

Antaira Technologies
Industrial Ethernet Extender

IVC-4011-T

User's Manual

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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 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 to disconnect the device from the power circuit.

Without removing the DC-plug, 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 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 and have to collect such WEEE separately.

Revision

Antaira Industrial Ethernet Extender User's Manual

For Models: IVC-4011-T

Rev 1.1 (Dec 2013)

Table Of Contents

1. Introduction	5
1.1 Checklist	5
1.2 Ethernet over VDSL2 Bridge Description	5
1.3 Key Features	6
1.4 Specifications	7
2. Hardware Description.....	10
2.1 Front Panel	10
2.1.1 LED Indicators for IVC-4011-T.....	11
2.1.2 MODE DIP Switch	12
2.2 The Upper Panel	13
3. Installation	14
3.1 Install Industrial Ethernet Extender – IVC-4011-T.....	14
3.2 IVC-4011-T BNC / RJ-11 Proper Connection	15
3.3 IVC-4011-T Application Connection.....	16
3.4 Wiring the Power Inputs.....	17
3.5 Wiring the Fault Alarm Contact	18
4. Troubleshooting	19
5. FAQ	20

1. Introduction

1.1 Checklist

Check the contents of the package for following parts:

- IVC-4011-T x 1
- DIN-Rail Kit x 1
- Wall Mount Kit x 1
- User's Manual x 1

If any of these items are missing or damaged, please contact Antaira Sales Representative or authorized dealer immediately. Please 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 us for repair.

1.2 Ethernet over VDSL2 Bridge Description

Antaira'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-4011-T Industrial Ethernet Extender has a switching architecture with 4 x RJ45 10/100Tx Ethernet port and 1 x 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-11or BNC Connector. The IVC-4011-T can set to **Master** or **Slave** mode via a DIP switch. When RJ-11 is connected with other end, the performance will up to 99/63Mbps for asymmetric data rate within 200m and up to 28/2Mbps at 1.4km. When BNC is connected, the performance is up to 99/65Mbps for asymmetric data rate within 200m and up to 31/4Mbps at 2.4km.

The IVC-4011-T Industrial Ethernet Extender builds with slim type and IP-30 metal shape for easily deployment in Heavy Industrial demanding environments.

Antaira Industrial Ethernet Extender provides a cost effective 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



Note

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-4011-T to Master or Slave, please refer to section 2.1.2 for more detail.

1.3 Key Features

The Industrial Ethernet Extender provides the following key features:

- Cost-effective VDSL2 Master / Slave bridge solution
- -40 to 75°C operating temperature
- Redundant Power Design: 12V ~ 48V DC, with polarity reverse protect function
- IP-30 metal case / Protection
- Master / Slave selectable via DIP Switch
- Selectable BNC and RJ-11 mode for the data transmission
- 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-4011-T
Hardware Specification		
Ports	10/100Tx	4 x RJ-45 Auto-negotiation Auto-MDI/MDI-X
	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		<ul style="list-style-type: none"> ● VDSL-DMT ● ITU-T G.993.1 VDSL ● ITU-T G.997.1 ● 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)

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) 	
	RJ-11	Twisted-pair telephone wires (AWG24 or better) up to 1.4km	
	BNC	50 ohm, RG58A/U, RG58C/U, RG58/U or 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	
		2400m -> 32/10Mbps	
		2600m -> 29/8Mbps	
		2800m -> 27/6Mbps	
		3000m -> 25/5Mbps	
	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	

Dimension (HxWxD)	135mm x 87.8mm x 32mm
Weight	495g
Power Requirement	12~48V DC, Redundant power with polarity reverse protection function
Power Consumption / Dissipation	5.64Watts / 19.24BTU
Installation	DIN-Rail Kit and Wall Mounting Ears
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 802.3x Full Duplex Pause Frame Flow Control ITU-T • G.993.1 (VDSL) • G.997.1 • 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.

2. Hardware Description

■ IVC-4011-T

The IVC-4011-T builds with 4 x RJ45, 1 x RJ-11, and 1 x BNC ports for network line connection. The 4 RJ-45 ports support 10/100BTx and will distinguish the speed of incoming connection automatically. This section describes the hardware features of the Industrial Ethernet Extender.

2.1 Front Panel

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

■ IVC-4011-T Front Panel



Figure 2-1: IVC-4011-T Front Panel

2.1.1 LED Indicators for IVC-4011-T

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

■ 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 both Power 1 and 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 training status (about 10 sec)
		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.

■ 10/100Tx Port

LED	Color	Function	
LNK/ACT	Green	Light	Indicate that the port is Link Up.
		Fast Blink	Indicate that the Extender is actively sending or receiving data over that port.
		Slow Blink	Indicate that the port is Link Down.

