



**Industrial 5-Port Fast Ethernet Switches
with SFP Slot and optional 4 PoE PSE Ports**

Basic Model: KSD-541

PoE Model: KSD-541-HP

Installation Guide



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TRADEMARKS

Ethernet is a registered trademark of Xerox Corp.

FCC NOTICE

This device complies with Class A Part 15 the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including the interference that may cause.

CE NOTICE

Marking by the symbol indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EMC Class A

EN55022 Class A

EN61000-3-2

EN61000-3-3

EN 55024

IEC 61000-4-2

IEC 61000-4-3

IEC 61000-4-4

IEC 61000-4-5

IEC 61000-4-6

IEC 61000-4-8

IEC 61000-4-11

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1. Introduction

The switches are 5-port Fast Ethernet switches which are featured with four copper ports and one combo port. The combo port comes with one RJ-45 and one SFP slot. The SFP slot can be mounted with a fiber transceiver optionally to support a fiber connection.



For more coming PoE (Power Over Ethernet) applications, the PoE switch model is equipped with high power PoE design in four copper ports. With proper 44 ~ 57VDC power supply, it is able to deliver power to four PoE or PoE+ PD devices via Cat.5 cables. This guide describes the installation information about two models as follows:

Basic Model Industrial 5-port Fast Ethernet switch with SFP slot

PoE Model Industrial 5-port Fast Ethernet switch with SFP slot and PoE+ (High power PoE) feature

In summary, the switch provides the following advantages:

Plug and Play

No configuration is required in using the switch. With the featured auto-negotiation function, the switch can detect and configure the connection speed and duplex automatically. The switch also provides auto MDI/MDI-X function, which can detect the connected cable and switch the transmission wire pair and receiving pair automatically. This auto-crossover function can simplify the type of network cables used.

Fiber Connectivity

For fiber connection, the SFP slot can be installed with an optional SFP optical fiber transceiver to support one fiber connection when needed.

Power over Ethernet

For PoE applications, four IEEE 802.3at-compliant PoE+ PSE ports are provided in four copper ports. Each PSE port can deliver power to one PoE PD (Powered Device) via the connected Cat.5 cable.

Industrial Features

For industrial environment, the devices are designed with the following enhanced features exceeding that of commercial Ethernet switches:

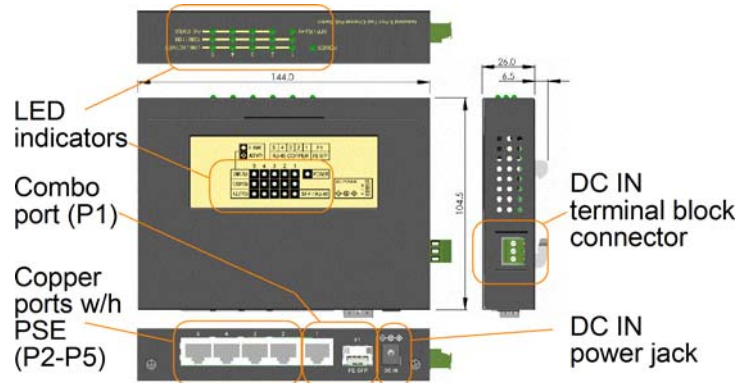
- High and wide operating Temperature
- Power input interface: Industrial screw terminal block and DC power jack for external commercial power adapter as option
- Screw panel and DIN rail mounting support for industrial enclosure
- Industrial-rated Emission and Immunity performance

1.1 Features

- Provides 5 10/100Mbps RJ-45 and one 100Mbps SFP slot
- All of the copper ports support auto-negotiation and auto-MDI/MDI-X detection.
- Provides full wire speed forwarding
- Supports IEEE 802.3x flow control for full-duplex and backpressure for half-duplex
- Provides SFP slot for optional optical fiber connection
- Provides four IEEE 802.3at-compliant PoE PSE ports
- Provides two types of power supply interfaces - DC Jack and terminal block
- Supports stand-alone, wall, Din-Rail, and panel mounting
- Industrial-rated emission and immunity performance

