Commercial Grade

PoE Network Switch

Quick Start Guide
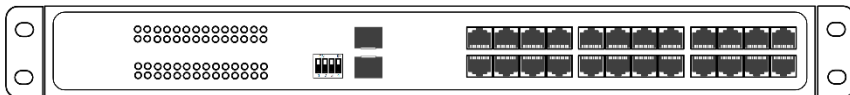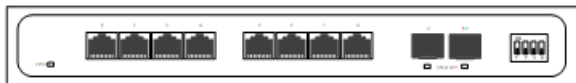**v2.0**

Introduction

Thank you for choosing Commercial Grade PoE Network Switch. This guide is designed to familiarize you with the layout of the PoE Network Switch and describes how to deploy them in your network.
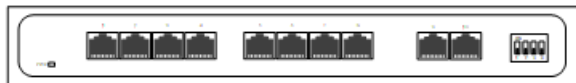

16x10/100/1000Base-TX RJ45
2x1000Base-X SFP

24x10/100/1000Base-TX RJ45
2x1000Base-X SFP

8x10/100/1000Base-TX RJ45
2x1000Base-X SFP

10x10/100/1000Base-TX RJ45

Product Overview

The new generation Power over Ethernet switch provides stable and reliable Ethernet transmission, with high-quality design and reliability. It can supply power to PD terminal equipment such as wireless AP, webcam, VoIP, and visual intelligent building intercom through network cable and meet the network environment that needs a high-density PoE power supply. It is suitable for hotels, campuses, factory dormitories and small and medium-sized enterprises.

AI PoE Switch used on all devices which are compatible with the PoE standards but don't support passive low voltage devices. It is also important not to let the power requirements of your devices exceed the total PoE budget of the switch when planning your installation. All models support Artificial intelligence features via dip switch and include, AI VLAN, AI QoS, AI PoE and AI Extend. Let's explore these in a little more detail.

LEDs Indications

LED	State	Indication
PWR	On	Power On
	Off	Power Off
LINK/ACT	On	Valid Ethernet Link
	Blink	Data Transmission
	Off	No Ethernet Link

DIP Switch

DIP Switch	Name	Status	Description
#1	AI VLAN	OFF	Disable
		ON	Enable
#2	AI Extend	OFF	Disable
		ON	Enable
#3	AI QoS	OFF	Disable
		ON	Enable
#4	AI PoE	OFF	Disable
		ON	Enable

Notes: 1. AI Extend: AI extend is a common PoE switch feature designed to extend PoE distance up to 250m. The downside is that port speeds will be limited to only 10Mbps. This limitation does not apply to the uplink ports. The AI Extend feature is suitable for situations where your power source is too far away. There is, however, that bandwidth limitation to be aware of.
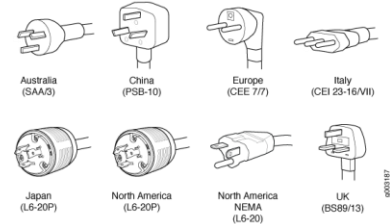
2. AI VLAN: AI VLAN is essentially port isolation on each of the PoE ports. All PoE ports are only able to communicate with the uplinks when this option is enabled. This can be useful when the setup requires multiple clients to connect to a common network resource but should not be able to connect to each other. Using this also improves network security.

3. When AI QoS is enabled on the 8 port models, Port 1 - 4 will prioritise Video and VoIP traffic flows over others. For example, an IP camera streaming in real-time takes preference over a user transferring a backup file to a server.

4. AI PoE: The AI PoE feature allows the switch to check the ports for activity periodically. If a port is not passing traffic for a certain amount of time, the switch will reset the power on that specific port. The device on the other end will reboot with the idea that it returns to a working state. This is a great feature to automate this process. It can save lots of time on support and driving out to the site to troubleshoot or manually power cycle equipment.

