

PoE Industrial Ethernet Extender

IVC-2004PT

User's Manual

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Revision

PoE Industrial Ethernet Extender User's Manual

For Model: IVC-2004PT

Rev 1.1 (January, 2011)

Part No.: 2350-AH0350-001

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1. Introduction

1.1 Checklist

Check the contents of your package for following parts:

- The PoE Industrial Ethernet Extender x1
- User's Manual x1
- DIN Rail Kit
- Wall Mount Kit

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 against 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 absolute fastest possible data transmission speeds over existing copper telephone lines or coaxial cables without the need for rewiring.

The IVC-2004PT PoE Industrial Ethernet Extender has a switching architecture with 4 PoE of RJ-45 10/100Mbps ports and Asymmetric or Symmetric Ethernet over VDSL port (Asymmetric means upstream and downstream rate are not the same and Symmetric means upstream and downstream rate are similar) – the VDSL port can be RJ-11 or BNC Connector. The IVC-2004PT can set to **Master** or **Slave** mode via a DIP switch. When IVC-2004PT (RJ-11) is connected with other IVC-2004PT device, the performance will up to 99/63Mbps for asymmetric data rate within 200m and up to 28/2Mbps at 1.4km. The IVC-2004PT (BNC) performance is up to 99/65Mbps for asymmetric data rate within 200m and up to 31/4Mbps at 2.4km. This capability is ideal for use as an Ethernet extender for your existing Ethernet network.

With 4 PoE interfaces, the **IVC-2004PT** will be the ideal for small business and workgroups requiring to deploy the PoE for the wireless access points, IP-based surveillance camera or IP phones in any places easily, efficiently and cost effective.

The IVC-2004PT PoE Industrial Ethernet Extender with IP-30 Aluminum metal shape for easily deployment in Heavy Industrial demanding environments.

PLANET PoE Industrial Ethernet Extender provides a lower cost replacement and smooth migration for existing **Long Reach Ethernet (LRE)** networks.

The cable specifications of the connection are listed as following:

- 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



Slave device (CPE) must connect to Master device (CO) through the telephone wire or coaxial cable. It is not allow connecting like Master to Master or Slave to Slave. To define the IVC-2004PT to Master or Slave, please refer to section 2.1.2 for more detail.

1.3 Key Features

The PoE Industrial Ethernet Extender provides the following key features:

- 4 x Ports IEEE 802.3af Power over Ethernet Standard
- Each of PoE port provides 15.4 Watts
- Compatible with IVC-2002, VC-201A and VC-202A (17a Profile)
- Cost-effective VDSL2 Master / Slave bridge solution via DIP Switch
- Selectable BNC and RJ-11 mode for the data transmission
- -40 to 75 Degree C operating temperature
- Redundant Power Design: 12V ~ 48V DC, redundant power with polarity reverse protect function
- IP-30 Aluminum metal case Protection
- 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
- Support up to 1536 bytes packet size, 802.1Q VLAN tag transparent
- Integrated address look-up engine, support 2K absolute MAC addresses
- VDSL2 Stand-Alone transceiver for simple bridge modem application
- Selectable Target Band Plan and Target SNR Margin
- Support extensive LED indicators for network diagnostics
- DIN Rail and Wall Mount Design

1.4 Specifications

Product		IVC-2004PT
Hardware Specification		
Ports	10/100 Base-TX	4 x RJ-45, Auto-Negotiation and Auto-MDI/MDI-X
	PoE	4 x PoE (Port1 ~ Port4)
	VDSL	1 x RJ-11, female Phone Jack 1 x BNC, female connector
DIP Switch		4 position DIP switch
Functionality *1		Master / Slave mode select Selectable BNC and RJ-11 mode Selectable target Band Plan Selectable target SNR mode
Encoding		VDSL-DMT - ITU-T G.997.1 - ITU-T G.993.1 VDSL - ITU-T G.993.2 VDSL2 (Profile 17a Support)
LED Indicators		P1 (Green) P2 (Green) Fault (Green) Master (Green) and Slave (Green) ACT (Green) Sync. (Green) PoE (Orange)
Power Over	PoE Standard	IEEE 802.3af Power over Ethernet / PSE
	PoE Type	End-Span
	PoE Power Input	48V DC power input source
	PoE Power Output	48V DC Per Port, 350mA. Max. 15.4 Watts
	PoE Pin Assignment	1/2(+), 3/6(-)

