ▼

Note:

Please note that in some case USB port connection will be terminated temporarily to activate the new configuration.

Click **OK** to save.

You may need to restart the router to bring up the connection.

It will take a few moments for the LTE connection to come up.

Step 5 – Establishing 4G connection

After completing the configuration steps outlined above, go to **Online Status>> Physical Connection** router menu and check if the LTE connection is up.

Details will be shown under **LTE status**.

You should see LTE WAN has a valid IP address and LTE status will be Operational and signal quality shown.

Online Status

Physical Connection



System Uptime: 0day 0:14:2

IPv4		IPv6			
LAN Status		Primary DNS: 10.143.147.147		Secondary DNS: 10.143.147.148	
IP Address	TX Packets	RX Packets			
192.168.1.1	1,128	786			
WAN 1 Status >> Renew					
Enable	Line	Name	Mode	Up Time	
Yes	ADSL		DHCP Client	00:00:00	
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)
---	---	0	0	0	0
WAN 2 Status >> Renew					
Enable	Line	Name	Mode	Up Time	
Yes	Ethernet		DHCP Client	00:00:00	
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)
LTE Status >> Release					
Enable	Line	Name	Mode	Up Time	
Yes	USB	4G Conection	DHCP Client	0:13:17	
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)
10.16.161.176	10.16.161.177	878	73	885	89
USB Modem	Status	Base Station ID	Signal Strength(RSSI)	Signal Quality(CINR)	NetWork Mode
Device Exists	Operational	00:A0:C6:00:01:55	-74 dBm	26 dB	4G Only
				(99%)	
WAN 4 Status >> Renew					
Enable	Line	Name	Mode	Up Time	

Check that you have Internet connectivity by going to an Internet web page or run ping to an external site.

```
C:\Users\Roy Panetta>Ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=18ms TTL=55
Reply from 8.8.8.8: bytes=32 time=17ms TTL=55
Reply from 8.8.8.8: bytes=32 time=15ms TTL=55
Reply from 8.8.8.8: bytes=32 time=24ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 15ms, Maximum = 24ms, Average = 18ms
```

4.2 Configure and Test Wi-Fi WAN for Vigor2862Lac Router

For this exercise we will connect the routers to the Internet using the router Wi-Fi.



For the Mobile Wi-Fi hotspot we will use the Telstra Wi-Fi USB 4G modem (Huawei E8372). This modem will allow up to 5 Wi-Fi connections.

Step 1: Enable Wireless LAN function on the router: Go to Wireless LAN (2.4GHz) >> General Setup, and enable Wireless LAN.

Wireless LAN >> General Setup

General Setting (IEEE 802.11)

☒ **Enable Wireless LAN**

Mode : Mixed(11b+11g+11n) ▼

Channel: Channel 6, 2437MHz ▼

	Enable	Hide SSID	SSID	Isolate Member	Isolate VPN
1	☐	☐	DrayTek	☐	☐
2	☐	☐	DrayTek_Guest	☐	☐

Step 2: Change the Physical Mode of WAN 2: Go to WAN >> General Setup >> WAN2, set Physical Mode as "Wireless", click OK to apply and reboot the router.

WAN >> General Setup

WAN 2

Enable: Yes ▼

Display Name:

Physical Mode: Wireless ▼

Line Speed(Kbps):

DownLink:

UpLink:

Active Mode: Always On ▼ Load Balance: ☒

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

OK **Cancel**

Step 3: Go to WAN >> Internet Access, you will see the WAN2's Physical Mode changed to "Wireless". Set Access Mode as "Static or Dynamic IP" and click **Details Page** to setup.

WAN >> Internet Access

Internet Access

Index	Display Name	Physical Mode	Access Mode		
WAN1		ADSL / VDSL2	MPoA / Static or Dynamic IP ▼	Details Page	IPv6
WAN2		Wireless	Static or Dynamic IP ▼	Details Page	IPv6
WAN3		USB	3G/4G USB Modem(DHCP mode) ▼	Details Page	IPv6
WAN4		USB	None ▼	Details Page	IPv6

Step 4: Enter the details for Wi-Fi connection:

- Enable Static or Dynamic IP
- Select "Obtain an IP address automatically"
- Click on **AP Discovery** to discover Wi-Fi Hot Spot devices

WAN >> Internet Access

WAN 2

Static or Dynamic IP

☒ Enable ☐ Disable

☒ Obtain an IP address automatically

☐ Specify an IP address

IP Address

Subnet Mask

Gateway IP Address

WAN Connection Detection

Mode

MTU (Max:1500)

Universal Repeater Parameters

SSID

MAC Address (Optional)

Channel :

Security Mode

AP Discovery

Note: If Channel is modified, the Channel setting of wireless 2.4G would be also modified.

