# RG-N18000-X Series Switches
# Hardware Installation and Reference Guide V1.22

## Copyright Statement



## Exemption Statement

## Preface

Thank you for using our products. This manual will guide you through the installation of the device.

This manual describes the functional and physical features and provides the device installation steps, hardware troubleshooting, module technical specifications, and specifications and usage guidelines for cables and connectors.

## Audience

It is intended for the users who have some experience in installing and maintaining network hardware. At the same time, it is assumed that the users are already familiar with the related terms and concepts.

## Document Structure

- Chapter 1 "**Product Overview**" describes the main characteristics, technical specifications, and related modules of this product.
- Chapter 2 "**Preparation before Installation**" lists the safety, power supply, and site requirements that must be met before the switch can be installed.
- Chapter 3 "**Product Installation**" describes how to install the integrated switch and modules, and connect its power cables and grounding lines.
- Chapter 4 "**System Debugging**" describes the commissioning after the switch is powered on for the first time.
- Chapter 5 "**Monitoring and Maintenance**"
- Chapter 5 **"Troubleshooting"** describes possible problems met during the installation and use of the switch and solutions for such problems.
- Chapter 6 "**Replacing Modules**" describes how to perform removal and replacement procedures for the modules of the switch.
- Chapter 7 "**Cables**" describes the precautions and simple steps for cable connection and bundling.
- Appendix A "**Connector and Connection Media**"
- Appendix B "**Mini-GBIC Modules**"
- Appendix C "**Lightening Protection**"
- Appendix D "**Cabling Recommendations in Installation**"
- Appendix E "**Site Selection**"

## Obtaining Technical Assistance

- Ruijie Networks Website: https://www.ruijienetworks.com/
- Technical Support Website: https://ruijienetworks.com/support
- Case Portal: https://caseportal.ruijienetworks.com
- Community: https://community.ruijienetworks.com
- Technical Support Email: service_rj@ruijienetworks.com
- Skype: service_rj@ruijienetworks.com

## Related Documents

| Documents | Description |
|---|---|
| Configuration Guide | Describes network protocols and related mechanisms that supported by the product, with configuration examples. |
| Command Reference | Describes the related configuration commands, including command modes, parameter descriptions, usage guides, and related examples. |

## Symbol Conventions

Means reader take note. Notes contain helpful suggestions or references.

Means reader be careful. In this situation, you might do something that could result in equipment damage or loss of data.

# 1 Product Overview

Launched by Ruijie independently, RG-N18000-X series next generation core switches adopt the Clos architecture and support large buffer. RG-N18000-X series support dual supervisor modules and redundancy of power supply, switch fabric and fan modules.

- The RG-N18018-X: designed with 18 transverse slots, supporting dual supervisor modules and providing 16 service module slots, 16 power supply modules, six switch fabric modules and three fan modules;
- The RG-N18010-X: designed with 10 transverse slots, supporting dual supervisor modules and providing eight service module slots, eight power supply modules, six switch fabric modules and three fan modules.
- The RG-N18006-X: designed with 6 transverse slots, supporting dual supervisor modules and providing four service module slots, four power supply modules, six switch fabric modules and three fan modules.

## 1.1 RG-N18018-X

### Specifications

| | |
|---|---|
| Model | RG-N18018-X |
| Module Slot | two supervisor module slots, 16 service module slots and six switch fabric module slots |
| Supervisor Module | M18000X-CM II<br>M18000X-CM II-C<br>M18000X-CM X |
| Supervisor Module Redundancy | Supported |
| Switch Fabric Module | M18018X-FE-C II<br>M18018X-FE-C V<br>M18018X-FE-D II |
| Service Module | M18000X-36CQ-CB<br>M18000X-36QXS-CB<br>M18000X-18CQ-CB<br>M18000X-48XS2CQ-CB<br>M18000X-18QXS18CQ-CB<br>M18000X-12QXS12CQ-CB<br>M18000X- 6QXS6CQ-CB<br>M18000X- 48XT2CQ-CB<br>M18000X-32CQ-DB |
| Hot Swapping | Supported |
| Power Supply Module | RG-PA2700I:<br>100V AC to 105V AC, power: 1,200W<br>105V AC to 176V AC, power: 1,450W<br>176V AC to 200V AC, power: 2,400W<br>200V AC to 240V AC, power: 2,700W<br><br>RG-PD2400I:<br>-40V DC to -72V DC power: 2,400W |
| HVDC Power Supply | RG-PA2700I: 192VDC to 350VDC power: 2,700W<br><br>The power supply supports reversible HVDC.<br>The HVDC-supported PDU socket should be provided.<br>Before connected to the PDU, the power core should be inserted into the power receiving port of the switch. Do not do it in a reverse way. |
| Power Supply Redundancy | The power supply redundancy of the same model is supported |
| Fan Module | M18018X-FAN |
| EMC Standards | GB9254-2008 CLASS A<br>FCC CLASS A |
| Safety Standards | GB4943-2011 |

| | |
|---|---|
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| Storage Humidity | 5% to 95% RH |
| Altitude | Long term operation height: 3000m at 35°C(95°F). The temperature decreases by 1°C as the altitude ranging from 3,000m to 4,000m increases by 200m. |
| | Operation height: -500m to 5,000m |
| MTBF | 235,000 hours |
| Noise | 67 dB at 27°C (80.6°F)<br>91 dB at 50°C (122°F) |
| Weight | Net weight: 116.95 kg (257.83 lbs) |
| Dimensions (W x D x H) | Cable management brackets excluded: 442 mm x 961 mm x 934.5 mm (17.40 in. x 37.83 in. x 36.79 in.), 21U<br>Cable management brackets included: 442 mm x 1,017 mm x 934.5 mm (17.40 in. x 40.04 in. x 36.79 in.), 21U |

The weight only includes that of the empty chassis and fans. The whole device's weight is subject to that of the modules selected.

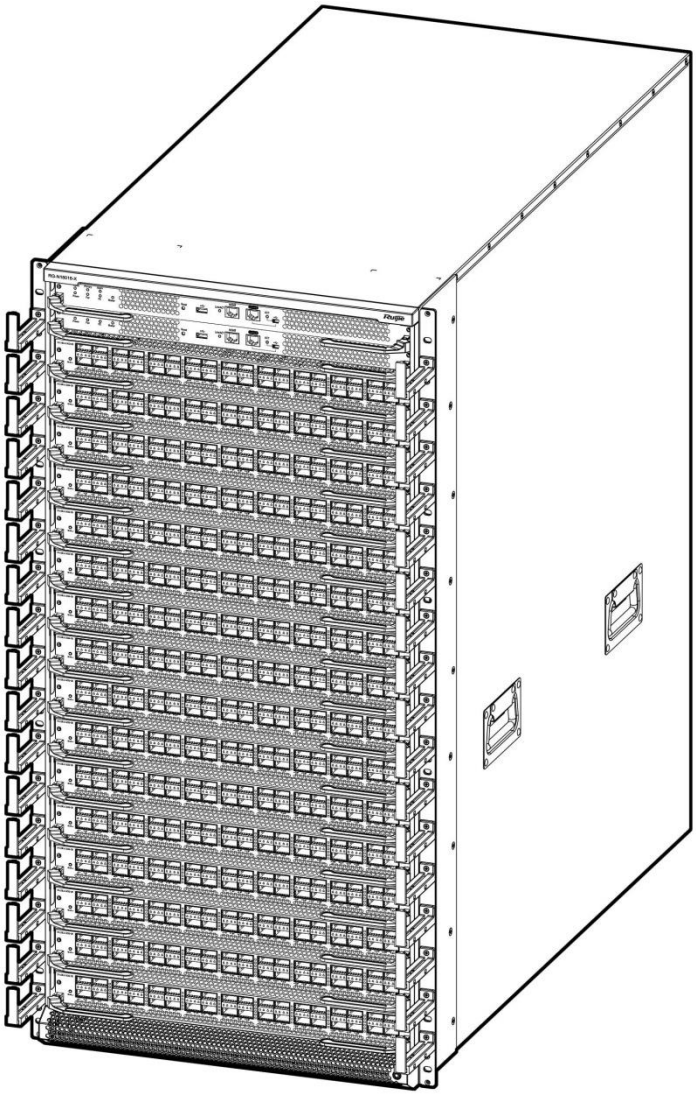
RG-N18018-X switch is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## Product Appearance

The hardware system of the RG-N18018-X switch is composed of the chassis, the power system, modules and the cooling system.

- The power system provides 16 power supply slots and supports N+M power supply redundancy. Users are recommended to configure redundancy for the power supplies.
- The RG-N18018-X switch provides two supervisor module slots, 16 service module slots and six switch fabric module slots. The supervisor modules support 1+1 redundancy. Users are recommended to configure redundancy for the supervisor modules. Users may choose different service modules as needed.
- Fan trays are at the back of the chassis. The service module, and the supervisor module are on the front of the chassis.

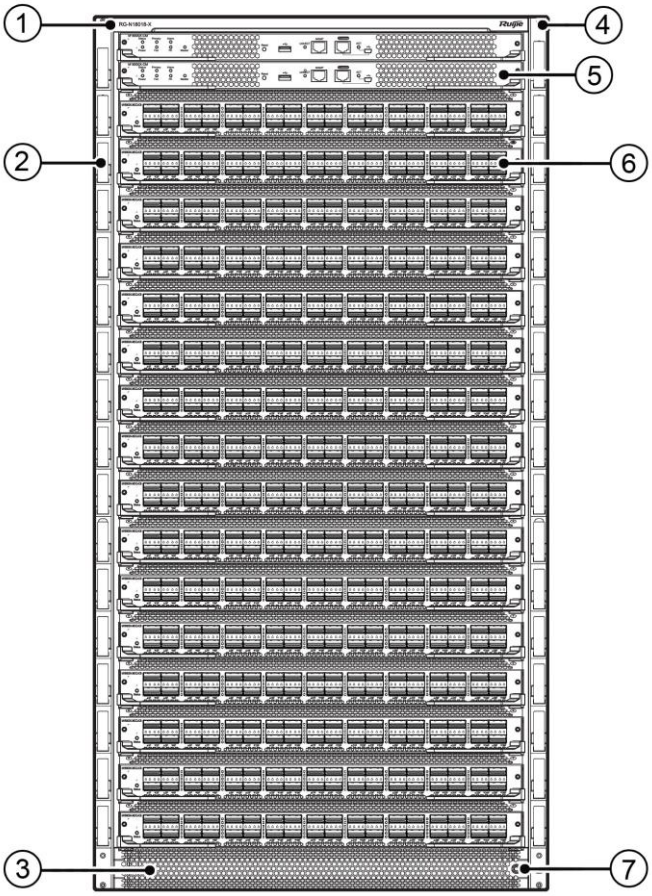
Figure 1-1 Appearance of the RG-N18018-X Switch



## Front Panel

The front panel of the RG-N18018-X switch is shown in the following figure.

