Ethernet over VDSL2 Converter

VC-201A / VC-202A

User's Manual

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FCC Warning

This equipment has been tested and found to comply with the limits 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 the Instruction manual, 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 is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Energy Saving Note of the Device

This power required device does not support Standby mode operation.

For energy saving, please remove the DC-plug or push the hardware Power Switch to OFF position to disconnect the device from the power circuit.

Without removing the DC-plug or switch off the device, the device will still consume power from the power source. In the view of Saving the Energy and reduce the unnecessary power consuming, it is strongly suggested to power off or to remove the DC-plug 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; they should be collected separately.

Revision

Ethernet over VDSL2 Converter User's Manual
For Models: VC-201A / VC-202A
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1. Introduction

1.1 Checklist

Check the contents of your package for following parts:

- VC-201A / VC-202A x 1
- 5V DC/2A AC-to-DC Power Adapter x 1
- RJ-11 Telephone Line x 1 (VC-201A only)
- User's Manual x 1

If any of these items 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.

1.2 Ethernet over VDSL2 Bridge Description

PLANET's state-of-the-art Ethernet-over-VDSL2 products are based on two core networking technologies: **Ethernet** and **VDSL2 (Very-high-data-rate Digital Subscriber Line 2)**. This technology offers the absolutely fastest possible data transmission speeds over existing copper telephone lines or coaxial cables without the need for rewiring.

The VC-201A / VC-202A Ethernet Over VDSL2 Converter has a switching architecture with RJ-45 10/100Mbps Ethernet port and one asymmetric or symmetric Ethernet over VDSL port (Asymmetric means upstream and downstream rates are not the same while symmetric means upstream and downstream rates are similar) – the VDSL port can be RJ-11 connector (VC-201A) or BNC Connector (VC-202A). The VC-201A / VC-202A can be set to Central Office (CO) or Customer Premises Equipment (CPE) mode via a DIP switch. When VC-201A-CO is connected with the other VC-201A-CPE device, the performance will go up to 100/55Mbps for asymmetric

data rate within 200m and up to 25/4Mbps for asymmetric data rate at 1.6km. The VC-202A (BNC) performance is up to 100/65Mbps for asymmetric data rate within 200m and up to 25/5Mbps for asymmetric data rate at 3.0km. This capability is ideal for use as an Ethernet extender for your existing Ethernet network.

PLANET VDSL2 Converter provides a much cheaper replacement and smooth migration for existing **Long Reach Ethernet (LRE)** networks.

The cable specifications of the connection are listed as follows:

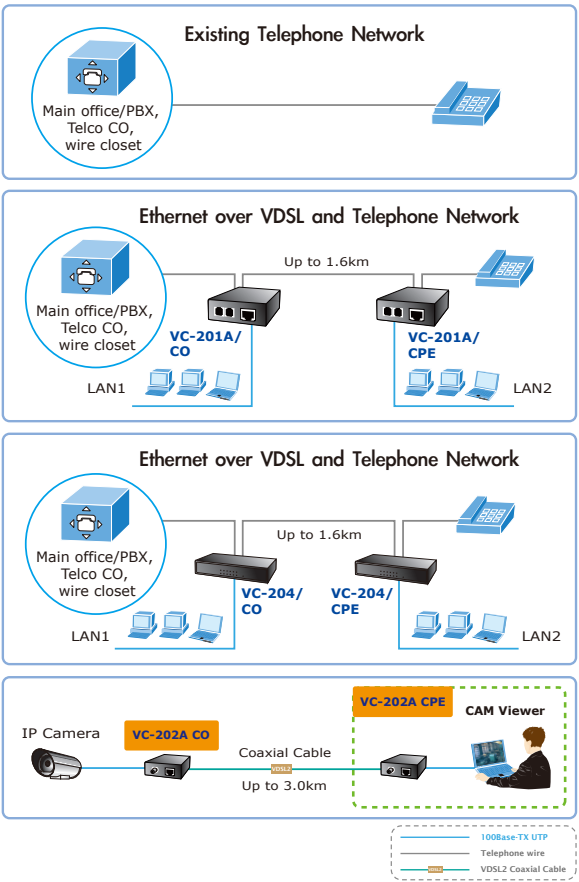
- 10Base-T, Category 3, 4 or 5 UTP
- 100Base-TX, Category 5, 5e or 6 UTP
- Ethernet over VDSL2, twisted-pair telephone wires
- Ethernet over VDSL2, coaxial cable

The two drawings are typical applications for the Ethernet over VDSL2 Converter.

