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# Chapter 1 Introduction

## 1.1 Product Brief

### 1.1.1 Overview

DCWS-6028 wired and wireless intelligent integration controller (AC, Access Controller) is the up associated intelligent wireless controller of cassette with high performance. It is designed for medium-sized wireless network environment. With the intelligent wireless AP, they make up the program of multimedia wireless local area network (WLAN) with centralized management.

DCWS-6028 adopts gigabit ports and the ports configuration is flexible. It supports 16 1000M COMBO ports, 8 1000M SFP ports, 4 10G SFP+ ports, 2 20G QSFP+ ports (only used for vsf) and AC + DC redundancy power supply. It meets the requirement for high performance, full functions, security and reliability of educational institutions, governments and SMEs.

DCWS-6028 supports 802.1d/w/s, 802.1Q, 802.1p, 802.3ad, 802.3x, GVRP, DHCP and SNTP etc. It also supports comprehensively the multicast protocols such as IGMP, DVMRP and PIM. Moreover, DCWS-6028 supports RIPv1/2, OSPF and IPv6. All these protocols supported enable DCWS-6028 to meet the requirements of complex network constructions.

DCWS-6028 can manage 2048 wireless APs at most. The functions include fine user controlling management, perfect RF management and security mechanism, super QoS, real seamless roaming and authentication mechanism. It supports the strong WLAN access controlling function. It is based on intelligent cluster management technology and monitor and manage the radio environment of every AP to achieve the policies of AP power, automatic channel adjustment and the load-balance based on user number or flow. It decreases the interference for wireless signal as far as possible to balance the load ability of wireless network.

DCWS-6028 adopts intelligent temperature controlling radiating system and ensures the system stable to run in high load as far as possible.

In short, according to the diversification business support and higher cost-effective, DCWS-6028 is the ideal AC for the medium park WLAN access, wireless network

covering of colleges, hospitals, hotels and so on.

The schematic diagram of DCWS-6028 is as below:

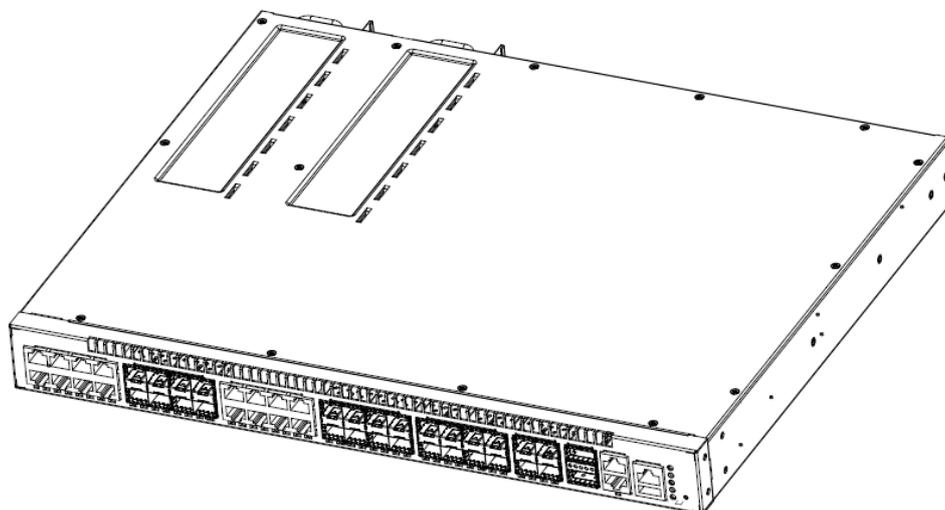


Fig 1-1 the schematic diagram of DCWS-6028

### **1.1.2 Features and Benefits**

- **Easy to Deploy**

DCN DCWS-6028 AC can be integrated seamless with the existing controllers, firewalls, authentication servers and other network architectures. DCN wireless AP can discover DCWS-6028 automatically and conduct configuration itself. AP zero configuration can enable wireless network.

- **Support 802.11abgn/ac Transmission in High Speed**

DCN DCWS-6028 AC is signed for high speed of IEEE802.11ac. And with DCN 802.11ac series wireless AP, it can provide the wireless network with the transmission bandwidth of 1300Mbps for single path and 1750Mbps for dual path.

- **Flexible Data Forwarding Method**

DCN DCWS-6028 AC can be deployed in layer 2 or layer 3 network and there is no need to change the original network architecture. It discovers AP automatically and control the data exchange method on AP. DCWS-6028 AC supports centralized forwarding and local forwarding. Based on the leading local forwarding technology, the data forwarding mode of AP can be configured on DCWS-6028. According to SSID of network and user VLAN plan, decide that data is all forwarded through DCWS-6028 or it enters wired

network to conduct local forwarding directly. There is no need to centralize all wireless businesses to controller for unified treatment in local forwarding. So it avoids that the forwarding ability of controller becomes the network bottleneck because of lots of wireless businesses to affect wireless functions.

- **Intelligent RF Management**

DCN DCWS-6028 AC provides automatic power and channel adjustment function. Through the specialized RF detection and RF management algorithm, the RF covering effect can be optimized. When AP signal receives strong signal interference outside, the interference can be avoided through controlling AP to controller to the right work channel to ensure WLAN network communication is unobstructed. It also provides Failed AP compensation black hole function. When there is AP accident of stopping work, the signal blind spot area can be compensated through RF management function of DCWS-6028 to make WLAN network work normally.