Figure 1-2 Front Panel of the RG-N18018-X Switch



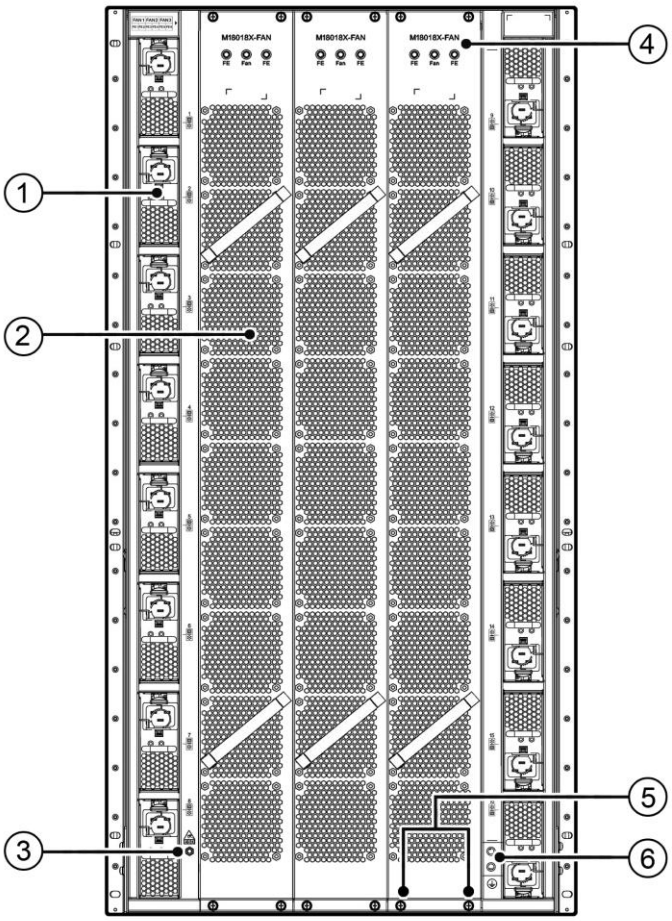

| Note | | |
|---|---|---|
| | ① Model name | ⑤ Supervisor module slot |
| | ② Cable management brackets | ⑥ Service module slot |
| | ③ Air intake of the power supply module | ⑦ Anti-static wrist strap |
| | ④ Bracket | |

⚠ Ensure the supervisor module, service module, switch fabric module and power supply module are removed from the chassis before you move or transport the RG-N18018-X chassis.

## Back Panel

The back panel of the RG-N18018-X switch is shown in the following figure.

Figure 1-3 Back Panel of the RG-N18018-X Switch




| | | |
|---|---|---|
| Note | ① Power supply module | ④ Fan module LED |
| | ② Fan module slot | ⑤ Captive screws of the fan module |
| | ③ Anti-static wrist strap jack | ⑥ Grounding point |

## Power supply

The RG-N18018-X switch adopts both AC and DC power supply input.

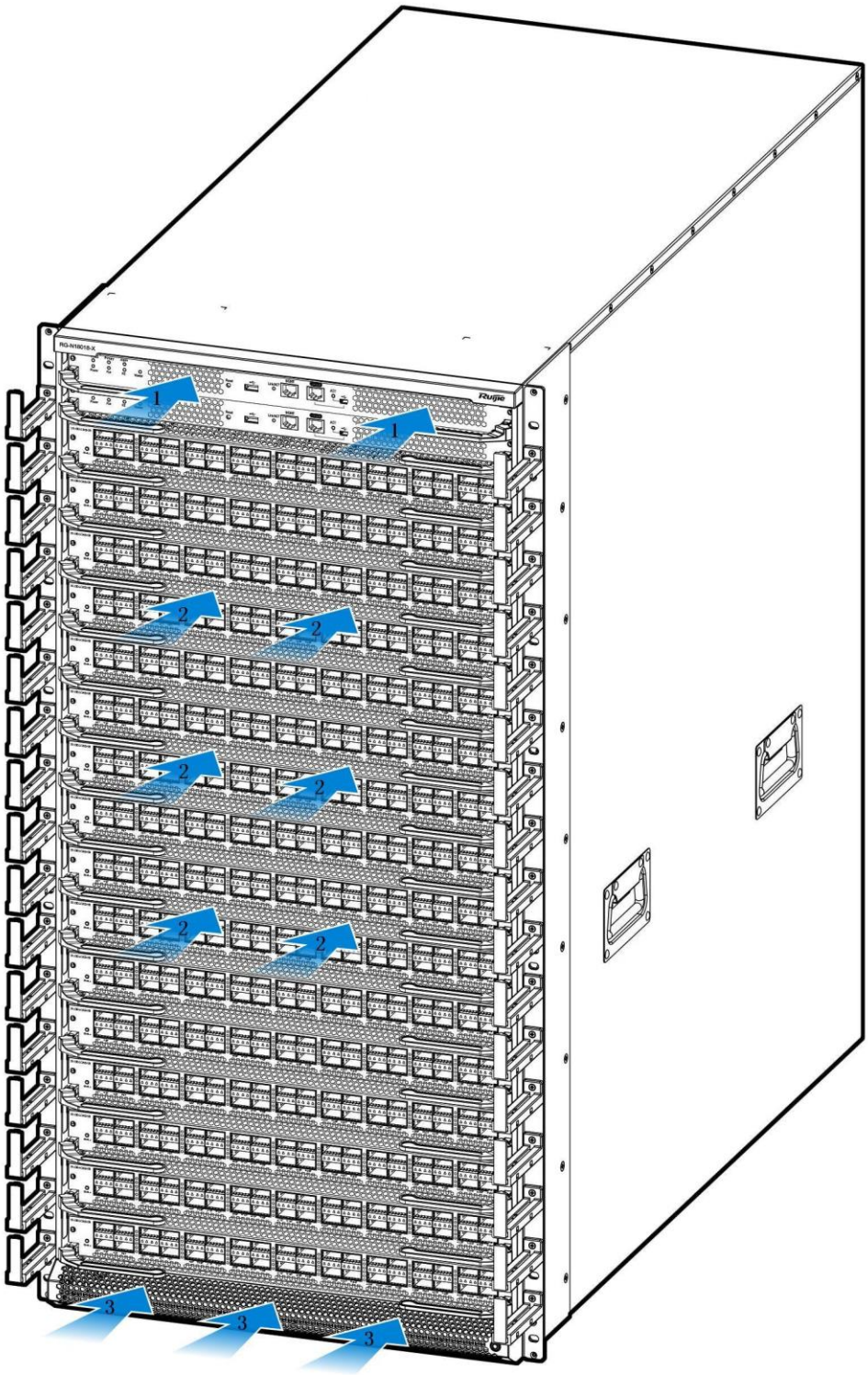
- AC power supply input: The RG-PA2700I power supply module is supported. This power supply module supports power management. The supervisor module of the RG-N18018-X switch can read the power supply information and implement flexible and intelligent power management.
- DC power supply input: The RG-PD2400I power supply module is supported. This power supply module supports power management. The supervisor module of the RG-N18018-X switch can read the power supply information and implement flexible and intelligent power management.

The RG-N18018-X switch supports N+M power supply redundancy to improve the system stability and reliability. We recommend users to configure N+M redundancy for power supply modules.

## Heat Dissipation System

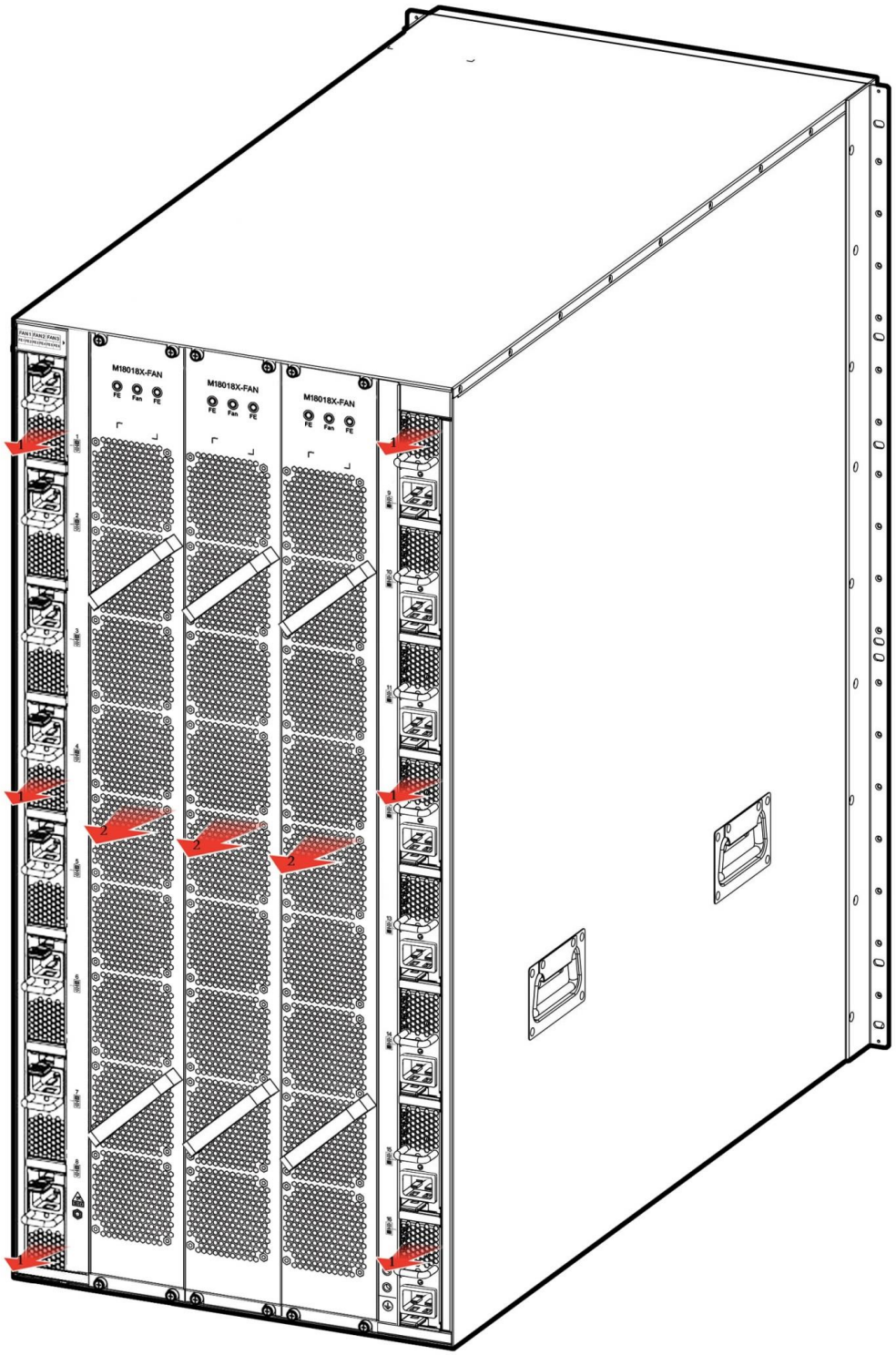
The operating environment temperature of the RG-N18018-X switch ranges between 0°C and 45°C. The thermal design must satisfy the requirement on the device's reliability in the temperature range while ensuring the device's safety and maintainability. According to the thermal design of the RG-N18018-X switch, fans are used to draw air for forced convection cooling in order to ensure that the device works properly in the specified environment.

Figure 1-4 Ventilation and Heat Dissipation System of the RG-N18018-X Switch (Air Intakes)




Note:
① Air intakes for supervisor modules
② Air intakes for service modules
③ Air intakes for power modules

Figure 1-5 Ventilation and Heat Dissipation System of the RG-N18018-X Switch (Exhaust Vents)




Note: ① Exhaust vents for power modules
② Exhaust vents for switch fabric, service and supervisor modules

For the supervisor and service modules, air flows across the chassis from the front intakes to the back vents.
For the power supply modules, air flows in from the front intakes and out from the back vents.
For the switch fabric module, air flows in from the front intakes and out from the back vents.

