



## **FCU-6001-SFP+**

**10G/5G/2.5G/1G Copper to  
10GBASE-X SFP+ Media Converter**



Version 1.0

## **User Manual**



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## FCC Notice

This equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. It may cause harmful interference to radio communications if the equipment is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Caution:** Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

## CE Mark Warning

This is a Class-A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## WEEE Warning



To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

## Revision

Antaira 10G/5G/2.5G/1G Copper to 10GBASE-X SFP+ Media Converter User's Manual

**MODEL:** FCU-6001-SFP+

**REVISION:** 1.0 (JANUARY, 2019)

This document is the current official release manual. Please check our website ([www.antaira.com](http://www.antaira.com)) for any updated manual or contact us by e-mail ([support@antaira.com](mailto:support@antaira.com)).

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# 1. Overview

## **Flexible and Reliable Network Distance Extension Solution**

Antaira's FCU-6001-SFP+ media converter is equipped with one **10G/5G/2.5G/1G BASE-T** auto-negotiation port and one **10GBASE-X SFP+** slot. It supports 10Gigabit Ethernet media conversion from copper 10GBASE-T to fiber multi-mode or single-mode, utilizing 10GBASE-SR or 10GBASE-LR SFP+ transceiver installed in the SFP+ slot to extend distances to servers, switches, and patch panels. The deployment distance can be extended from 300 meters (multi-mode) to up to 60 kilometers (single-mode). They are designed for use in network environments where the ultra-high bandwidth provided by 10Gigabit Ethernet is required (i.e. data center cloud computing, enterprise backbones, campus networks, and carrier infrastructure).

## **High Performance 10Gbps Ethernet Capacity**

The FCU-6001-SFP+ offers wire-speed packets transfer performance without risk of packet loss. The high data throughput of the device makes it ideal for most gigabit environments. With a 20Gbps internal fabric and featuring auto negotiation support in its 10 Gigabit port, the FCU-6001-SFP+ media converter can handle large amounts of data in a secure topology linking to a backbone or high capacity servers.

## **Fiber-optic Linking Capability Enables Extension of Network Deployment**

The SFP+ slot of the FCU-6001-SFP+ is compatible with **10GBASE-SR** or **10GBASE-LR** (Small Form Factor Pluggable) fiber-optic transceivers. The fiber optic uplink capability guarantees the throughput to all nodes hooked into the network and the 10 Gigabit Ethernet distance can be extended from 300 meters (multi-mode fiber cable) to 10/40/60 kilometers (single-mode fiber cable). It is ideal for applications within data centers and distributions.

## **Low Power Consumption**

The FCU-6001-SFP+, adopting the advanced chip technology, has the power-saving feature such as a low power consumption of only 3.75 watts when in full operation.

## 1.1 Key Features

### **FCU-6001-SFP+ Physical Port**

One 10G/5G/2.5G/1G BASE-T RJ45 interface with auto MDI/MDI-X function

One 10GBASE-X SFP+ slot

### **Layer 2 Features**

IEEE 802.3ab/802.3bz/802.3ae Ethernet standard compliant

Supports auto-negotiation and 1/2.5/5/10Gbps full duplex mode

Prevents packet loss with back pressure (half-duplex) and IEEE 802.3x pause frame flow control (full-duplex)

16K jumbo frame size support

Automatic address learning and address aging

### **Case and Installation**

External 5V DC, 2.5A power supply

DIN-Rail and wall-mount design

Supports 6000 VDC Ethernet ESD protection

100 meters over CAT. 6A / CAT.7 at 10Gbps copper port

0 to 50 degrees C operating temperature

Plug and Play installation

## 1.2 Package Contents

- FCU-6001-SFP+
- 5V, 2.5A Power Adapter

## 2. Hardware Description

### 2.1 Physical Dimensions

Figure 2.1, below, shows the physical dimensions of Antaira Technologies' FCU-6001-SFP+:

(W x D x H) is **94mm x 70mm x 26mm**

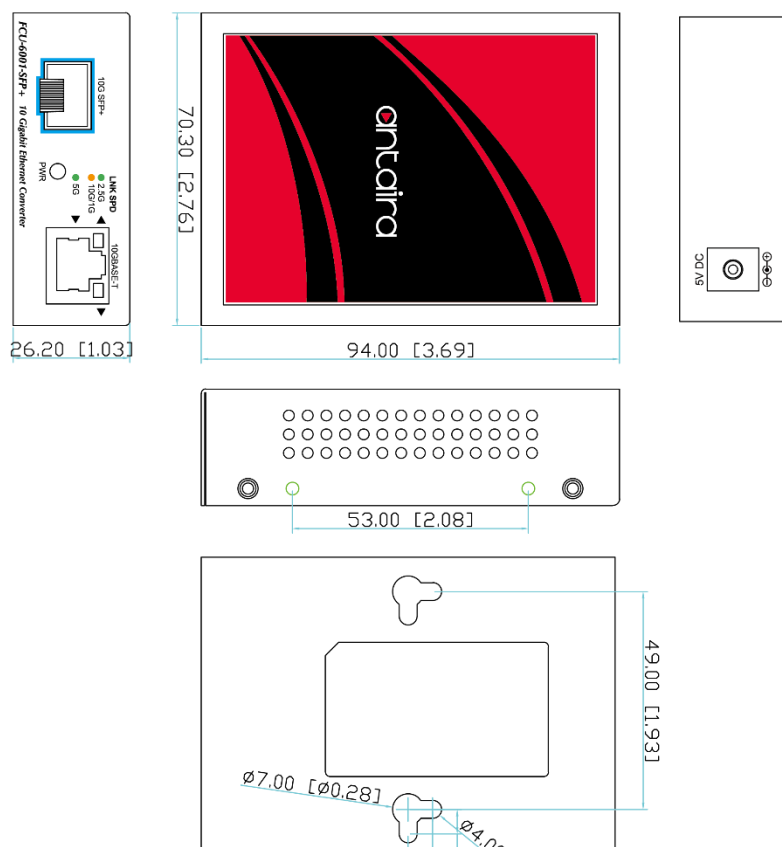


Figure 2.1

FCU-6001-SFP+ Physical Dimensions

## 2.32.2 Front Panel

The front panel of the FCU-600-SFP: Ethernet media converter (*Figure 2.2*).

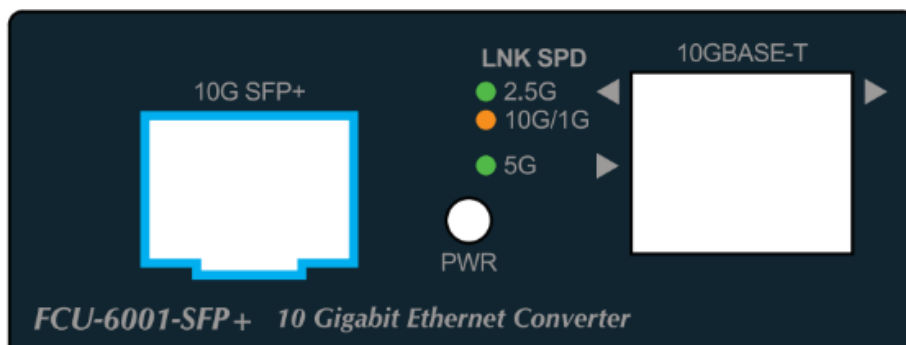


Figure 2.2

Front Panel of the FCU-6001-SFP+

### System

LED	Color	Function
PWR	Green	<b>Lit:</b> Power is active
		<b>Off:</b> Power is inactive

### Per 10G/5G/2.5G/1G BASE-T Port

LED	Color	Function
10/2.5/ 1G	Green	<b>Lit:</b> To indicate that the port is operating at <b>2.5Gbps</b> .
	Orange	<b>Lit:</b> To indicate that the port is operating at <b>10/1Gbps</b> .
5G	Green	<b>Lit:</b> To indicate that the port is operating at <b>5Gbps</b> .



