Ethernet over VDSL2 Bridge

VC-231/VC-234

User's Manual

■ FCC Warning

This equipment has been tested and found to comply with the regulations for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may

cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

■ CE Mark Warning

This device is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

■ Energy Saving Note of the Device

This power required device does not support Standby mode operation.

For energy saving, please remove the power cable to disconnect the device from the power circuit.

Without removing power cable, the device will still consuming power from the power source. In the view of Saving the Energy and reduce the unnecessary power consuming, it is strongly suggested to remove the power connection for the device if this device is not intended to be active.

■ WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

■ Revision

Ethernet over VDSL2 Bridge User's Manual

For Models: VC-231/VC-234

Rev 1.2 (Nov. 2019)

Part No.: 2350-AC0140-002

Table of Contents

1. Package Contents

Thank you for purchasing PLANET Fast Ethernet over VDSL2 Bridge Series, VC-231 and VC-234. In the following sections, the term **"VDSL2 Bridge"** means the VC-23x series.

Open the box of the VDSL2 Bridge and carefully unpack it. The box should contain the following items:

VDSL2 Bridge x 1		User's Manual x 1
5V, 2A Power Adapter x 1	Splitter x 1 (VC-231 only)	RJ11 Telephone Wire x 1

If any of these are missing or damaged, please contact your dealer immediately; if possible, retain the carton including the original packing material, and use them again to repack the product in case there is a need to return it to us for repair.

2. Product Features

- Cost-effective VDSL2 CO/CPE bridge solution

- One box design, CO/CPE selectable via DIP Switch

- Defines profile 17a band plan for the long distance transmission of upstream and downstream signals

- Defines profile 30a band plan for the short distance transmission of upstream and downstream signals

- Complies with IEEE 802.3, IEEE 802.3u and IEEE 802.3x standards

- DMT (Discrete Multi-Tone) line coding

- Half-duplex back pressure and IEEE 802.3x full-duplex pause frame flow control

- Built-in POTS splitter to share voice and data (VC-234 only)

- Voice and data communication can be shared on the existing telephone wire simultaneously

- Hardware IGMP Snooping for multimedia service (VC-234)

- Supports up to 1536 bytes packet size, 802.1Q VLAN tag transparency

- VDSL2 stand-alone transceiver for simple bridge modem application

- Selectable target profile and target SNR margin

- Supports extensive LED indicators for network diagnostics

3. Hardware Introduction

3.1 Front Panel

■ VC-231 Front Panel
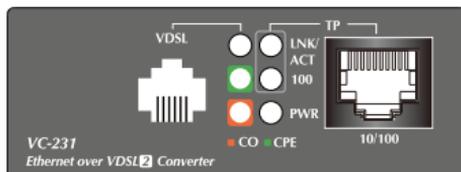
Figure 3-1: VC-231 front panel

■ VC-234 Front Panel

Figure 3-2: VC-234 front panel

3.2 LED Indicators

■ System

LED	Color		Function
PWR	Green	Lit	Lights to indicate that the VDSL2 Bridge has power.
		Off	Indicate that the VDSL2 Bridge has no power.

■ **VDSL**

LED	Color		Function
VDSL	Green	Lit	Indicates that the VDSL link is established.
		Fast Blink	Indicates that the VDSL link is in training status (about 10 seconds).
		Slow Blink	Indicates that the VDSL link is in idle status.
CO	Green	Lit	Indicates the VDSL2 Bridge is running in **CO** mode.
CPE	Green	Lit	Indicates the VDSL2 Bridge is running in **CPE** mode.

■ **10/100BASE-TX Port for VC-231**

LED	Color		Function
LNK/ ACT	Green	Lit	Indicates that the port is linked up.
		Blink	Indicates that the VDSL2 Bridge is actively sending or receiving data over that port.
		Off	Indicates that the port is **linked down**.
100	Green	Lit	Indicates that the port is operating at **100Mbps**.
		Off	Indicate that the port is **linked down** or **10Mbps**.

■ 10/100BASE-TX Port for VC-234

LED	Color		Function
LNK/ ACT	Green	Lit	Indicates that the port is linked up at 10/100Mbps.
		Blink	Indicates that the VDSL Bridge is actively sending or receiving data over that port.
		Off	Indicates that the port is **linked down**.