The chassis should be mounted in a place with sufficient space for air circulation. Sufficient space (10 cm at least) must be reserved at the air intakes and exhaust vents for ventilation.

If any module slot is unoccupied, install a filler panel to ensure proper airflow. Ensure there is at least one filler panel installed in two neighboring unoccupied slots.

## 1.2 RG-N18010-X

### Specifications

| | |
|---|---|
| Model | RG-N18010-X |
| Module Slot | Two supervisor module slots, eight service module slots and six switch fabric module slots |
| Supervisor Module | M18000X-CM II<br>M18000X-CM II-C<br>M18000X-CM X |
| Supervisor Module Redundancy | Supported |
| Switch Fabric Module | M18010X-FE-C I<br>M18010X-FE-C II<br>M18010X-FE-D I<br>M18010X-FE-E II |
| Service Module | M18000X-36CQ-CB<br>M18000X-36QXS-CB<br>M18000X-18CQ-CB<br>M18000X-48XS2CQ-CB<br>M18000X-18QXS18CQ-CB<br>M18000X-12QXS12CQ-CB<br>M18000X- 6QXS6CQ-CB<br>M18000X- 48XT2CQ-CB<br>M18000X-32CQ-DB<br>M18000X-48CQ-CE |
| Hot Swapping | Supported |
| Power Supply Module | RG-PA2700I:<br>100V AC to 105V AC, power: 1,200W<br>105V AC to 176V AC, power: 1,450W<br>176V AC to 200V AC, power: 2,400W<br>200V AC to 240V AC, power: 2,700W<br><br>RG-PD2400I:<br>-40V DC to -72V DC, power: 2,400W |
| HVDC Power Supply | RG-PA2700I:<br>192V to 350V, power: 2,700W<br><br>The power supply supports reversible HVDC.<br>The HVDC-supported PDU socket should be provided.<br>Before connected to the PDU, the power core should be inserted into the power receiving port of the switch. Do not do it in a reverse way. |
| Power Supply Redundancy | The power supply redundancy of the same model is supported. |
| Fan Module | M18010X-FAN |
| EMC Standards | GB9254-2008 CLASS A<br>FCC CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| Storage Humidity | 5% to 95% RH |
| Altitude | Long term operation altitude: 3000m at 35°C( 95°F). The temperature decreases by 1°C as the altitude ranging from 3000m to 5,000m increases by 200m. |

| | |
|---|---|
| | Operation altitude: -500m to 5,000m |
| MTBF | 418,000 hours |
| Noise | 62 dB at 27°C (80.6°F)<br>87 dB at 50°C (122°F) |
| Weight | 52kg (114.64lbs) |
| Dimensions<br>(W x D x H) | Cable management brackets excluded: 442 mm x 961 mm x 534 mm(17.40 in. x 37.83 in. x 21.02 in.), 12U<br>Cable management brackets included: 442 mm x 1,017 mm x 534 mm(17.40 in. x 40.04 in. x 21.02 in.), 12U |

The weight only includes that of the empty chassis and fans. The whole device's weight is subject to that of the modules selected.

RG-N18010-X switch 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.

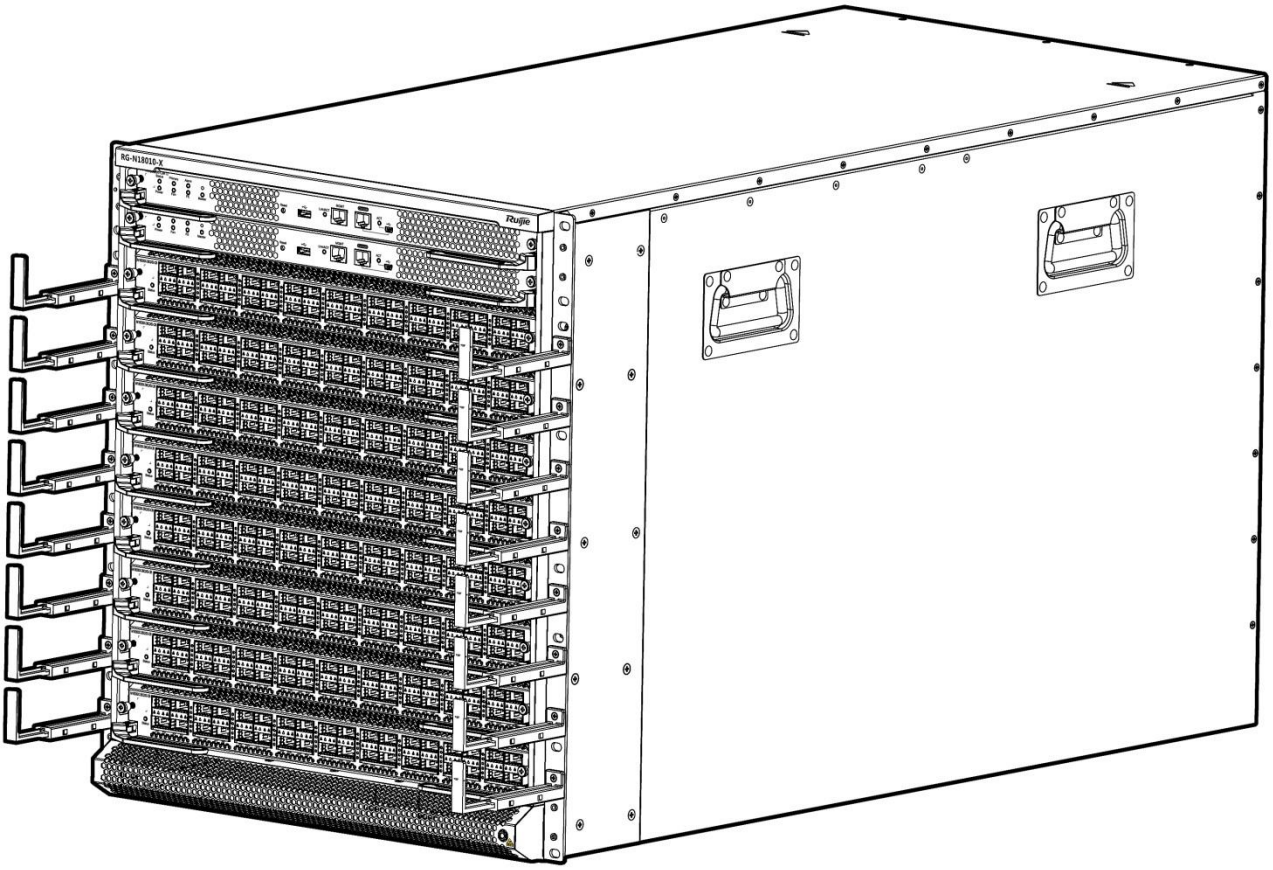
This device has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the device is operated in a commercial environment. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## Product Appearance

The hardware system of the RG-N18010-X switch is composed of the chassis, power system, system modules and cooling system.

- The power system provides eight power supply slots and supports N+M power supply redundancy. Users are recommended to configure redundancy for the power supplies.
- The RG-N18010-X provides two supervisor module slots, eight service module slots and six switch fabric module slots. The supervisor modules support 1+1 redundancy. We recommend users to configure redundancy for supervisor modules. Users may select different service modules as needed.
- The heat dissipation system is composed of fan trays and air filters. The fan tray is at the back of the chassis, and the service, supervisor modules and air filters are in the front of the chassis.

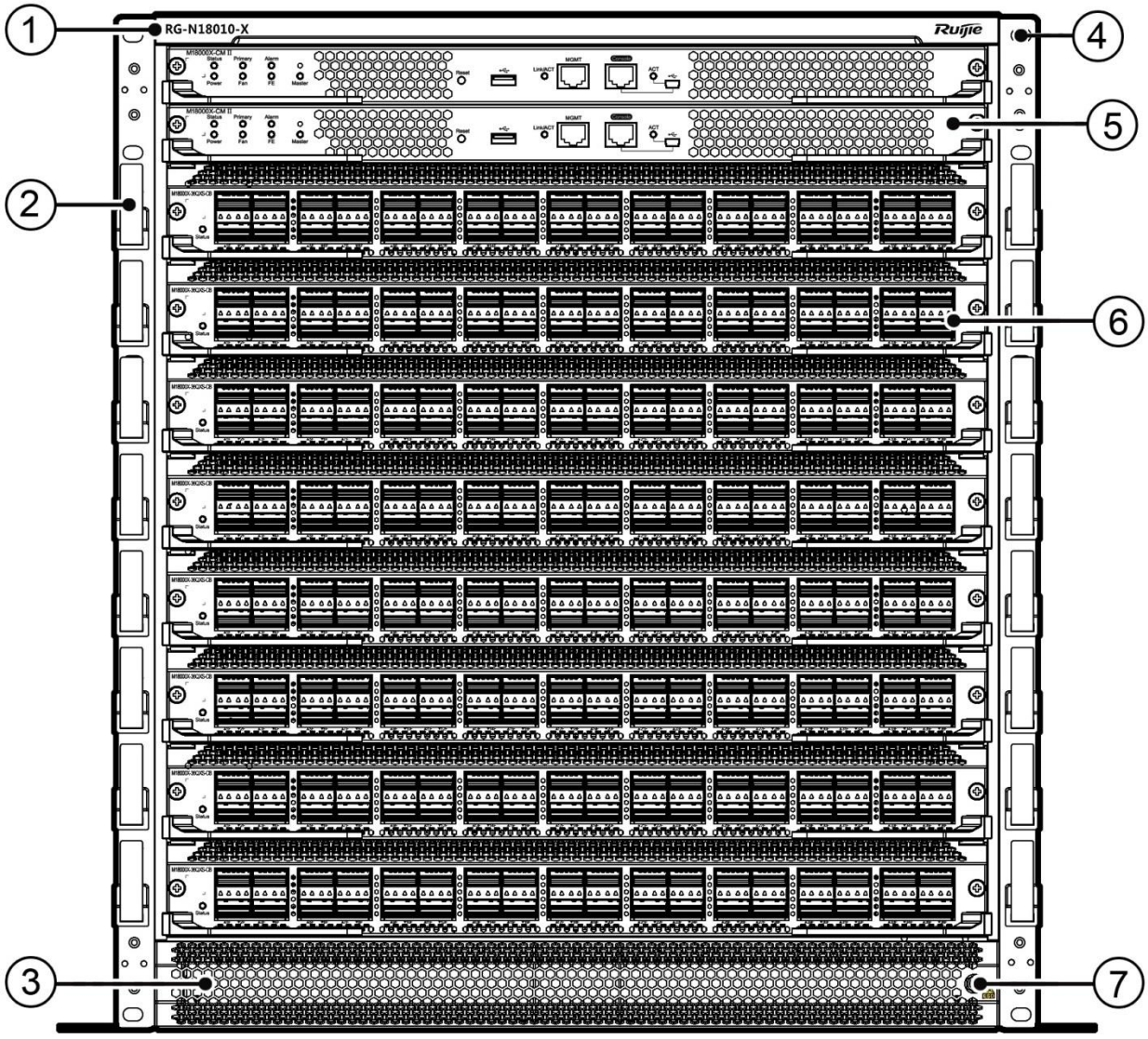
Figure 1-6 Appearance of the RG-N18010-X Switch




## Front Panel

The front panel of the RG-N18010-X switch is shown in the following figure Figure 1-7.