Cabling	Ethernet	<ul style="list-style-type: none"> • 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(RJ-11)	Twisted-pair telephone wires (AWG24 or better) up to 1.4km	
	BNC	50 ohm: RG58A/U, RG58C/U, RG58/U and 75 ohm: RG6 (Distance 2.4km)	
Performance *2 (Down Stream / Up Stream)		Asymmetric Mode	
		VDSL (RJ-11)	BNC
		200m -> 99/63Mbps	200m -> 99/65Mbps
		400m -> 91/48Mbps	400m -> 99/64Mbps
		600m -> 71/32Mbps	600m -> 97/59Mbps
		800m -> 53/18Mbps	800m -> 94/51Mbps
		1000m -> 38/8Mbps	1000m -> 84/45Mbps
		1200m -> 33/5Mbps	1200m -> 73/37Mbps
		1400m -> 28/2Mbps	1400m -> 61/28Mbps
			1600m -> 54/20Mbps
			1800m -> 48/13Mbps
			2000m -> 39/9Mbps
			2200m -> 35/6Mbps
			2400m -> 31/4Mbps
		Symmetric Mode	
		VDSL (RJ-11)	BNC
		200m -> 91/99Mbps	200m -> 95/99Mbps
		400m -> 74/79Mbps	400m -> 92/97Mbps
		600m -> 54/51Mbps	600m -> 81/82Mbps
		800m -> 38/34Mbps	800m -> 71/70Mbps
		1000m -> 27/21Mbps	1000m -> 60/57Mbps
		1200m -> 24/15Mbps	1200m -> 50/44Mbps
		1400m -> 21/10Mbps	1400m -> 42/33Mbps
			1600m -> 37/27Mbps
			1800m -> 29/22Mbps
			2000m -> 23/21Mbps
			2200m -> 19/17Mbps
			2400m -> 19/13Mbps

Dimensions (H x W x D)	135mm x 87.8mm x 50mm
Weight	631g
Power Requirement *3	48V DC for PoE Devices 12 ~ 36V DC for Non-PoE Devices Redundant power with polarity reverse protection function
Power Consumption / Dissipation	66.4 Watts / 226BTU Max. (PoE) 5.64 Watts / 19.24BTU (Non-PoE)
Installation	DIN Rail Kit and Wall Mount Ear
Standard Conformance	
Stability testing	IEC60068-2-32 (Free Fall) IEC60068-2-27 (Shock) IEC60068-2-6 (Vibration)
Operating Temperature	-40 ~ 75°C
Storage Temperature	-40 ~ 85°C
Operating Humidity	10% to 90%, relative humidity, non-condensing
Storage Humidity	10% to 90%, relative humidity, non-condensing
Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX IEEE 802.3af Power over Ethernet IEEE 802.3x Full Duplex Pause frame Flow Control ITU-T • G.997.1 • G.993.1 VDSL • G.993.2 VDSL2 (Profile 17a)

*1. BNC and RJ-11 mode must switch to the same position for Master and Slave. Otherwise, it may cause unstable.

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

*3. If power source is lower than 48V DC, the 802.3af PoE function will not be activated. However, it will not influence the VDSL2 and 4-ports TP operation.

2. Hardware Description

■ IVC-2004PT

The IVC-2004PT provides 4 RJ-45 with PoE, 1 RJ-11 and 1 BNC port for network line connection. The 4 RJ-45 ports 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 PoE Industrial Ethernet Extender. For easier control of the PoE Industrial Ethernet Extender, 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 PoE Industrial Ethernet Extender, read this chapter carefully.

2.1 Front Panel

The units' front panel provides a simple interface monitoring the PoE Industrial Ethernet Extender.