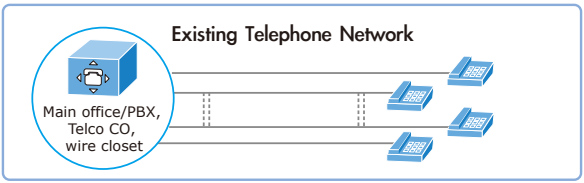
Note

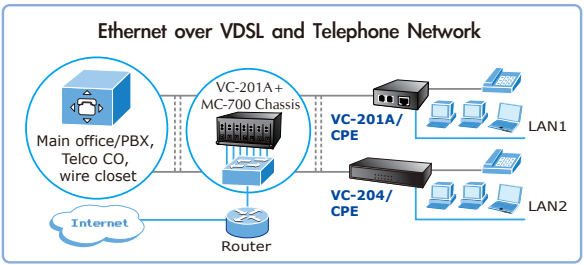
Slave device (CPE) must connect to Master device (CO) through the telephone wire or coaxial cable. Connecting Master to Master or Slave to Slave is not allowed. For the detailed definition of the VC-201A / VC-202A to CO or CPE, please refer to section 2.2.1.

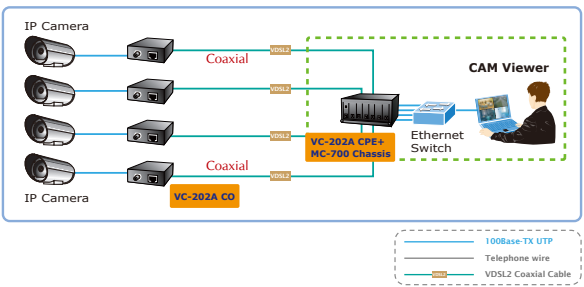
LAN to LAN Connection



Multi-LAN Connection







1.3 Key Features

The Ethernet Over VDSL2 Converter provides the following key features:

- Cost-effective VDSL2 CO / CPE bridge solution
- One box design, CO / CPE selectable via DIP Switch
- Defines Asymmetric (Band Plan 998) and Symmetric band plans for the 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-201A)**
- Voice and data communication can be shared on the existing telephone wire simultaneously - **(VC-201A)**
- Supports up to 1536 bytes packet size, 802.1Q VLAN tag transparent
- VDSL2 Stand-Alone transceiver for simple bridge modem application
- Selectable Target Band Plan and Target SNR Margin
- Supports extensive LED indicators for network diagnostics

1.4 Specifications

Product		VC-201A	VC-202A
Hardware Specifications			
Ports	10/100 Base-TX	1 x RJ-45, Auto-negotiation Auto-MDI/MDI-X	1 x RJ-45, Auto-negotiation Auto-MDI/MDI-X
	VDSL	1 x RJ-11, female Phone Jack	1 x BNC, female connector
	PHONE	1 x RJ-11, Built-in splitters for POTS connection	-
DIP Switch		4 position DIP switch	
Functionality		• **CO / CPE** mode select • Selectable **fast** and **interleaved** mode • Selectable target **Band Plan** • 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 Support)	
LED Indicators		One Power 3 for RJ-11/VDSL2 2 for RJ-45 10/100Base-TX port	One Power 3 for RJ-11/VDSL2 2 for RJ-45 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, 5e, 6 up to 100m (328ft)	
	VDSL	Twisted-pair telephone wires (AWG24 or better) up to 1.6km	50 ohm, RG58A/U, RG58C/U, RG58/U or 75 ohm, RG6 (Distance 3.0km)

