CONNECTION TECHNOLOGY SYSTEMS

HES-5106SFP+

6-port L2 Managed Fiber CPE Switch

User's Guide

Version: 1.2

Revision History

Version	Date	Changes
1.0	05/22/2020	First release
1.1	06/24/2020	Modify the pictures of HES-5106SFP+
1.2	08/17/2020	Add the description of copper cables transmission distance.

FCC Warning

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

CE Mark Warning

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Table of Contents

About this manual

In this user's guide, it will not only clearly introduce CTS HES-5106SFP+ Managed Switch but tell you how to install this Managed Switch with detailed instructions.

Organization of the Manual

- Chapter 1 "Introduction" describes the features of the Managed Switch
- Chapter 2 "Installing the Managed Switch"
- Chapter 3 "Operation"
- Chapter 4 "Maintenance"

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1

Introduction

CTS's Managed Switch is designed to meet the emerging FTTX & Metro Ethernet requirements. When massive fiber ports need to be deployed, the Managed Switch provides the best performance and price ratio.

1.1 Overview of HES-5106SFP+

HES-5106SFP+, a compact Managed Ethernet CPE Switch, has 5 RJ-45 ports (4 10/100/1000Base-T & 1 NBase-T (1G/2.5G/5G/10G)) on the front panel and 1 SFP+ uplink port (1G/10GBase-R) on the rear panel. This Managed Switch provides high performance, store and forward switching capability plus other advanced features such as QoS, VLAN, and so on.

This Managed Switch is a typical SFP+ solution to Metro Ethernet application. Besides, it can be used as a stand-alone switch. LED indicators located on the top panel ease the users' effort to monitor and manage the network status. The built-in management module also allows users to configure, control and monitor the system remotely via SNMP_based management system.

1.2 Key Features

- **4 x 10/100/1000Base-T ports**
  - IEEE 802.3/802.3u/802.3ab
  - Support Auto-Negotiation
  - Support MDI/MDIX/Auto-Crossover
  - RJ-45 Slot

- **1 x NBase-T port**
  - IEEE 802.3ab, 802.3bz, 802.3ae, and 802.3an
  - Support Auto-Negotiation for 4-speed options (1G/2.5G/5G/10G)
  - Support MDI/MDIX/Auto-Crossover
  - Support Auto-Sensing for NBase-T port
  - RJ-45 Slot

- **1 x 1G/10GBase-R SFP+ ports**
  - IEEE 802.3z compliance
  - IEEE 802.3ae 10Gb/s Ethernet
  - Support Auto-Sensing for fiber port
  - SFP+ Slot

- **Switching Features**
  - Store & forward switching
  - Non-blocking switching fabric:48Gbps
  - Mac address table:16K
  - Packet buffer total 12Mbit
  - VLANs support up to 4K VLAN Groups
  - 802.1Q Tunneling (QinQ)
  - VLAN Translation
  - Support jumbo frame on all ports up to 9K bytes size
  - QoS classification based on IEEE802.1p, TOS/DSCP
  - Rate limit control
  - NTP client
  - Static multicasting
  - IGMP v1/v2/v3 snooping
  - IGMP fast leave & query
  - MLD v1/v2 snooping
  - IGMP filtering via filtering profile
  - Multicast channel limitations per port
  - DHCP snooping
  - DHCP client and auto-provision
  - DHCP relay agent with option 82
  - Access Control List (ACL)
  - IPv6 over Ethernet
  - IPv6 Addressing Architecture
  - IPv6 Dual Stack
  - Storm Control
  - CPU temperature alarm notification
  - Port Linkup Delay
  - Port Link Flap
  - 4-level LED Intensity Control

- Support lan-follow-wan function
- Support DHCP Auto-Provision via DHCP option 60/43 for firmware and configuration

■ **Management Functions**
- Telnet & SSH/CLI
- Web (HTTP & HTTPS)
- RADIUS for authentication
- SNMP v1/v2c/v3 and network management
- SNMP Power-Down Trap
- Private, RFC-1213, RMON MIBs
- Port mirroring
- FTP, TFTP, HTTP server and client firmware upgrade