Figure 1-7 Front Panel of the RG-N18010-X Switch



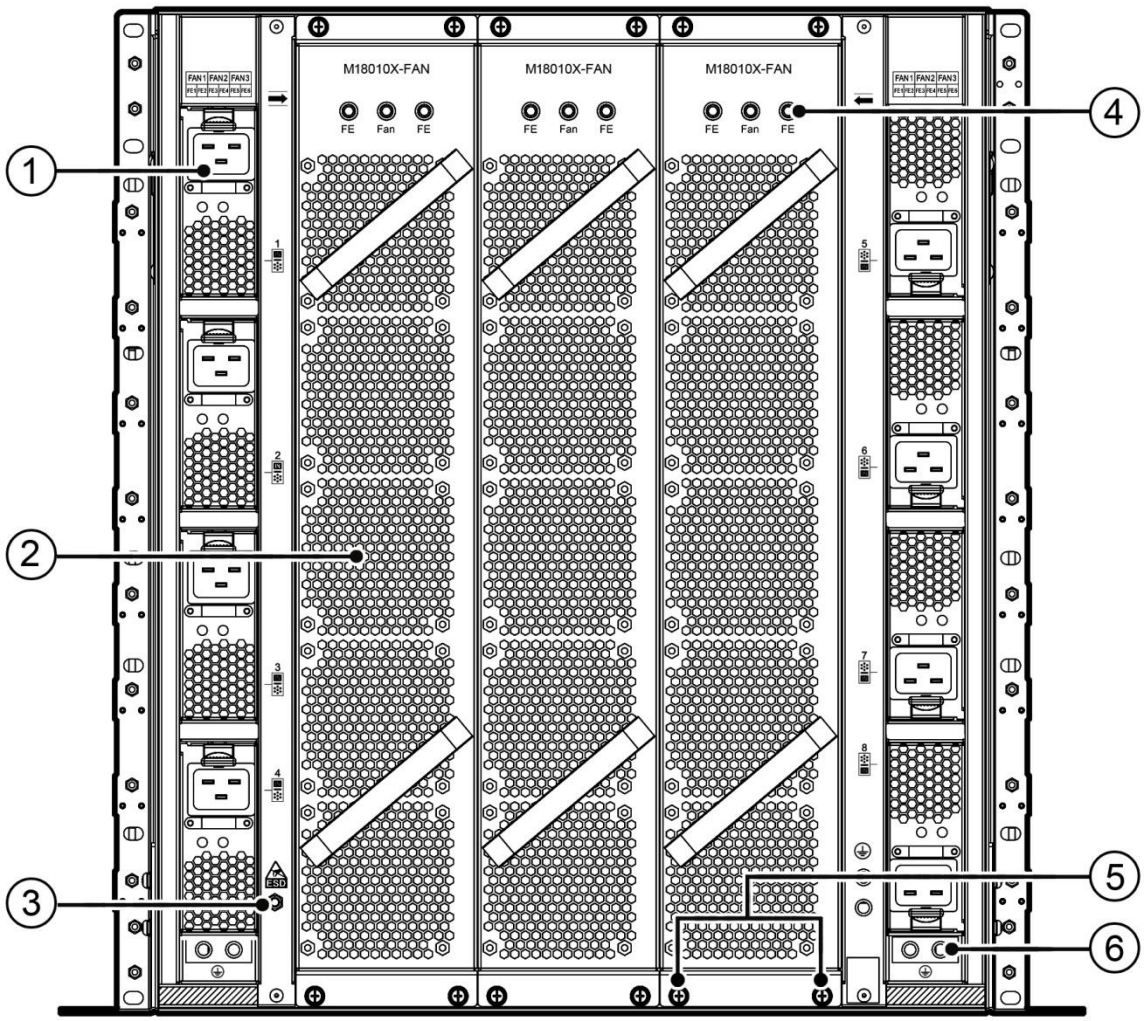

| | | |
|---|---|---|
| Note | ① Model name | ⑤ Supervisor module slot |
| | ② Cable management brackets | ⑥ Service module slot |
| | ③ Air intake of the power supply module | ⑦ Anti-static wrist strap |
| | ④ Bracket | |

⚠ Ensure the supervisor module, service module, switch fabric module and power supply module are removed from the chassis before you move or transport the RG-N18010-X chassis.

## Back Panel

The back panel of the RG-N18010-X switch is shown in the following figure.

Figure 1-8 Back Panel of the RG-N18010-X Switch




| Note | | |
|---|---|---|
| | ① Power supply module | ④ Fan module LED |
| | ② Fan module slot | ⑤ Captive screws of the fan module |
| | ③ Anti-static wrist strap jack | ⑥ Grounding point |

## Power Supply

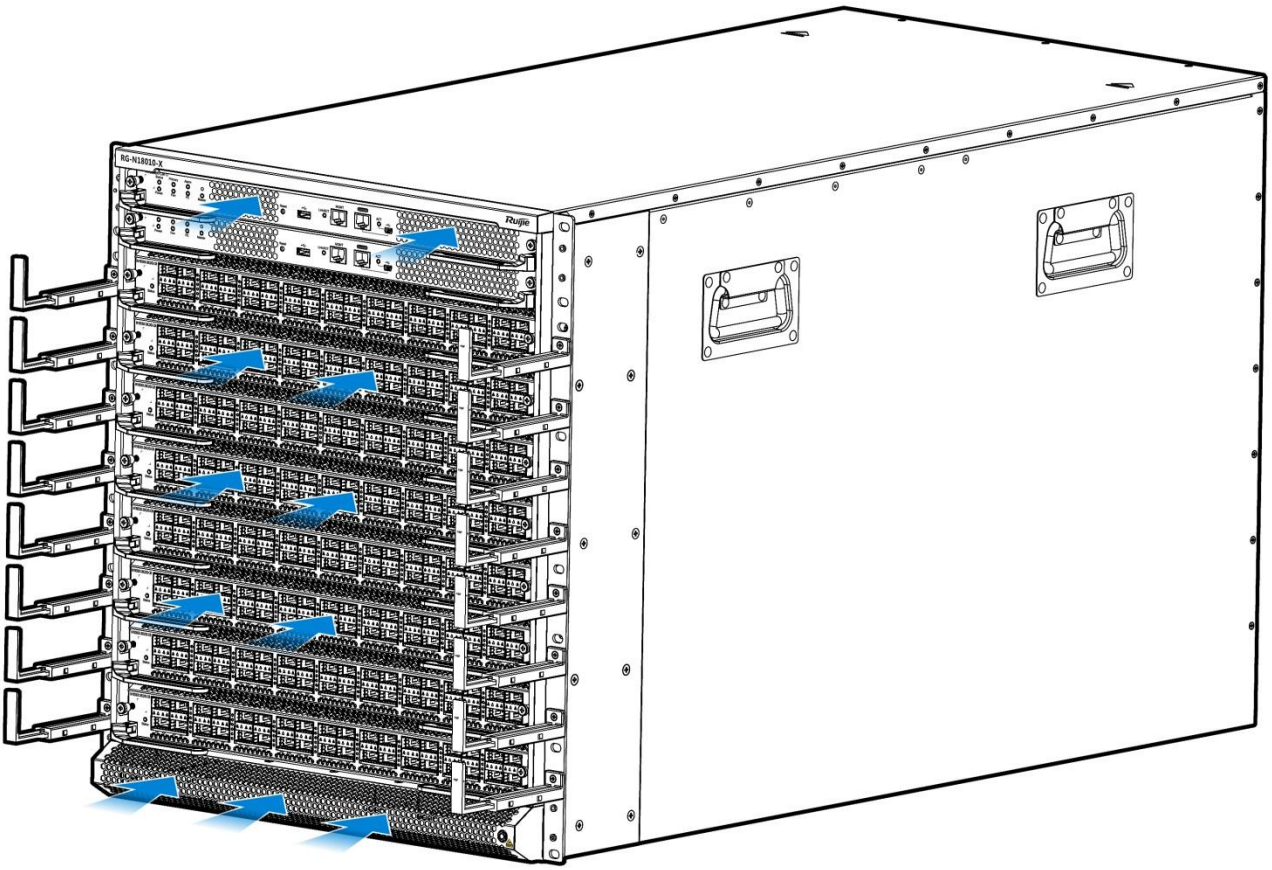
- AC input: The RG-PA2700I power supply module is supported. This type of power supply module supports power management. The supervisor module of the RG-N18010-X switch can read the power supply information and implement flexible and intelligent power management.
- DC input: The RG-PD2400I. This type of power supply module supports power management. The supervisor module of the RG-N18010-X switch can read the power supply information and implement flexible and intelligent power management.

The RG-N18010-X switches support N+M power redundancy to improve the system stability and reliability. We recommend users to configure N+M redundancy for power supply modules.

## Heat Dissipation Solution

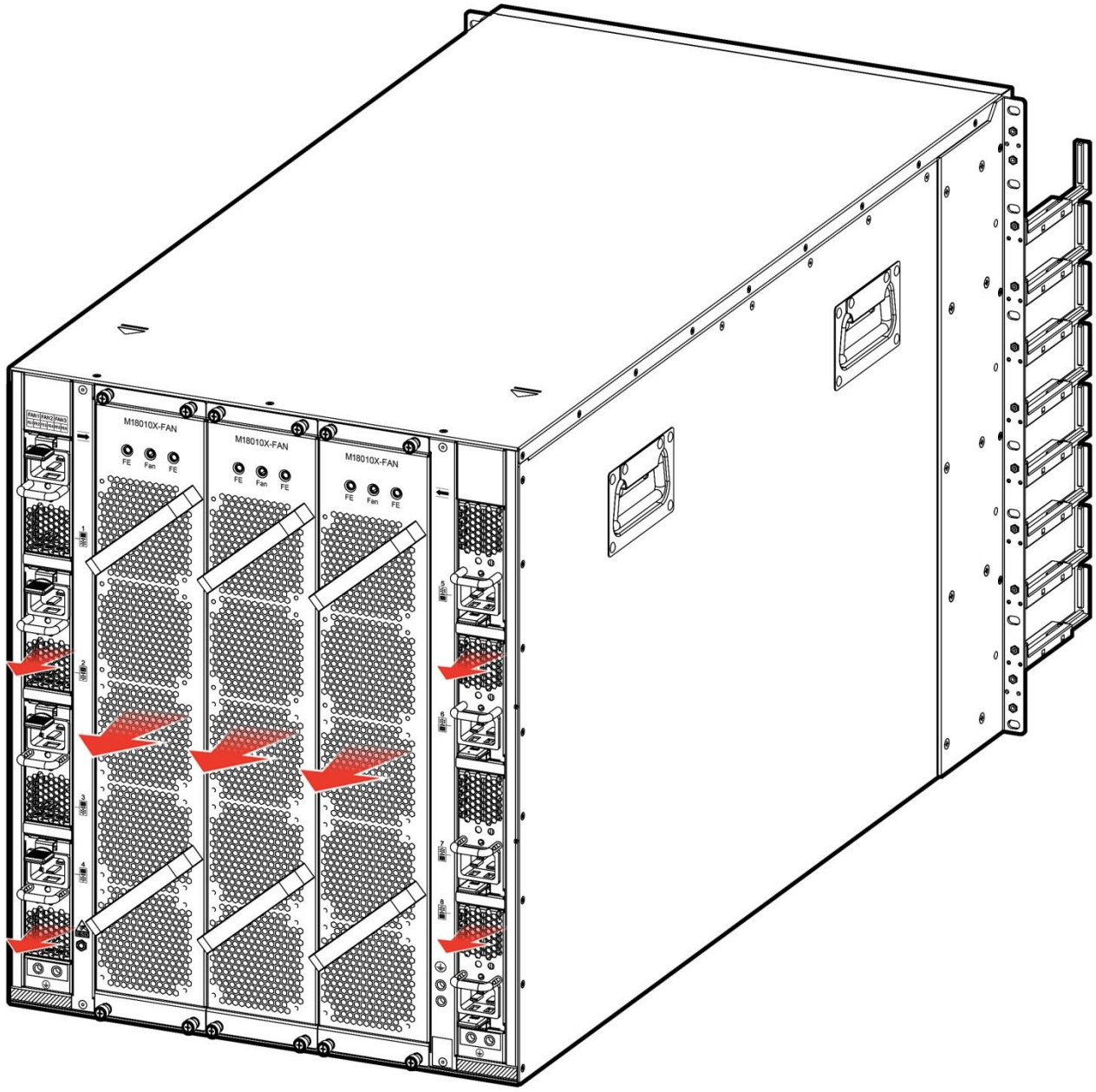
The operating environment temperature of RG-N18010-X switches ranges between 0°C and 45°C. The heat dissipation design must satisfy the requirement on the device's reliability in the temperature range while ensuring the device's safety and maintainability. RG-N18010-X uses fans to draw air to blow air for forced convection in order to ensure that the device works properly in the specified environment.