PoE & Power Supply

PoE Ports	Port 1 to 8 IEEE802.3af/at	Port 1 to 16 IEEE802.3af/at	Port 1 to 24 IEEE802.3af/at
Power Supply Pin	Default: 1/2(+), 3/6(-)		
Max Power Per Port	30W; IEEE802.3af/at		
Total PWR/Input Voltage	150W 48-56VDC	350W 48-56VDC	350W 48-56VDC
Power Consumption	< 6W no PD connected	< 15W no PD connected	< 18W no PD connected)
Power Inputs	1		
Power Supply	External power adapter with AC100 – 240V 50-60Hz 2A	Internal power adapter with AC100 – 240V 50-60Hz	
Protection	Overload Current Protection		
AC Power Plug Types			

Dimensions (unit: mm)
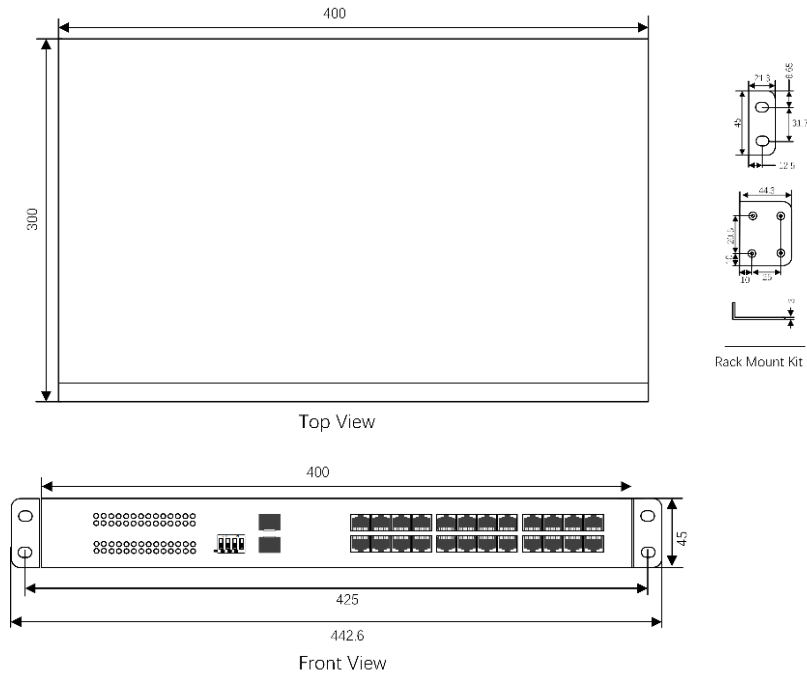
Top View

Rack Mount Kit

Front View

24x10/100/1000Base-TX RJ45+2x1000Base-X SFP

Front View

Back View

Top View

Side View
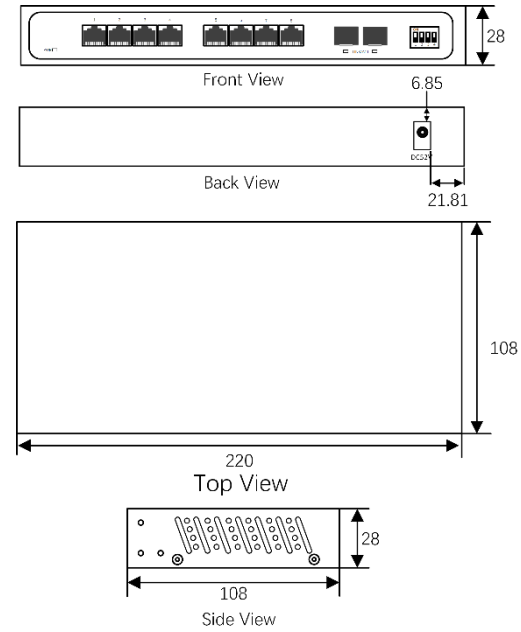
8x10/100/1000Base-TX RJ45+2x1000Base-X SFP
**10x10/100/1000Base-TX RJ45**

