Industrial 3-Port Fast Ethernet POF Media Converter Switches

21.13.1098AR
21.13.1099AR

Installation Guide

NCD-303P DOC.081022

TRADEMARKS

Ethernet is a registered trademark of Xerox Corp.

OptoLock™is a registered trademark of Firecomms Ltd.

FCC NOTICE

This device complies with Class B 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 **CE** 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 B

EN 50081-1/1992 :EN55022:2006 Class B

        EN61000-3-2:2006

        EN61000-3-3:1995/A1:2001/A2:2005 Class B

EN 55024:1998/A1:2001/A2:2003

        IEC 61000-4-2:2001

        IEC 61000-4-3:2002/A1:2002

        IEC 61000-4-4:2004

        IEC 61000-4-5:2001

        IEC 61000-4-6:2003

        IEC 61000-4-8:2001

        IEC 61000-4-11:2001

Table of Contents

1.   Introduction

The media converter switch series supports three switched connections including copper and fiber for networks over POF (Plastic Optical Fiber). The copper ports support 10/100Mbps auto-negotiation and auto-MDI/MDIX for Cat.5 plug-and-play. The fiber ports support plug-less connections of high bandwidth 100Mbps data rate over POF cables. POF technology offers a complementary solution to UTP copper wire for industrial, office and home networks because it is low cost, weight little, thin, easy and safe to install and electronic noise immunity.

Depending on the types of the network ports and the supported POF cables, several different models are defined as follows:

Model		Copper Port (RJ-45)	Fiber Port (POF)	POF Support
21.13.1098AR	303P-A1	2 ports	1 port	1.5mm
21.13.1099AR	303P-B1	1 port	2 ports	1.5mm

The switch also provides the following advantages:

Plug and Play

No configuration is required in using the switches. With the featured auto-negotiation function, the switches can detect and configure the connection speed and duplex automatically for the copper ports. The switches also provide 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.

POF Connectivity

The switches support plug-less POF connection. Both model series offer an ideal solution for POF deployment in home and industrial networks. For the application need, 1.5mm POF and 2.2mm POF are supported in different models.

Industrial Features

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

- High and wide operating temperature
- Screw panel-mounting support for industrial enclosure
- Optional AC-DC power adapters with extended operating temperature range

● Industrial-rated Emission and Immunity performance

1.1 Features

● Supports 3 switching-base network segments – [2 x Copper, 1 x POF] and [1 x Copper, 2 x POF]
● Auto MDI/MDI-X crossover function on the UTP copper port
● Supports IEEE 802.3x flow control for full-duplex operation
● Supports Back-pressure flow control for half-duplex operation
● Wide operating temperature range for temperature critical environment
● Supports desktop mounting, panel mounting, and optional Din-rail mounting
● Industrial-rated Emission and Immunity performance

1.2 Product Panels

The following figure illustrates the faces of the switches:

Model 21.13.1098AR
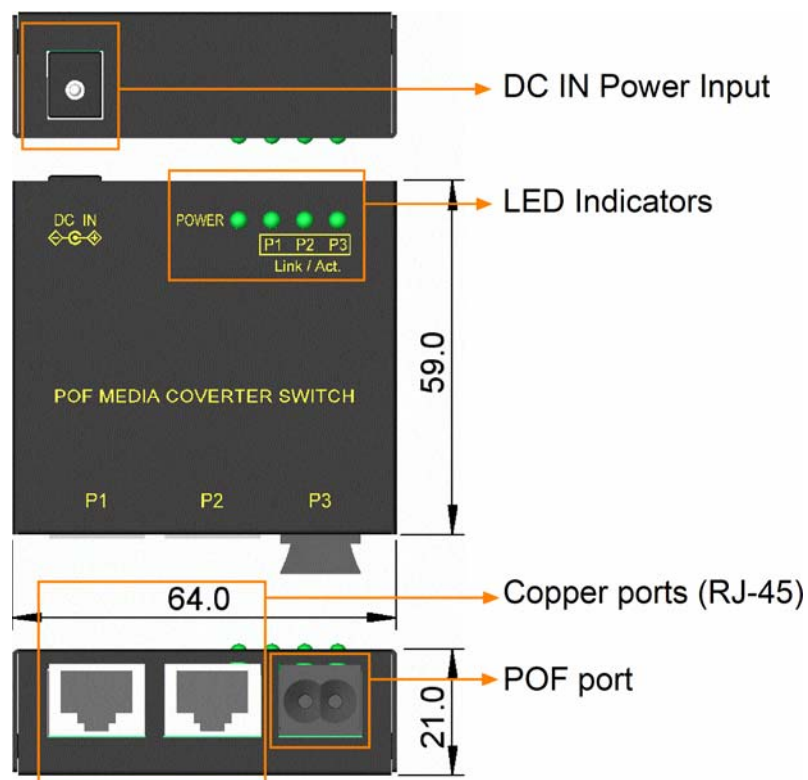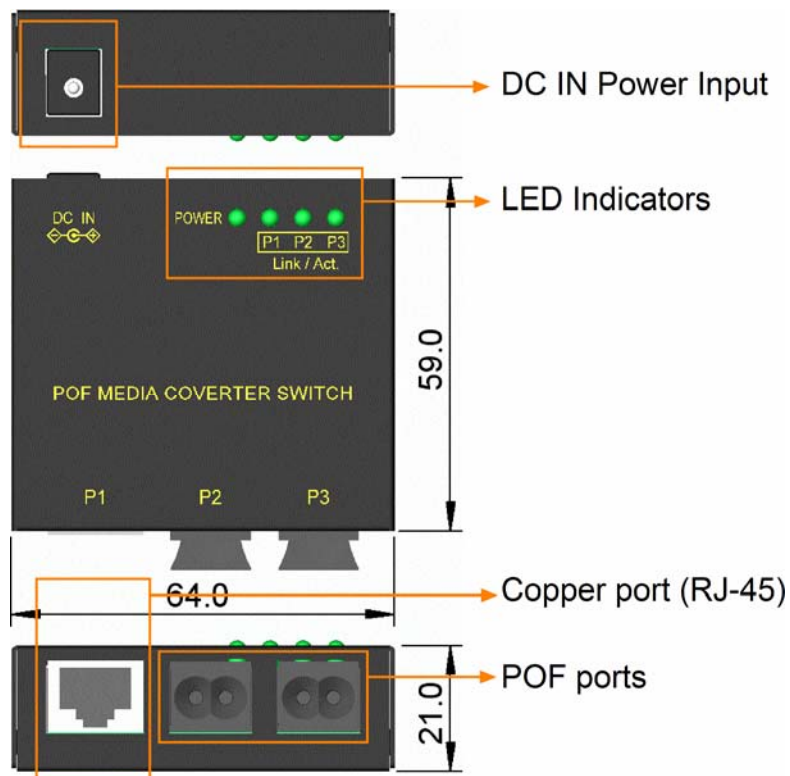
1.3   Specifications

Copper Ports

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 up to 100 meters

POF Ports

Connectors	OptoLock^{TM} connector
Optical	RCLED 650nm
Configuration	100Mbps, Full duplex
Network cables	1.5mm or 2.2mm POF (model dependent)
Distance	50 meters typical. The different numeric aperture of POF might result in different transmit distance. Distance of 100 meters tested with 0.3NA Mitsubishi Rayon Eska Mega POF

Far End Fault Support   Enabled

Switch Functions

MAC Addresses Table	1K entries
Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	1552 bytes max.
Flow control	IEEE 802.3x pause frame base for full duplex operation
	Back pressure for half duplex operation
Broadcast Storm	Protection design

DC IN Power Input

Interfaces	DC IN Jack (-D 6.3mm / + D 2.0mm)
Operating Voltages	+4.75 ~ 12.6VDC
Power Consumption	2W max.

Mechanical

Dimension (base)	64 x 59 x 21 mm
Housing	Enclosed metal with no fan
Mounting Support	Panel mounting, Wall mounting, Desktop mounting

Environmental

Operating Temperature	Main body 0ºC ~ 70ºC
Storage Temperature	-20ºC ~ 85ºC
Relative Humidity	10% ~ 90%

Electrical Approvals

FCC	Part 15 rule Class B
CE	EMC, CISPR22 Class B
Safety	IEC60950-1 / EN60950

2. Installation

2.1 Unpacking

The product package contains:

- The switch unit
- One AC-DC power adapter
- 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 on a Wall