- **Support IPv6**

DCN DCWS-6028 AC can be deployed in IPv6 network, IPv6 tunnel is made up between wireless controller and AP. Wireless controller and AP work in IPv6 status, wireless controller still can distinguish IPv4 directly and deal with IPv4 packets for wireless client. IPv4/6 ability of DCWS-6028 can satisfy clients' application in moving from IPv4 to IPv6. It can provide IPv4 service to clients in IPv6 network and can also make user login network through IPv6 in IPv4 network. In addition, under the premise of not changing hardware, the more comprehensive IPv6 function can be achieved free through updating software in the future; it will make the advanced device and the value of investment balance and perfect.

- **Seamless Roaming in the Whole Network**

DCN DCWS-6028 supports the advanced wireless controller cluster technology. Among more than one DCWS-6028, all users' online connection information and L2 seamless roaming in wireless controller roaming records can be synchronous. The quick roaming in cross-wireless controllers can be achieved perfectly. In roaming, clients IP information will not be changed and there is no need to authenticate. It can satisfy hospitals, transport sectors and others to conduct mobile businesses in a row.

- **Provide Fine Wireless User Management**

64 WLAN can be supported by every AP at most; they can make up WLAN to achieve multi-level and multi-business management for wireless users. Every WLAN/WLAN group can achieve different access controlling purview, uplink and downlink restriction and binding to VLAN according to MAC and IP address; it can also achieve different

authentication accounting policy. In the environment with multi-operator, it has very actual using value.

- **Convenient Installation and Maintaining**

With DCN DCWS-6028, the intelligent wireless AP can achieve plug and play. Zero configuration of AP, AP device management, controlling and configuration are all completed by wireless controller, the network management does not need to manage and maintain lots of wireless AP alone. All configurations, firmware updating and security policy can be issued by wireless controller.

DCWS-6028 provides flexible management methods for users. It supports intuition configuration of WEB page, the advanced configuration can be also conducted through CLI command.

- **User Security Access**

DCN DCWS-6028 provides multiple security access and authentication accounting mechanism for different application environments:

DCN DCWS-6028 can be redirected to external AAA service to achieve user authentication accounting.

DCN DCWS-6028 supports Captive Portal authentication. It avoids that installing client is not convenient. And it provides convenient authentication mechanism for temporary interviewing WLAN.

DCN DCWS-6028 can achieve increasing many flexible authentication and many authentication groups such as 802.1x, WEB, and PPPoE with DCN authentication and accounting management system (DCSM). Then it can achieve wired and wireless integration uniform authentication and accounting.

## 1.2 Description of Hardware

### 1.2.1 Front Panel

#### 1. Front Panel Diagram

The front panel descriptions of DCWS-6028 in the following table.

Table 1-1 The front panel descriptions of DCWS-6028

Type	RJ-45 port	SFP port	SFP+ port	QSFP+ port	ETHERNE T port	Console port	USB2.0 connector
DCWS-6028	16	8	4	2	1	1	1



		off	No power supply or make a mistake.
Power supply indicator light 2	PWR2	Green solid	power supply module 2 move normally.
		off	No power supply or make a mistake.
indicator light of System	DIAG	Green solid	System fault or System is starting.
		Blinking green	System is normal.
		Off	System no run
indicator light of FAN	FAN	Green solid	FAN is normal
		Blinking green	FAN fault
		Off	FAN no in
indicator light of MODE Key	MODE	Blinking green	The port indicator light use to indicate vsf member ID templatly.
		Off	The port indicator light use to port status.

Table 1-3 Port LED description

LED	State	Explanation
Link light of 1000M port and ETHERNET port	Green	The port is under the connection state of 10M, 100M or 1000M.
	Blinking	The port is transmitting data.
	Off	No connection or fail to connect.
Indicator light of SFP+ port	Green	The port is under the connection state of 1G or 10G.
	Green Blinking	The port is transmitting data.
	Off	No connection or fail to connect.

## 1.4 Port Description

DCWS-6028 provides 16 1000Mb ports of RJ-45, 8 SFP ports, 4 10Gb ports of SFP+ and 2 20Gb ports of QSFP+(for vsf only).

DCWS-6028 controller supports the following SFP transceivers:

- SFP-SX-L transceiver
- SFP-LX-L transceiver

- SFP-LX-20-L            20 km transceiver
- SFP-LX-40            40 km mid distance transceiver
- SFP-LH-70-L         70 km long distance transceiver
- SFP-LH-120-L        120 km long distance transceiver
- SFP-GT                1000 Base-T SFP interface cards module

Each port description is in the following:

Table 1-4 DCWS-6028 port description

Port mode	Spec
RJ-45 port	<ul style="list-style-type: none"> <li>• 10/100/1000Mbps auto negotiation</li> <li>• MDI/MDI-X cable mode auto negotiation</li> <li>• 5 kinds of UTP: 100 m</li> </ul>
SFP	<ul style="list-style-type: none"> <li>• SFP-SX-L transceiver 1000Base-SX SFP(850nm,MMF,550m)</li> <li>• SFP-LX-L transceiver 1000Base-LX SFP(1310nm, SMF, 10km or MMF, 550m)</li> <li>• SFP-LX-20-L transceiver 1310nm light wave, 9/125um single mode fiber: 20km</li> <li>• SFP-LX-40 transceiver 9/125um single mode fiber: 40km</li> <li>• SFP-LH-70-L transceiver 9/125um single mode fiber: 70km</li> <li>• SFP-LH-120-L transceiver 9/125um single mode fiber: 120km</li> </ul>