Figure 1-9 Ventilation and Heat Dissipation System of the RG-N18010-X Switch (Air Intakes)



Note:
① Air intakes for supervisor modules
② Air intakes for service modules
③ Air intakes for power supply modules

Figure 1-10 Ventilation and Heat Dissipation System of the RG-N18010-X Switch (Exhaust Vents)




Note: ① Exhaust vents for power supply modules
② Exhaust vents for switch fabric, service and supervisor modules

- For supervisor and service modules, air flows in from the front intakes and out from the back vents.
- For the power supply modules, air flows in from the front intakes and out from the back vents.
- For the switch fabric modules, air flows in from the front intakes and out from the back vents.

The chassis should be mounted in a place with sufficient space for air circulation. Sufficient space (10 cm at least) must be reserved at the air intakes and exhaust vents for ventilation.

If any module slot is unoccupied, install a filler panel to ensure proper airflow. Ensure there is at least one filler panel installed in two neighboring unoccupied slots.

## 1.3 RG-N18006-X

## Specifications

| | |
|---|---|
| Model | RG-N18006-X |
| Module Slot | Two supervisor module slots, four service module slots and six switch fabric module slots |
| Supervisor Module | M18006X-CM II |
| Supervisor Module Redundancy | Supported |
| Switch Fabric Module | M18006X-FE-C I |
| Service Module | M18000X-36CQ-CB<br>M18000X-36QXS-CB<br>M18000X-18CQ-CB<br>M18000X-48XS2CQ-CB<br>M18000X-18QXS18CQ-CB<br>M18000X-12QXS12CQ-CB<br>M18000X-6QXS6CQ-CB<br>M18000X-48XT2CQ-CB |
| Hot Swapping | Supported |
| Power Supply Module | RG-PA3000I-F:<br>100V AC to 105V AC, power: 1,200W<br>105V AC to 176V AC, power: 1,450W<br>176V AC to 205V AC, power: 2,400W<br>205V AC to 240V AC, power: 3,000W |
| HVDC Power Supply | RG-PA3000I-F:<br>192V to 210V, power: 2,400W<br>210V to 320V, power: 3,000W<br>The power supply supports reversible HVDC.<br>The HVDC-supported PDU socket should be provided.<br>Before connected to the PDU, the power core should be inserted into the power receiving port of the switch. Do not do it in a reverse way. |
| Power Supply Redundancy | The power supply redundancy of the same model is supported. |
| Fan Module | M18006X-FAN |
| EMC Standards | GB9254-2008 CLASS A<br>FCC CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| Storage Humidity | 5% to 95% RH |
| Altitude | Long term operation altitude: 3000m at 35°C( 95°F). The temperature decreases by 1°C as the altitude ranging from 3000m to 5,000m increases by 200m.<br>Operation altitude: -500m to 5,000m |
| MTBF | 870,000 hours |
| Noise | 62 dB at 27°C (80.6°F)<br>93 dB at 50°C (122°F) |
| Weight | 49kg (108.03lbs) |
| Dimensions (W x D x H) | Cable management brackets excluded: 442 mm x 893 mm x 308.4 mm(17.40 in. x 37.83 in. x 21.02 in.), 7U<br>Cable management brackets included: 442 mm x 956 mm x 308.4 mm(17.40 in. x 40.04 in. x 21.02 in.), 7U |

The weight only includes that of the empty chassis and fans. The whole device's weight is subject to that of the modules selected.

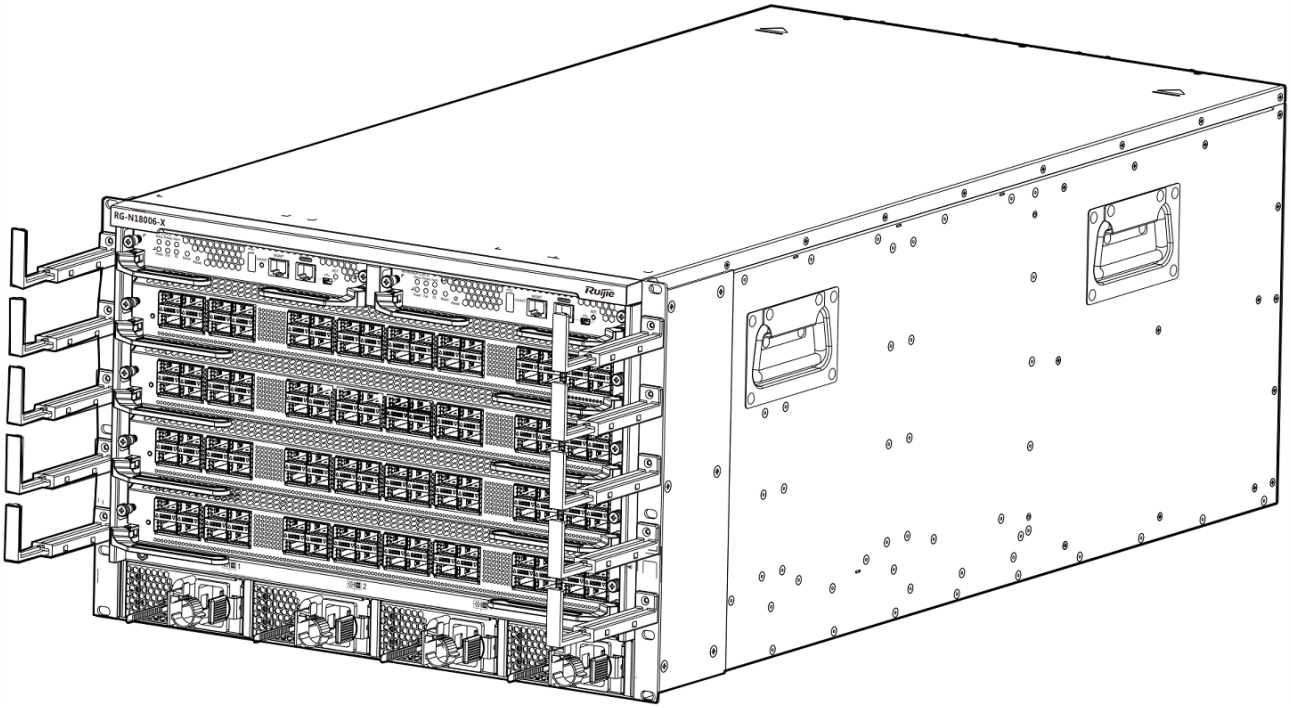
RG-N18006-X switch is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## Product Appearance

The hardware system of the RG-N18006-X switch is composed of the chassis, power system, system modules and cooling system.

- The power system provides four power supply slots and supports N+M power supply redundancy. Users are recommended to configure redundancy for the power supplies.
- The RG-N18006-X provides two supervisor module slots, four service module slots and six switch fabric module slots. The supervisor modules support 1+1 redundancy. We recommend users to configure redundancy for supervisor modules. Users may select different service modules as needed.
- The heat dissipation system is composed of fan trays and air filters. The fan tray is at the back of the chassis, and the service, supervisor modules and air filters are in the front of the chassis.

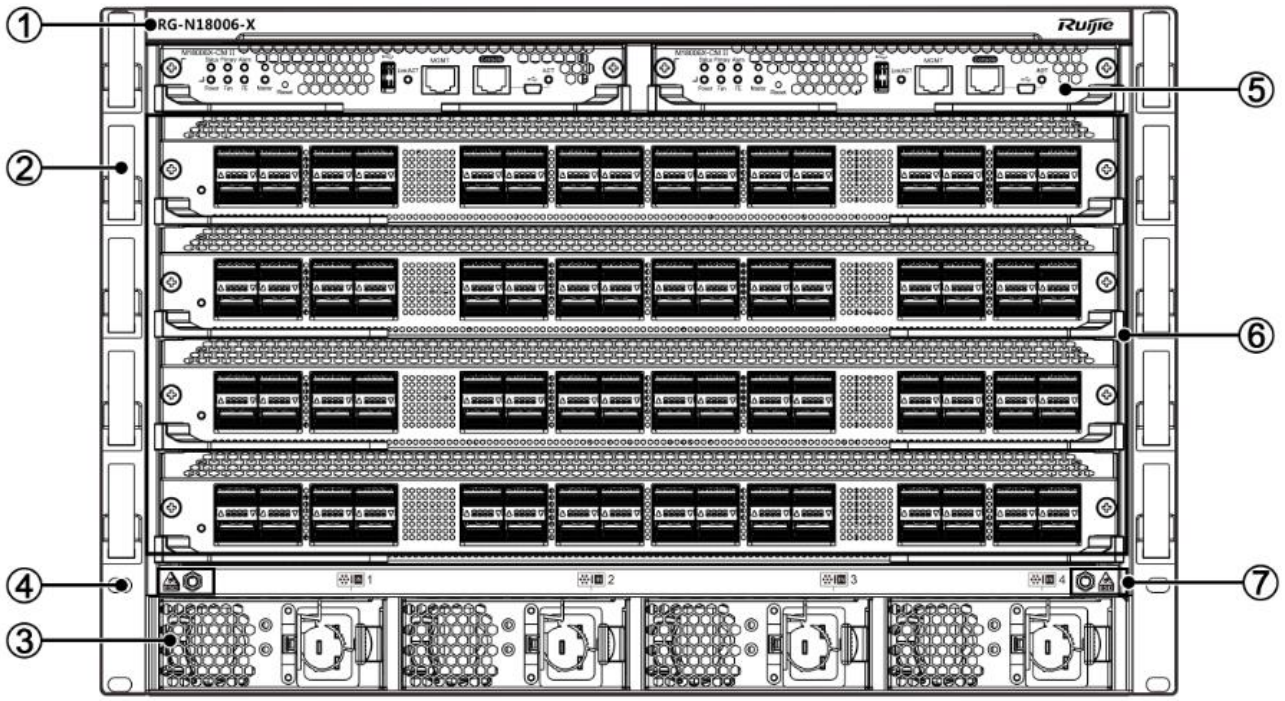
Figure 1-11 Appearance of the RG-N18006-X Switch




## Front Panel

The front panel of the RG-N18006-X switch is shown in the following figure.