1.2 Product Panels

The following figure illustrates the faces of the switch:



1.3 LED Indicators

<u>LED</u>	<u>Function</u>
POWER	Power status
LINK/ACT	Port link status and activities (Port 1 - Port 5)
100M/10M	Port speed status (Port 1 - Port 5)
PoE STATUS	Port PoE power status (Port 2 - Port 5)
SFP/RJ-45	Port 1 SFP / RJ-45 selection status

1.4 Specifications

Copper Ports w/h PSE (P2-P5)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation
Transmission rate	10Mbps, 100Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP
Power over Ethernet	IEEE 802.3at-compliant PSE (function equipped in PoE Model only)

Combo Port (P1)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX/100Base-FX
Interface Selection	Fiber is selected if an SFP fiber transceiver is installed in SFP slot

Copper Interface

Connector	Shielded RJ-45 jack
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP

Fiber Interface

Connector	SFP slot for optional SFP type fiber transceivers
Configuration	100Mbps, Full duplex
Far End Fault Support	Enabled
Network cables	MMF 50/125 60/125, SMF 9/125
Eye safety	IEC 825 compliant

Switch Functions

MAC Addresses Table	1K entries
Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	1536 bytes
Flow control	IEEE 802.3x pause frame base for full duplex operation Back pressure for half duplex operation
Broadcast Storm	Protection design

Power over Ethernet Function (PoE Model)

PoE Standard	IEEE 802.3at PSE (High power PoE+)
PD Support	Type 1 Class 0 ~ 3 (IEEE 802,3af PD), Type 2 Class 4 (IEEE 802.3at PD)
Power Delivery	30W max. (per port)
Protection	Under voltage, Over voltage, Over current, Over temperature
PSE Power Pins	RJ-45 connector Vpoe+ on pins 4/5 Vpoe- on pins 7/8

DC IN Power Input

Interfaces	DC IN Jack (-D 6.3mm / + D 2.0mm) DC IN Terminal Block (screw type)
Operating Input Voltages	+6 ~ 60VDC for general application
Power Consumption	3W max. @7.5V (No PoE output)
PoE Model	+44 ~ 57V for IEEE 802.3af PoE applications (supporting Type 1 PDs) +51 ~ 57V for high power PoE (IEEE 802.3at) applications (supporting Type 2 PDs)
DC IN Jack Interfaces	Power jack -D 6.3mm / + D 2.0mm
DC IN Terminal Block	Pins: + / - / GND
Insulation	Isolated between FG vs. DC power lines (500VDC/10M-Ohm)

Mechanical

Dimension (base)	144 x 104.5 x 26 mm
Housing	Enclosed metal with no fan
Mounting Support	Din-rail mounting, Panel mounting, Wall mounting, Desktop mounting

Environmental

Operating Temperature	Typical -20°C ~ 70°C
Storage Temperature	-20°C ~ 85°C
Relative Humidity	10% ~ 90%

Electrical Approvals

FCC	Part 15 rule Class A
CE	EMC, CISPR22 Class A, RoHS 2.0
Safety	IEC60950-1 / EN60950

2. Installation

2.1 Unpacking

The product package contains:

- The switch unit
- One product CD-ROM

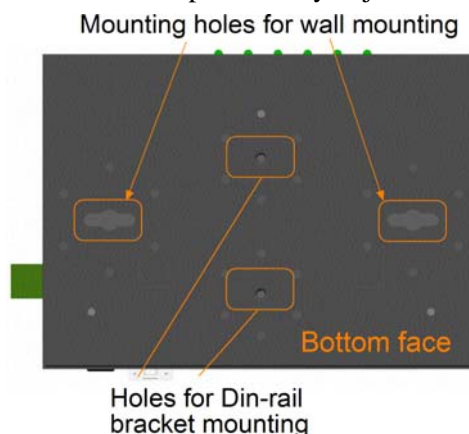
2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the product, observe the following precautions.

