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**Please read this  
document carefully  
before installation!**

# **ADSL Loop Extender (AER800-24P)**

## **Installation Manual**

**Version: 001**

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## **Preface**

This manual provides information on how to best 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

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1. General Description.....	3
2. Technical Specifications .....	4
3. Application .....	4
3.1 The Real Lines Connection of Equipment.....	5
3.2 Resistance and Length Demand .....	5
4. Products Structure .....	6
4.1 AER800-24P ADSL Loop Extender .....	7
4.1.1 AER800-24P.....	7
4.1.2 Extender card AER800-C1P.....	10
4.1.3 Power card AER800-PWR .....	10
4.2 AEC Power supply Series.....	11
4.2.1 AEC-B1P.....	11
4.2.2 AEC-B4P.....	11
4.2.3 AEC-RACK .....	12
5. Installation Procedure.....	14
5.1 Unpack .....	14
5.2 Install the Power Supply Equipment .....	14
5.3 Install the ADSL Loop Extender .....	15
6. Troubleshooting.....	16

# 1. General Description

**The ADSL Loop Extender** expands the coverage of ADSL lines. It will provide systems with a higher performance-to-cost ratio, improve equipment utilization rates, and optimize the network. This product will allow you to double the number of subscribers that you can reach while offering a more consistent high bandwidth service to your existing customers.

**The ADSL Loop Extender** is an active element installed in the outside loop plant. It operates as an amplifier and equalizes the signal.

The new generations of line powered ADSL Loop Extenders consist of an enclosure and card system designed to offer a modular deployment option. The parts list is detailed below:

- AER800-24P Box: A Box for 24 AER800-C1P cards and 3 AER800-PWR cards, which are divided into 3 independent sub-systems.
- AER800-C1P: A one port ADSL Loop Extender designed to be inserted into the backplane of the AER800-24P enclosure.
- AER800-PWR: One port Power Supply, which can power 1~8 AER800-C1P cards, and can be inserted into the AER800-24P.

## Benefits

- Additional ADSL subscribers can be added by inserting AER800-C1P cards.
- Only one additional power pairs can power 1~8 AER800-C1P cards.
- Comprehensive over-voltage protection.
- Easy to install, deploy, and maintain.
- Low power consumption.

## 2. Technical Specifications

**Table 1 –Technical Specifications of AER800-24P**

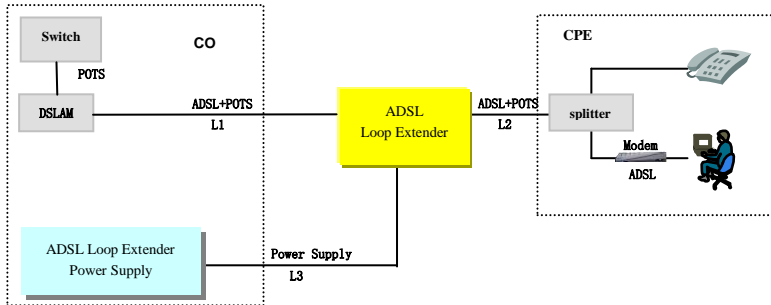
Operating Environment	Temperature	-40℃ ~ +65℃
	Relative Humidity	5% ~ 95% (Non-condensing)
Input Voltage	DC60V~DC122V	
Power Consumption	Less than 0.2W( per port )	
Max. Output Current	Less than 18mA for each power card (for eight ports )	
Dimension(LWH)	AER800-24P Box	662mm×362mm×94mm
Supported Subscribers	AER800-24P	24 ADSL subscribers