## 2.42.3 Rear View

Figure 2.3, below, shows the rear panel of the FCU-6001-SFP+ media converter.

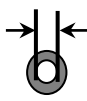


Figure 2.3  
One DC Jack for DC Power Input

## 2.52.4 Power Information

The central pole of the media converter's power jacks measures 2.5mm wide that require +5VDC power input. It conforms to the bundled AC-DC adapter and Antaira's media chassis. Should you have the issue of power connection, please contact your local sales representative.

Please keep the AC-DC adapter as a spare part when the FCU-6001-SFP+ is installed in a media chassis.



2.5mm  
Width of DC Receptacle: **2.5mm**  
+5V for each slot  
⊖ ⊕

DC receptacle is 2.5mm wide that matches the central pole; the width of the Media Converter DC jack also measures 2.5mm.

**Warning:** Do not install any improper unit.

The device is a power-required device, meaning it will not work until it is powered. If your networks

need be active at all times, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime.

In some areas, installing a surge suppression device may also help protect your media converter from being damaged by unregulated surge or current to the converter or the power adapter.

## 3. Mounting Installation

### 3.1 Stand Alone

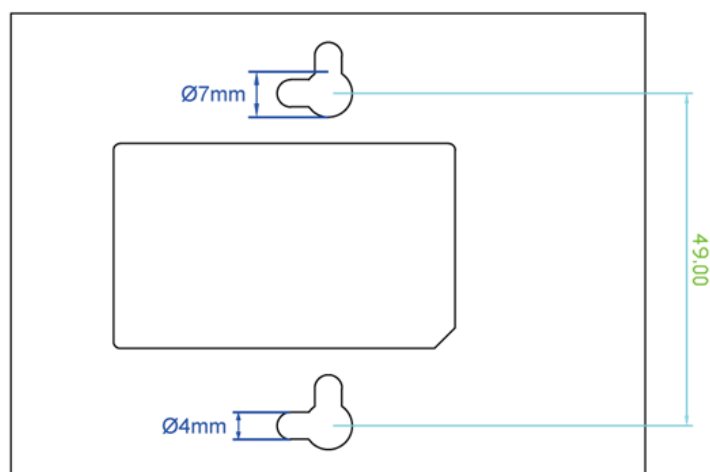
**Step 1:** Please find a secure location to lay the media converter.

**Step 2:** Refer to Chapter **2.4 Power Information** on power supply to the media converter.

### 3.2 Wall Mounting

**Step 1:** Please find the wall that can mount the media converter.

**Step 2:** Screw two screws on the wall.



**Figure 3-1:** FCU-6001-SFP+ Switch Bottom Side

**Step 3:** Hang the media converter on the screws from the wall.

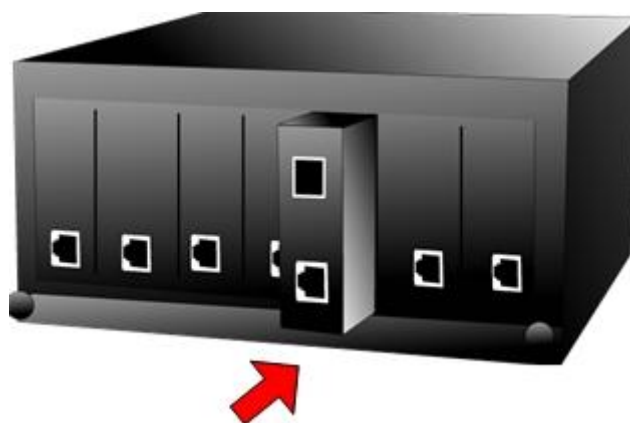
**Step 4:** Refer to Chapter **2.4 Power Information** on power supply to the media converter.

### 3.3 Media Chassis Installation

To install the media converter in a **19-inch** standard rack, follow the instructions described below.

**Step 1:** Place your media converter on a hard, flat surface with the front panel positioned towards your front side.

**Step 2:** Carefully slide in the module until it is fully and firmly fitted into the slot of the chassis. The Power LED of the media converter will turn ON.