Figure 1-12 Front Panel of the RG-N18006-X Switch



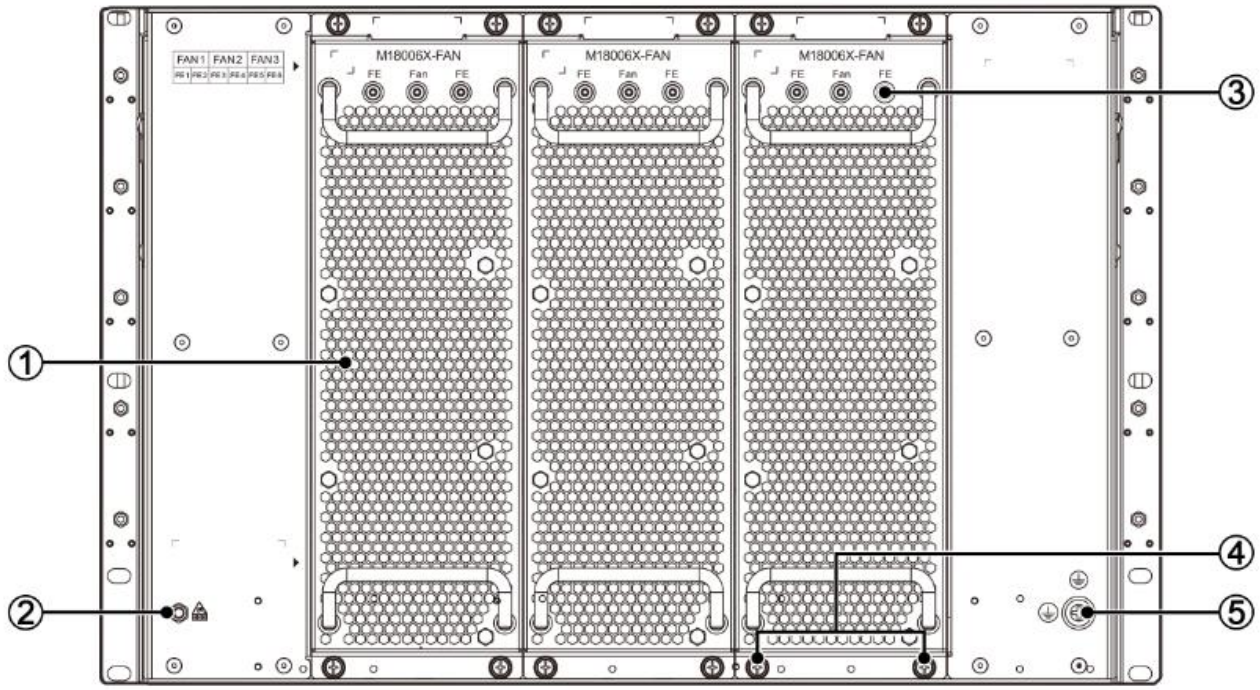

| Note | | |
|---|---|---|
| | ① Model name | ⑤ Supervisor module slot |
| | ② Cable management brackets | ⑥ Service module slot |
| | ③ Power supply module | ⑦ Anti-static wrist strap |
| | ④ Bracket | |

Ensure the supervisor module, service module, switch fabric module and power supply module are removed from the chassis before you move or transport the RG-N18006-X chassis.

## Back Panel

The back panel of the RG-N18006-X switch is shown in the following figure.

Figure 1-13 Back Panel of the RG-N18006-X Switch




| | | |
|---|---|---|
| Note | ① Fan module slot | ④ Captive screws of the fan module |
| | ② Anti-static wrist strap jack | ⑤ Grounding point |
| | ③ Fan module LED | |

## Power Supply

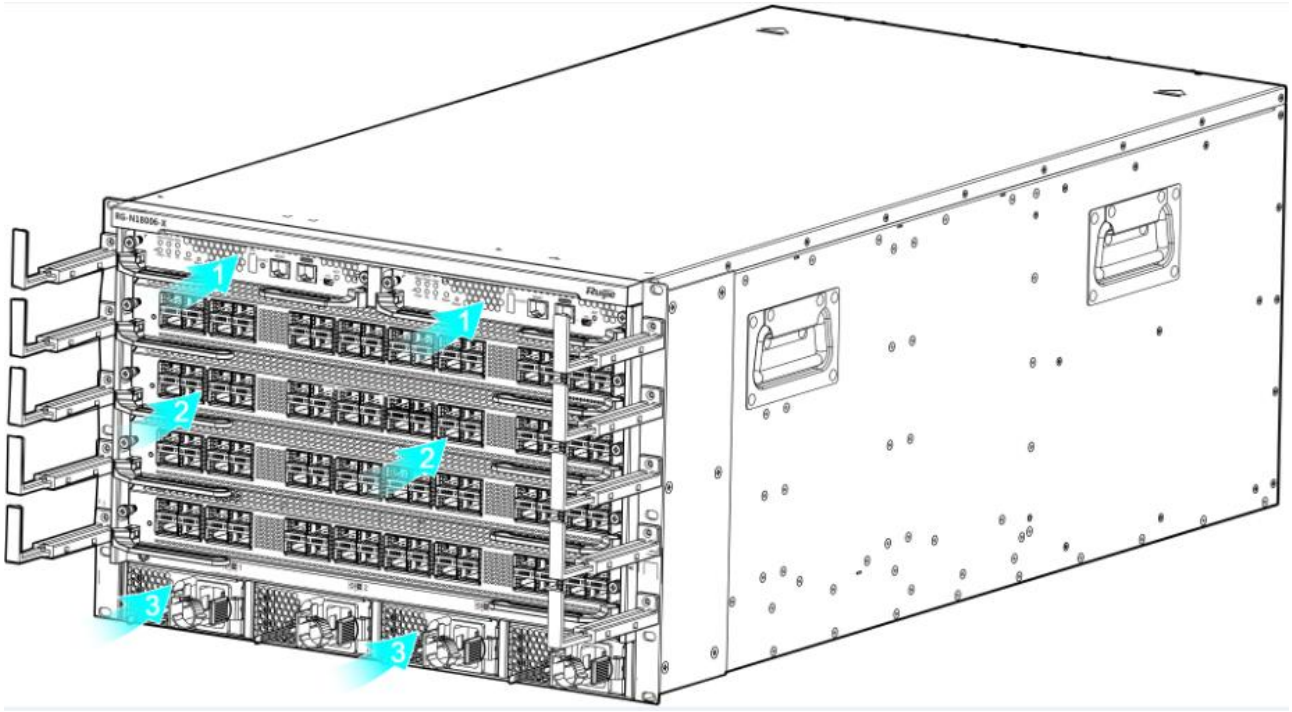
- AC input: The RG-PA3000I power supply module is supported. This type of power supply module supports power management. The supervisor module of the RG-N18006-X switch can read the power supply information and implement flexible and intelligent power management.

The RG-N18006-X switches support N+M power redundancy to improve the system stability and reliability. We recommend users to configure N+M redundancy for power supply modules.

## Heat Dissipation Solution

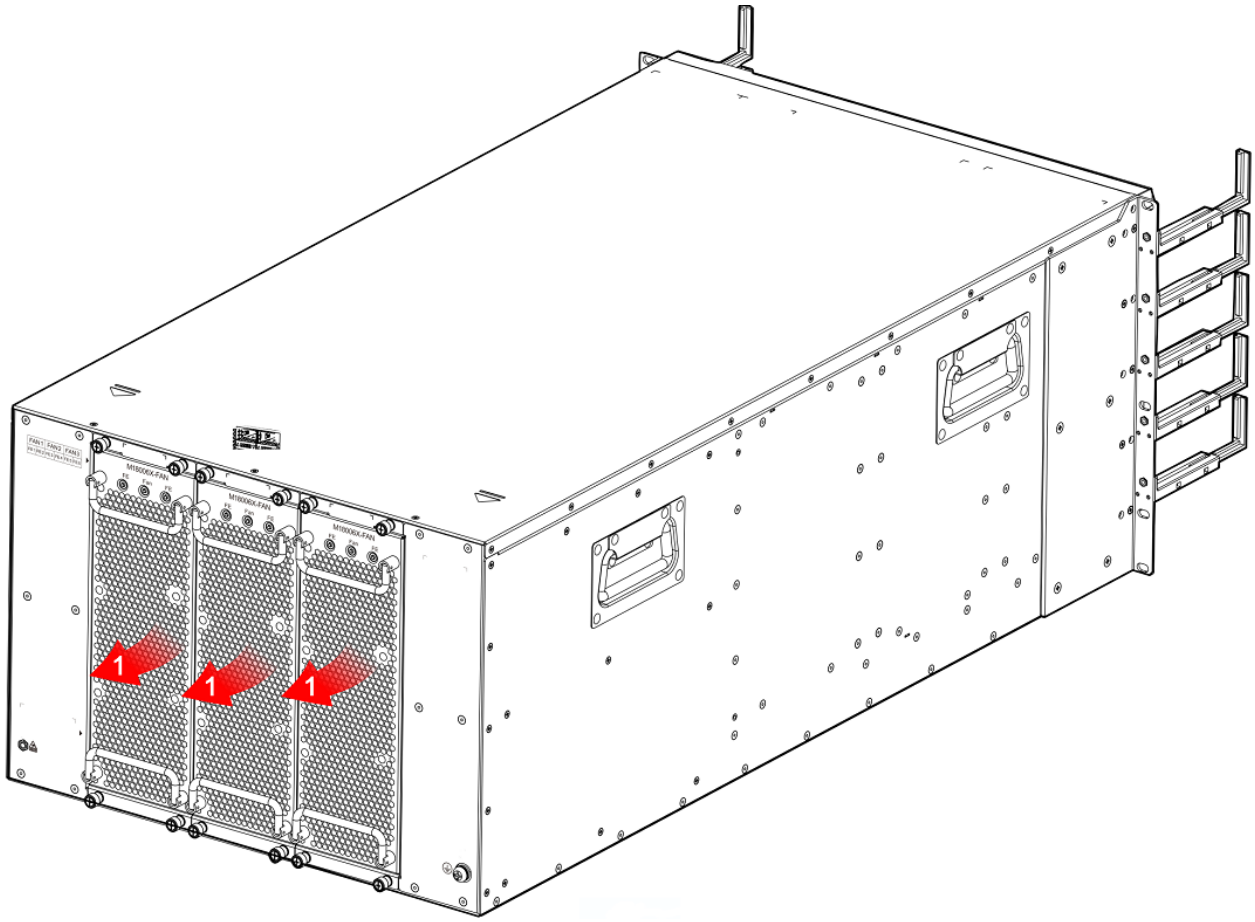
The operating environment temperature of RG-N18006-X switches ranges between 0°C and 45°C. The heat dissipation design must satisfy the requirement on the device's reliability in the temperature range while ensuring the device's safety and maintainability. RG-N18006-X uses fans to draw air to blow air for forced convection in order to ensure that the device works properly in the specified environment.

Figure 1-14 Ventilation and Heat Dissipation System of the RG-N18006-X Switch (Air Intakes)




Note:
① Air intakes for supervisor modules
② Air intakes for service modules
③ Air intakes for power supply modules

Figure 1-15 Ventilation and Heat Dissipation System of the RG-N18006-X Switch (Exhaust Vents)




Note: ① Exhaust vents for power supply, switch fabric, service and supervisor modules

- For supervisor and service modules, air flows in from the front intakes and out from the back vents.
- For the power supply modules, air flows in from the front intakes and out from the back vents.
- For the switch fabric modules, air flows in from the front intakes and out from the back vents.