3.3 Rear Panel

The rear panel of the VDSL2 Bridge is shown below.

■ VC-231 Rear Panel

Figure 3-3: VC-231 rear panel

➢ DIP switch

➢ DC jack (DC input) for power adapter

■ **VC-234 Rear Panel**
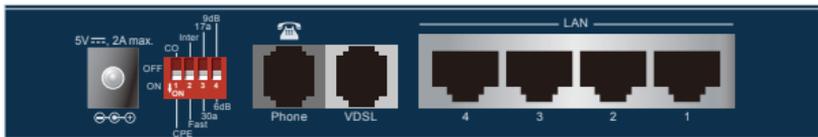
Figure 3-4: VC-234 rear panel

> Four 10/100BASE-TX RJ45 connectors for Ethernet
> One RJ11 connector for VDSL2; connect to IP DSLAM or another VDSL2 Bridge
> One RJ11 connector for telephone or PBX POTS
> DIP switch
> DC jack (DC input) for power adapter

3.4 Mode DIP Switch

The Ethernet over VDSL2 Bridge provides 4 selective transmission modes. By switching the transmission modes, you can obtain a best transmission mode to suit with phone line quality or distance of connectivity. The following is the summary table of transmission setting, bandwidth and distance extensibility tested for AWG 24 (0.5mm) twisted-pair without noise and cross talk.

	DIP-1	DIP-2	DIP-3	DIP-4
	Mode	Channel	Profile	SNR
OFF	CO	Interleave	17A	9dB
ON (default)	**CPE**	**Fast**	**30A**	**6dB**

■ DIP-1: Mode (CO/CPE)

CO (Central Office)	The Master device mode, usually the CO device will be located at the data center of ISP or enterprise to link to the backbone.
CPE (Customer Premises Equipment)	The Slave device mode, usually the CPE device will be located at branch office, home or remote side as the long reach data receiver. The CPE can be connecting to the PC, IP Camera or Wireless Access Point or other network devices.

Note	When the Ethernet Over VDSL2 Bridge operates in CPE mode, DIP switch 2, 3, 4 have no function.

■ DIP-2: Channel (Fast and Interleave mode)

Fast	Fast mode guarantees a minimum end-to-end latency less than 1 ms.
Interleave	Interleaved mode provides impulse noises protection for any impulse noise with a duration less than 250 us. Interleaved mode has a maximum end to end latency of 10m sec.

■ DIP-3: Profile (17a/30a)

User has the ability to select profile

30A	When 30a is selected that provides better downstream/upstream performance in short distance.
17A	When 17a is selected that provide longer distance link capability.

■ DIP-4: SNR (9dB/6dB)Target SNR (Signal Noise Ratio) Margin

When SNR margin is selected, the system provides 9 dB/6 dB SNR margin for across all usable loop length.

Note	1. By default, the four DIP switch at **"ON"** position that will operate as **"CPE"**. For operate as **"CO"**, please adjust the DIP 1 switch as **"OFF"** position. Then adjust other DIP switch accordingly to fulfill different network application demand.
	2. Please power off the Ethernet over VDSL2 Bridge, before making any transmission mode adjustment.

3.5 Power Information

The central posts of the VDSL2 Bridge's power jacks measure **2.5mm** wide that require +5VDC power input. They conform to the bundled AC-DC adapter and Planet's media chassis. Should you have the issue of power connection, please contact your local sales representative.

Please keep the AC-DC adapter as a spare part when the VC-231 is installed to a media chassis.

Width of DC Receptacle: 2.5mm
+5V for each slot
⊖‒⊙‒⊕

DC receptacle is 2.5mm wide that matches the central post, measuring 2.5mm wide, of the VDSL2 Bridge's DC jack. Do not install any improper unit.

4. Connecting and using the VDSL2 Bridge

The Ethernet over VDSL2 Bridge does not require any software configuration. Users can immediately use any feature of this product simply by attaching the cables and plug power on. There is some key limitation on the Ethernet over VDSL2 Bridge. Please check the following items:

➢ The device is used for **Point-to-Point** connection only (Master device to Slave device) and allows data and voice work on the same telephone lines.