- Do not service any product except as explained in your system documentation.
- Opening or removing covers may expose you to electrical shock.
- Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
 - The power cable, extension cable, or plug is damaged.
 - An object has fallen into the product.
 - The product has been exposed to water.
 - The product has been dropped or damaged.
 - The product does not operate correctly when you follow the operating instructions.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.

2.3 Mounting the Switch on a Wall

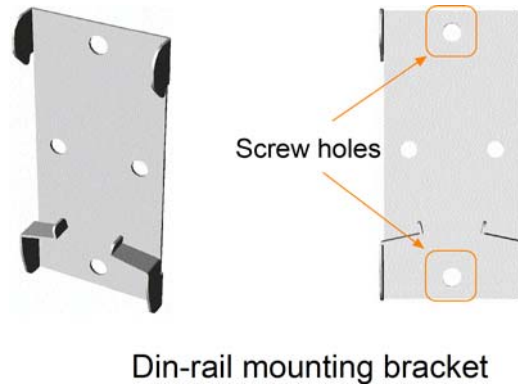
The switch can be mounted on a desktop or shelf or a wall. Make sure that there is proper heat dissipation from and adequate ventilation around the device. Do not place heavy objects on the device.



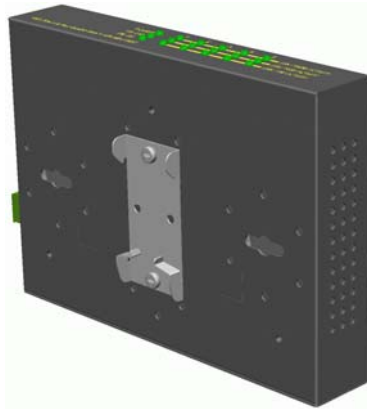
2.4 Din-Rail Mounting

The steps to mount the switch on a Din-rail are:

One Din-rail mounting bracket is provided in the product package as shown below:



Install the bracket on the bottom of the switch unit.

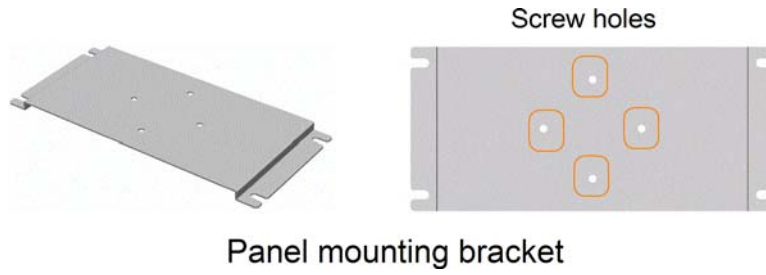


Mount the device on a Din-rail.

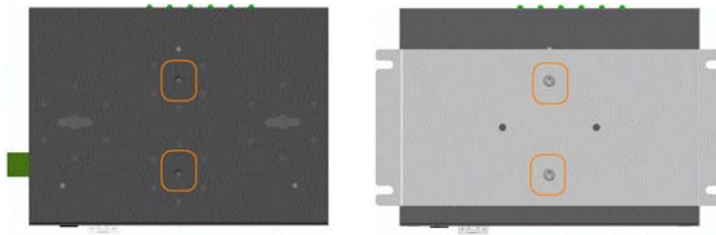


2.5 Panel Mounting

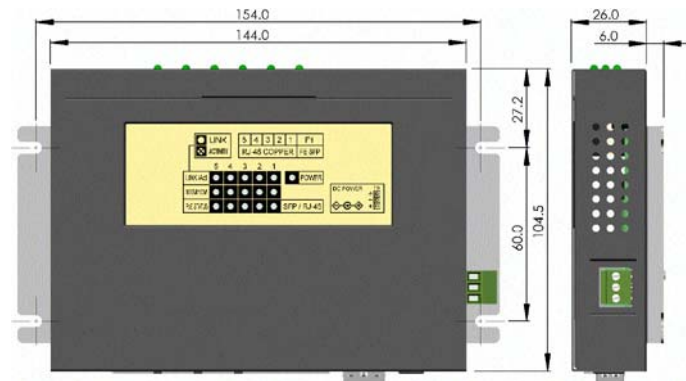
One optional panel mounting bracket is available for purchasing as shown below:



Install the bracket on the bottom of the switch unit.