## 1.5 System Specifications

Table 1-5 System Specifications of DCWS-6028

Attribute \ Type	DCWS-6028
Dimension(W * H * D) (mm)	440×330×44
Weight	About 6kg
Fixed Port	16 1000Mb ports of RJ-45, 8 SFP ports, 4 10Gb SFP+ ports and 2 20Gb QSFP+ ports (only for vsf)
Management Port	1 RJ-45 serial console port; 1 USB2.0 connector;1 Ethernet management port

Power Input	180~240VAC(50~60Hz)
System Consumption	<150W
Operating Temperature	0°C~40°C
Storage Temperature	-40°C~70°C
Relative Humidity	10%~90%, no condensate

## Chapter 2 Installation Notice

To ensure the proper operation of DCWS-6028 and your physical security, please read carefully the following installation guide.

### 2.1 Environmental Requirements

- The controller must be installed in a clean area. Otherwise, the controller may be damaged by electrostatic adherence.
- Maintain the temperature within 0 to 40 °C and the humidity within 10% to 90%, non-condensing.
- The controller must be put in a dry and cool place. Leave sufficient spacing around the controller for good air circulation.
- The controller must work in the range of AC power input: 100 ~ 240VAC (50/60Hz).
- The controller must be well grounded in order to avoid ESD damage and physical injury of people.
- The controller should avoid the sunlight perpendicular incidence. Keep the controller away from heat sources and strong electromagnetic interference sources.
- The controller must be mounted to a standard 19" rack or placed on a clean level desktop.

#### 2.1.1 Dust and Particles

Dust is harmful to the safe operation of DCWS-6028. Dust can lead to electrostatic adherence, especially likely under low relative humidity, causing poor contact of metal connectors or contacts. Electrostatic adherence will result in not only reduced product lifespan, but also increased chance of communication failures. The recommended value for dust content and particle diameter in the site is shown below:

Max Diameter (μm)	0.5	1	3	5
Max Density (particles/m <sup>3</sup> )	1.4×10 <sup>5</sup>	7×10 <sup>5</sup>	2.4×10 <sup>5</sup>	1.3×10 <sup>5</sup>

Table 2-1 Environmental Requirements: Dust

In addition, salt, acid and sulfide in the air are also harmful to the controller. Such harmful gases will aggravate metal corrosion and the aging of some parts. The site should avoid harmful gases, such as SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>2</sub>, NH<sub>3</sub> and Cl<sub>2</sub>, etc. The table below details the threshold value.

Gas	Average (mg/m <sup>3</sup> )	Max (mg/m <sup>3</sup> )
SO <sub>2</sub>	0.2	1.5
H <sub>2</sub> S	0.006	0.03
NO <sub>2</sub>	0.04	0.15
NH <sub>3</sub>	0.05	0.15
Cl <sub>2</sub>	0.01	0.3

Table 2-2 Environmental Requirements: Particles

## 2.1.2 Temperature and Humidity

Although the controller is designed to use 4 fans, the site should still maintain a desirable temperature and humidity. High-humidity conditions can cause electrical resistance degradation or even electric leakage, degradation of mechanical properties and corrosion of internal components. Extreme low relative humidity may cause the insulation spacer to contract, making the fastening screw insecure. Furthermore, in dry environments, static electricity is liable to be produced and cause harm to internal circuits. Temperature extremes can cause reduced reliability and premature aging of insulation materials, thus reducing the controller's working lifespan. In the hot summer, it is recommended to use air-conditioners to cool down the site. And the cold winter, it is recommended to use heaters.

The recommended temperature and humidity are shown below:

Temperature:		Relative humidity	
Long term condition	Short term condition	Long term condition	Short term condition
15 ~ 30°C	0 ~ 40°C	40 ~ 65%	10 ~ 90%

Table 2-3 Environmental Requirements: Temperature and Humidity

### Caution!

A sample of ambient temperature and humidity should be taken at 1.5m above the floor and 0.4m in front of the controller rack, with no protective panel covering the front and rear of the rack. Short term working conditions refer to a maximum of 48 hours of continued operation and an annual cumulative total of less than 15 days. Formidable operation conditions refers to the ambient temperature and relative humidity value that may occur during an air-conditioning system failure, and normal operation conditions should be recovered within 5 hours.

### 2.1.3 Power Supply

Before powering on the power supply, please check the power input to ensure proper grounding of the power supply system. The input source for the controller should be reliable and secure; a voltage adaptor can be used if necessary. The building's circuit protection system should include in the circuit a fuse or circuit-breaker of no greater than 240 V, 5A. It is recommended to use a UPS for more reliable power supplying. .

#### Caution!

Improper power supply system grounding, extreme fluctuation of the input source, and transients (or spikes) can result in larger error rate, or even hardware damage!

### 2.1.4 Preventing Electrostatic Discharge Damage

Static electric discharges can cause damage to internal circuits, even the entire controller. Follow these guidelines for avoiding ESD damage:

- Ensure proper earth grounding of the device;
- Perform regular cleaning to reduce dust;
- Maintain proper temperature and humidity;
- Always wear an ESD wrist strap and antistatic uniform when in contact with circuit boards.