➢ **VC-231** provides one RJ11 connector for VDSL port and the port can build VDSL2 connection easily. For voice device connection, the additional splitter together with VC-231 package is an ideal choice.
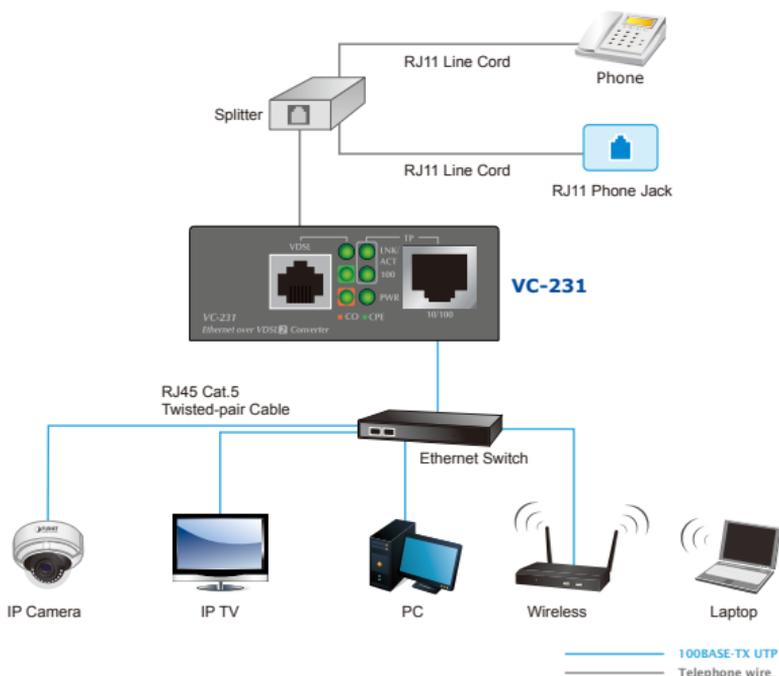
➢ The **VC-234** provides two RJ11 connectors for VDSL port. One for voice device connection (like telephone) and the other one for network link connection.
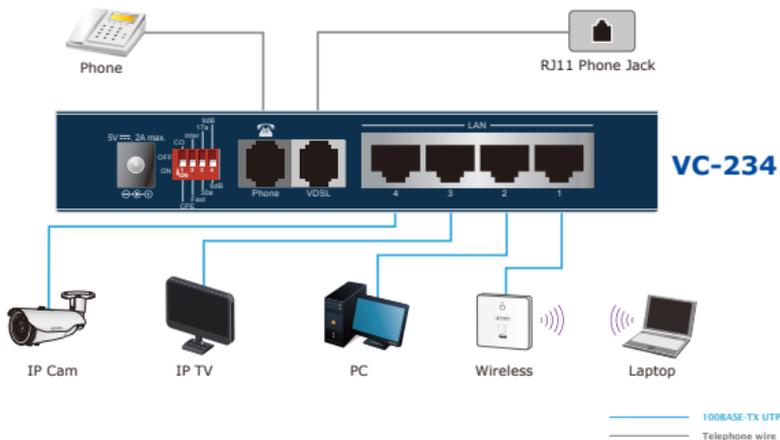
➢ Depending on the quality of telephone line, the maximum distance of one VDSL segment is 1.4km (4593ft) with AWG 24 telephone wires. The distance could vary on the quality of telephone wires.

4.1 Point-to-Point Application -- LAN to LAN Connection

Two sets of the Ethernet over VDSL2 Bridges could be used to link two local Area networks that are located in a different place. Through the normal telephone line, it could set up a 100/100Mbps symmetric backbone, but one Ethernet over VDSL2 Bridge must be Master (CO mode) and the other one is Slave (CPE mode).