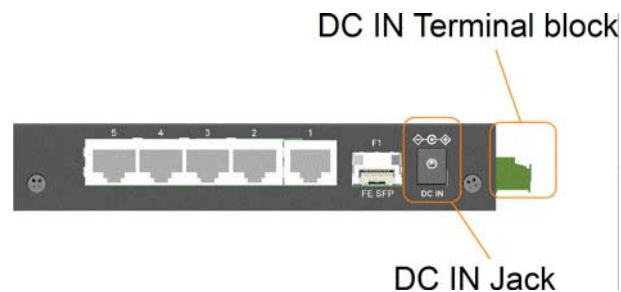


The final dimension after panel bracket is installed is shown below:

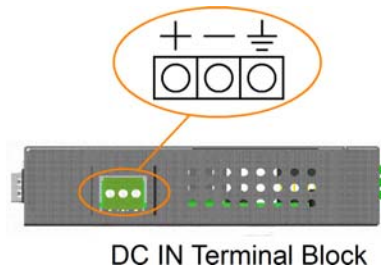


2.6 Applying Power

The switch provides two types of power interfaces, terminal block and DC power jack for receiving DC power input from external power supply system.



Using Terminal Blocks



Three terminal contacts are provided:

Vdc Positive (+) terminal

Vdc Negative (-) terminal

Chassis ground

* Working Vdc for general applications: +6V ~ +60VDC

* Working Vdc for PoE applications: +44V ~ +57VDC (Typ. 48V)

* Working Vdc for PoE+ applications: +51V ~ +57VDC

One 3P terminal plugs are provided together with the switch. The plug is shown below:



Power wires: 24 ~ 12AWG (IEC 0.5~2.5mm²)

Install the power source wires with the plug properly. Then, plug in the terminal block socket.

Using DC Power Jack

When an external power system is not available, the switch provides a DC jack to receive power from typical AC-DC power adapter alternatively.



AC Power Adapters: Optional commercial rated adapters are available for purchasing.

Non-PoE applications Rated output DC7.5V 0.5A / 1A / 1.2A

PoE applications Rated input 100V ~ 240VAC, Output 48VDC / 24W (About 20-21W is reserved for PoE PDs connected.)

*Note: * Before you begin the installation, check the AC voltage of your area. The AC power adapter which is used to supply the DC power for the unit should have the AC voltage matching the commercial power voltage in your area.*

** For PoE applications, make sure the rated output power meets the required voltage and power consumption required by all connected PD devices. Refer to sec. 3.3 for more information.*

3. Making Connections

3.1 Making UTP Connections

The copper ports support the following connection types and distances:

Network Cables

10BASE-T: 2-pair UTP Cat. 3,4,5 , EIA/TIA-568B 100-ohm

100BASE-TX: 2-pair / 4-pair UTP Cat. 5, EIA/TIA-568B 100-ohm

Link distance: Up to 100 meters

Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable is connected, the ports can sense the receiving pair automatically and configure itself to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

Auto-negotiation Function

The ports are featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both devices will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the switch will sense the speed and use half duplex for the connection.

3.2 Making Fiber Connection

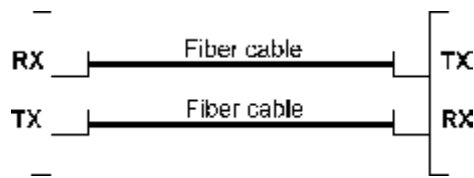
The SFP slot must be installed with an SFP fiber transceiver for making fiber connection. Your switch may come with an SFP transceiver pre-installed when it is shipped.

To install an SFP fiber transceiver into the SFP slot, the steps are:

1. Turn off the power to the switch.
2. Insert the SFP fiber transceiver into the SFP slot. Normally, a bail is provided for every SFP transceiver. Hold the bail and make insertion.
3. Until the SFP transceiver is seated securely in the slot, place the bail in lock position.
4. Turn on the power to the switch.