**Table 2 - Technical Specifications of AEC-B1P/B4P/RACK**

Operating Environment	Temperature	-10℃ ~ +45℃
	Relative Humidity	5% ~ 95% (Non-condensing)
Input Voltage	AEC-B1P	AC 110V/ AC220V or DC -48V
	AEC-B4P	DC -48V
	AEC-RACK	DC -48V
Output Voltage	DC 116V	
Max. Output Current	Less than 50mA	
Output Port	AEC-B1P	1Port
	AEC-B4P	4Port
	AEC-RACK	2×13Port(MAX)
Supported quantity of AER800-C1P	AEC-B1P	8 AER800-C1P
	AEC-B4P	32 AER800-C1P
	AEC-RACK	208 AER800-C1P
Dimension(LWH)	AEC-B1P	110×50×30mm
	AEC-B4P	480×160×44mm
	AEC-RACK	485×153×133mm

## 3. Application

### 3.1 Equipment connection diagram:



**Figure 1 ADSL Loop Extender Application Diagram**

L1: The signal twisted-pair connecting the AER800-C1P to the DSLAM.

L2: The signal twisted-pair connecting the AER800-C1P to the Modem.

L3: Power supply twisted-pair sending DC116V to the AER800-PWR card.

### 3.2 Resistance and Length Demand

The recommended installation conditions are as follows:

- (1) 26 AWG (0.4mm) twisted-pair

**Table 3 -The demand of loop resistance and length**

Route	Loop Resistance (Ohms)	length	
		K feet	Km
L1(CO-Extender)	415 ~ 1240	4.9 ~ 14.8	1.5 ~ 4.5
L2(Extender-CPE)	83 ~ 1100	1.0 ~ 13.0	0.3 ~ 4.0
L(CO-Extender-CPE)	635 ~ 1660	7.5 ~ 19.7	2.3 ~ 6.0

(2) 24 AWG(0.5mm) twisted-pair

**Table 4 -The demand of resistance and length**

Route	Loop Resistance (Ohms)	Length	
		K feet	Km
L1(CO-Extender)	345 ~ 1030	6.6 ~ 19.7	2.0 ~ 6.0
L2(Extender-CPE)	52 ~ 929	1.0 ~ 17.7	0.3 ~ 5.4
L(CO-Extender-CPE)	570 ~ 1449	10.8 ~ 27.6	3.3 ~ 8.4

## 4. Products Structure

- AER800-24P Box: Enclosure for 24 AER800-C1P cards and 3 AER800-PWR cards.
- AER800-C1P: A one port ADSL Loop Extender designed to be inserted into the AER800-24P
- AER800-PWR: Provides power for 1~8 AER800-C1P cards.