Optical Fiber Port
SFP Transceiver Module
You can select different SFP modules as required (Please refer to our SFP selection list for the appropriate module). To insert/remove the SFP, the procedures are as follow:
1. On the side panel, insert the SFP module into the SFP port until it is securely locked.
2. Connect the optical fiber (1/2 core) to the LC connector(s) of the SFP.
3. To remove the SFP module, press down the lock of the LC connector

of the optical fiber to pull out the fiber cable.
4. Pull down the SFP lever and hold its position. Pull out the SFP module from the SFP port.
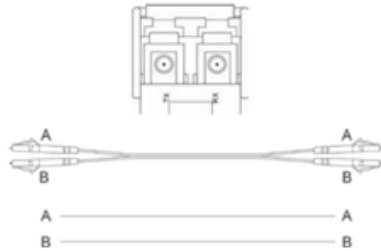
Notes: If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, shown as below, or A1-to-A2 and B1-to-B2).

Connector	Multimode Fiber		Sigle-mode Fiber	
1000Base-SX(850nm)	Bandwidth MHZ-KM	Distance	Bandwidth MHZ-KM	Distance
	260	220m	400	500m
	200	275m	500	550m
1000Base-LX (1310nm/1550nm)	Single-mode Fiber 9/125um:2km			
	Single-mode Transceiver 1310nm: 10/20km			
	Single-mode Transceiver 1550nm: 40-120km			

RJ45 Ethernet Port
RJ 45 port support automatic MDI/MDI-X operation. Can connect the PC, Server, Converter and HUB .Pin 1,2,3,6 Corresponding connections in MDI. 1→3, 2→6, 3→1, 6→2 are used as cross wiring in the MDI-X port of Converter and HUB. 10/100/1000Base-TX are used in MDI/MDI-X, the define of Pin in the table as below.

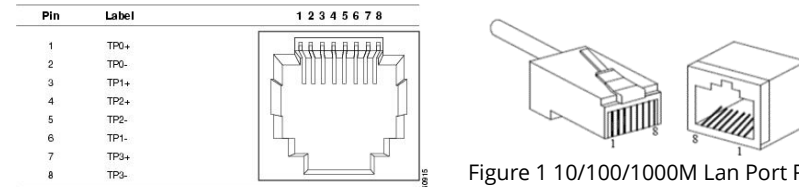| 1000Mbps 1000Base-T, RJ45 Connector Pin Assignment		
Pin	MDI Signal Definition	MDIX Signal Definition
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

Figure 1 10/100/1000M Lan Port Pinouts

As before mentioned, an Ethernet crossover cable is adopted to connect two ports of the same configuration (i.e. MDI-to-MDI or MDIX-to-MDIX). However, it may generate some confusion and inconveniences when deploying two different kinds of Ethernet cables. The auto-MDI/MDIX technology is developed to fix this problem: It automatically switches between MDI and MDIX as required. Auto MDI/MDIX ports on newer device interfaces detect if the connection requires a crossover, then automatically choose the MDI or MDIX configuration to properly match the other end of the link. In this case, it doesn't matter if you using straight through or crossover cables. The chart below shows cable types for MDI/MDIX and auto-MDIX.

Setting	MDI/MDIX Device Type	
	PC or other MDI Device	Switch, hub or other MDIX Device
MDI	Crossover cable	Straight-through cable
MDIX	Straight-through cable	Crossover cable
Auto-MDI/MDIX	Either crossover or straight-through cable	

Power over Ethernet (PoE) Pinout Diagram

Power over Ethernet or PoE is a standard system that transmits or delivers electrical power along with data through the same cable. We know that there are different types of network cables are available such as cat6, cat7, cat5, etc, and different types of ports also available such as RJ45. RJ45 has a total of eight pins and it connects with an ethernet cable that consists of eight separate wires. All these eight wires are not used for the data transmission, so some of them can be used for electrical power transmission. As per the standard, the electrical current should interface with the data transmission and the cable should be safe.