Connecting Fiber Cables

LC connectors are commonly equipped on most SFP transceiver modules. Identify TX and RX connector before making cable connection. The following figure illustrates a connection example between two fiber ports:



Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

3.2.1 Combo Port Operation Rule

Switch power-up status	Copper/Fiber interface configuration	Effective time
SFP transceiver installed	Fiber interface	Until device power down
SFP transceiver not installed	Copper interface	Until device power down

3.3 Making PoE Connections

This section describes how to make a connection between a PSE port and a PoE PD device. For the PoE switch model, Port 2, Port 3, Port 4 and Port 5 are equipped with PoE PSE function. The ports are enabled to deliver power together with network signal to a connected powered device via Cat.5 cable.

To make a PoE connection, the following check points should be noted:

1. For safety reason, the connected PoE PD (Powered Device) must be a IEEE 802.3-compliant PoE device. Incompliant devices are not supported by the PoE switch model.
2. The Cat.5 cables used for the connections must be 4-pair cables. The power is sent over the spare pairs (4,5) (7,8) of the cable. The maximum distance supported is 100 meters.
3. The DC IN power voltage supplied to the switch must be within the following range to make PoE function working.

PoE applications supporting Type 1 PD devices: +44 ~ +57VDC

PoE+ high power applications supporting Type 2 PD devices: +51 ~ +57VDC

4. The DC IN power supplied to the switch must meet the following calculation:

DC IN power = Sum of all connected PD power required + 3 watts

** Typical IEEE 802.3af PD consumed: 15.4W max.*

** Typical IEEE 802.3at PD consumed: 30W max.*

The PSE ports are equipped with the following capabilities:

1. Detection for an IEEE 802.3af and IEEE 802.3at compliant PD.
2. No power is supplied to a device which is classified non-IEEE 802.3 compliant PD.
3. No power is supplied when no connection exists on the port.

4. The power is cut off immediately from powering condition when disconnection occurs.
5. The power is cut off immediately from powering condition when overload occurs.
6. The power is cut off immediately from powering condition when over-current occurs.
7. The power is cut off immediately from powering condition when short circuit condition occurs.

The figure below illustrates two connection examples:

- Connects IEEE 802.3af-compliant PD
- Connects IEEE 802.3at-compliant PD



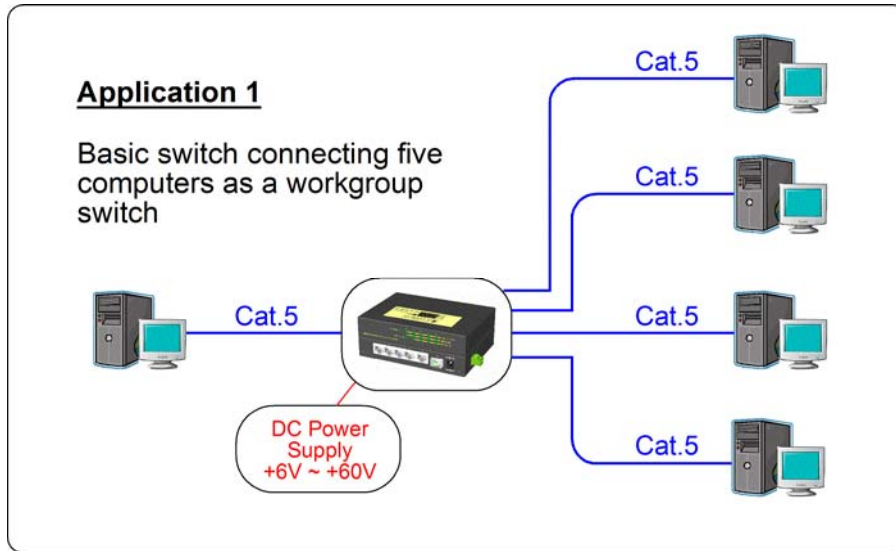
3.4 LED Indication

LED	Function	State	Interpretation
POWER	Power status	ON	The power is supplied to the switch.
		OFF	The power is not supplied to the switch.
LINK/ACT	Port link status	ON	A port link is established. (No traffic)
		BLINK	Port link is up and there is traffic.
		OFF	Port link is down.
100M/10M	Port speed status	ON	Speed 100M is selected.
		OFF	Speed 10M is selected.
PoE STATUS	Port PoE power	ON	PoE power is delivered on the port.
		OFF	PoE power is shut down.
SFP/RJ-45	Port1 status	ON	SFP is used on Port 1.
		OFF	RJ-45 is used on Port 1.