### 4.1 AER800-24P ADSL Loop Extender

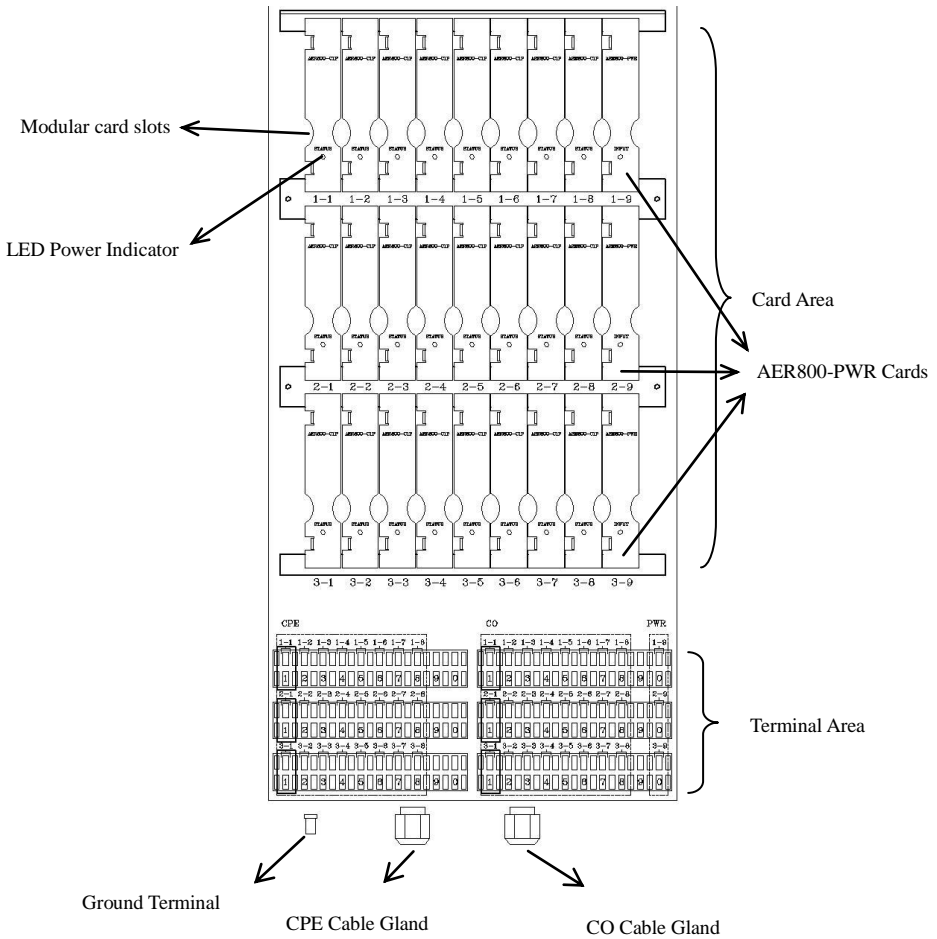
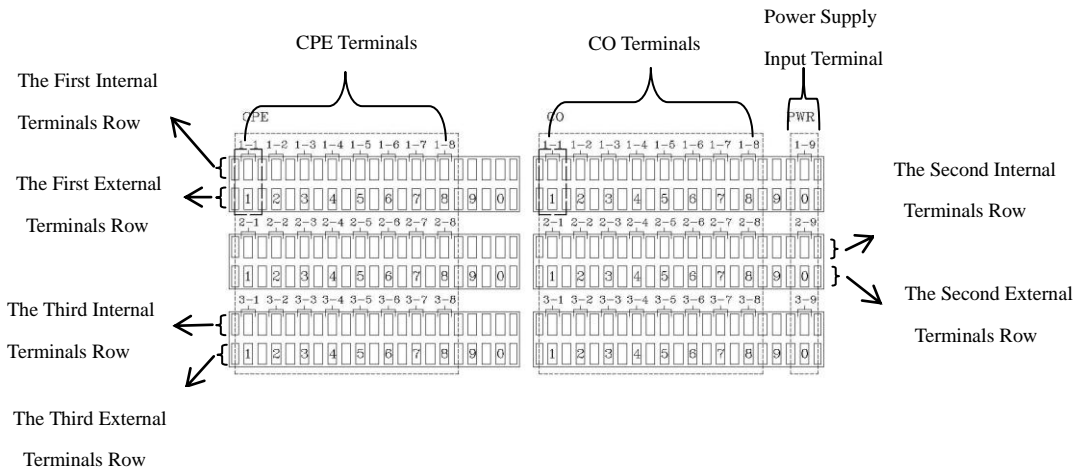


Figure 1 AER800-24P Overview

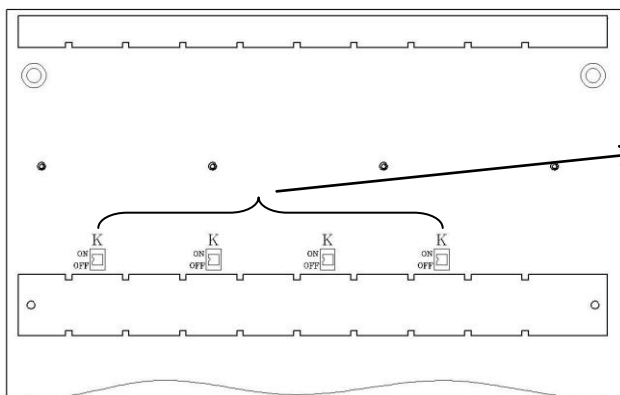




**Figure 2 AER800-24P Terminals Area**

According to the connection diagram on the back of the door, terminals are connected to the card with the same code internally. Through the internal pairs, Extender cards are connected to the internal terminal. CO and CPE cables should be connected to external terminals.