The chassis should be mounted in a place with sufficient space for air circulation. Sufficient space (10 cm at least) must be reserved at the air intakes and exhaust vents for ventilation.

If any module slot is unoccupied, install a filler panel to ensure proper airflow. Ensure there is at least one filler panel installed in two neighboring unoccupied slots.

## 1.4 Module

The RG-N18000-X switch adopts the module-based design. Compliant with industry standards, the design divides modules and integrates module interfaces to ensure the switch system's functioning and independence of various function modules.

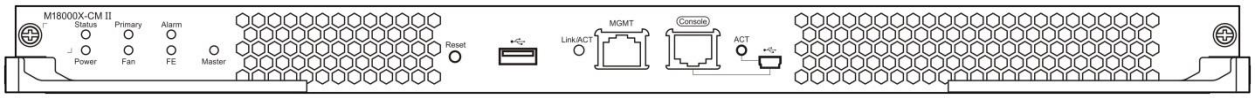
The modules of the RG-N18000-X switch provide 10G/40G/100G optical fiber interfaces.

### 1.4.1 M18000X-CM II

M18000X-CM II is the supervisor module of the RG-N18000-X series switches and is designed with management and switching functions.

#### Module Appearance

Figure 1-16 Appearance of the M18000X-CM II Module




## External Port

The M18000X-CM II module provides four external ports:

- Universal Serial Bus (USB) port: By connecting to the USB port, the USB storage devices can store logs, host version, alarms and other diagnosis information, facilitating online upgrade of switch software and storage of logs.

To secure data and prevent damage to the device, it is recommended to use high-quality flash disks produced by reliable manufacturers. The USB port is compatible with most USB controllers but may be unable to identify some USB disk models.

- 10/100/1000M MGMT port: As the 10/100/1000BASE-T Ethernet port, it uses the RJ-45 connector. This port can be used to connect the device to the Ethernet port of the background computer to load programs. Use the standard cable to connect the device to the Ethernet port of the background computer.
- Mini USB port: As a virtual USB serial port, this port can be used as a serial port for installing the software driver. It conducts commissioning, configuration, maintenance, management, and software loading.
- Console port: As a serial communications port, it uses the RS-232 interface level and standard RJ-45 connector. This port is used to connect the device to serial ports of background terminal computers to perform tasks including system commissioning, configuration, maintenance, management, and host software loading.

The default serial port is Console port. When a USB cable is inserted into the Mini USB port, this port becomes the serial port. When the USB cable is removed, Console port automatically becomes serial port.

## Button

The M18000X-CM II module provides a Reset button, which is used to reset the system. If the button is held for less than five seconds, it is a short press; if the button is held for five seconds or longer, it is a long press.

In case of a short press, the Status LED flashes in green. In case of a long press, the Status LED flashes in green and then flashes in red; the device resets within 5.5 min after the press.

Press the button, and the system starts to collect information, during which the device will not restart. After the collection is complete, the device restarts automatically. Hold the button for a while, the system starts to collect information. Then release the button, the device restarts automatically in 5.5 min.

## LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | Initialization is complete. |
| Primary/standby supervisor module LED | Primary | Off | The module acts as the standby supervisor module. |
| | | Solid green | The module acts as the primary supervisor module. |
| Fault alarm LED | Alarm | Off | No fault |
| | | Solid red | The system fails, interrupting functioning of the whole system or a module; the device may be damaged if it continues operating. |
| | | Solid yellow | The device overheats, which will affect the system performance. The system may continue operating. |
| Primary/standby supervisor module LED in switch stacks | Master | Off | In stacking mode, the module is the standby supervisor module or in the stand-alone mode |
| | | Solid green | In stacking mode, the module is the primary supervisor module. |
| Switch fabric module status LED | FE | Off | The module is NOT receiving power or is NOT in the position. |
| | | Solid green | The module is operational. |
| | | Solid red | One of the modules is faulty. |

| | | | |
|---|---|---|---|
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. (Any module is being initialized.) |
| Fan status LED | FAN | Solid green | The fan is operational. |
| | | Off | The fan is NOT in the position. (The fan tray is NOT in the position or is NOT receiving power.) |
| | | Solid red | The fan is faulty or is NOT in the position. |
| Power status LED | Power | Solid yellow | The power is insufficient for all modules in operation. |
| | | Solid green | The power supply module is operational. |
| | | Solid red | The power supply module is faulty. |
| MGMT port status LED | Link/ACT | Off | The MGMT port is NOT connected. |
| | | Green | The MGMT port is connected at 1000Mbps. |
| | | Yellow | The MGMT port is connected at 10/100Mbps. |
| | | Blinking | The MGMT port is transmitting or receiving data. |
| Mini USB port LED | ACT | Off | RJ45 serial port is in use. |
| | | Solid green | USB serial port is in use. |

### Specifications

| | |
|---|---|
| Model | M18000X-CM II |
| CPU | 32-core CPU, each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 8 GB |
| SDRAM | DDRIII 32GB DIMM |
| External Port | One Console port;<br>One 10/100/1000M MGMT port;<br>One USB port;<br>One Mini USB port |
| Button | One Reset button |
| Power Consumption | 96W |
| Hot Swapping | Supported |
| Management Redundancy | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 265,000 hours |
| Weight | Net weight: 4.7 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 29.98 mm |

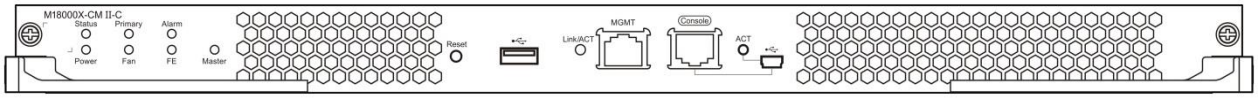
The M18000X-CM II adopts the CR2032 lithium battery. The device may explode if a wrong battery model is used. Used batteries should be properly disposed of.

## 1.4.2 M18000X-CM II-C

M18000X-CM II-C is the supervisor module of the RG-N18000-X series switches and is designed with management and switching functions.

### Module Appearance

Figure 1-17 Appearance of the M18000X-CM II-C Module




## External Port

The M18000X-CM II-C module provides four external ports:

- Universal Serial Bus (USB) port: By connecting to the USB port, the USB storage devices can store logs, host version, alarms and other diagnosis information, facilitating online upgrade of switch software and storage of logs.

To secure data and prevent damage to the device, it is recommended to use high-quality flash disks produced by reliable manufacturers. The USB port is compatible with most USB controllers but may be unable to identify some USB disk models.

- 10/100/1000M MGMT port: As the 10/100/1000BASE-T Ethernet port, it uses the RJ-45 connector. This port can be used to connect the device to the Ethernet port of the background computer to load programs. Use the standard cable to connect the device to the Ethernet port of the background computer.
- Mini USB port: As a virtual USB serial port, this port can be used as a serial port for installing the software driver. It conducts commissioning, configuration, maintenance, management, and software loading.
- Console port: As a serial communications port, it uses the RS-232 interface level and standard RJ-45 connector. This port is used to connect the device to serial ports of background terminal computers to perform tasks including system commissioning, configuration, maintenance, management, and host software loading.

The default serial port is Console port. When a USB cable is inserted into the Mini USB port, this port becomes the serial port. When the USB cable is removed, Console port automatically becomes serial port.

## Button

The M18000X-CM II-C module provides a Reset button, which is used to reset the system. If the button is held for less than five seconds, it is a short press; if the button is held for five seconds or longer, it is a long press.

In case of a short press, the Status LED flashes in green. In case of a long press, the Status LED flashes in green and then flashes in red; the device resets within 5.5 min after the press.

Press the button, and the system starts to collect information, during which the device will not restart. After the collection is complete, the device restarts automatically. Hold the button for a while, the system starts to collect information. Then release the button, the device restarts automatically in 5.5 min.

## LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | Initialization is complete. |
| Primary/standby supervisor module LED | Primary | Off | The module acts as the standby supervisor module. |
| | | Solid green | The module acts as the primary supervisor module. |
| Fault alarm LED | Alarm | Off | No fault |
| | | Solid red | The system fails, interrupting functioning of the whole system or a module; the device may be damaged if it continues operating. |
| | | Solid yellow | The device overheats, which will affect the system performance. The system may continue operating. |
| Primary/standby supervisor module LED in switch | Master | Off | In stacking mode, the module is the standby supervisor module or in the stand-alone mode |

| | | | |
|---|---|---|---|
| stacks | | Solid green | In stacking mode, the module is the primary supervisor module. |
| Switch fabric module status LED | FE | Off | The module is NOT receiving power or is NOT in the position. |
| | | Solid green | The module is operational. |
| | | Solid red | One of the modules is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. (Any module is being initialized.) |
| Fan status LED | FAN | Solid green | The fan is operational. |
| | | Off | The fan is NOT in the position. (The fan tray is NOT in the position or is NOT receiving power.) |
| | | Solid red | The fan is faulty or is NOT in the position. |
| Power status LED | Power | Solid yellow | The power is insufficient for all modules in operation. |
| | | Solid green | The power supply module is operational. |
| | | Solid red | The power supply module is faulty. |
| MGMT port status LED | Link/ACT | Off | The MGMT port is NOT connected. |
| | | Green | The MGMT port is connected at 1000Mbps. |
| | | Yellow | The MGMT port is connected at 10/100Mbps. |
| | | Blinking | The MGMT port is transmitting or receiving data. |
| Mini USB port LED | ACT | Off | RJ45 serial port is in use. |
| | | Solid green | USB serial port is in use. |

## Specifications

| | |
|---|---|
| Model | M18000X-CM II-C |
| CPU | 32-core CPU, each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 8 GB |
| SDRAM | DDRIII 16GB DIMM |
| External Port | One Console port;<br>One 10/100/1000M MGMT port;<br>One USB port;<br>One Mini USB port |
| Button | One Reset button |
| Power Consumption | 96W |
| Hot Swapping | Supported |
| Management Redundancy | Supported |

| | |
|---|---|
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 265,000 hours |
| Weight | Net weight: 4.9 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 29.98 mm |

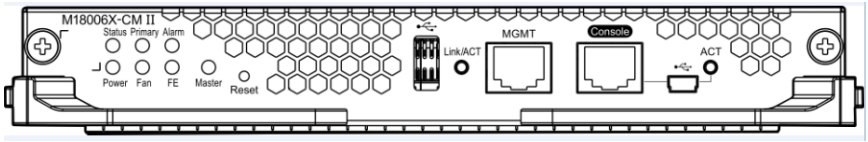
The M18000X-CM II-C adopts the CR2032 lithium battery. The device may explode if a wrong battery model is used. Used batteries should be properly disposed of.

## 1.4.3 M18006X-CM II

M18006X-CM II-C is the supervisor module of the RG-N18006-X series switches and is designed with management and switching functions.

### Module Appearance

Figure 1-18 Appearance of the M18006X-CM II-C Module




### External Port

The M18006X-CM II module provides four external ports:

- Universal Serial Bus (USB) port: By connecting to the USB port, the USB storage devices can store logs, host version, alarms and other diagnosis information, facilitating online upgrade of switch software and storage of logs.