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

To mount the device on a wall, one wall mounting hole is provided on the bottom of the device. Hang the device on the wall reliably. The following figure illustrates example of a device bottom face:
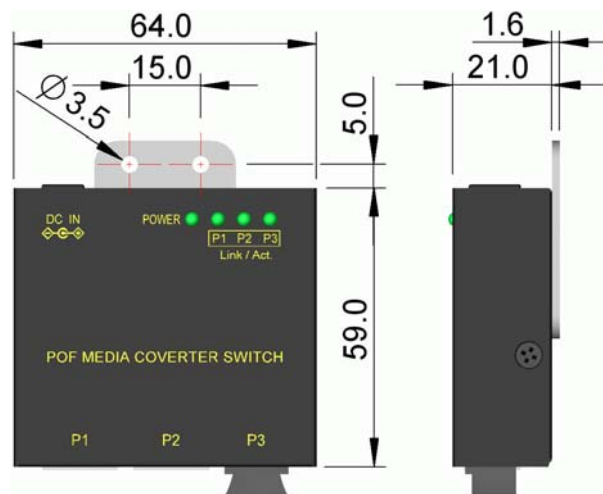

Wall mounting hole
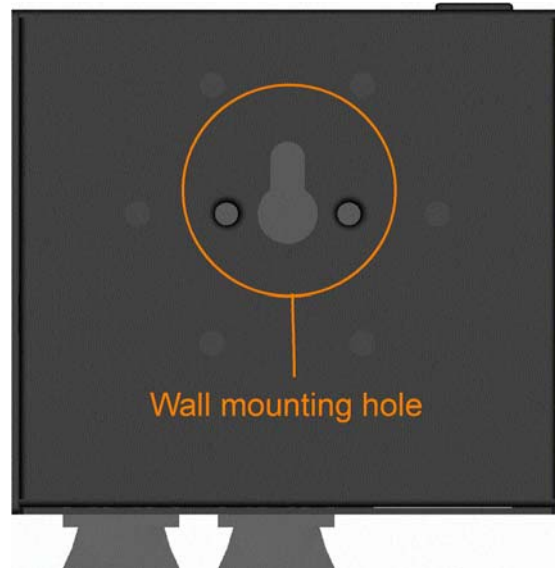
2.4 Panel Mounting

The switches support panel mounting in industrial enclosure. A panel mounting bracket is required for the mounting. Install the bracket onto the device as shown in the figure below:
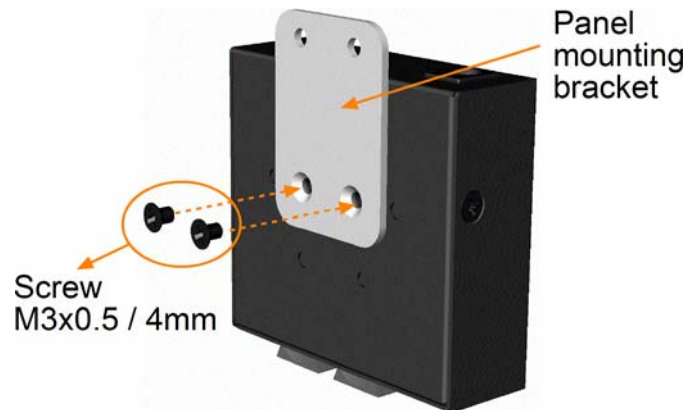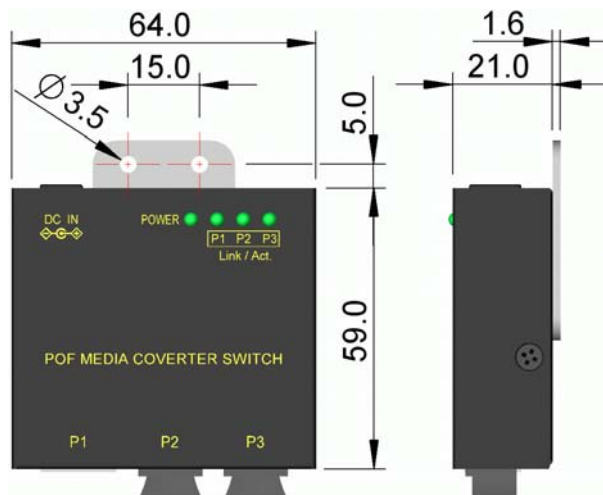