**Note:** When inserting Line Power Extender Cards, 1-9 / 2-9 / 3-9 slots can be used for additional AER800-C1PL cards, allowing for a total of 27 subscribers.



**Extender Card Power Switch.**

To turn on the individual Extender cards, make sure each switch is set to ON. Each card has a corresponding power switch directly beneath the slot.

Figure 5 AER800-24P Cards Area

Table 5- The Corresponding of K Switch

Switch Bit	AER800-C1P Card
K1	1-1,1-2
K2	1-3,1-4
K3	1-5,1-6
K4	1-7,1-8
K5	2-1,2-2
K6	2-3,2-4
K7	2-5,2-6
K8	2-7,2-8
K9	3-1,3-2
K10	3-3,3-4
K11	3-5,3-6
K12	3-7,3-8

#### 4.1.2 Extender card AER800-C1P

AER800-C1P is the Extender card. LED light indicates power supply status.

#### 4.1.3 Power card AER800-PWR

AER800-PWR is the power supply card, which receives remote power from the CO, after conversion, it powers the AER800-C1P. The LED indicates that DC116V power has been supplied.

## 4.2 AEC Power Supply Series

### 4.2.1 AEC-B1P (1Port Output)



Figure 6 AEC-B1P

Output connector:

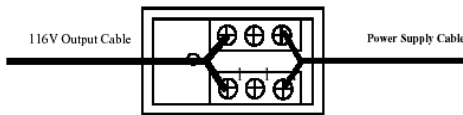


Figure.7 AEC-B1P Output Connector Wiring Diagram

### 4.2.2 AEC-B4P (4Port Output)



Figure 8 AEC-B4P Front View



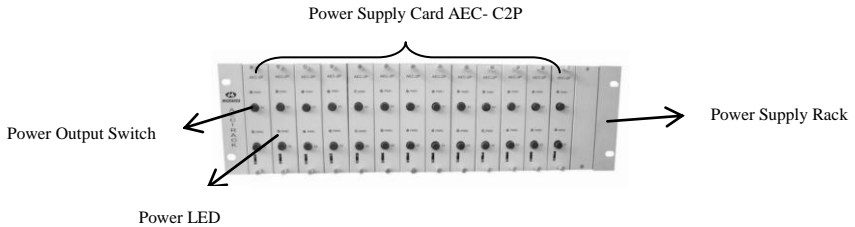
Figure 9 AEC-B4P Back View

**Table 6- The Description of AEC-B4P Terminal**

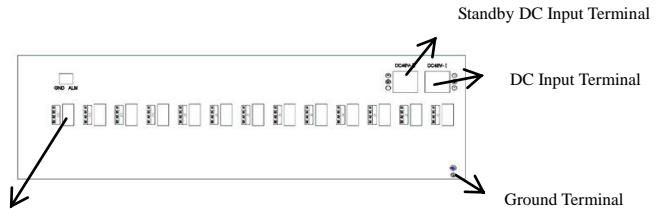
Terminal			Description	
K11	PWR11	J1		First group and first output.
		A11	B11	
K12	PWR12	J2		First group and second output.
		A12	B12	
K21	PWR21	J3		Second group and first output.
		A21	B21	
K22	PWR22	J4		Second group and second output.
		A22	B22	

**4.2.3 AEC-RACK (Maximum 2×13Port Output)**

- AEC-RACK is a rack for AEC-C2P cards. One rack contains slots for 13 cards.
- AEC-C2P is a 2 port power supply for express powered ADSL Loop Extenders (AER800-xP).