<table>
<tr><td rowspan="4">Performance*
(Downstream /
Upstream)</td><td colspan="2">Asymmetric Mode</td></tr>
<tr><td>200m -> 100/55Mbps
400m -> 90/50Mbps
600m -> 70/40Mbps
800m -> 60/25Mbps
1000m -> 45/15Mbps
1200m -> 35/10Mbps
1400m -> 30/6Mbps
1600m -> 25/4Mbps</td><td>200m -> 100/65Mbps
400m -> 100/64Mbps
600m -> 100/59Mbps
800m -> 100/53Mbps
1000m -> 94/44Mbps
1200m -> 84/36Mbps
1400m -> 74/28Mbps
1600m -> 66/19Mbps
1800m -> 60/14Mbps
2000m -> 44/15Mbps
2200m -> 35/12Mbps
2400m -> 32/10Mbps
2600m -> 29/8Mbps
2800m -> 27/6Mbps
3000m -> 25/5Mbps</td></tr>
<tr><td colspan="2">Symmetric Mode</td></tr>
<tr><td>200m -> 100/100Mbps
400m -> 90/95Mbps
600m -> 70/70Mbps
800m -> 55/50Mbps
1000m -> 45/35Mbps
1200m -> 30/25Mbps
1400m -> 25/20Mbps
1600m -> 20/15Mbps</td><td>200m ->100/100Mbps
400m -> 97/100Mbps
600m -> 86/91Mbps
800m -> 79/80Mbps
1000m -> 69/66Mbps
1200m -> 60/52Mbps
1400m -> 51/41Mbps
1600m -> 45/36Mbps
1800m -> 40/29Mbps
2000m -> 27/26Mbps
2200m -> 23/24Mbps
2400m -> 22/21Mbps
2600m -> 20/18Mbps
2800m -> 18/15Mbps
3000m -> 17/13Mbps</td></tr>
<tr><td>Power
Requirements</td><td colspan="2">5V DC, 2A</td></tr>
</table>

Operating Temperature	0~50 degrees C
Storage Temperature	-10~70 degrees C
Operating Humidity	10% to 90%, relative humidity, non-condensing
Storage Humidity	10% to 90%, relative humidity, non-condensing
Standard Conformance	
Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX IEEE 802.3x Full Duplex Pause Frame Flow Control ITU-T • G.993.1 (VDSL) • G.997.1 • G.993.2 VDSL2 (Profile 17a)

* The actual data rate will vary on the quality of the copper wire and environment factors.

2. Hardware Description

■ **VC-201A**

The VC-201A provides 2 RJ-11 ports for voice connection (like telephone) and for network line connection.

■ **VC-202A**

The VC-202A provides 1 BNC connector and supports 50 or 75 ohm cable with distance up to 3.0km.

The VC-201A and VC-202A provide 1 RJ-45 port each with two different running speeds – 10Mbps and 100Mbps. It will distinguish the speed of incoming connection automatically.

This section describes the hardware features of the Ethernet over VDSL2 Converter. For easier control of the converter, familiarize yourself with its display indicators and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the converter, read this chapter carefully.

2.1 Front Panel

The units' front panel provides a simple interface monitoring the Ethernet over VDSL2 Converter.

■ **VC-201A Front Panel**

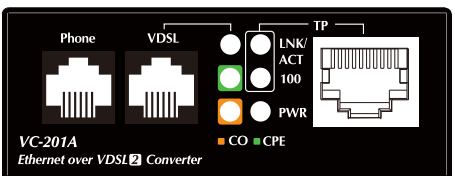


Figure 2-1: VC-201A Front Panel

■ **VC-202A Front Panel**

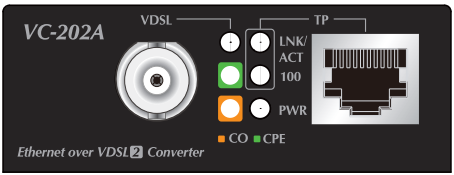


Figure 2-2: VC-202A Front Panel

2.1.1 LED Indicators for VC-201A and VC-202A

The rich diagnostic LEDs on the front panel can provide the operating status of individual port and whole system.

■ **System**

LED	Color	Function	
PWR	Green	Light	Power ON.
		Off	Power OFF.

■ **VDSL**

LED	Color	Function	
LNK/ACT	Green	Light	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	Light	Indicates the VDSL Bridge is running in **CO** mode.
CPE	Green	Light	Indicates the VDSL Bridge is running in **CPE** mode.

■ **10/100Base-TX Port**

LED	Color	Function	
LNK/ACT	Green	Light	Indicates that the port is **Link Up.**
		Blink	Indicates that the Converter is actively sending or receiving data over that port.
		Off	Indicates that the port is **Link Down**.
100	Green	Light	Indicates that the port is operating at **100Mbps**.
		Off	Indicates that the port is **Link Down** or **10Mbps**.

2.2 The Rear Panel

The rear panel of the Ethernet over VDSL2 Converter is shown below.

■ **VC-201A / VC-202A Rear Panel**

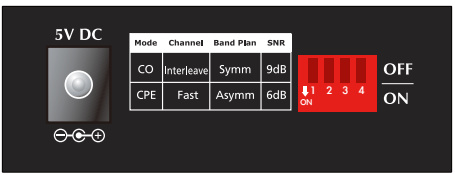


Figure 2-3: VC-201A / VC-202A Rear Panel

2.2.1 DIP Switch Mode

The Ethernet over VDSL2 Converter provides 4 selective transmission modes. By switching the transmission mode, you can obtain the 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**	**Band Plan**	**SNR**
OFF	CO	Interleave	Symm	9dB
ON (default)	**CPE**	**Fast**	**Asymm**	**6dB**

- **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 connected to the PC, IP Camera or Wireless Access Point and etc network devices.

When the Ethernet Over VDSL2 Converter operates in CPE mode, the DIP switch 2,3,4 is not functional.

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

- **Band Plan**
  - User can switch the Band Plan either Symmetric or Asymmetric by their own. Symmetric is selected to provide better upstream performance. Asymmetric is selected to provide better downstream performance. Refer to the table above for details.

■ **Target SNR (Signal Noise Ratio) Margin**

- When fixed SNR margin is selected, the system will maintain the SNR margin at 9 dB across all usable loop lengths.

Note

By default setting, the fourth DIP switch is at **"ON"** position and operates as **"CPE"**. To operate as **"CO"**, please adjust DIP 1 switch to **"OFF"** position. Adjust the other DIP switch setting to meet different network application demands.

Please power off the Ethernet over VDSL2 Converter before making any transmission mode adjustment.

2.2.2 DC Power Jack

The VC-201A and VC-202A require 5V DC power input. It will conform to the bundled AC adapter. If you have the issue about the power connection, please contact your local sales representative.

Note

1. The device is a power-required device, meaning it will not work till it is powered. If your networks should be active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network down-time.
2. In some areas, installing a surge suppression device may also help to protect your Ethernet Over VDSL2 Converter from being damaged by unregulated surge or current to the Ethernet over VDSL2 Converter or the power adapter.

3. Installation

3.1 Installing Ethernet over VDSL2 Converter

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

- **VC-201A:** The device is used for **Point-to-Point** connection only (Master device to Slave device) and has equipped with 2 RJ-11 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 1.6km (6561ft) with AWG 24 telephone wires.

- **VC-202A:** 1 BNC connector that supports 50 or 75 ohm cable. Depending on the quality of coaxial cable, the maximum distance of one VDSL segment is 3.0km (9842ft) over 5C coaxial cable.

  The distance will change by the quality of telephone wires and coaxial cables.

3.1.1 VC-201A / VC-202A LAN to LAN Connection

Two sets of the Ethernet over VDSL2 Converters could be used to link two local Area networks that are located in different places. Through the normal telephone line, it could set up a 100/55Mbps asymmetric backbone, but one Ethernet over VDSL2 Converter must be Master (CO mode) and the other one is Slave (CPE mode).

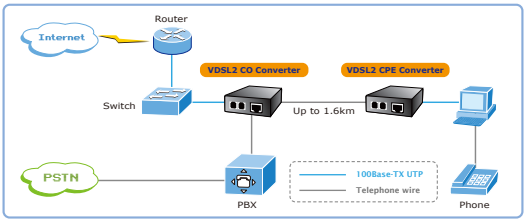


Figure 3-1: VC-201A LAN to LAN Connection

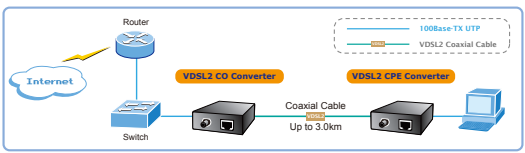


Figure 3-2: VC-202A LAN to LAN Connection

3.2 Connecting VC-201A / VC-202A

3.2.1 Connecting Standalone PC

Refer to the following procedures to setup the VC-201A to a standalone PC.