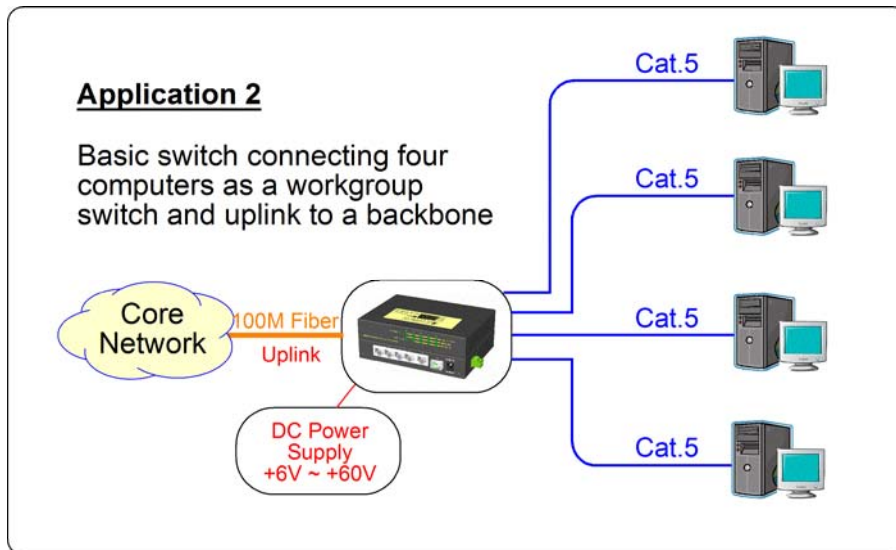
4. Applications

4.1 Applications with Basic Switch Model

The following figure illustrates a basic switch model connects five computers via Cat.5 cables.

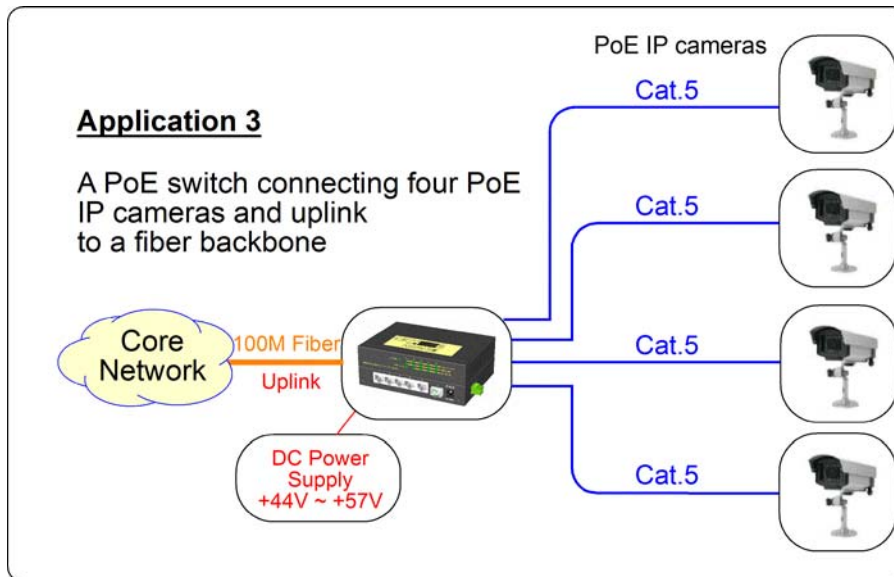


The following figure illustrates a basic switch model connects four computers via Cat.5 cables and uplink to a fiber backbone network.