Ethernet over VDSL2 and Telephone Network
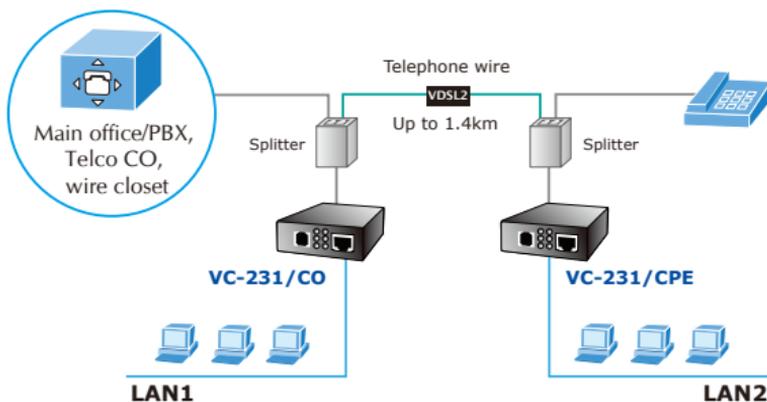
Refer to the following procedures to set up the VDSL2 Bridge LAN to LAN connection.

1. **[LAN1]** Set the VDSL2 Bridge at LAN 1 to be **CO** mode from the DIP switch.

2. **[LAN2]** Set the VDSL2 Bridge at LAN 2 to be **CPE** mode from the DIP switch.

3. Power on the VDSL2 Bridge CO and CPE at both sides by connecting its power source.

4. Power LED will illuminate.

5. Connect VDSL line from another VDSL device to RJ11 **VDSL port** of the VDSL2 Bridge.

6. **VDSL LNK LED** will blink to illuminate at both VDSL2 bridges.

7. Connect telephone to the RJ11 **Phone port** of the VDSL2 Bridge.

8. Connect the VDSL2 Bridge Ethernet **LAN port to** other network device via regular Cat.5 UTP cable for VC-231/ VC-234.

4.2 Point-to-Multipoint Application -- Connect to IP DSLAM

To build a local Internet in apartment, hotel and campus and hospitality environments, it requires:

➢ The multi-port VDSL2 IP DSLAM or VDSL2 switch (for example, PLANET VC-820M) operates as a **CO Master** and needs to be placed in the wiring center (MDF room) and connects to the telephone line system.

➢ On the other hand, it needs to install a **CPE Slave** (VC-231/VC-234 VDSL2 Bridge) on the individual client side and connect to the Multi-port Master through the telephone lines.

Ethernet over VDSL2 and Telephone Network
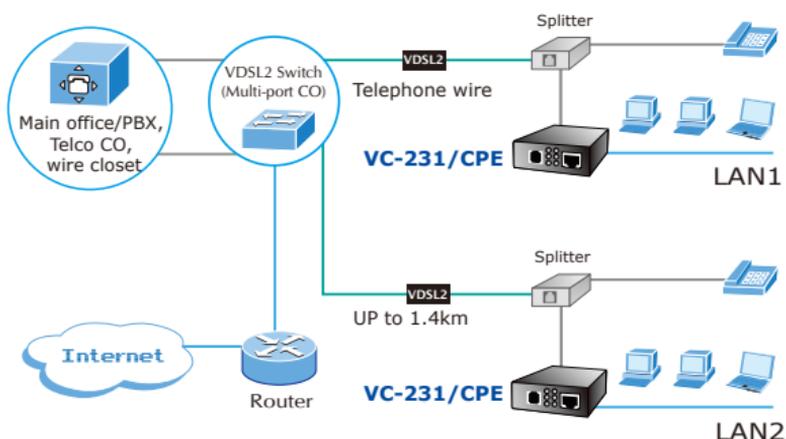
Refer to the following procedure to set up the VDSL2 Bridge to IP DSLAM connection.

1. **[Remote End]** Set the remote IP DSLAM/VDSL2 switch to **CO** mode with proper VDSL2 profile.
2. **[Local End]** Set the VDSL2 Bridge at the local end to **CPE** mode from the DIP switch.

3. Power on the VDSL2 Bridge CPEs by connecting its power source.
4. Power LED will illuminate.
5. Connect VDSL line from IP DSLAM/VDSL2 switch to RJ11 VDSL port of the VDSL2 Bridge.
6. VDSL LNK LED will blink to illuminate.
7. Connect telephone to the RJ11 Phone port of the VDSL2 Bridge.
8. Connect the VDSL2 Bridge Ethernet LAN port to other network device via regular Cat.5 UTP cable.