### 2.1.5 Anti-interference

All sources of interference, whether from the device/system itself or the outside environment, will affect operations in various ways, such as capacitive coupling, inductive coupling, electromagnetic radiation, common impedance (including the grounding system) and cables/lines (power cables, signal lines, and output lines). The following should be noted:

- Precautions should be taken to prevent power source interruptions;
- Provide the system with a dedicated grounding, rather than sharing the grounding with the electronic equipment or lightning protection devices;
- Keep away from high power radio transmitters, radar transmitters, and high frequency strong circuit devices;
- Provide electromagnetic shielding if necessary.

### 2.1.6 Rack Configuration

The dimensions of the DCWS-6028 are designed to be mounted on a standard 19" rack, please ensure good ventilation for the rack.

- Every device in the rack will generate heat during operation, therefore vent and fans must be provided for an enclosed rack, and devices should not be stacked closely.
- When mounting devices in an open rack, care should be taken to prevent the rack frame from obstructing the controller ventilation openings. Be sure to check the positioning of the controller after installation to avoid the aforementioned.

Caution!

If a standard 19" rack is not available, the DCWS-6028 can be placed on a clean level desktop, leave a clearance of 100mm around the controller for ventilation, and do not place anything on top of the controller.

## **2.2 Installation Notice**

- Read through the installation instruction carefully before operating on the system. Make sure the installation materials and tools are prepared. And make sure the installation site is well prepared.
- During the installation, users must use the brackets and screws provided in the accessory kit. Users should use the proper tools to perform the installation. Users should always wear antistatic uniform and ESD wrist straps. Users should use standard cables and connectors.
- After the installation, users should clean the site. Before powering on the controller, users should ensure the controller is well grounded. Users should maintain the controller regularly to extend the lifespan of the controller.

## **2.3 Security Warnings**

- When using SFP transceiver, do not stare directly at the fiber bore when the controller is in operation. Otherwise the laser may hurt your eyes.
- Do not attempt to conduct the operations which can damage the controller or which can cause physical injury.
- Do not install, move or disclose the controller and its modules when the controller is in operation.
- Do not open the controller shell.
- Do not drop metals into the controller. It can cause short-circuit.
- Do not touch the power plug and power socket.
- Do not place the tinder near the controller.
- Do not configure the controller alone in a dangerous situation,
- Use standard power sockets which have overload and leakage protection.
- Inspect and maintain the site and the controller regularly.

- Have the emergence power switch on the site. In case of emergence, switch off the power immediately.

**Caution!**

Potential risk include: Electric leakage, Power supply arcing, Power line breakage, Imperfect earth, Overload circuit and Electrical short circuit. If electric shock, fire, electrical short circuit occurs, please cut off the electricity supply and alarm rapidly. Rescue the injured person in the contingency under inherently safe, give the injured person proper first aid treatment according to the injury state, and seek help from the Medical Emergency using various ways.

# Chapter 3 Device Installation

## 3.1 Installation Preparation

### 3.1.1 Verify the Package Contents

Please unpack the shipping package and verify carefully the contents inside.

### 3.1.2 Required Tools and Utilities

The required tools and utilities are shown below:

- Cross screwdrivers
- Flat-blade screwdriver
- ESD wrist strap
- Antistatic uniform

Caution!

Users should prepare the required tools and utilities by themselves.

## 3.2 Device Installation

### 3.2.1 Installing the Controller

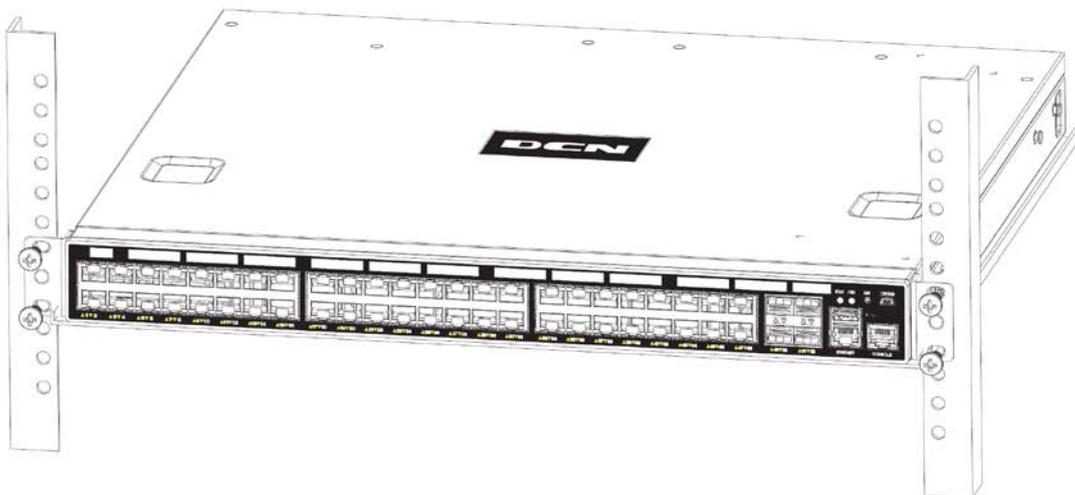


Figure 3-1 DCWS-6028 controller install sketch map on the rack

Please mount DCWS-6028 on the 19" rack as below:

1. Attach the 2 brackets on the DCWS-6028 with screws provided in the accessory kit.
2. The device is heavy, please put the device on the tray of the rack before installation.
3. Put the bracket-mounted controller smoothly into a standard 19" rack. Fasten the DCWS-6028 to the rack with the screws provided. Leave enough space around the controller for good air circulation.