■ IVC-2004PT Front Panel

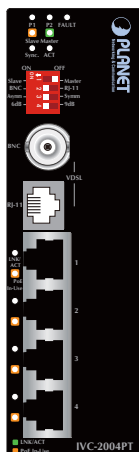


Figure 2-1: IVC-2004PT Front Panel

2.1.1 LED indicators for IVC-2004PT

On the front panel of rich diagnostic LEDs provide the operating status of individual port.

■ System

LED	Color	Function	
P1	Green	Light	Indicate the power 1 has power.
P2	Green	Light	Indicate the power 2 has power.
FAULT	Green	Light	Indicate the either power 1 or power 2 has no power.

■ VDSL / BNC

LED	Color	Function	
ACT	Green	Light	Indicate that the VDSL link is established.
		Blink	Indicate that the VDSL link is actively sending or receiving data over that port.
Sync	Green	Light	Indicate that the VDSL link is established.
		Fast Blink	Indicate that the VDSL link is at training status (about 10 seconds).
		Slow Blink	Indicate that the VDSL link is at idle status.
Master	Green	Light	Indicate the VDSL Bridge is running at Master mode.
Slave	Green	Light	Indicate the VDSL Bridge is running at Slave mode.

■ 10/100Base-TX with PoE Port

LED	Color	Function	
LNK/ ACT	Green	Light	Indicate that the port is link up.
		Blink	Indicate that the Extender is actively sending or receiving data over that port.
		Off	Indicate that the port is link down .
PoE In-Use	Orange	Light	Indicate the port is providing 48V DC in-line power. (1-4 ports).

2.1.2 DIP Switch Indication

The PoE Industrial Ethernet Extender provides 4 selective transmission modes. By switching the transmission modes, you can obtain a best transmission mode to suit with phone line or BNC quality of distance 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 Switch	DIP-1	DIP-2	DIP-3	DIP-4
Function	Mode	Link Type	Band Plan	SNR
OFF	Master	RJ-11	Symm	9dB
ON (default)	Slave	BNC	Asymm	6dB

■ Master / Slave

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



When the PoE Industrial Ethernet Extender operates at Slave mode, the DIP switch 2, 3 and 4 are no function.

■ Link Type

- ◆ BNC mode allows IVC-2004PT to connect and data transfer by using BNC cable.
- ◆ RJ-11 mode allows IVC-2004PT to connect and data transfer by using Telephone Wire.

■ Band Plan

- ◆ User can switch the Band Plan either Symmetric or Asymmetric by their own. When Symmetric is selected that provides better upstream performance, when Asymmetric is selected that provides better downstream performance. Refer to 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 length.



Note

1. By default setting, the four DIP switch at **"ON"** position and operate as **"Slave"**. For operate as **"Master"**, please adjust the DIP 1 switch to **"OFF"** position. Adjust other DIP switch setting to fill different network application demand.
2. Link type: both of IVC-2004PT must switch to the same position, otherwise, it may cause unstable. For example, if want to connect both of IVC-2004PT through BNC cable, the Master (CO) and Slave (CPE) must switch the DIP-2 at BNC mode.

Please power off the PoE Industrial Ethernet Extender before making any transmission mode adjustment.

2.2 The Upper Panel

The upper panel of the PoE Industrial Ethernet Extender consists one terminal block connector within two DC power inputs.

Figure 2-2 shows the upper panel of the PoE Industrial Ethernet Extender.

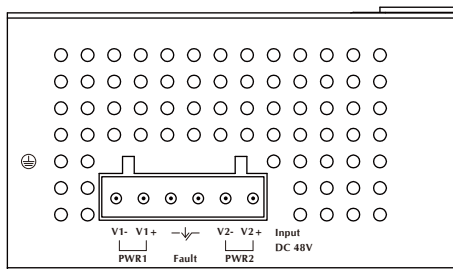


Figure 2-2 PoE Industrial Ethernet Extender Upper Panel.