- Use AP Discovery to find an available access point. (Select the SSID indicated by the instructor or you can use your mobile phone as a Wi-Fi Hotspot).
- Click on **Add to** for Universal Repeater mode

Wireless LAN >> Access Point Discovery

Access Point List

Index	BSSID	Channel	RSSI	SSID	Authentication
2	00:1D:AA:38:AA:60	6	78%	DrayTek	Mixed(WPA+WPA2)/PSK
3	00:1D:AA:80:23:A4	11	47%	i-LAN-Technology 2.4	Mixed(WPA+WPA2)/PSK
4	E0:91:F5:5A:A7:1B	6	23%	hypecitys	WPA2/PSK
5	00:1D:AA:32:F0:58	6	37%	DrayTek	Mixed(WPA+WPA2)/PSK
6	00:1D:AA:E4:C6:38	6	100%	DrayTek	Mixed(WPA+WPA2)/PSK
7	00:1D:AA:E5:B2:50	6	26%	DrayTek	Mixed(WPA+WPA2)/PSK
9	5C:A8:6A:2F:23:87	2	63%	TP04G_L6NJ	WPA2/PSK

AP's MAC address: 5C : A8 : 6A : 2F : 23 : 87

Add to ☒ Universal Repeater

Note:

1. During the scanning process (~5 seconds), no station is allowed to connect with the router.
2. AP Discovery can only support up to 32 APs displayed on the screen.

Note: For some access points you may need to change the router's channel bandwidth setting to 20 to establish a Wi-Fi WAN connection (20/40 is the default setting). This setting is in **Wireless LAN>>Advanced Setting** menu

Wireless LAN >> Advanced Setting

HT Physical Mode

Operation Mode: ☒ Mixed Mode ☐ Green Field

Channel Bandwidth: ☒ 20 ☐ 20/40 ☐ 40

Guard Interval: ☒ Long ☐ Auto

Aggregation MSDU(A-MSDU): ☒ Enable ☐ Disable

Long Preamble: ☒ Enable ☐ Disable

Packet-OVERDRIVE™ TX Burst: ☒ Enable ☐ Disable

Antenna: ☒ 2T2R ☐ 1T1R

Tx Power: ☒ 100% ☐ 80% ☐ 60% ☐ 30% ☐ 20% ☐ 10%

WMM Capable: ☒ Enable ☐ Disable

APSD Capable: ☒ Enable ☐ Disable

Rate Adaptation Algorithm: ☒ New ☐ Old

Fragment Length (256 - 2346): 2346 bytes

RTS Threshold (1 - 2347): 2347 bytes

Country Code: (Reference)

- Enter Pass Phrase for the SSID. (This will be provided during the exercise)
- Click OK to apply and reboot the router.

Universal Repeater Parameters

SSID: TPU4G_L6NJ **AP Discovery**

MAC Address (Optional): 5C : A8 : 6A : 2F : 23 : 87

Channel: Channel 2, 2417MHz

Security Mode: WPA2/PSK

Encryption Mode: AES

Pass Phrase: *****

Note: If Channel is modified, the Channel setting of wireless 2.4G would be also modified.

OK **Cancel**

Step 5: After the router reboots, check the WAN connection status via Online Status >> Physical Connection.

Online Status

Physical Connection

System Uptime: 0day 0:0:42

IPv4			IPv6			
LAN Status						
IP Address	TX Packets		RX Packets		Router Primary DNS:	Router Secondary DNS:
192.168.1.1	1,057		725		192.168.10.1	192.168.10.1
WAN 1 Status >> Dial PPPoA						
Enable	Line	Name	Mode	Up Time		
Yes	ADSL		PPPoA	00:00:00		
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)	
---	---	0	0	0	0	
WAN 2 Status >> Release						
Enable	Line	Name	Mode	Up Time		
Yes	Wireless 2.4G		DHCP Client	0:00:15		
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)	
192.168.10.101	192.168.10.1	108	599	139	1,337	
SSID	Channel	Security	PHY Mode	Rate	Signal Strength	
TPU4G_L6NJ	2	WPA2/PSK	11n	130	47%	
WAN 3 Status						
Enable	Line	Name	Mode	Up Time	Signal	
Yes	USB		---	00:00:00	-	
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)	
---	---	0	0	0	0	
WAN 4 Status						
Enable	Line	Name	Mode	Up Time	Signal	
Yes	USB		---	00:00:00	-	
IP	GW IP	TX Packets	TX Rate(Bps)	RX Packets	RX Rate(Bps)	
---	---	0	0	0	0	
Line 1 Information (ADSL Firmware Version: 544401_A)						
ATM Statistics	TX Cells	RX Cells	TX CRC errs		RX CRC errs	
	0	0	0		0	
ADSL Status	Mode	State	Up Speed	Down Speed	SNR Margin	Loop Att.
		TRAINING	0	0	0	0

Check that you have Internet connectivity by going to an Internet web page or run ping to an external site.

```
C:\Users\Roy Panetta>Ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=18ms TTL=55
Reply from 8.8.8.8: bytes=32 time=17ms TTL=55
Reply from 8.8.8.8: bytes=32 time=15ms TTL=55
Reply from 8.8.8.8: bytes=32 time=24ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 15ms, Maximum = 24ms, Average = 18ms
```