**Caution!**

The brackets are used to fix the controller on the rack. They can't serve as a bearing. Please place a rack shelf under the controller because the device is heavy. Do not place anything on top of the controller. Do not block the blowholes on the controller to ensure the proper operation of the controller. If there is no tray, the lugs (device provides) can be used on the back of the controller for fixing the device to the rack.

There is no back horn iron in standard configuration. If users bought it, the figure of installation is below:

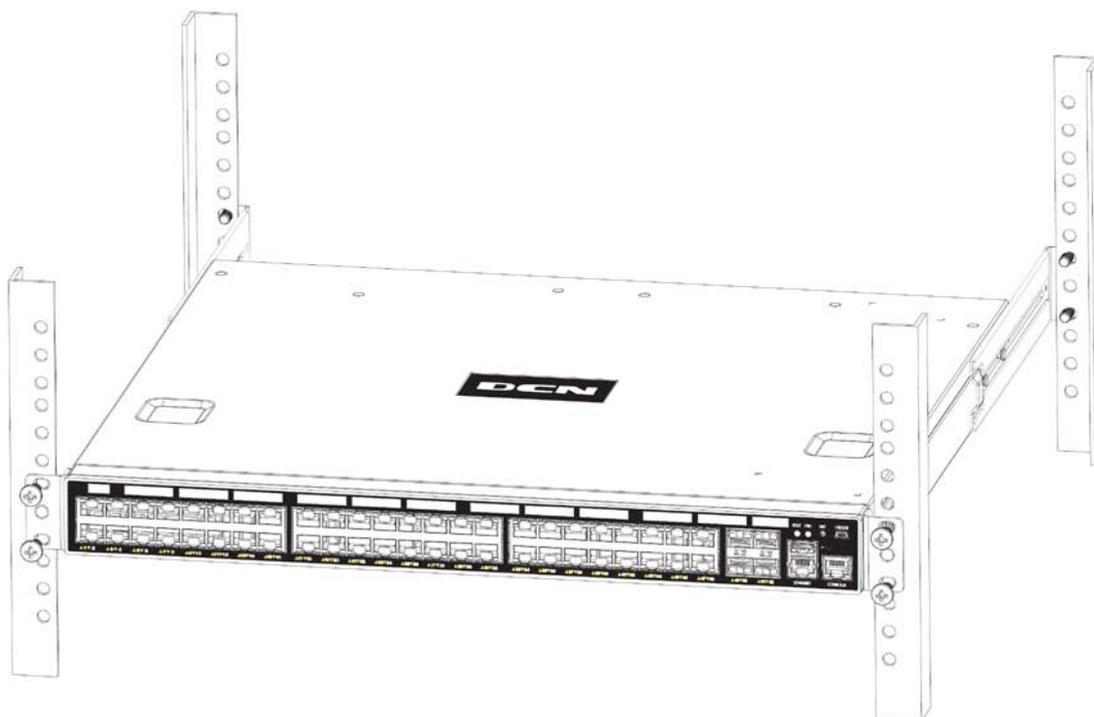


Fig 3-2 The figure of DCWS-6028 installing on the rack by using the front and back horn iron

## 3.2.2 Installing the Power Supply Module

DCWS-6028 supports 2 power supplies.

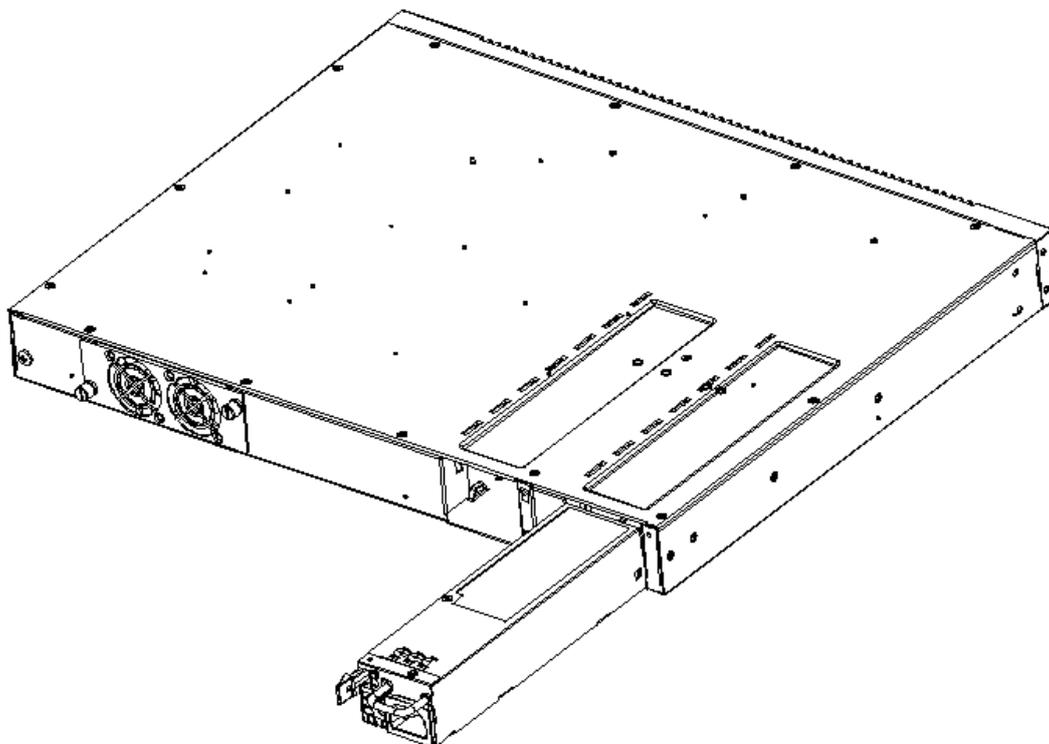


Figure 3-3 The figure of DCWS-6028 power supply installing

Please install the power supply module according to the following approach:

1. Take out the power supply module from the little packing box.
2. The golden finger is entad and aim at the power supply rabbet of the machine to insert to the end downwards. You can hear the lock sound of “click”.
3. Force the board on the side of AC cable bore to the direction of fan when taking out the power supply module. And draw the power supply forth.

## 3.2.3 Connecting Console

DCWS-6028 provide a serial console port.

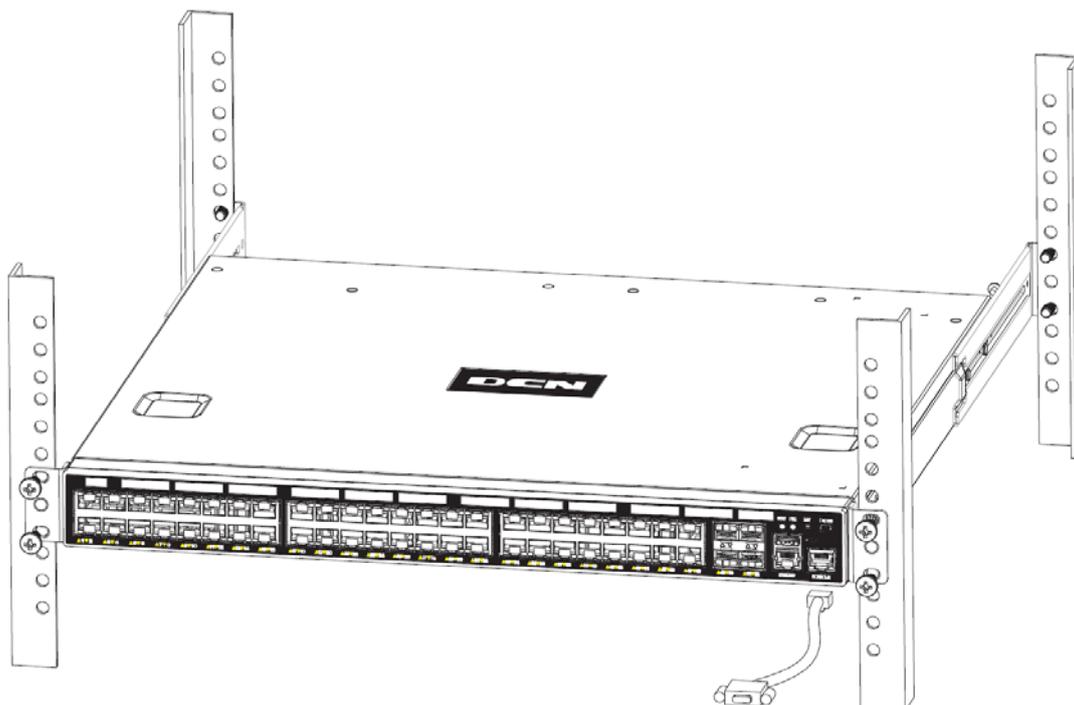


Figure 3-4 Connecting Console to DCWS-6028 controller

The connection procedure is listed below:

1. Find the console cable provided in the accessory kit. Attach the console cable end to console port of the controller.
2. Connect the other side of the console cable to a character terminal (PC).
3. Power on the controller and the character terminal. Configure the controller through the character terminal.

### 3.2.4 SFP/SFP+ Transceiver Installation

DCWS-6028 provides 4 SFP/SFP+ transceiver slots.

The procedure for installing the SFP/SFP+ transceiver is shown below:

Step 1: Put on a ESD wrist strap (or antistatic gloves)

Step 2: Insert the SFP/SFP+ transceiver to the guide rail inside the SFP/SFP+ port. Do not put the SFP/SFP+ transceiver up-side-down.

Step 3: Push the SFP/SFP+ transceiver along the guide rail gently until you feel the transceiver snap into place at the bottom of the SFP/SFP+ port.

Note: the SFP/SFP+ transceiver is hot swappable.

#### Caution!

Do not stare directly at the 2 fiber bore in the SFP/SFP+ transceiver when the controller is in operation, otherwise the laser may hurt your eyes.

### 3.2.5 Copper Cable/Fiber Cable Connection

Copper cables should be connected as below:

Step 1: Insert one end of the Ethernet cable to the RJ-45 Ethernet port in the controller copper port;

Step 2: Insert the other end of the Ethernet cable to the RJ-45 Ethernet port of other device;

Step 3: Check all status indicators for the corresponding ports; a lighted LED indicates that the link has been established, otherwise the link is not ready and the cable should be examined.

#### Caution!

Please verify the sign above the port to ensure using the right port. Connecting to wrong ports might damage the controller.

Fiber cables should be connected as below:

Step 1: Remove the protective plug from the SFP/SFP+ fiber transceiver bore; Remove the protective cap from one end of the fiber cable. Keep the fiber end clean and neat.

Step 2: Attach one end of the fiber cable to the SFP/SFP+ transceiver, and attach the other end to the transceiver of the corresponding devices. Note: The SFP/SFP+ transceiver's TX port should be connected to the RX port of the corresponding device, and vice versa.

Step 3: Check the fiber port status indicator, a lighted LED indicates that the link has been established; otherwise the link is not ready and should be examined.

#### Caution!

Please verify the sign above the port to ensure using the other ports. Connecting to wrong ports might damage the transceiver or the other ports. When connecting other devices through a fiber cable to the controller, the output power of the fiber cable must not exceed the maximum received power of the corresponding modules. Otherwise, it will damage the fiber transceiver. Do not stare at the fiber bore when the controller is in operation. That may hurt your eyes.

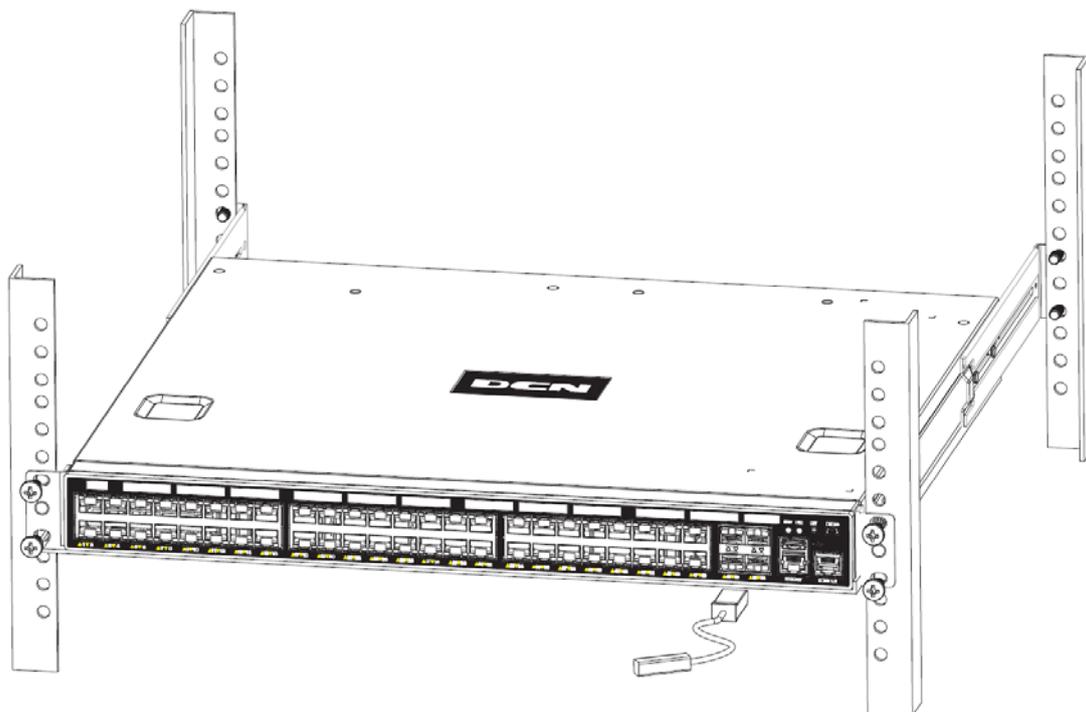


Figure 3-5 Connect the DAC cable to DCWS-6028 controller

**The connection approach of DAC cable is below:**

1. Connect the two side of DAC cable to SFP/SFP+ transceiver of DCWS-6028 controller.
2. Check out the indicator light state of the light port. If LINK light is bright, it means the link is connection. If LINK light puts out, it means the lines have trouble and please check out the line connection.

### 3.2.6 AC Power Supply Connection

DCWS-6028 uses 220VAC power supply by default. Please read the power input specification for the detailed information.