When deciding where to put the converter and/or prolong the operational life of the bridge, please also refer to the following points:

➢ It is accessible and cables can be connected easily.
➢ Cabling is away from sources of electrical noise such as radios, transmitters, motors, power lines and fluorescent lighting fixtures.
➢ Do not place objects on top of any unit or stack.
➢ Water or moisture cannot enter the VDSL2 Bridge.
➢ Air flow around the unit and through the vents in the side of the case is not restricted (we recommend that you provide a minimum of 25mm clearance).

4.3 Chassis Installation and Rack Mounting (VC-231)

To install the Ethernet over VDSL2 Bridge in a 10-inch or 19-inch Converter Chassis with standard rack, follow the instructions described below.

Step 1: Place your VDSL2 Bridge on a hard flat surface, with the front panel positioned towards your front side.

Step 2: Carefully slide in the module until it is fully and firmly fitted into the slot of the converter chassis.
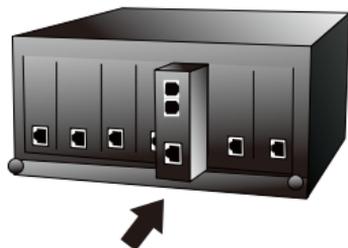
Step 3: Attach a rack-mount bracket to each side of the Converter Chassis with supplied screws attached to the package.

Step 4: After the brackets are attached to the Converter Chassis, use suitable screws to securely attach the brackets to the rack.

Step 5: Connect one end of the power cable to the **10-inch** or **19-inch** Converter Chassis.

Step 6: Connect the power plug of the power cable to a standard wall outlet, and then power on the 10-inch or 19-inch Converter Chassis. The PWR LED should be lit.

⚠ Caution	You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate your warranty.

5. Specifications

Product		VC-231	VC-234
Hardware Specifications			
Ports	10/ 100BASE-TX	1 RJ45, auto-negotiation and auto-MDI/MDI-X	4 RJ45, Auto-negotiation and auto-MDI/MDI-X
	VDSL	1 RJ11, female Phone Jack	1 RJ11, female Phone Jack
	Phone	Additional splitter for POTS connection	1 RJ11, built-in splitters for POTS connection
DIP Switch & Functionality		4 position DIP switch • CO/CPE mode select • Selectable fast and interleaved mode • Selectable target 17a/30a profiles • Selectable target SNR mode	
Encoding		• VDSL-DMT - ITU-T G.993.1 VDSL - ITU-T G.997.1 - ITU-T G.993.2 VDSL2 (Profile 17a/30a support)	
LED Indicators		• One Power • 3 for RJ11/VDSL2: • 2 for per RJ45 10/100BASE-TX port	• One Power • 3 for RJ11/VDSL2: • 1 for per RJ45 10/100BASE-TX port

Cabling	Ethernet	• 10BASE-T: 2-pair UTP Cat.3, 4, 5 up to 100m (328ft) • 100BASE-TX: 2-pair UTP Cat.5, up to 100m (328ft)	
	VDSL	Twisted-pair telephone wires (AWG24 or better) up to 1.4km	
Performance* (Down Stream/ Up Stream)		17a profile	
		300m -> 86/65Mbps 400m -> 86/52Mbps 600m -> 81/36Mbps 800m -> 72/19Mbps 1000m -> 60/9Mbps 1200m -> 59/6Mbps 1400m -> 50/2Mbps	300m -> 99/70Mbps 400m -> 99/60Mbps 600m -> 90/45Mbps 800m -> 50/28Mbps 1000m -> 40/12Mbps 1200m -> 20/7Mbps 1400m -> 20/4Mbps
		30a profile 300m -> 100/100Mbps 400m -> 90/90Mbps 600m -> 61/40Mbps 800m -> 54/8Mbps	300m -> 100/100Mbps 400m -> 90/90Mbps 600m -> 69/55Mbps 800m -> 48/9Mbps
Power Requirement		5V DC, 2A	
Dimensions (W x D x H)		97 x 70 x 26 mm	155 x 86 x 26 mm
Weight		199g	368g
Operating Temperature		0~50ºC	
Storage Temperature		-25~70ºC	
Operating Humidity		10% to 90%, relative humidity, non-condensing	
Storage Humidity		10% to 90%, relative humidity, non-condensing	