After bracket installation, the final dimension is shown below:

Model 21.13.1098AR
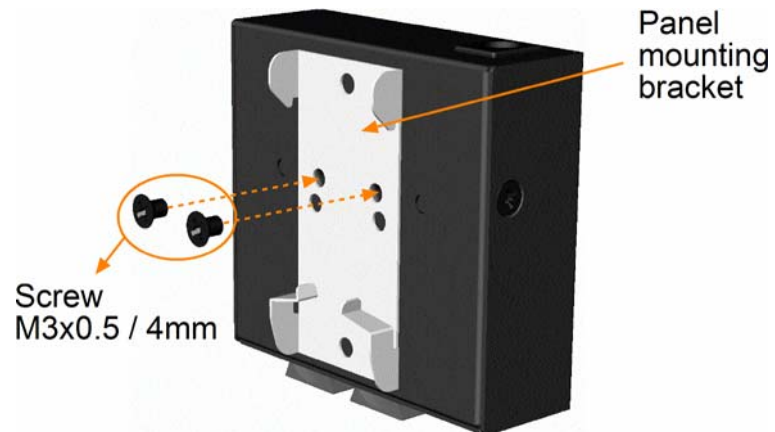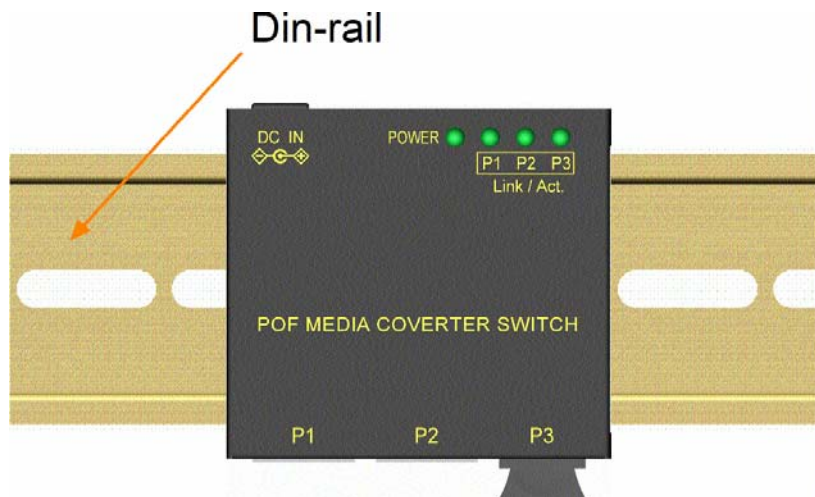

Model 21.13.1099AR

2.5   Din-Rail Mounting

To mount the device on a Din-rail, the optional Din-rail mounting bracket is required. Install the bracket onto the device.
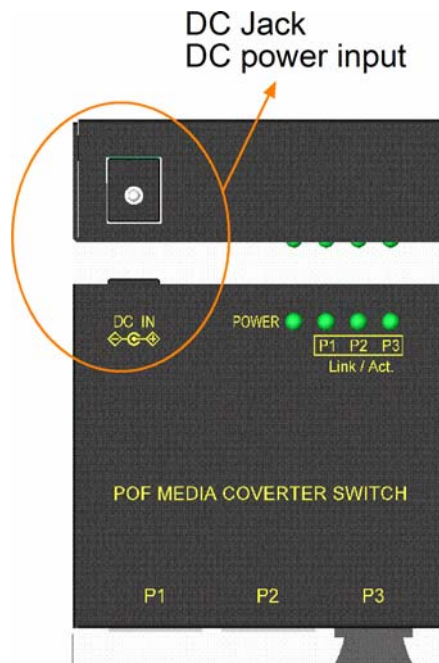
Panel mounting bracket

Screw M3x0.5 / 4mm

After bracket installation, the device is ready to be mounted on a din-rail as shown below:

Din-rail

DC IN   POWER
P1 P2 P3
Link / Act.

POF MEDIA COVERTER SWITCH

P1   P2   P3

2.6   Applying Power with Power Adapter

The device provides a DC power jack for receiving DC power input from an external AC-DC power adapter.

One power adapter is packed in each product package. It is with extended operating temperature rating for critical applications as follows:

Extended Rating: $-10^o \sim 60^oC$ operating temperature

Consult your purchasing agency for the right part number which matching the operating rating you require.

Note: Before you begin the installation, check the AC voltage of your area. The AC-DC power adapter should have the AC voltage matching the commercial power voltage in your area.

2.7   Applying Power via USB

The USB port on the common computers provides an output of 5V/500mA, equally 5V/2.5Watt, for the connected USB devices. With an USB DC power cable, the USB power is applicable to the devices and serves as a handy power, and eliminates the need for extra power adapters and occupation of limited AC power sockets.

One optional "USB DC power cable" is available for purchasing to supply power for the switch via USB connection.

To make the connection, the steps are:

1. Connect the USB "A" plug end of the cable to an USB High-power port for power source.

2. Connect power plug end of the cable to the device.

Notes:

1. The cable must be connected to USB High-power port for power source.

2. The power source maybe shared by other USB powered devices. Make sure it can deliver 500mA for the cable to the network device.

3. When connected to an USB hub, the result is unpredictable, since other devices connected to the hub are sharing the limited DC power. When power is insufficient, the network device would operate incorrectly.

3.   Making LAN Connections

3.1   Making Copper Port (RJ-45) 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 connected, the ports can sense the receiving pair automatically and configure self 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.
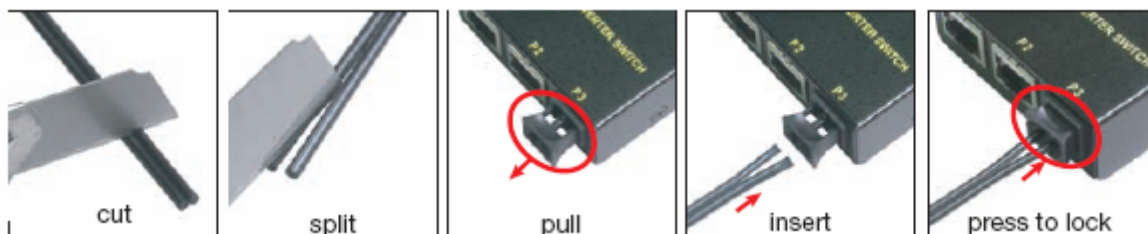
3.2 Making POF Connections

POF Cable

Depending on the model specified, two different sizes of POF cables are supported. One is 1.5mm and the other is 2.2mm in diameter. The following figure illustrates 2.2mm POF and Cat.5 as comparison.
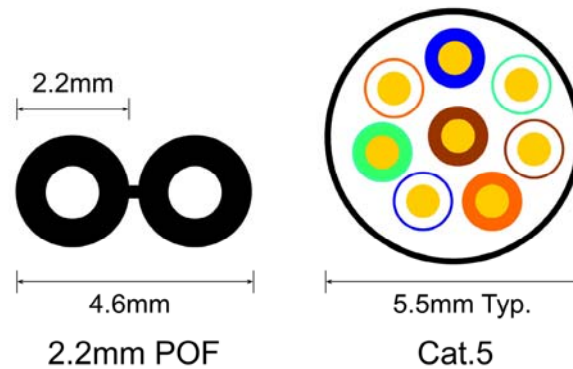

Easy POF Installation

The design of the device enables the POF to be cut and terminated to the exact required length on site, allowing even the most novice user to quickly and easily terminate the bare POF fiber. To terminate the POF cable into OptoLock™ connector, the end of the cable is cut cleanly, and the two strands are separated. One strand is inserted into each of two holes in the termination housing, which is then pressed closed to hold the POF in place.

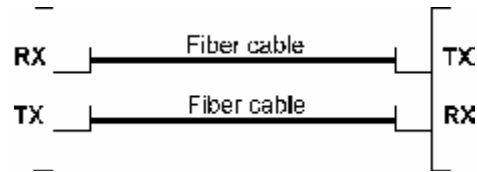*Note: When cutting the cable, use sharp knife and make a quick cut.*

POF Connector

Identify TX and RX holes on OptoLock™ connector before making cable connection.
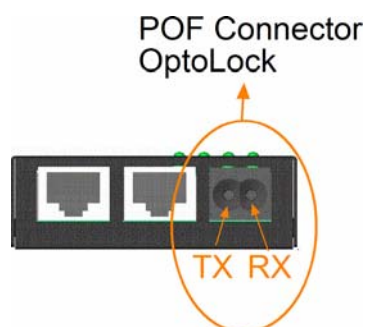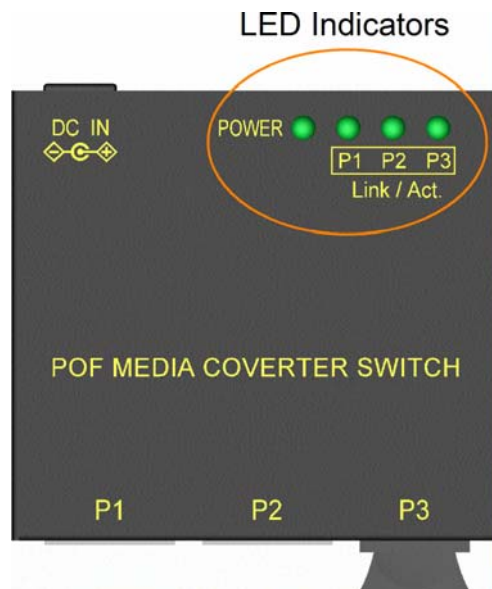
The following figure illustrates a connection example between two POF ports located on two devices:

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

3.3 LED Indication

LED	Function	State	Interpretation
POWER	Power status	ON	The power is supplied to the device.
		OFF	The power is not supplied to the device.
Px Link/Act.	Port Px link status	ON	Port link is established. (No traffic)
		BLINK	Port link is up and there is traffic.
		OFF	Port link is down.

4.   Applications
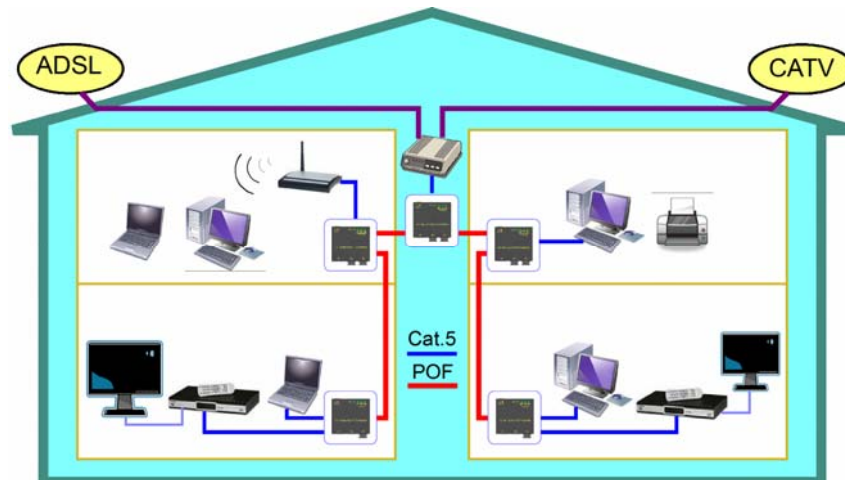
4.1   Application in Industrial Networks

The following figure illustrates an application example in an industrial network. Four devices are cascaded by POF cables.

Fiber Cascading
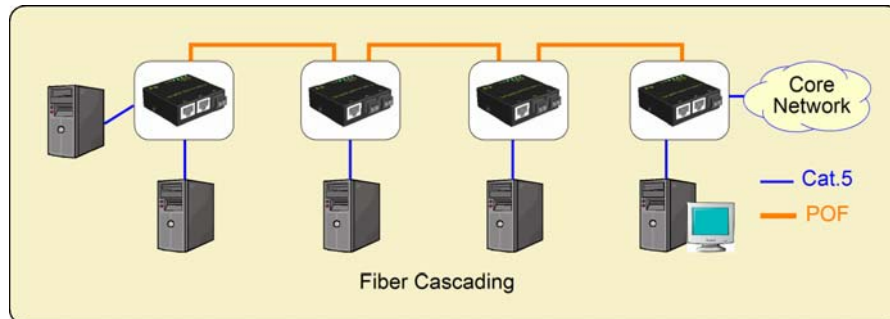
4.2   Application For Home Network

The following figure illustrates an application example in home network.

4.3   Copper to POF Media Converter Application

The following figure illustrates an application of copper Cat.5 to POF media conversion.