3. Installation

3.1 Install PoE Industrial Ethernet Extender – IVC-2004PT

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

IVC-2004PT: The device is used for **Point-to-Point** connection only (Master device to Slave device) and has equipped with one RJ-11 and one BNC connector for VDSL2 network connection.

Telephone Wire: Depending on the quality of telephone line, the maximum distances of RJ-11 segment is 1.4km (4593ft) with AWG 24 telephone wires.

Coaxial: Depending on the quality of coaxial cable, the maximum distance of BNC segment is 2.4km (7874ft) with 5C type of coaxial cable.

The link distances and performance will vary on the quality of telephone wire and coaxial cable.

3.2 IVC-2004PT BNC / RJ-11 Proper Connection

PLANET PoE Industrial Ethernet Extender has a DIP switch which can adjust to be Master or Slave mode. Connection of two PLANET PoE Industrial Ethernet Extenders, one must be Master (CO) mode and the other one must be Slave (CPE) mode. Please refer to the following Figure 3-1 chart.



Note

PoE Industrial Ethernet Extender does not allow connecting **BNC** and **RJ-11** at the same time.

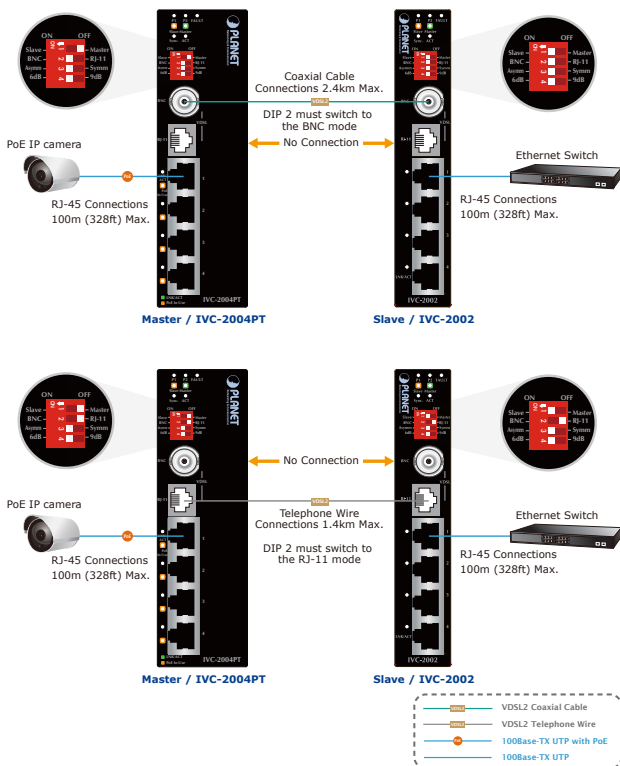


Figure 3-1: Industrial Ethernet Extender BNC and RJ-11 Connection Chart

3.3 IVC-2004PT Application Connection

Two PoE Industrial Ethernet Extenders could be used to link two different Area networks. Through the normal telephone line or coaxial cable, it could setup 99/63Mbps (RJ-11) or 99/65Mbps (BNC) asymmetric backbone.

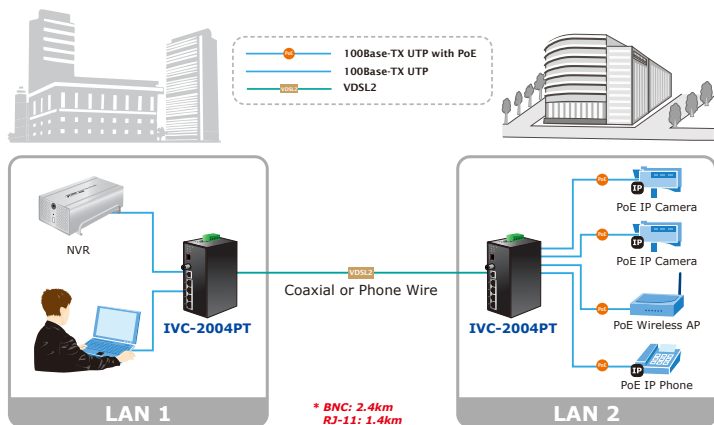


Figure 3-2: IVC-2004PT BNC and RJ-11 Connection

With 4 PoE, in-line power interfaces, the PoE Industrial Ethernet Extender can build a power central-controlled IP phone system, IP camera system, AP group for the enterprise. For instance, 4 camera / AP can be easily installed around the corner in the company for surveillance demands or build a wireless roaming environment in the offices. Without the power-socket limitation, it makes the installation of cameras or WLAN AP more easily and efficiently.

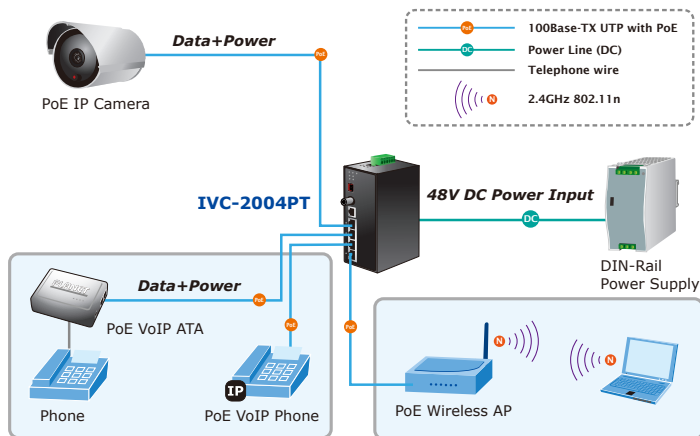


Figure 3-3: IVC-2004PT PoE Connection

IVC-2004PT temperature range is from -40 to 75 Degree C which can handle any harsh environment and places. It also compatibles with PLANET IVC-2002, VC-201A and VC-202A. Without spend extra cost to deploy a new local Internet in apartment, hotel, campus and hospitality environment. It can use the original network structure to re-deploy with our latest product PLANET IVC-2004PT. For example, MC-700, MC-1500 and MC-1500R chassis with VC-201A and VC-202A inside and set it as **CPE (Customer Premises Equipment)** mode which placed in the wiring center (MDF room). On the other hand, connects an **IVC-2004PT extender with Master mode** by using telephone line or coaxial cable.

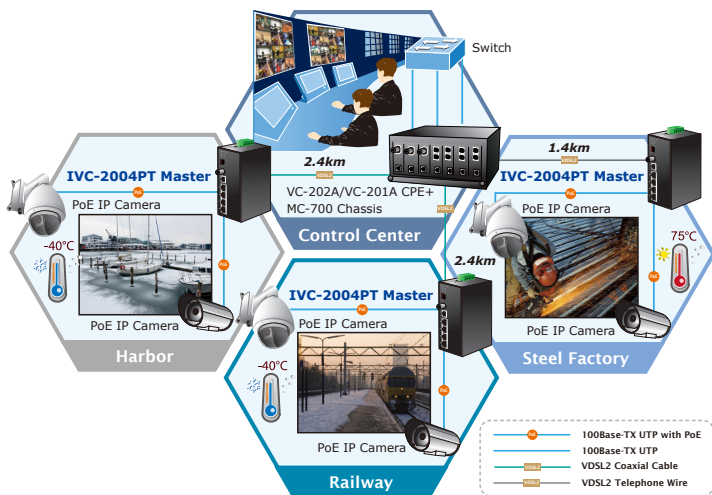


Figure 3-4: IVC-2004PT Application Topology

When deciding where to put the IVC-2004PT then you must ensure:

- ◆ It is accessible and cables can be connected easily.
- ◆ Cabling is away from sources of electrical noise such as radios, transmitters and power lines and fluorescent lighting fixtures.
- ◆ Avoid the Water or moisture to reach the IVC-2004PT.
- ◆ Air Flow around the unit and through the vents in the side of the case is not restricted (company recommend that you provide a minimum of 25mm inch clearance).

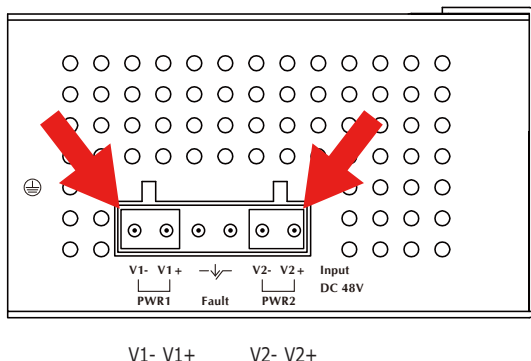
To prolong the operational life of your units:

- ◆ Do not place objects on top of any unit or stack.

3.4 Wiring the Power Inputs

The 6-contact terminal block connector on the top panel of PoE Industrial Ethernet Extender is used for two DC redundant powers input. Please follow the steps below to insert the power wire.

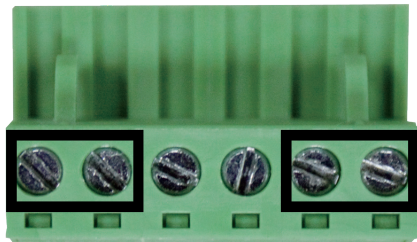
1. Insert positive / negative DC power wires into the contacts 1 and 2 for POWER 1, or 5 and 6 for POWER 2.



Note

Must input 48V DC power source to make PoE function workable.

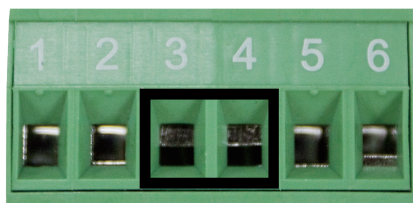
2. Tighten the wire-clamp screws for preventing the wires from loosening.



1	2	3	4	5	6
Power 1		Fault		Power 2	
-	+			-	+

3.5 Wiring the Fault Alarm Contact

The fault alarm contacts are in the middle of the terminal block connector as the picture shows below. Inserting the wires, the PoE Industrial Ethernet Extender will detect the fault status of the power failure and then forms an open circuit. The following illustration shows an application example for wiring the fault alarm contacts.

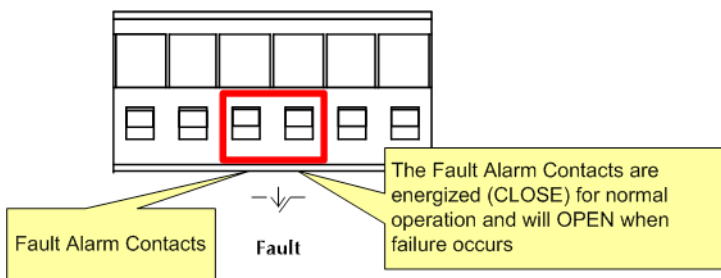


Insert the wires into the fault alarm contacts



Note

1. The wire gauge for the terminal block should be in the range between 12 ~ 24 AWG.
2. Alarm relay circuit accepts up to 30V, max. 3A currents.



3.6 Mounting Installation

This section describes how to install the PoE Industrial Ethernet Extender and make connection to it. Please read the following topics and perform the procedures in the order being presented.



Note

In the installation steps below, this Manual use IGS-801 (PLANET 8 Port Industrial Gigabit Switch) as the example. However, the steps for PLANET Industrial Switch & Industrial Media Converter are similar.

3.6.1 Install DIN-Rail Mounting

The DIN-Rail is screwed on the PoE Industrial Ethernet Extender when out of factory. Please refer to following figures to hang the PoE Industrial Ethernet Extender on track.



Step 1: Lightly press the button of DIN-Rail into the track.



Step 2: Check the DIN-Rail is tightly on the track.

Step 3: Please refer to following procedures to remove the PoE Industrial Ethernet Extender from the track.



Step 4: Lightly press the button of DIN-Rail for remove it from track.

3.6.2 Wall Mount Plate Mounting

To install the PoE Industrial Ethernet Extender on the wall, please follow the instructions described below.

Step 1: Remove the DIN-Rail from the PoE Industrial Ethernet Extender; loose the screws to remove the DIN-Rail.



Step 2: Place the wall mount plate on the rear panel of the PoE Industrial Ethernet Extender.



Step 3: Use the screws to screw the wall mount plate on the PoE Industrial Ethernet Extender.

Step 4: Use the hook holes at the corners of the wall mount plate to hang the PoE Industrial Ethernet Extender on the wall.

Step 5: To remove the wall mount plate, reverse steps above.

4. Troubleshooting

SYMPTOM:

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

CHECKPOINT:

1. Verify the length of the wires connected between two IVC-2004PT extenders not more than 2.4km for BNC and 1.4km for RJ-11 connections. Please also try to adjust the DIP switch of IVC-2004PT to other SNR mode.
2. Please note that you must use one IVC-2004PT with Master mode and the other IVC-2004PT with Slave mode.

SYMPTOM:

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

CHECKPOINT:

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

SYMPTOM:

VDSL sometimes will re-chain and unstable.

CHECKPOINT:

1. Verify what connection type of the cable is using, BNC or RJ-11 cable.
2. Check the Master (CO) and Slave (CPE) DIP-2 are switch to the same and correct mode.

5. FAQ

Q1: What is the IVC-2004PT power input?

A1: 48V DC for PoE function and 12 to 36V DC for Non-PoE function

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 exiting xDSL-infrastructure.

Q3: What is the best distance for IVC-2004PT?

A3: In order to guarantee the stability and better quality of network, so we would suggest the distance within 1.4 kilometer is the best for RJ-11 Connecting and 2.4 kilometer for BNC Connecting.

Q4: What is the best data rate for IVC-2004PT?

A4:

Link Type & Distance	RJ-11 (Telephone Wire)		BNC (Coaxial Cable)	
	200m	1400m	200m	2400m
DIP Mode				
Asymmetric	99/63Mbps	28/2Mbps	99/65Mbps	31/4Mbps
Symmetric	91/99Mbps	21/10Mbps	95/99Mbps	19/13Mbps

Q5: Can IVC-2004PT compatible with VC-201A / VC-202A?

A5: YES, IVC-2004PT (profile 17a) and VC-201A / VC-202A (profile 17a) are base on ITU-T G.993.2 VDSL2 with same Profiles; so far they are compatible with each other.

Q6: What is SNR and what's the effect?

A6: In analog and digital communications, Signal-to-Noise Ratio, often written 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.

Q7: What is band plan and what's the effect?

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. When Symmetric is selected that provides better downstream performance, when Asymmetric is selected that provides better upstream performance.



EC Declaration of Conformity

For the following equipment:

*Type of Product: Industrial Ethernet Extender with 4-Port PoE (1 BNC / RJ-11 + 4-Port 10/100TX PoE -17a Profile, -40~75 DegreeC)

*Model Number: IVC-2004PT

* Produced by:

Manufacturer's Name : **Planet Technology Corp.**

Manufacturer's Address: 11F, No 96, Min Chuan Road,
Hsin Tien, Taipei, 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 Directive on (2004/108/EC).

For the evaluation regarding the EMC, the following standards were applied:

Emission	EN 55022	(Class A: 2006)
Harmonic	EN 61000-3-2	(2006)
Flicker	EN 61000-3-3	(1995/A1: 2001/A2:2005)
Immunity	EN 55024	(1998/A1: 2001/A2:2003)
ESD	IEC 61000-4-2	(2001)
RS	IEC 61000-4-3	(2008)
EFT/ Burst	IEC 61000-4-4	(2004)
Surge	IEC 61000-4-5	(2005)
CS	IEC 61000-4-6	(2008)
Magnetic Field	IEC 61000-4-8	(2001)
Voltage Disp	IEC 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: 11F, No.96, Min Chuan Road, Hsin Tien, Taipei, Taiwan, R.O.C

Person responsible for making this declaration

Name, Surname Kent Kang

Position / Title : Product Manager

Taiwan
Place

22 Oct., 2010
Date


Legal Signature

PLANET TECHNOLOGY CORPORATION

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