Switch Specifications (VC-234 only)		
Switch Processing Scheme	Store-and-Forward	
Address Table	1K entries	2K entries
Flow Control	Back pressure for half duplex IEEE 802.3x pause frame for full duplex	
Switch fabric	0.2Gbps	0.8Gbps
Throughput (packet per second)	0.14Mpps	0.59Mpps
Network cables	10/100BASE-TX: 2-pair UTP Cat. 3, 4, 5 (max. 100 meters) EIA/TIA-568 100-ohm STP (max. 100 meters)	
Standard Conformance		
Regulatory Compliance	FCC Part 15 Class A, CE	
Standards Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-TX ITU-T - G.993.1 (VDSL) - G.997.1 - G.993.2 VDSL2 (Profile 17a/30a)	

* The performance data above is for reference only; the actual
  data rate will vary on the quality of the copper wire and
  environment factors.

6. Troubleshooting

■ **SYMPTOM:**
VDSL LNK LED does not light after wire is connected to the VDSL port.

■ **CHECKPOINT:**
1. Verify the length of the wire connected between the VC-231 and the VC-234 should not be more than 1.4km. Or use the DIP switch to switch to other SNR mode.
2. Note that you must use one VC-231/VC-234 in CO mode and the other VC-231/VC-234 in CPE mode to make the connection work.

■ **SYMPTOM:**
TP LED does not light after cable is connected to the port.

■ **CHECKPOINT:**
1. Verify you are using the Cat.5 or better cable with RJ45 connector connecting to the port.
2. If your device (like LAN card) supports Auto Negotiation, manually set at a fixed speed of your device to solve this issue.
3. Check whether the power of the Converter/Bridge and the connected device is on or not.
4. The port's cable must be firmly seated in its connectors in the switch and in the associated device.
5. The connecting cable must be good and the correct type.
6. The connecting device, including any network adapter, must be functional.

7. FAQs

Q1: What is voltage of the VC-231/VC-234?
A1: 5V DC, 2A

Q2: What is VDSL2?
A2: VDSL2 (Very High-Bit-Rate Digital Subscriber Line 2), G.993.2 is the newest and most advanced standard of xDSL broadband wire line communications.
Designed to support the wide deployment of Triple Play services such as voice, data, high definition television (HDTV) and interactive gaming, VDSL2 enable operators and carrier to gradually, flexibly, and cost efficiently upgrade the existing xDSL infrastructure.

Q3: What is the best distance for the VC-231/VC-234?
A3: For the stability and better quality of the network, the suggested distance between them should be 1.4 kilometer.

Q4: What is the best data rate for the VC-231/VC-234?
A4: The data rate of the VC-231/VC-234 provided is up to 100Mbps/100Mbps (downstream/upstream) in 200 meters.

Q5: Is the VC-201 compatible with the VC-231/VC-234?
A5: Currently not. Although the VC-201 (Profile 12a) and VC-231/VC-234 (Profile 17a/30a) are based on ITU-T G.993.2 VDSL2, but with different Profiles, so far they are not compatible with each other.

Q6: What is SNR and what's the effect?
A6: In analog and digital communications, Signal-to-Noise Ratio, often abbreviated as SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB).
In digital communications, the SNR will probably cause a reduction in data speed because of frequent errors that

require the source (transmitting) computer or terminal to resend some packets of data. SNR measures the quality of a transmission channel over a network channel. The greater the ratio, the easier it is to identify and subsequently isolate and eliminate the source of noise.

Generally speaking, the higher SNR value gets, the quality of line gets better, but with lower performance.

Q7: What is profile and what's the benefit?

A7: VDSL2 defines multiple band plans and configuration modes (profiles) to allow asymmetric and symmetric services in the same binder (by designated frequency bands) for the transmission of upstream and downstream signals. User has the ability to select fixed band plan. Profile 17a is selected for long-distance transmission but with average performance while Profile 30a is selected for short-distance transmission but with wire-speed performance.

8. Customer Support

Thank you for purchasing PLANET products. You can browse our online FAQ resource on PLANET Website first to check if it could solve your issue. If you need more support information, please contact PLANET switch support team.

PLANET online FAQs:
https://www.planet.com.tw/en/support/faq

Switch support team mail address:
support@planet.com.tw