**Figure 3-2:** Insert Gigabit Media Converter into an Available Slot



**Caution**

1. Never push the converter into the slot with force; it could damage the chassis.
  2. The media converter chassis supports hot-swap. There is no need to turn off the whole chassis before sliding in the new converter.
-

## 4. Hardware Installation

### 4.1 Installing the SFP+ Transceiver

The sections describe how to insert an SFP+ transceiver into an SFP+ slot.

The SFP+ transceivers are hot-pluggable and hot-swappable. You can plug in and out the transceiver to/from any SFP+ port without having to power down the media converter.



It is recommended to use Antaira SFP+s on the media converter. If you insert an SFP+ transceiver that is not supported, the media converter will not recognize it.

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#### ■ 10GBASE-X SR/LR:

Before connecting the other switches, workstation, or media converter, please do the following:

1. Make sure both sides of the SFP+ transceiver are with the same media type (i.e. 10GBASE-SR to 10GBASE-SR, 10GBASE-LR to 10GBASE-LR).
2. Check whether the fiber-optic cable type matches the SFP+ transceiver model.
3. To connect to 10GBASE-SR SFP+ transceiver, use the **multi-mode** fiber cable with one side being the male duplex LC connector type.
4. To connect to 10GBASE-LR SFP+ transceiver, use the **single-mode** fiber cable with one side being the male duplex LC connector type.

#### Connecting the fiber cable

1. Attach the duplex LC connector of the network cable to the SFP+ transceiver.
2. Connect the other end of the cable to a device like a switch with SFP+ installed, fiber NIC on a workstation, or a media converter.

#### ■ Removing the Transceiver Module

1. Make sure there is no network activity by consulting or checking with the network administrator; or through the management interface of the switch/converter (if available) disabling the port in advance.
2. Remove the fiber optic cable gently.
3. Turn the lever of the MTB module to a horizontal position.
4. Pull out the module gently through the lever.



Never pull out the module without pulling the lever or the push bolts on the module. Directly pulling out the module with effort could damage the module and SFP+ module slot of the media converter.

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■ **10G/5G/2.5G/1G BASE-T**

The 10G/5G/2.5G/1G BASE-T port comes with auto-negotiation capability. It automatically supports 1GBASE-T, 2.5GBASE-T, 5GBASE-T and 10GBASE-T networks. Users only need to plug a working network device into the 10G/5G/2.5G/1G BASE-T port, and then turn on the media converter. The port will automatically run at 1000Mbps, 2500Mbps, or 5000Mbps and 10000Mbps after the negotiation with the connected device.

**Connecting the UTP Cable**

The 10G/5G/2.5G/1G BASE-T port uses RJ45 socket -- similar to a phone jack -- for connection of unshielded twisted-pair cable (UTP). The 10G/5G/2.5G/1G BASE-T uses Cat5e/6/6A/7 UTP (**see table below**). Maximum distance is 100 meters (328 feet).

Standard	Transfer Speed	Cable Requirement (100M)
10GBASE-T	10000Mbit/s	Cat 6A/7
5GBASE-T	5000Mbit/s	Cat 6/6A/7
2.5GBASE-T	2500Mbit/s	Cat 5e/6/6A/7
1000BASE-T	1000Mbit/s	Cat 5e/6/6A/7

## 4.2 Cabling

This section describes the functionalities of the media converter's components and guides you to how to install it on the desktop. Basic knowledge of networking is assumed. Please read this chapter completely before continuing.

**Step 1:** Unpack the media converter.

**Step 2:** Connect the 5V DC power adapter to the FCU-6001-SFP+ and verify that the Power LED lights up.

(Please refer to the **2.4 Power Information** section for power input.)

**Step 3:**

**3-1:** Prepare a twisted-pair, straight-through **Category 5e/6/7 UTP cable** for Ethernet connection.

**3-2:** Prepare a fiber cable for connection to the 10GBASE-T SFP+ slot, and make sure both sides of the SFP transceiver are with the same media type.

(Please refer to the **3.5 Cable Connection** section for the type of connection.)

**Step 4:**

**4-1:** Insert one side of **Category 5e/6/7 cable** into the media converter Ethernet port (RJ45) while the other side of Category 5e/6/7 cable into the network devices' Ethernet port (RJ45), e.g., switch, PC or server.

The UTP port (RJ45) LED on the media converter will light up when the cable is connected with the network device. (Please refer to the **2.2 LED Indicators** section for the functions of LED lights.)

**4-2:** Connect the **fiber cable**. Attach the duplex LC connector on the network cable to the SFP+ transceiver. Attach the fiber cable from the FCU-6001-SFP+ to the fiber network. TX, RX must be paired at both ends.

**Step 5:** When all the connections are all set and the LED lights all show normally, the installation is complete.

## 5. Trouble Shooting

This chapter contains information to help you solve issues. If the media converter is not functioning properly, make sure the media converter is set up according to instructions in this manual.

### **The per port LED is not lit**

Solution:

Check the cable connection of the media converter.

### **Performance is bad**

Solution:

Check the speed duplex mode of the partner device. The media converter usually runs in auto-negotiation mode. If the partner is set to half duplex, the performance will be poor.

### **Per port LED is lit, but the traffic is irregular**

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

### **Why the Media Converter doesn't connect to the network**

Solution:

Check per port LED on the media converter. Make sure the cable is installed properly. Make sure the cable is the right type. Turn off the power. After a while, turn the power on again.



## 6. Technical Specifications

Table 6.1 has the technical specifications for Antaira Technologies' FCU-6001-SFP+:

Model	FCU-6001-SFP+
<b>Hardware Specifications</b>	
<b>Copper Interface</b>	1 x 1G/2.5G/5G/10GBASE-T RJ45 Auto-MDI/MDI-X, auto-negotiation
<b>Fiber Optic Interface</b>	1 x 10GBASE-X R SFP+ interface
<b>LED</b>	System: PWR (Green) 10G/5G/2.5G/1G BASE-T RJ45 Interfaces: 1G/10G LNK (Orange) 5G/2.5G LNK (Green)
<b>ESD Protection</b>	6KV DC
<b>Enclosure</b>	Compact-sized metal case
<b>Installation</b>	Desktop, wall mountable Media converter chassis installation Optional DIN-Rail kit
<b>Dimensions (WxDxH)</b>	94 x 70 x 26mm
<b>Weight</b>	180g (device only)
<b>Power Requirements</b>	5V DC, 2A max.
<b>Power Consumption</b>	3.75 watts / 12.8 BTU per hour max.
<b>Converter Specifications</b>	
<b>Fabric</b>	20Gbps
<b>Jumbo Frame</b>	Over 16K
<b>Network Cables</b>	<b>10G/5G/2.5G/1G BASE-T:</b> 10G--Cat 6A/Cat 7 5G--Cat 6/Cat 6A/Cat 7 1G/2.5G--Cat 5e/Cat 6/Cat 6A/ Cat 7 Cat 5/5e/6/6A/7 UTP cable (100 meters, max.) EIA/TIA-568 100-ohm STP (100 meters, max.) <b>10GBASE-LR/SR/BX :</b> 50/125µm or 62.5/125µm multi-mode fiber optic cable, up to 300m 9/125µm single-mode fiber optic cable, up to 60km
<b>Standards Conformance</b>	
<b>Regulatory Compliance</b>	FCC Part 15 Class A, CE
<b>Operating environment</b>	0 ~ 50 degrees C
<b>Storage environment</b>	-10 ~ 70 degrees C
<b>Operating Humidity</b>	5 ~ 95%, relative humidity (non-condensing)
<b>Storage Humidity</b>	5 ~ 95%, relative humidity (non-condensing)
<b>Standards Compliance</b>	IEEE 802.3ab 1000BASE-T IEEE 802.3bz 2.5G/5GBASE-T IEEE 802.3an 10GBASE-T IEEE 802.3ae 10Gbps Ethernet IEEE 802.3x full-duplex flow control

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