1. Set the VC-201A to be CO or CPE mode from the DIP switch on the rear panel.
2. Power on the VC-201A by connecting its power source.
3. Power LED will illuminate.
4. Connect VDSL line from another VDSL device to VDSL port of the VC-201A.
5. LNK LED will blink to illuminate.
6. Connect telephone to the PHONE port.
7. Connect Ethernet port to PC Network Interface Card (NIC) via regular Cat. 5, 5e or 6 cable.

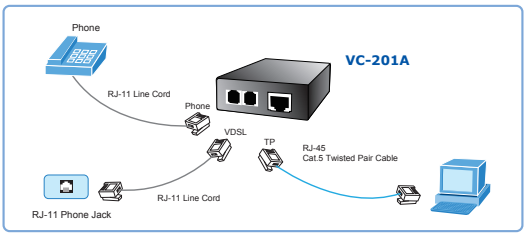


Figure 3-3: Connecting Standalone PC

3.2.2 Connecting Multiple PCs to an Ethernet LAN

Refer to the following procedures to set up the VC-201A to an Ethernet LAN.

1. Set the VC-201A to be CO or CPE mode from the DIP switch on the rear panel.
2. Power on the VC-201A by connecting its power source.
3. Power LED will illuminate.
4. Connect VDSL line from another VDSL device to VDSL port of the VC-201A.
5. LNK LED will illuminate.
6. Connect telephone to the Phone port.
7. VC-201A: Connect Ethernet port to Ethernet Switch (or Broadband Router) via regular Cat. 5, 5e or 6 cables.

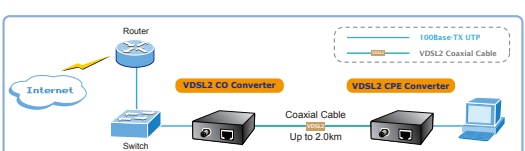


Figure 3-4: Connecting Multiple PCs to an Ethernet LAN

Note

Please refer to your Ethernet device User's Manual for the device's setup information.

3.3 Connecting VC-202A

3.3.1 Connecting Standalone IP Device

Refer to the following procedures to set up the VC-202A to a standalone PC.

1. Set the VC-202A to be CO or CPE mode from the DIP switch on the rear panel.
2. Power on the VC-202A by connecting its power source.
3. Power LED will illuminate.
4. Connect coaxial cable from another VDSL device to VDSL BNC port of the VC-202A.
5. LNK LED will blink for illuminating.
6. Connect Ethernet port to Ethernet device via regular Cat. 5, 5e or 6 cables.

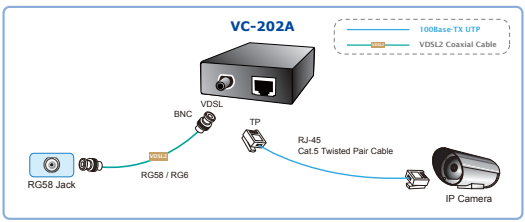


Figure 3-5: Connecting Standalone IP Device

3.3.2 Connecting Multiple PCs to an Ethernet LAN

1. Set the VC-202A to be CO or CPE mode from the DIP switch on the rear panel.
2. Power on the VC-202A by connecting its power source.
3. Power LED will illuminate.
4. Connect coaxial cable from another VDSL device to VDSL BNC port of the VC-202A.
5. LNK LED will illuminate.
6. Connect Ethernet port to Ethernet Switch (or Broadband Router) via regular Cat. 5, 5e or 6 cables.

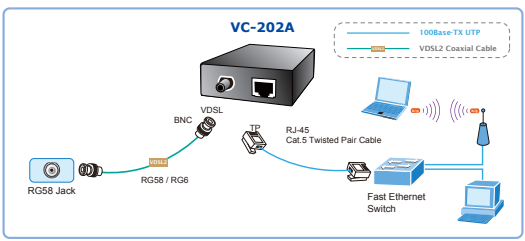


Figure 3-6: Connecting Multiple PCs to an Ethernet LAN

Note

Please refer to your Ethernet device User's Manual for the device's setup information.

3.4 Chassis Installation and Rack Mounting (VC-201A and VC-202A)

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

Step 1: Place your VC-201A / VC-202A 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.

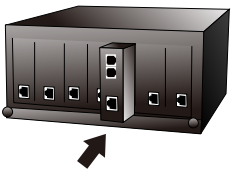


Figure 3-7: Insert a VDSL2 Converter Into an Available Slot

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: Proceed with Step 4 and Step 5 of the session **3.2 Stand-alone Installation** to connect the network cabling and supply power to your Converter Chassis.