The Power over Ethernet system works under the standardization of the (Institute of Electrical and Electronics Engineers)IEEE 802.3 committee. Generally, PoE delivers 47-57V DC power. This PoE system is used for both data and power transmission purposes in Internet Protocol(IP) cameras, Wireless Access points(WAPs), Voice over Internet Protocol(VoIP), etc.

According to the IEEE standard cat5 or better cable is required for the transmission of high power levels. But cat3 cable also can be used if less power transmission is required. The PoE system was physically implemented under the specification of IEEE 802.3af-2003. Also, we know that there are two categories for the RJ45 colour code - T568A and T568B.

IEEE 802.3af -2003 Standard PoE Pinout Diagram for T568A

No.	Description
1	White Green (TX+)
2	Green (TX-)
3	White Orange (RX+)
4	Blue (DC+) - PoE
5	White Blue (DC+) - PoE
6	Orange (RX-)
7	White Brown (DC-) - PoE
8	Brown (DC-) - PoE

*Hold the copper strips toward your face

No.	Description
1	White Orange (X+)
2	Orange (TX-)
3	White Green (RX+)
4	Blue (DC+) - PoE
5	White Blue (DC+) - PoE
6	Green (RX-)
7	White Brown (DC-) - PoE
8	Brown (DC-) - PoE

Installation Preparation

Before installation, confirm that the work environment meets the installation requirements, including the power needs and abundant space. Whether it is close to the connection equipment and other equipment are prepared or not.

1. Avoid in the sunshine, keep away from the heat fountainhead or the area wherein intense EMI.
2. Examine the cables and plugs that installation requirement.
3. Examine whether the cables be seemly or not (less than 100m) according to a reasonable scheme.
4. Power: AC220V power input
5. Environment:
   working temperature: 0 ~ 50℃ (32 to 122℉)
   Storage Temperature: -20 ~ 70℃ (-4 to +158℉)
   Relative humidity 5% ~ 95% (noncondensing)

Rack Mount Installation

To install the PoE Switch in a 19-inch standard rack, follow the instructions described below.

Step 1: Place the PoE Switch on a hard flat surface, with the front panel positioned towards your front side.

Step 2: Attach a rack-mount bracket to each side of the PoE switch with supplied screw attached to the package.
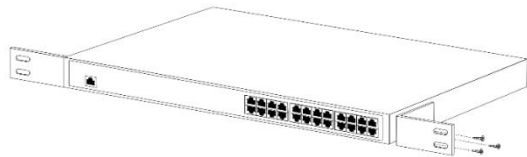

Figure 2-1 shows how to attach brackets to one side of the PoE switch

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

Step 3: Secure the brackets tightly.

Step 4: Follow the same steps to attach the second bracket to the opposite side.

Step 5: After the brackets are attached to the injector, use a suitable screw to securely attach the brackets to the rack, as shown in Figure 2-2.
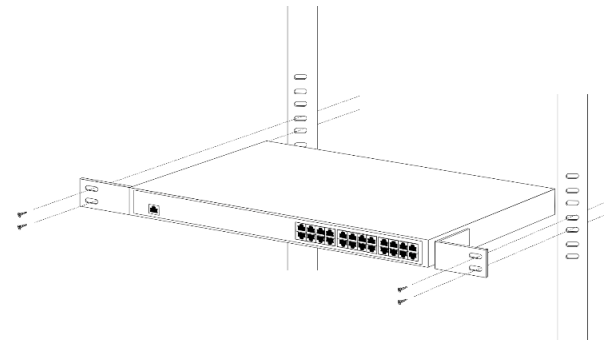

Figure 2-2: Mounting the PoE Switch in a Rack

Desk Top Installation

To install a PoE Network switch on a desktop or shelf, simply complete the following steps:

Step 1: Attach the rubber feet to the recessed areas on the bottom of the PoE Network Switch.