■ **Operation Environment**
- Operating Temperature: 0ºC~40ºC

1.3 Front & Top & Rear Panels

1.3.1 Front & Top Panels

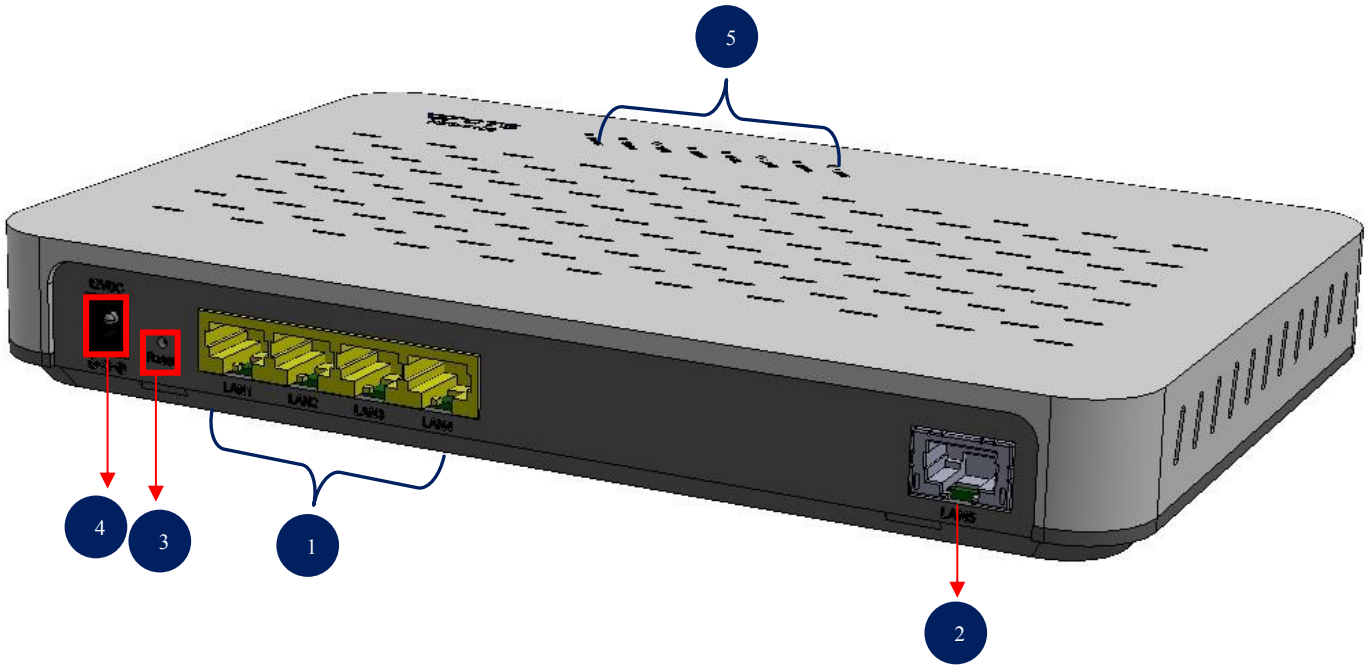

Figure 1-1. HES-5106SFP+ Managed Switch Front Panel

The interfaces on the front & top panels of the Managed Switch are described below:

1. **4 x 10/100/1000Base-T RJ-45 ports (Ports 1-4)**
2. **1 x NBase-T (1G/2.5G/5G/10G) RJ-45 port (Port 5)**
3. **Reset Button:**
   - Press the reset button for 5~10 seconds, then release it to restart the system.
   - Press the reset button for more than 10 seconds, then release it to reset the Managed Switch. The settings will be back to the factory defaults and restart the system.

4. **Power Jack:**
   - Input AC: 100-240V, 50/60Hz
   - Output DC Rating: 12V, 2.1A

5. **LEDs:**
   - Includes Power LED, Status LED, and LEDs of Link/ACT 1~6 ports. For more details on LEDs description, please refer to Section 1.4 LED Definitions.

1.3.2 Rear Panel

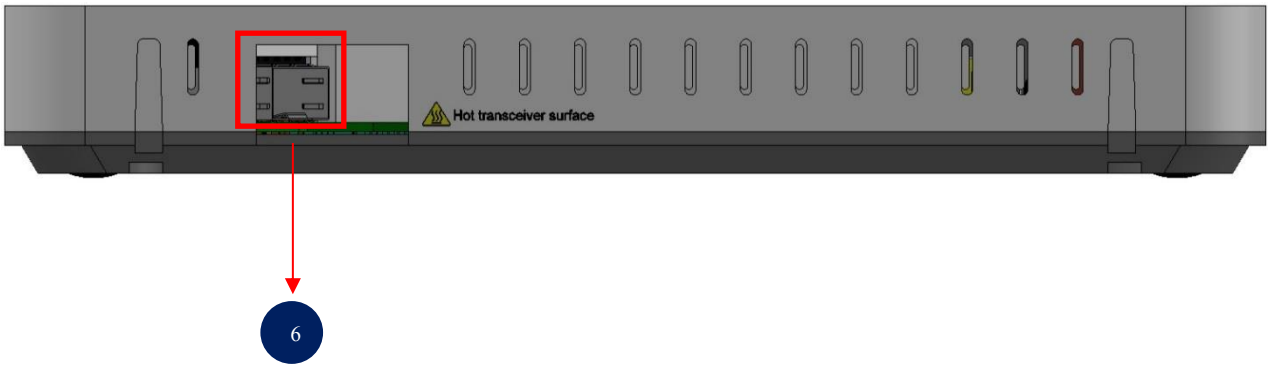

Figure 1-2. HES-5106SFP+ Managed Switch Rear Panel

The interface on the rear panel of the Managed Switch is described below:

6. 1 x 1G/10GBase-R SFP+ UPLINK port (Port 6)

1.4 LED Definitions

The Managed Switch is Plug & Play compliant. The real-time operational status can be monitored through a set of LED indicators located on the front panel.

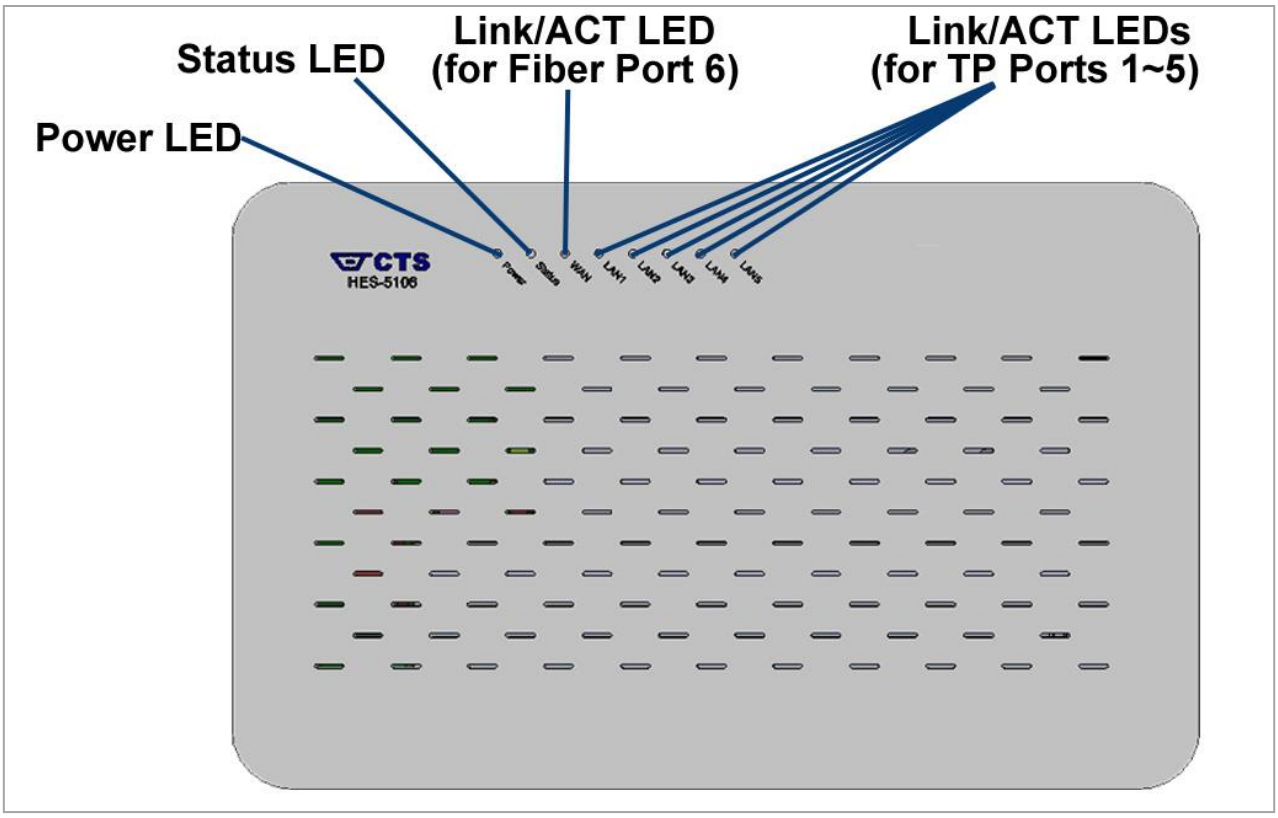

Figure 1-3. LEDs of HES-5106SFP+ Managed Switch

LED	Color	Operation
POWER	OFF	Device is powered down or power is not installed.
	Green	Lit when this power is in normal operation.
	Orange	Lit when this power works abnormally.
STATUS	Green	Lit when the system is working normally.
	Orange	Blinking when press the Reset button for more than 10 seconds and then release to reset (return to factory default settings) and restart the system. The LED indicator will blink in orange color for three times.
		Lit when the device is booting up or press the Reset button for 5~10 seconds and then release to restart the system.
Link/ACT (1~4 TP Ports)	OFF	No connection exists.
	Orange	Lit when 1000Mbps TP port link is up. Blinking when TP port is receiving and transmitting data at the speed of 1000Mbps. Slowly blinking in every 1 second when Fiber port is in loop.

	Green	Lit when 10/100Mbps TP port link is up. Blinking when TP port is receiving and transmitting data at the speed of 10/100Mbps.
Link/ACT (TP Port 5)	OFF	No connection exists.
	Orange	Lit when 1000Mbps TP port link is up. Blinking when this TP Port is receiving and transmitting data at the speed of 1000Mbps.
	Blue	Lit when 2.5G/5G/10G TP port link is up. Blinking when this TP Port is receiving and transmitting data at the speed of 2.5G/5G/10Gbps. Slowly blinking in every 1 second when Fiber port is in loop.
Link/ACT (SFP+ Port 6)	OFF	No connection exists.
	Orange	Lit when Fiber 1Gbps port link is up. Rapidly blinking when Fiber port is receiving and transmitting data at the speed of 1Gbps.
	Blue	Lit when Fiber 10Gbps port link is up. Blinking when Fiber port is receiving and transmitting data at the speed of 10Gbps. Slowly blinking in every 1 second when Fiber port is in loop.

1.5 Cable Specifications

The following table contains various cable specifications for the Managed Switch. Please make sure that you use the proper cable when connecting the Managed Switch.

Cable Type	Description
100BASE-FX	Multi-mode fiber module(2km) / Single-mode fiber module
1000BASE-SX	Multi-mode fiber module (550m)
1000BASE-LX	Single-mode fiber module (10km)
1000BASE-LH	Single-mode fiber module (30km/50km)
1000BASE-ZX	Single-mode fiber module (80km)
SFP Transceiver	SFP Transceiver for 1000BASE-SX Multi-mode fiber module (550m) SFP Transceiver for 1000BASE-LX Single-mode fiber module (10km) SFP Transceiver for 1000BASE-LH Single-mode fiber module (30km/50km) SFP Transceiver for 1000BASE-ZX Single-mode fiber module (80km)
10GBASE-SR	Multi-mode fiber module (26m or 400m)
10GBASE-LR	Single-mode fiber module (10km)
10GBASE-ER	Single-mode fiber module (40km)
10GBASE-LRM	Multi-mode fiber module (220m)

1.6 Transmission Distance Using Copper Cables

The following table shows the maximum transmission distance for HES-5106SFP+ Managed Switch at the speed of 1G/2.5G/5G/10G when using various copper cables.

Speed(bps) / Cable	1G	2.5G	5G	10G
Cat. 5E (22~24 AWG)	100	100	100*	N/A
Cat. 6 (22~24 AWG)	100	100	100*	N/A
Cat. 6A (22~24 AWG)	100	100	100	100

Unit: meter

***The port speed needs to be configured as 5Gbps manually, otherwise, the link will fail.**

Note:

1. Use UTP or STP cable as Cat.5E (Max. 100 meters)

2. Use STP cable as Cat.6/6A (Max. 100 meters)

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Installation

To properly install the HES-5106SFP+ Managed Switch, please follow the procedures listed below. These procedures will be respectively described in detail in the following sections.

- Installation Requirements
- Checking the Package Contents
- Installing the Managed Switch
- Powering on the Managed Switch
- Connecting the Managed Switch to the Network

2.1 Installation Requirements

Basic requirements for installation are as follows:

- Environmental conditions
  - One power outlet
  - Proper ventilation
  - Proper isolation to electrical noise, radio, etc.
  - UTP cables should not run in the same duct with power and phone line cables
- Required SFP/SFP+ Transceiver or UTP cables

2.2 Checking the Package Contents

Unpack the package carefully and check the package contents. The package should contain the following items:

- One set of the Managed Switch
- Four rubber feet with adhesive backing
- Documentation CD
- 1x Power Adaptor

If any item is found missing or damaged, please contact your local sales representative for support or replacement.

2.3 Installing the Managed Switch

You can install the HES-3106SFP-F2 switch on a flat surface.

CAUTION

To prevent any damage or failure of the Managed Switch, please DO NOT block the ventilation holes.

Use the following guidelines when choosing a place to install the switch:

- Firm and steady flat surface.
- Proper power outlet location, not too far from the device.
- Make sure that there is proper heat dissipation from and adequate ventilation around the switch. Do not place heavy objects on the Managed Switch.

2.4 Powering on the Managed Switch

The Managed Switch can be used with AC power adapter 100-240 VAC Input and 12VDC output. The power connector is located on the front panel of the Managed Switch. Before turning on the Managed Switch, please make sure that network cable and power cable are securely connected. After the Managed Switch is turned on, the Power LED indicators should light in green color. For more details about the power LED description, please refer to Section 1.4 LED Definitions.

Power Failure

In the event of power failure, unplug the power that is plugged into the switch in the front of the device. When power is resumed, plug the power back to the switch.

2.5 Connecting the Managed Switch to the Network

Connect to Network

The Managed Switch has 5 RJ-45 ports on the front panel and 1 SFP+ port on the rear panel. RJ-45 ports 1-4 can be plugged with 10/100/1000Base-T Cat.5E UTP cable and RJ-45 Port 5 can be plugged with Cat.5E/Cat.6/Cat.6A (22~24 AWG) or better cabling. SFP+ Port 6 can be plugged with 1000Base-X SFP Fiber transceiver or 10GBase-R SFP+ Fiber transceiver. The connection of the fiber port must be matched, i.e. Transmitter to Receiver, and vice versa.

2.6 Installing and Removing SFP/SFP+ Modules

2.6.1 Installing SFP/SFP+ Modules

To connect the fiber transceiver and LC/SC cable, use the following guidelines:

1. Position the SFP/SFP+ transceiver with the handle on top.
2. Locate the triangular marking in the slot and align it with the bottom of the transceiver.
3. Insert the SFP/SFP+ transceiver into the slot until it clicks into place.
4. Make sure the module is seated correctly before sliding the module into the slot. A click sounds when it is locked in place.

Note: *If you are attaching fiber optic cables to the transceiver, continue with the following step. Otherwise, repeat the previous steps to install the remaining SFP/SFP+ transceivers in the device.*

1. Remove the protective plug from the SFP/SFP+ transceiver.

Note: *Do not remove the dust plug from the transceiver if you are not installing the fiber optic cable at this time. The dust plug protects hardware from dust contamination.*

2. Insert the fiber cable into the transceiver. The connector snaps into place and locks.
3. Repeat the previous procedures to install any additional SFP/SFP+ transceivers in the switch. The fiber port is now set up.

2.6.2 Removing SFP/SFP+ Modules

To disconnect an LC/SC connector, use the following guidelines:

1. Press down and hold the locking clips on the upper side of the optic cable.
2. Pull the optic cable out to release it from the transceiver.
3. Hold the handle on the transceiver and pull the transceiver out of the slot.

3

Operation

A built-in management module of Managed Switch provides users flexible interfaces to configure, control and monitor the system remotely. To know the further information about the operation of Managed Switch, please refer to HES-5106SFP+ Network Management User's Manual for the detailed management functions and required installation and operation procedures.

3.1 Network Management

The following is a list of management options available in this Managed Switch:

- Telnet Management
- SNMP Management
- Web Management

Telnet Management

Telnet is done through the network. Once there is a network connection to the Managed Switch, users can use Telnet to configure, control and monitor the system. Using the network connection to manage is often referred to as In-Band-Management.

SNMP Management

SNMP is also In-Band-Management and requires a network connection to the Managed Switch. The Managed Switch private Management Information Bases (MIB) is provided for SNMP-based network management program to configure, control and monitor the system.

Web Management

Web Management is done over the network. Once the Managed Switch is available on the network, you can login and monitor the status of it through a web browser remotely. Web management in the local site, especially for the first time use of the Managed Switch to set up the needed IP, can also be done through one of the 10/100/1000Base-TX 8-pin or NBase-T RJ-45 ports located at the front panel of the Managed Switch. Direct RJ-45 LAN cable connection between a PC and the Managed Switch is required for Web Management. Or through the SFP+ port located on the rear panel of the Managed Switch, a converter and direct RJ-45 LAN cable connection between a PC and the Managed Switch are required for this Web Management.

4

Maintenance

This Managed Switch is easy to maintain. The procedures are suggested when you would like to identify faults, perform hardware replacement and do the firmware upgrade.

4.1 Fault Identification

Identifying faults can greatly reduce the times required to find problem and solution. Users may perform local check or remote check to find the problems.

4.1.1 Local Check

Users can perform local check by observing LED indicators status.

- When the whole system fails to function,

  1. Check Power LED status
  2. Check Power connection
  3. Reset power

- When certain network link fails to function,

  1. Locate the port of the switch
  2. Check LINK/ACT LED of the port
  3. Check Status LED of the port
  4. Check cable connection between the port and the connected device
  5. Reset power

4.1.2 Remote Check

Users may check the Managed Switch through SNMP manager remotely. For detailed procedures, please refer to the Network Management User's Manual.

4.2 Hardware Replacement Procedures

WARNING!

The Managed Switch contains no user-serviceable parts. DO NOT, UNDER ANY CIRCUMSTANCES, open and attempt to repair it.

Failure to observe this warning could result in personal injury or death from electrical shock.

Failure to observe the above warning will immediately void any Warranty.

4.3 Firmware Upgrade

This Managed Switch may perform the firmware upgrade when required. The latest firmware can be obtained from your sales representative. For the detailed upgrade procedures, please refer to HES-5106SFP+ Network Management User's Manual.

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