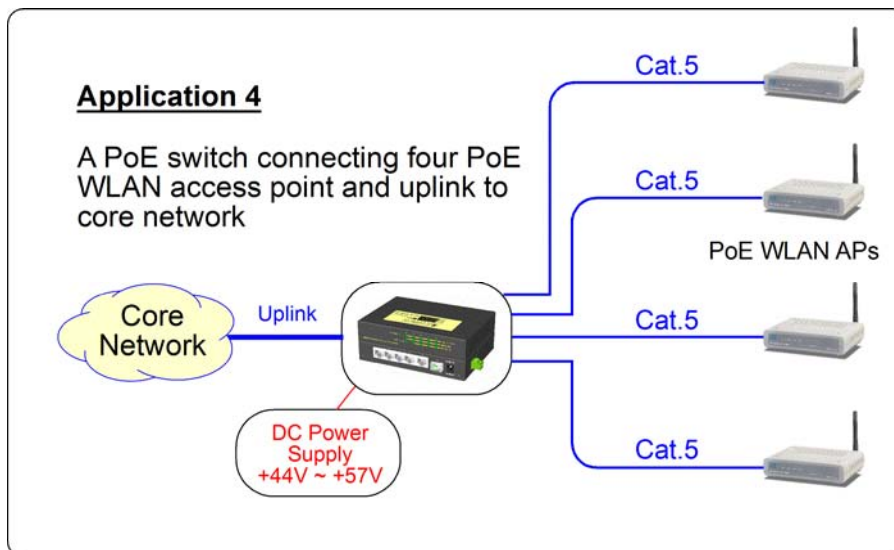


4.2 Applications with PoE Switch Model

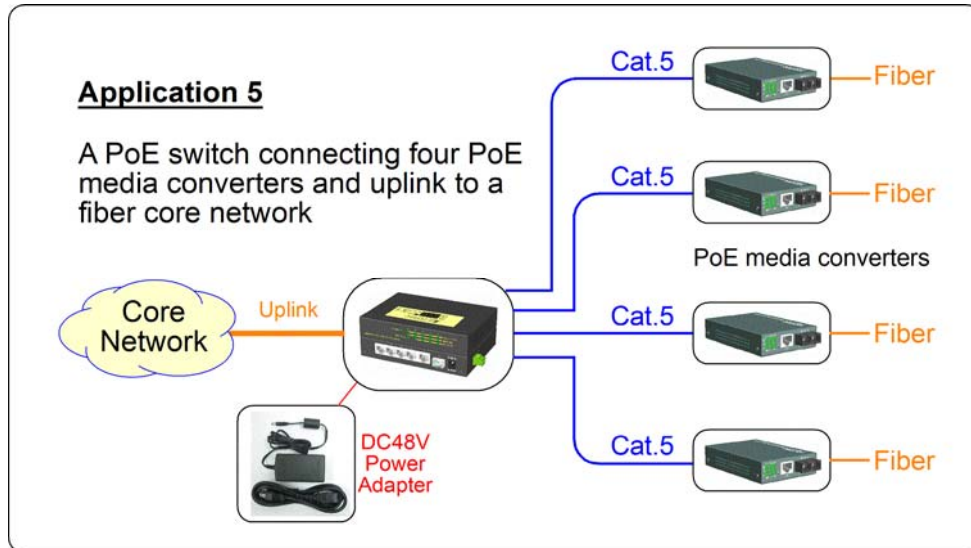
The figure below illustrates a PoE switch connects four PoE IP cameras via Cat.5 cables and uplinks to a fiber backbone:



The figure below illustrates a PoE switch connects four PoE WLAN access points via Cat.5 cables and uplinks to a backbone:



The figure below illustrates the PoE switch powered by a 48V DC power adapter connects four PoE media converters via Cat.5 cables and uplinks to a fiber backbone:



The figure below illustrates the PoE switch connects four high power PoE IP cameras via Cat.5 cables and uplinks to a fiber backbone:

