Please read this document carefully before installation!

Line Power

VDSL2 Loop Extender

AER800-xPVL

Installation Manual

Version: 1.0

WIDEAREA Telecommunication Technology Co.,Ltd

<u>Preface</u>

This manual provides information on how to use this product. Please read this manual thoroughly before installation and use. Additionally, please keep this manual handy for ease of reference during installation and troubleshooting.

● The contents of this document may be updated in the future, without prior notice.

● This booklet was created with thorough attention to the content. If, however, you have a question, spot an error, or find a description lacking, please refer to the end of this booklet for information on how to contact us.

● All brand names and trademarks are the property of their respective owners.

Contents

Abbreviations

WTT Widearea Telecommunication Technology Co.,Ltd

CO   Center Office

CPE   Customer Point Equipment

DSLAM Digital Subscriber Line Access Multiplexer

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1.General Description

The line power VDSL2 loop extender can boost downstream and upstream bite rate observably in a suitable range for VDSL2 user . It helps Telecom broadband operators to better satisfy the bandwidth of high speed services.

The line power VDSL2 loop extender is an active element installed in the outside loop plant. It operates as an amplifier to recover the VDSL2 signal attenuated.

The line power VDSL2 loop extender consists of an enclosure and cards system designed to offer a modular deployment option. The parts list is detailed below:

➢ AER800-1PVL: Stand-alone 1 port unit.

➢ AER800-4PVL Box: A Box for up to 5 AER800-C1PVL cards.

➢ AER800-8PVL Box: A Box for up to 9 AER800-C1PVL cards.

➢ AER800-C1PVL: A one port line power VDSL2 loop extender designed to be inserted into the backplane of any AER800-xPL enclosure, is plug and play.

NOTE: Product is suitable for VDSL2

Feature:

➢ Boost VDSL2 downsteam and upstream bit rates observably in a suitable range

➢ No remote power supply required.

➢ Powered by the 48V on the twist pair from PBX

➢ **No POTS can be used**

➢ IP-66 Rated enclosures.

➢ High grade protection from lightening.

➢ Easy to install, deploy, and maintain.

2. Technical Specifications

Table 1 –Technical Specifications of AER800-1PVL , AER800-4PVL box, AER800-8PVL box,

Operating Environment	Temperature	-35℃～+65℃
	Relative Humidity	5%～95% (Non-condensing)
Input Power Voltage	DC18V~DC72V	
Power Consumption	Less than 0.5W(per port)	
Lightning-proof grade	4000V(10/700μS)	
Number of supported subscribers	AER800-1PVL	1 VDSL2 subscriber
	AER800-4PVL	5 VDSL2 subscribers
	AER800-8PVL	9 VDSL2 subscribers
Dimension(LWH)	AER800-1PVL Box	160mm×70mm×48mm
	AER800-4PVL Box	215mm×290mm×82mm
	AER800-8PVL Box	315mm×290mm×82mm

3. Application

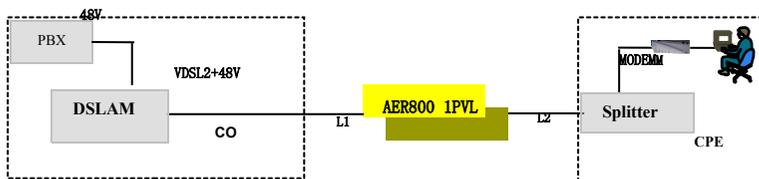## 3.1 Equipment connection diagram:

Figure 1、 Line Power VDSL2 loop extender Connection Diagram

L1: The twist pair connecting booster to DSLAM.

L2: The twist pair connecting booster to Modem.

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3.2 Loop resistance and distance of twist pair demanded

The recommended installation conditions are as follows:

（1）24 AWG(ϕ0.5mm) twist pair

Table 2 -The Demand about Resistance and Distance of 24AWG:

Route	Loop resistance demand (Ω)	Distance demand	
		Kfeet	km
L1(CO- (Extender)	157 ~ 422	3 ~ 8	0.91 ~ 2.44
L2(Extender-CPE)	106 ~ 528	2 ~ 10	0.61 ~ 3.05
L(CO-Extender -CPE)	263 ~ 791	5 ~ 15	1.52 ~ 4.57

（2）26 AWG(ϕ0.4mm) twist pair

Table 3 -The Demand about resistance and distance of 26AWG:

Route	Loop resistance Demand(Ω)	Distance demand	
		Kfeet	km
L1(CO- (Extender)	188 ~ 495	2.3 ~ 6	0.69 ~ 1.83
L2(Extender-CPE)	130 ~ 620	1.5 ~ 7.5	0.48 ~ 2.29
L(CO-Extender -CPE)	312 ~ 928	3.8 ~ 11.3	1.15 ~ 3.43

4. Physical Structure

➢   AER800-1PVL: Stand-alone 1 port unit.

➢   AER800-4PVL Box: A Box for up to 5 AER800-C1PVL cards.

➢   AER800-8PVL Box: A Box for up to 9 AER800-C1PVL cards.

➢   AER800-C1PVL: A one port line power VDSL2 loop extender used to be inserted into the

backplane of any AER800-xPVL enclosure.

4.1 AER800-1PVL Box

Figure 2 AER800-1PVL Box

Table 4 - Twist-pair Connection Description of AER800-1PVL

Color	Connection
Orange/White (A/B)	to DSLAM
Green/White (A/B)	to Modem

4.2 AER800-4PVL Box

AER800-C1PVL Subscriber Cards

Modula Card Slots

LED STATUS Light

Ground Terminal

Wiring terminal to CO and CPE
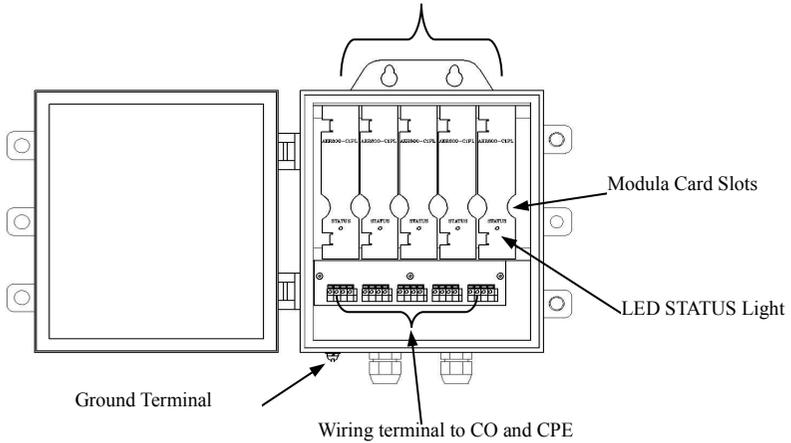
Figure 3 AER800-4PVL Box

4.3 AER800-8PVL Box

AER800-C1PVL Subscriber Card

Modular Card Slots

LED STATUS Light

Ground Terminal

Wiring terminal to CO and CPE
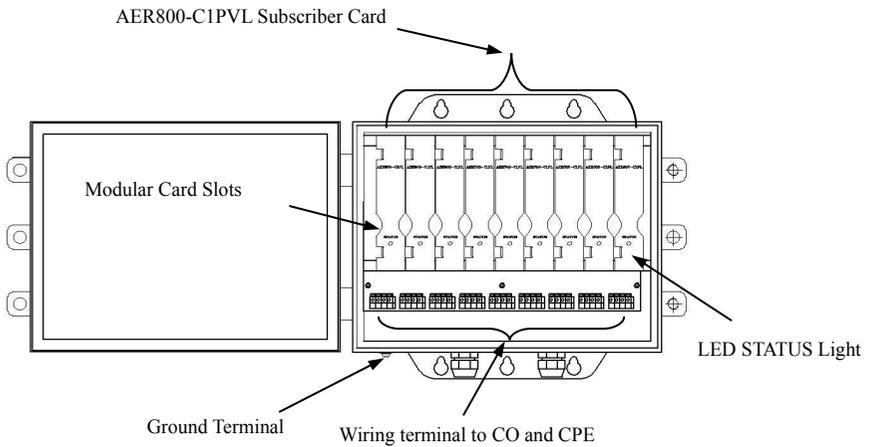
Figure 4 AER800-8PVL Box

The AER800-C1PVL card is plug and play.

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The backplane of the AER800-xPVL series enclosures contain wiring terminals for connecting the booster to the existing loop plant. "CO" connects the line from the DSLAM to AER800-C1PVL, "CPE" connects the line to the customer modem.

5. Installation Procedure

5.1 Unpack

When unpacking the equipment, be sure to check the contents of the packaging for completeness against your purchase order. Notify your supplier immediately if any items are missing.

Note: Please save packing material. All equipment returned must be packed in the original packing material.

Be sure to inspect the equipment for shipping damage, including bent or loose hardware, and broken connectors. If the equipment appears to have been damaged in transit, please contact your supplier.

5.2 VDSL2 Loop Extender Installation

(1) The AER800-1/4/8PVL Box can be installed in a junction cabinet, pedestal, or pole mounted via the supplied mounting brackets. Once mounted, ground the unit via the supplied grounding screw on the bottom outside of the box.

Attention: Copper-core wire with no less than 2.5mm² (13 AWG) diameter is required as ground wire. One end of the wire should connect to Loop Extender's ground terminal. The other end of the wire should connect to a good grounding point. Grounding reliability is the best way to protect the unit against lightning damage.

(2) Insert the AER800-C1PVL card into the AER800-4/8P box.

(3) Connect the line from the DSLAM to the "CO" terminal, and connect the line linked to the customer's modem to the "CPE" terminal. Once the "CO" pair is connected, the power LED will come on to indicated the AER800-C1PVL card is operational.

(4) After confirming that all the twist-pair cables are connected correctly, and the AER800-4/8P box is securely installed, the booster will function 10 seconds after power is steadily applied.

Attention:

"A" and "B" represent tip and ring of the twisted-pair. No polarity.

6. Troubleshooting

Checks at the Central Office

➢ check that there are no leakage currents on the line (measured at the CO). With no extender on the line, current should be essentially zero. With a line powered loop extender, you will read about 15mA .

Checks at the Pedestal

➢ The minimum distance (on 24AWG) from the Central Office to extender installation is 11.8Kft for line power loop extender.

➢ Is the LED on the extender on?

➢ Is the extender grounded? Bonded? The ground, cable sheath, and extender should all be bonded together at the extender and as frequently as possible elsewhere. Lack of bonding will allow significant interference from AC power, AM radio, electric fences and similar problems. Lack of bonding will also make you a prime target for lightning and other surges. If you can't bond, don't ground the extender. If you can't ground, you have to take steps to isolate the enclosure from ground too. Grounding & Bonding together is preferred.

➢ Does the loop resistance and attenuation match the numbers predicted by the VDSL2 Bandwidth Estimator? Check service pair. If not, re-check distances, connections and eliminate loads.

➢ Does modem sync at the pedestal without the extender connected? The sync rate at this location is the maximum the extender can deliver down range. If you can't get sync, the extender will not work at this location. You must clean up the line so that you get sync nearly matching the rate predicted by the VDSL2 Bandwidth Estimator

Checks at the Customer Premise

➢ Customer premise should be at least 4.8Kft (on 24AWG) from the extender for optimal performance. It will work at shorter distances with sub-optimal performance.

➢ Does the modem run without errors?

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Table 6 – Line power VDSL2 loop extender Troubleshooting

Problem Description		Possible Reason	Suggested Resolution
Equipment does not work after connected. Status LED is OFF.		CO side cable is not connected properly.	Check CO side cable.
No Sync.	status LED is on.	Cables at DSLAM or Modem side are connected on wrong side.	Correct the cable connection.
		Line quality issues.	Diagnose cable for proper Ohms/Attenuation values.
		There is a telephone before the splitter on CPE side.	Discard the telephone before the splitter on CPE side.
		VDSL2 Loop Extender is not connected properly.	Correct the cable connection, or check whether the distance between the DSLAM, Extender, and Modem is within recommended values.
		L1 or L2 is too short.	Check that loop extender placement meets engineering requirements.

		SNR Margin is too high.	Reduce SNR Margin setting on the DSLAM until a connection is made. We suggest using SNR Margin < 10. Testing with SNR margin = 1 can provide useful hints during troubleshooting.
Internet is slow, frequent disconnects.		The install position is not correct.	Change the install position to comply the recommended installation conditions in 3.2.
		Possible PC issues, virus, hardware malfunction, etc.	Verify issue with test set or a known good piece of hardware. Check statistics on modem and DSLAM.
		Parallel open wire at CPE is too long or the connector is rusted.	Change the parallel cable to copper twisted-pair.
		The CPE side cable has too many connectors.	Avoid exposed connectors, use good quality cable.
		SNR Margin too low.	Increase the SNR margin setting in the DSLAM to 6 or more.
		Bit Error Rate too High.	Increase SNR Margin setting in the DSLAM.
		Data profile is too high for this circuit.	Lower the minimum data rate in the DSLAM.