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

4. Power Information

The power jack of the VC-201A / VC-202A is with 2.5mm in the central post and required +5V DC power input. It conforms to the bundled AC-DC adapter and Planet's Media Chassis. If you encounter the issue about the power connection, please contact your local sales representative.

Please keep the AC-DC adapter as a spare part when your VC-201A / VC-202A is installed in a Media Chassis.

2.5mm
DC Receptacle 2.5mm
+5V for each slot

Media Chassis DC receptacle is 2.5mm wide which conforms to and matches the VDSL2 Converter 2.5mm DC jack's central post. Do not install any improper devices in Media Chassis.

5. Troubleshooting

SYMPTOM:

VDSL LNK LED does not light up after wire is connected to the VDSL port.

CHECKPOINT:

1. Verify the length of the wire connected between two VC-201A / VC-202A is not more than 2km. Please also try to adjust the DIP switch of the VC-201A / VC-202A to the other SNR mode.
2. Please note you must use one VC-201A / VC-202A in CO mode and the other VC-201A / VC-202A in CPE mode. Connect to each other to make it work.

SYMPTOM:

TP LED does not light up after cable is connected to the port.

CHECKPOINT:

1. Verify you are using the Cat.5, 5e or 6 cables with RJ-45 connector connected to the port.
2. If your device (like LAN card) supports auto-negotiation, please try to modify at a fixed speed of your device manually.
3. Check whether the converter and the connected device's power are ON or OFF.
4. Check whether the port's cable is firmly seated in its connectors in the switch and in the associated device.
5. Check whether the connecting cable is good.
6. Check whether the power adapters are functional, including the connecting device.

6. FAQs

Q1: What voltage do the VC-201A and VC-202A use?

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 enables operators and carrier to gradually, flexibly, and cost-efficiently upgrade the exiting xDSL-infrastructure.

Q3: What is the best distance for the VC-201A and VC-202A?

A3: In order to guarantee the stability and better quality of network, so we would suggest the distance within 1.6 kilometer is the best for the VC-201A and 3.0 kilometer for the VC-202A.

Q4: What are the best data rates for the VC-201A and VC-202A?

A4: The data rates of the VC-201A and VC-202A are up to 100Mbps/55Mbps and up to 100Mbps/65Mbps (downstream / upstream) in 200 meters, respectively.

Q5: Is the VC-201 compatible with the VC-201A?

A5: Currently no. Although the VC-201 (profile 12a) and the VC-201A (profile 17a) are based on ITU-T G.993.2 VDSL2, but with different profiles, so far, they are not compatible with each other.

Q6: Is the VC-202 compatible with the VC-202A?

A6: Currently no. Although the VC-202 (profile 12a) and the VC-202A (profile 17a) are based on ITU-T G.993.2 VDSL2, but with different profiles, so far, they are not compatible with each other.

Q7: What is SNR and what's the effect?

A7: In analog and digital communications, Signal-to-Noise Ratio, often written 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 better line quality, but lower performance.

Q8: What is band plan and what's the effect?

A8: 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. Symmetric is selected to provide better downstream performance while asymmetric is selected to provide better upstream performance.

EC Declaration of Conformity

For the following equipment:

*Type of Product	:	Ethernet over VDSL2 Converter
*Model Number	:	VC-201A / VC-202A
* Produced by:		
Manufacturer's Name	:	**Planet Technology Corp.**
Manufacturer's Address	:	10F., No.96, Minquan Rd., Xindian Dist. New Taipei City 231, Taiwan (R.O.C.).

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (2004/108/EC).
For the evaluation regarding the Electromagnetic Compatibility, the following standards were applied:

EN 55022	(2010)
EN 61000-3-2	(2006+A1:2009+A2:2009)
EN 61000-3-3	(2008)
EN 55024	(1998 + A1:2001 + A2: 2003)
EN 61000-4-2	(2009)
EN 61000-4-3	(2006+A2:2010)
EN 61000-4-4	(2004+A1:2010)
EN 61000-4-5	(2006)
EN 61000-4-6	(2009)
EN 61000-4-8	(2010)
EN 61000-4-11	(2004)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	**16th Dec., 2013**	Kent Kang
Place	*Date*	*Legal Signature*