2.1.2 MODE DIP Switch

The Industrial Ethernet Extender provides 4 selective transmission modes. By switching the transmission modes, user 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-1	DIP-2	DIP-3	DIP-4
	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 Industrial Ethernet Extender operates at Slave mode, the DIP switch 3 and 4 is no function.

Link Type

- BNC mode BNC mode allows IVC-4011-T to connect and data transfer by using BNC cable
- RJ-11 mode allows IVC-4011-T 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-4011-T must switch to the same position, otherwise, it may cause unstable. For example, if want to connect both of IVC-4011-T through BNC cable, the Master (CO) and Slave (CPE) must switch the DIP-2 at BNC mode.

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

2.2 The Upper Panel

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

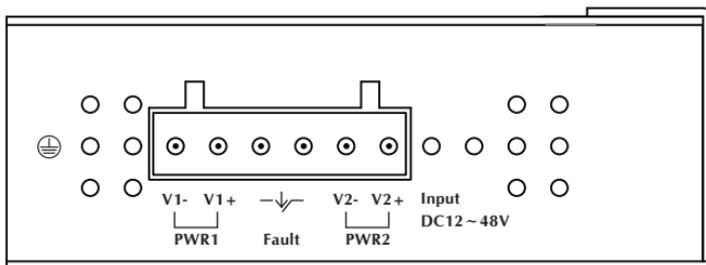


Figure 2-2 Industrial Ethernet Extender Upper Panel.

3. Installation

3.1 Install Industrial Ethernet Extender – IVC-4011-T

The 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. Below is some key limitation on the Industrial Ethernet Extender:

- Used for Point-to-Point
 - ◇ When the connection with either RJ-11 or BNC port for VDSL2 network connection.
- Phone wire
 - ◇ Depending on the quality of telephone line, the maximum distance of one VDSL segment is 1.4km (4593ft) with AWG 24 telephone wires.
- Coaxial
 - ◇ Depending on the quality of coaxial cable, the maximum distance of one VDSL segment is 2.4km (7874ft) with 5C type of coaxial cable.

The link distances and performance will vary on the quality of telephone wires and coaxial cables.

3.2 IVC-4011-T BNC / RJ-11 Proper Connection

Antaira Industrial Ethernet Extender has a DIP switch which can adjust to be Master or Slave mode. Connection of 2 Antaira Industrial Ethernet Extenders, one must be set as Master (CO) mode and the other one must be set as Slave (CPE) mode. Please refer to the follow Figure 3-1 chart for reference.

 **Note**
Industrial Ethernet Extender could not allow the **BNC** and **RJ-11** be connected at the same time.

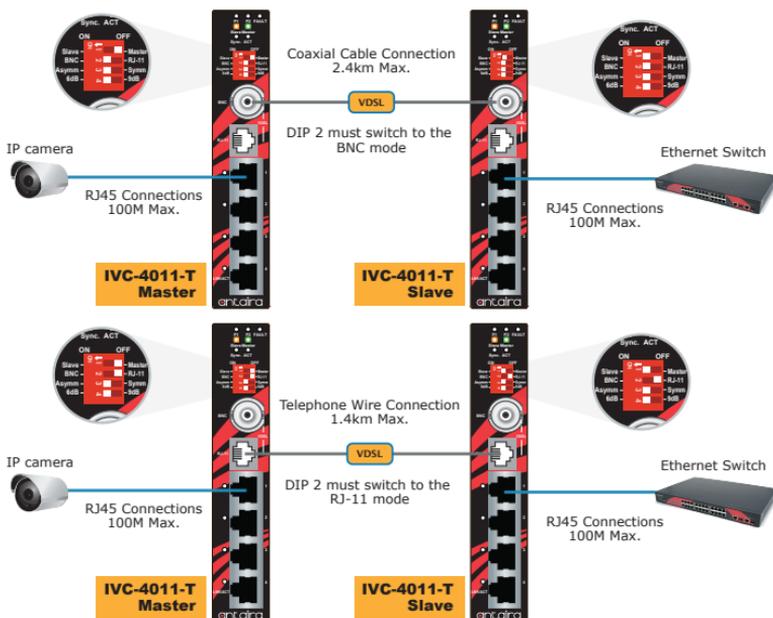


Figure 3-1: Industrial Ethernet Extender - BNC and RJ-11 connection chart

3.3 IVC-4011-T Application Connection

Two sets of the Industrial Ethernet Extenders could be used to link two local Area networks that are located in different place. The normal telephone line or coaxial cable could be setup as a 99/63Mbps (RJ11) or 99/65Mbps (BNC) asymmetric backbone.

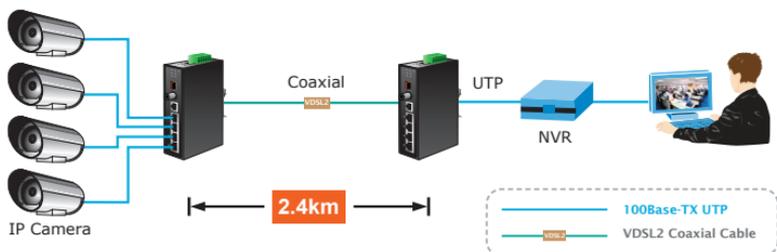


Figure 3-2: IVC-4011-T BNC and RJ-11 connection

Antaira IVC-4011-T is compatible with Antaira EVC-3001 and EVC-3010. Customers can have Antaira IVC-4011-T and EVC-3001 / EVC-3010 to re-deploy the original network without spend extra cost to deploy a new local Internet in any facility.

- For instance, user can setup either EVC-3001 or EVC-3010 inside the facility and set it as **CPE (Customer Premises Equipment)** which need to be placed in the wiring center (MDF room) and connect it to the telephone line system or coaxial cable system.
- On the other hand, user can have the **IVC-4011-T extender** setup as **Master mode** and connect it to the telephone lines or coaxial cable.

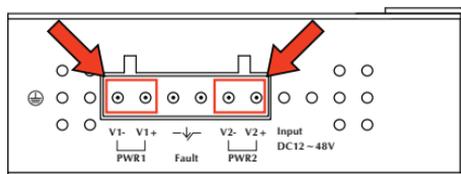
Please be ensuring below points, before to deploy the Antaira Industrial Ethernet Extender IVC-4011-T:

- It is accessible and cables can be connected easily.
- Cables should be away from sources of electrical noise, such as, radios, transmitters, power lines, and fluorescent lighting fixtures.
- No chance of water or moisture get into the IVC-4011-T
- Air Flow around the unit and through the vents in the side of the case is not restricted (minimum of 25mm inches clearance is recommended).

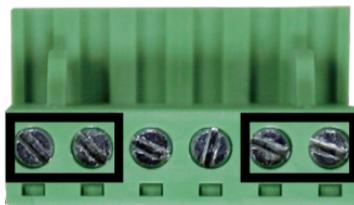
3.4 Wiring the Power Inputs

The 6-contact terminal block connector on the top panel of Industrial Ethernet Extender is used for Dual Redundant power inputs. The below instruction is the guideline for the power wiring:

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



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



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 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.

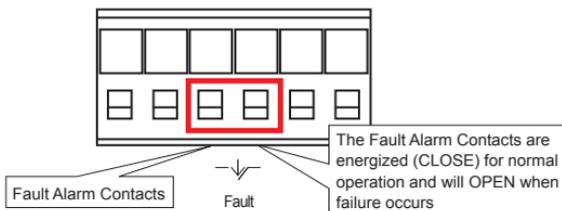


Insert the wires into the fault alarm contacts



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.



4. 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 two IVC-4011-T not more than 2.4km (BNC) and 1.4km (RJ-11). Please also try to adjust the DIP switch of IVC-4011-T to other SNR mode.
2. Please make sure one unit of IVC-4011-T setup as Master mode and the other IVC-4011-T with Slave mode.

SYMPTOM:

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

CHECKPOINT:

1. Make sure to have the Cat.5, 5e, or 6 cables with the RJ-45 connector connect to the port(s).
2. If the connected device (such as LAN card) supports Auto-Negotiation – adjust the device at a fixed speed by manually.
3. Check the power “ON” for both the Industrial Ethernet Extender and connected devices.
4. Check the cables are firmly seated in its connectors in the switch and the associated device(s).
5. Check the connecting cables are good.
6. Check the power adapter is functional, including the connecting device(s).

SYMPTOM:

VDSL sometimes will re-chain and unstable.

CHECKPOINT:

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

5. FAQ

Q1: What is the IVC-4011-T power input?

A1: 12V to 48V DC

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 existing xDSL-infrastructure.

Q3: What is the best distance for IVC-4011-T?

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-4011-T

A4:

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

Q5: Can IVC-4011-T compatible with EVC-3001 / EVC-3010?

A5: Yes, all IVC-4011-T and EVC-3001 / EVC-3011 are with the same Profile 17a, and they are based on ITU-T G993.2 VDSL2.

Q6: What is SNR and what is the effect?

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

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