Step 2: Place the PoE Network Switch on a desktop or shelf near an AC power sources.

Step 3: Keep enough ventilation space between the PoE Network switch and the surrounding objects.

Step 4: Connect your PoE Switch to network 802.3at/802.3af powered devices(PD) and Switch.

A. Connect one end of a standard network cable to the upper stack 10/100/1000 RJ45 ports on the front of the PoE Switch.

B. Connect the other end of the cable to the 802.3at / 802.3af power devices (PD) such as IP phone, wireless, access point, IP camera, splitter, or switch etc.
C. Connect one end of a standard network cable to the relative lower stack 10/100/1000 RJ45 port on the front of the PoE Switch.
D. Connect the other end of the cable to the port of switch

Step 5: Supply Power to the PoE Switch
A. Connect one end of the power cable to the PoE Switch.
B. Connect the power plug of the power cable to a standard wall outlet. When the PoE Switch receives power, the power LED should remain solid Green.

Wiring Requirements
Cable laying need to meet the following requirements,
1. It is needed to check whether the type, quantity and specification of cable match the requirement before cable laying;
2. It is needed to check the cable is damaged or not, factory records and quality assurance booklet before cable laying;
3. The required cable specification, quantity, direction and laying position need to match construction requirements, and cable length depends on actual position;
4. All the cable cannot have break-down and terminal in the middle;
5. Cables should be straight in the hallways and turning;
6. Cable should be straight in the groove, and cannot beyond the groove in case of holding back the inlet and outlet holes. Cables should be banded and fixed when they are out of the groove;
7. User cable should be separated from the power lines. Cables, power lines and grounding lines cannot be overlapped and mixed when they are in the same groove road. When cable is too long, it cannot hold down other cable, but structure in the middle of alignment rack;
8. Pigtail cannot be tied and swerved as less as possible. Swerving radius cannot be too small (small swerving causes terrible loss of link). Its banding should be moderate, not too tight, and should be

separated from other cables;
9. It should have corresponding simple signal at both sides of the cable for maintaining.

Power over Ethernet Powered Device

	Voice over IP Phones (3-5 Watts)
	IP Camera (10-12 Watts)
	Wireless LAN Access Points (6-12 Watts)
	PAN/Tilt/Zoom Cameras (30 Watts)
	Remote Computer (30 Watts)

PoE Power Supply Budget Calculation

Step1: Add Up The Demand For PoE In Watts

Add up the expected demand for power for each Powered Device (PD) in watts. Allow for the maximum power and upper end of PD classification. Any unspecified devices should be assumed Class 0.

For example, an IEEE802.3af, Class 0 device may consume 9 watts; however, as it's Class 0, assume 15.4 watts.

Round the numbers up, occasionally, to account for the additional consumption of the UTP (unshielded twisted-pair) ethernet cable that runs between the PD and PoE switch.

For example, if an IEEE802.3at Class 4 IP camera consumes 25.5 watts, round to 30 watts, which adds a buffer to balance out the loss between the PoE switch and the device.

Include room for future capacity. It's convenient to have at least one spare port for diagnostics, troubleshooting, or monitoring. And many clients want extra ports for the option to add more PD devices in the future. However, as long as devices are appropriately selected and integrated, accounting for spare ports isn't required for a PoE power budget calculation.

Step 2: Scale For The Operating Environment

When performing a PoE power budget calculation, it's essential to account for environmental conditions.

Accommodate for the conditions. Expect the long-term performance of a power supply to be 70% of its rating in a benign/conditioned environment (somewhere with steady temperatures between 32°F/0°C and 120°F/50°C). In a benign environment, divide the total wattage from step one by 0.7.

If the power supply is subject to a harsh environment (cold temperatures less than 32°F/0°C or heat above 120°F/50°C), plan for diminished performance. Divide the total wattage from step one by 0.6 for this type of setting.