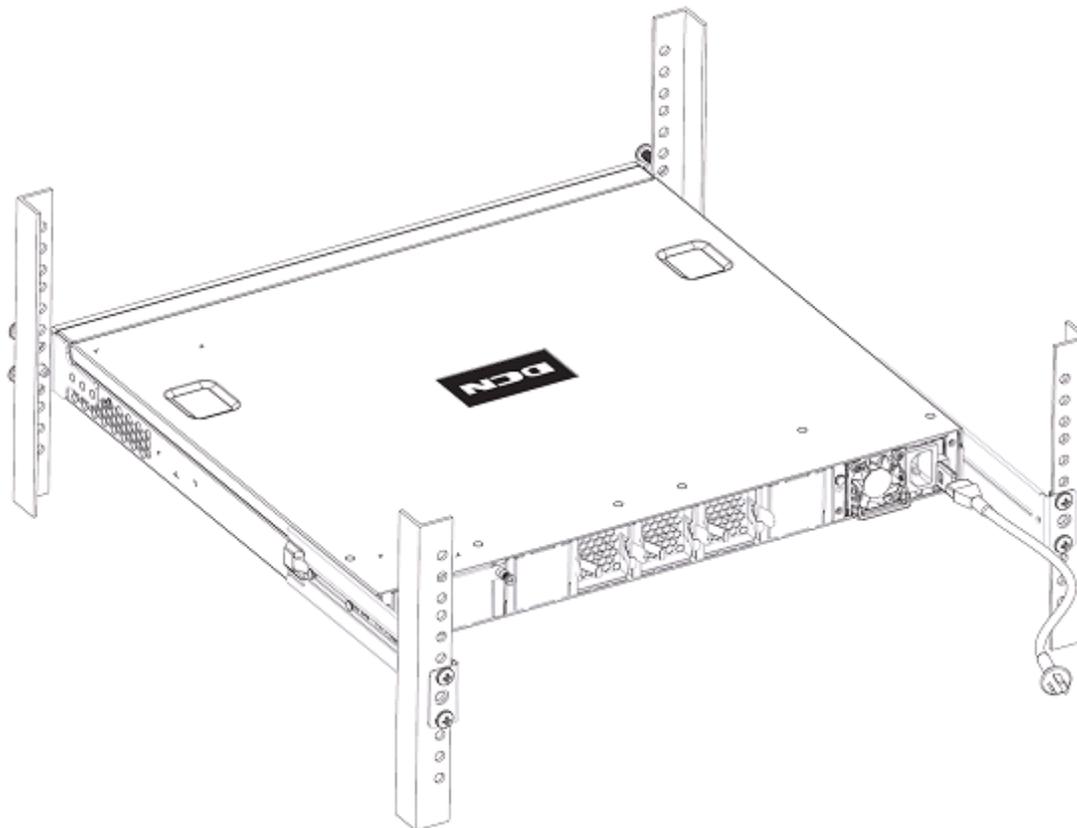


Fig 3-6 Connect the power supply cable to the DCWS-6028 controller

AC Power supply connection procedure is described as below:

1. Insert one end of the power cable provided in the accessory kit into power source socket, and the other end to the power socket (with overload and leakage protection).
2. Check the power status indicator in the front panel of the controller. The corresponding power indicator should light. DCWS-6028 is self-adjustable for the input voltage. As soon as the input voltage is in the range printed on the controller surface, the controller can operate correctly.
3. When the controller is powered on, it executes self-test procedure and startups.

**Caution!**

The input voltage must be within the required range, otherwise the controller can be damaged or malfunction. Do not open the controller shell without permission. It can cause physical injury.

### 3.2.7 Earthing Cable Connection

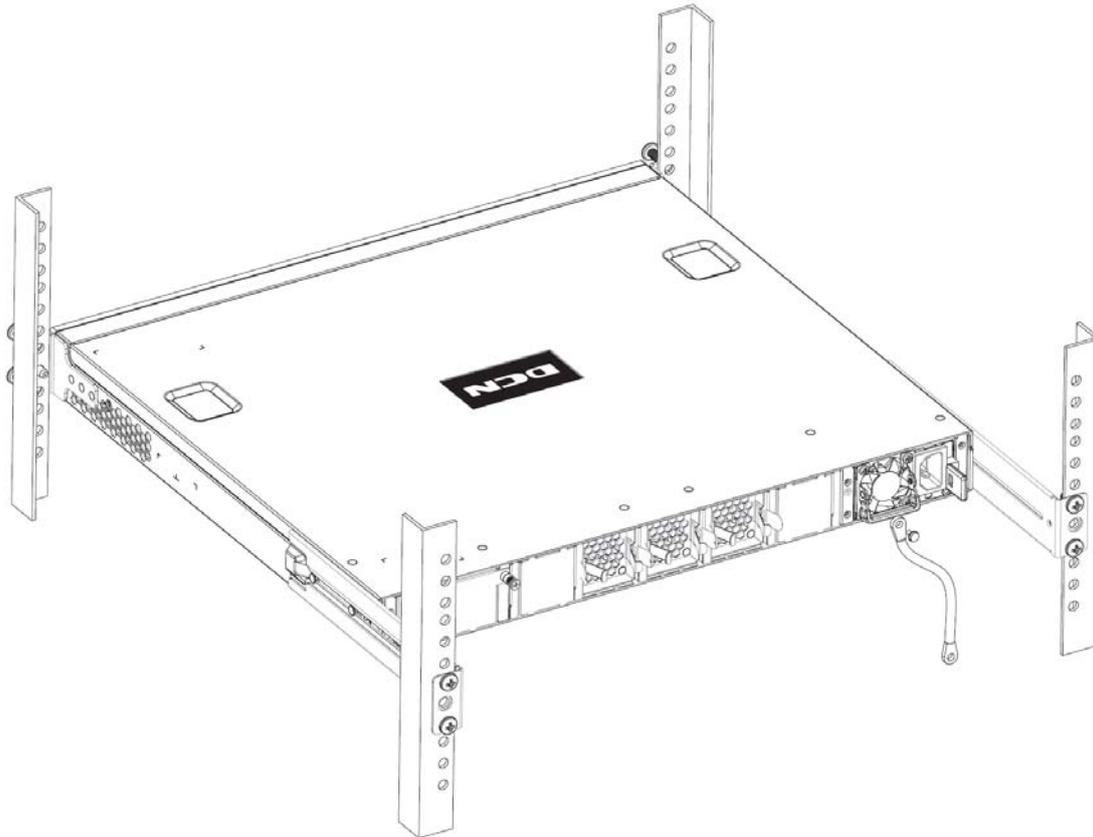


Figure 3-7 Connect the earthing cable to the CS6200 controller

Please connect the earthing cable according to the following approach:

1. Screw out the fixed nut on the earthing pillar of the controller.
2. Cover one side of the earthing cable to the earthing pillar of the back panel.
3. Put and screw down the fixed nut.
4. Connect another side of the earthing cable to the earthing side.

### 3.2.8 Checking the Controller

- Whether the used power corresponds to the power of the sign.
- Whether the ground cable is connected.
- Whether the Console cable connect to power cable correctly.
- If there are cables at the outside, please ensure the cable is well connected with the lightning protection devices.