**Figure 10 AEC-RACK Front View**



**Figure 11 AEC-RACK Back View**

**Attention: Polarity of DC48V power input.**

**Table 7 – Technical Specifications of AEC-RACK, AEC-C2P**

Operating Environment	Temperature	-10°C ~ +45°C
	Relative Humidity	5% ~ 95% (Non-condensing)
Input Voltage	DC48V ( 36V ~ 72V )	
Output Voltage	DC 116V per port	
Output Current	Less than 50mA	
Fuse Rating	5A	
Dimension of RACK	485mm (L) ×153mm (W) ×133mm (H)	

**Table 8- the Description of the AEC-RACK Terminal**

Terminal			Description
K1	PWR1	J	First output
		A1   B1	
K2	PWR2	J	Second output.
		A2   B2	

**Note: In this table, the “J” indicates any of the outlets “J1~J13”**

In figure 11, you can input DC48V through the 2×3 cords “DC48V-I”. The “DC48V-II” is only used in during factory testing. Additionally, the grounding screw is located in the lower right hand corner. “COM ALM” in the upper left hand corner is only used for factory testing. The outlets “J1~J13” are the DC116V output terminals. AEC-C2P cards can supply 2×DC116V which allows a single card to power two lines.

- AEC-C2P



Figure 12 The Panel of AEC-C2P

In figure 12, the lights “PWR1” and “PWR2” indicate the status of the equipment. After the power supply is connected, press the button “K1” and “K2”, and the corresponding PWR light should be solid green. Flashing indicator indicates short circuits or over-current alarm condition.

## 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 Install the Power Supply

- (1) Generally, the Power Supply is installed at the CO. Make sure the type of power supply you ordered, AC85V~AC265V or DC48V is correct for your source voltage.
- (2) Before installation, the DC 48V or AC85V~AC265V power supply must be reliably grounded.
- (3) The power supply can also be installed in the CPE or near the ALE, if CO installation is not

- feasible.
- (4) If the ADSL Loop Extender is installed in a remote location without local power available, an additional copper pair (L3 as shown in Fig. 1) is required for power. The supply voltage will pass through the power converter and feed to this additional pair.
  - (5) The supplied accessories include a power cord for DC -48V. Connect it to the DC -48V power source. Please connect the cord according to the polarization indicated.
  - (6) Remove about 10mm of insulation and insert the wire end into the connector matched with the outlet and screw it down. Then insert the connector into the outlet. After that, connect the signal cable, the signal cable is polarity independent.

- Attention: 1. Please connect the ground terminal to reliable a ground. Copper-core wire with no less than  $2.5\text{mm}^2$  (13 AWG) diameter is required as ground wire.**
- 2. Power supply should NOT be turned on until the ALE installation is finished.**
- 3. When the power supply wire is active, do NOT operate the A and B wire of the supply pair simultaneously. The A and B wire should be isolated.**

### 5.3 Install the ADSL Loop Extender

- (1) Install the AER800-24P Enclosure in the junction cabinet. Ground the Enclosure through the grounding screw located on the bottom outside the Box.

**Attention: Copper-core wire with no less than  $2.5\text{mm}^2$  (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 reliable grounding point.**

- (2) Insert the power card AER800-PWR into the AER800-24P Box.
- (3) Insert the Extender card AER800-C1P into the AER800-24P Box.
- (4) Connect the cable according to the connection diagram.

Connect the power pair into the AER800-PWR card.

Connect the signal cable to the terminal area, the cable from the DSLAM connects to the "CO" terminal, and the cable from the modem connects to the "CPE" terminal.

**Attention: The Power Supply should NOT be turned on until the Extender installation is**

finished.

(5) Power on: after confirming that all the twisted-pair cables are connected correctly and the Enclosure is securely installed, **Then turn on the Extender card, please make sure Extender card Power Switch is set to ON.** After powering on the system the ADSL Loop Extender will work within 10 seconds.

## 6. Troubleshooting

**Table 5 - ADSL 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 connection	AER800-C1PL status LED is on.	Cables at DSLAM or Modem side are not connected properly.	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.
		ADSL 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.
There is noise on the user's telephone line.	CO/CPE cable is connected to ground or the wire insulation is faulty.		Check the cables.
	Possible electromagnetic interference.		Check to ensure the extender is not located near any high voltage equipment.
Internet is slow, frequent disconnects.	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.