In extreme conditions, industrial-grade modes, such as Fiberroad Industrial PoE Series, DIN rail mountable, and DC 48V power supplies.

Take this harsh scenario, for instance:

A switch and its power supply will be stored in a metal enclosure, exposed to direct sun, at a site in the northeastern United States. In winter, the temperature inside the enclosure could be as low as –10°F/–24°C. And in summer, it could be as high as 140°F/60°C. Accounting for the temperature inflexions, expect the power supply to operate at 60% of its power rating.

It's always safe to assume a conservative long-term performance drop of 50%, no matter the conditions. That means totalling the anticipated power demand (step 1) and dividing by 0.5 (step 2) to get a power budget in watts.

Step 3: Select The Power Source

After determining the demand for PoE power and accounting for the surroundings, it's time to select an appropriate supply. Fiberroad has DC 48-56V supplies with ratings from 30 watts to 480 watts.

Troubleshoot

- Please follow this step if the equipment have trouble.
- Make sure the equipment is installed according to the manufactures installation guide.
- Confirm RJ45 cable order meets EIA/TIA568A or 568B standard.
- Every PoE port can provide PoE equipment with a maximum power of less than 30W; please do not connect the PoE equipment with control over 30W.
- Replace the equipment that can not work with a proper

functioning 8port PoE Ethernet switch to check if the equipment is damaged.
- Please get in touch with your vendor if trouble still exists.

Specifications

Ethernet Interface		
RJ45 Port	8x10/100/1000Base-TX	16/24x10/100/1000Base-TX
Optical Fiber Port	2x1000Base-X SFP	2x1000Base-X SFP
SFP Slot Port	Gigabit SFP optical fiber interface, default matching optical modules (optional order single-mode / multi-mode, single fiber / dual fiber optical module. LC)	
Twisted Pair Transmission	10BASE-T: Cat3,4,5 UTP(≤100 meter) 100BASE-TX: Cat5 or later UTP(≤100 meter) 1000BASE-T: Cat5e or later UTP(≤100 meter)	
Port Mode (Tx)	Auto-Negotiation Full/Half Duplex Mode Auto MDI/MDI-X Connection	
Standards	IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseT(X) and 100BaseFX IEEE 802.3ab for 1000BaseT(X) IEEE 802.3z for 1000BaseSX/LX/LHX/ZX IEEE 802.3x for flow control IEEE 802.1p for Class of Service IEEE802.3az Energy Efficient Ethernet	
Packet Buffer Size	2Mbits	4Mbits
Maximum Packet Length	Up to 9K	Up to 10K
MAC Address Table	4K	8K
Transmission Mode	Store and Forward (Full Wire Speed)	
Exchange Property	Delay time: < 7μs	

	Backplane bandwidth: 52Gbps（16/24 Port Model）
	Backplane bandwidth: 20Gbps（10 Port Model）
Advanced Features	Compatible With IEEE 802.3at/af Compliant PDs
	Extend Mode (Up to 250m PoE power supply and data transmission)
	Priority Mode
	Isolation Mode
	PD Detection
	Intelligent Power Supply
	Mac Address Auto-Learning and Auto-Aging

Working Environment	
Operating Temperature	0℃~50℃（32to 122 ℉）
Operating Humidity	5%~90% (non-condensing)
Storage Temperature	-20℃~70℃（-4 to 158 ℉）
MTBF	100,819 Hours
MTBF Standard	Telcordia SR-332 GB 25℃
Cooling	Fanless, Passive Cooling
Noise Level	0 dBA

Electronic Emission Notices

This equipment has been tested and found to comply with the FCC Part 15, Subpart B, Class A and protection requirements of European Emission Standard as follows: EMI Comply with FCC Part 15 Class A & CE Mark Approval LVD EN 62368-1 Safety UL and others by request.

FCC Class a statement

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Disclaimer

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