To secure data and prevent damage to the device, it is recommended to use high-quality flash disks produced by reliable manufacturers. The USB port is compatible with most USB controllers but may be unable to identify some USB disk models.

- 10/100/1000M MGMT port: As the 10/100/1000BASE-T Ethernet port, it uses the RJ-45 connector. This port can be used to connect the device to the Ethernet port of the background computer to load programs. Use the standard cable to connect the device to the Ethernet port of the background computer.
- Mini USB port: As a virtual USB serial port, this port can be used as a serial port for installing the software driver. It conducts commissioning, configuration, maintenance, management, and software loading.
- Console port: As a serial communications port, it uses the RS-232 interface level and standard RJ-45 connector. This port is used to connect the device to serial ports of background terminal computers to perform tasks including system commissioning, configuration, maintenance, management, and host software loading.

The default serial port is Console port. When a USB cable is inserted into the Mini USB port, this port becomes the serial port. When the USB cable is removed, Console port automatically becomes serial port.

### Button

The M18006X-CM II module provides a Reset button, which is used to reset the system. If the button is held for less than five seconds, it is a short press; if the button is held for five seconds or longer, it is a long press.

In case of a short press, the Status LED flashes in green. In case of a long press, the Status LED flashes in green and then flashes in red; the device resets within 5.5 min after the press.

Press the button, and the system starts to collect information, during which the device will not restart. After the collection is complete, the device restarts automatically. Hold the button for a while, the system starts to collect information. Then release the button, the device restarts automatically in 5.5 min.

## LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | Initialization is complete. |
| Primary/standby supervisor module LED | Primary | Off | The module acts as the standby supervisor module. |
| | | Solid green | The module acts as the primary supervisor module. |
| Fault alarm LED | Alarm | Off | No fault |
| | | Solid red | The system fails, interrupting functioning of the whole system or a module; the device may be damaged if it continues operating. |
| | | Solid yellow | The device overheats, which will affect the system performance. The system may continue operating. |
| Primary/standby supervisor module LED in switch stacks | Master | Off | In stacking mode, the module is the standby supervisor module or in the stand-alone mode |
| | | Solid green | In stacking mode, the module is the primary supervisor module. |
| Switch fabric module status LED | FE | Off | The module is NOT receiving power or is NOT in the position. |
| | | Solid green | The module is operational. |
| | | Solid red | One of the modules is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. (Any module is being initialized.) |
| Fan status LED | FAN | Solid green | The fan is operational. |
| | | Off | The fan is NOT in the position. (The fan tray is NOT in the position or is NOT receiving power.) |
| | | Solid red | The fan is faulty or is NOT in the position. |
| Power status LED | Power | Solid yellow | The power is insufficient for all modules in operation. |
| | | Solid green | The power supply module is operational. |
| | | Solid red | The power supply module is faulty. |
| MGMT port status LED | Link/ACT | Off | The MGMT port is NOT connected. |
| | | Green | The MGMT port is connected at 1000Mbps. |
| | | Yellow | The MGMT port is connected at 10/100Mbps. |

| | | | |
|---|---|---|---|
| | | Blinking | The MGMT port is transmitting or receiving data. |
| Mini USB port LED | ACT | Off | RJ45 serial port is in use. |
| | | Solid green | USB serial port is in use. |

### Specifications

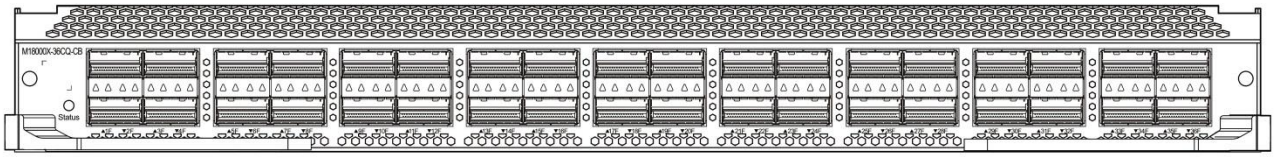
| | |
|---|---|
| Model | M18006X-CM II |
| CPU | 16-core CPU, each core with the clock speed of 1.5G |
| BOOTROM | 8 MB |
| Flash Memory | 8 GB |
| SDRAM | DDR4 16GB |
| External Port | One Console port;<br>One 10/100/1000M MGMT port;<br>One USB port;<br>One Mini USB port |
| Button | One Reset button |
| Power Consumption | 65W |
| Hot Swapping | Supported |
| Management Redundancy | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 763,000 hours |
| Weight | Net weight: 2.25 kg |
| Dimensions (W x D x H) | 208 mm x 522 mm x 29.98 mm |

The M18000X-CM II-C adopts the CR2032 lithium battery. The device may explode if a wrong battery model is used. Used batteries should be properly disposed of.

## 1.4.4 M18000X-36CQ-CB

### Module Appearance

Figure 1-19 Appearance of the M18000X-36CQ-CB Module




## External Port

It provides 36 QSFP28 ports. The QSFP28 ports support 100G QSFP28 modules, 40G QSFP+ modules, as well as 100G-4x25G and 40G-4x10G optical interface modules. Hot swapping of the M18000X-36CQ-CB and QSFP28/QSFP+ modules is supported.

M18000X-36CQ-CB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 module cannot be used as a 40G module.

## LED

When QSFP28 modules are in use, if the first port LED stays solid green, the port is connected at 100Gbps.

When QSFP28 modules are in use, if all the port LEDs stay solid green, the port is connected at 4x25Gbps.

When QSFP+ modules are in use, if the first port LED stays solid green, the port is connected at 40Gbps.

When QSFP+ modules are in use, if all the port LEDs stay solid green, the port is connected at 4x10Gbps.

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| QSFP28 port LED | 1F-36F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |

## Specifications

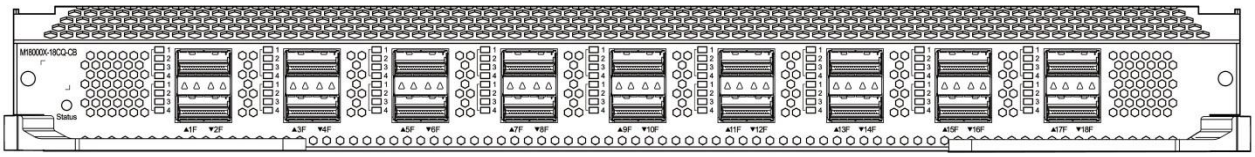
| | |
|---|---|
| Model | M18000X-36CQ-CB |
| CPU | 16-core CPU, each core with the clock speed of 1.5G |
| BOOTROM | 8 MB |
| Flash Memory | 8 GB |
| SDRAM | DDR4 8GB |
| Port Type | 36 QSFP28 ports, supporting 100G QSFP28 modules |
| Transmission Medium | 40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF<br><br>100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, QSFP28 port LED |
| Hot Swapping | Supported |
| Power Consumption | 903W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage | -40°C to 70°C (-40°F to 158°F) |

| | |
|---|---|
| Temperature | |
| Operating Humidity | 10%-90% RH (non-condensing) |
| MTBF | 100,000 hours |
| Weight | Net weight: 10.25 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |

## 1.4.5 M18000X-18CQ-CB

### Module Appearance

Figure 1-20 Appearance of the M18000X-18CQ-CB Module



### External Port

It provides 18 QSFP28 ports. The QSFP28 ports support 100G QSFP28, 40G QSFP+ modules, as well as 100G-4x25G and 40G-4x10G optical interface modules. Hot swapping of the M18000X-18CQ-CB and QSFP28/QSFP+ modules is supported.

M18000X-18CQ-CB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 module cannot be used as a 40G module.

### LED

When QSFP28 modules are in use, if the first port LED stays solid green, the port is connected at 100Gbps.

When QSFP28 modules are in use, if all the port LEDs stay solid green, the port is connected at 4x25Gbps.

When QSFP+ modules are in use, if the first port LED stays solid green, the port is connected at 40Gbps.

When QSFP+ modules are in use, if all the port LEDs stay solid green, the port is connected at 4x10Gbps.

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Solid yellow | High temperature alarm. The system keeps operating but the performance is affected. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| QSFP28 port LED | 1F-18F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |

### Specifications

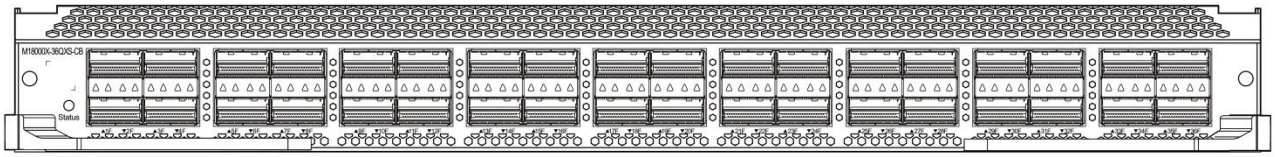
| | |
|---|---|
| Model | M18000X-18CQ-CB |
| CPU | 10-core CPU, each core with the clock speed of 1G |
| BOOTROM | 8 MB |
| Flash Memory | 1 GB |
| SDRAM | DDRIII 4GB |
| Port Type | 18 QSFP28 ports, supporting 100G QSFP28 modules |
| Transmission Medium | 40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF |

| | |
|---|---|
| | 100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, Link/ACT |
| Hot Swapping | Supported |
| Power Consumption | 475W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40 to 70°C (-40°F to 158°F) |
| Operating Humidity | 10%-90% RH (non-condensing) |
| MTBF | 200,000 hours |
| Weight | Net weight: 8.6 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |

## 1.4.6 M18000X-36QXS-CB

### Module Appearance

Figure 1-21 Appearance of the M18000X-36QXS-CB



### External Port

It provides 36 QSFP+ ports. The QSFP+ ports support 40G QSFP+ modules and 40G-4x10G optical interface modules. Hot swapping of the M18000X-36XS-CB and QSFP+ modules.

### LED

When QSFP+ modules are in use, if the first port LED stays solid green, the port is connected at 40Gbps.

When QSFP+ modules are in use, if all the port LEDs stay solid green, the port is connected at 4x10Gbps.

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| QSFP+ port LED | 1F-36F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected at 40Gbps. |
| | | Blinking | The port is transmitting and receiving data. |

### Specifications

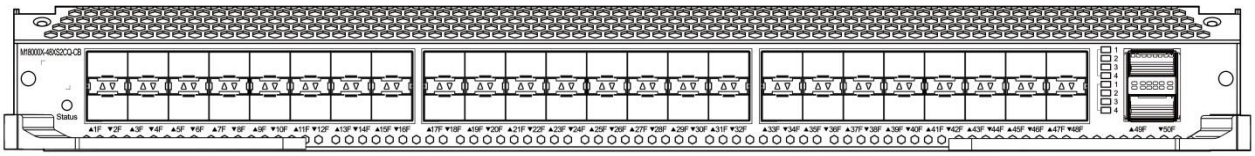
| | |
|---|---|
| Model | M18000X-36QXS-CB |
| CPU | 10-core CPU, each core with the clock speed of 1.1G |
| BOOTROM | 8 MB |
| Flash Memory | 1 GB |

| | |
|---|---|
| SDRAM | DDRIII 4GB |
| Port Type | 36 QSFP+ ports, supporting 40G QSFP+ modules and 40G-4x10G optical interface module |
| Transmission Medium | 40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF |
| LED | Status, Link/ACT |
| Hot Swapping | Supported |
| Power Consumption | 482W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10%-90% RH (non-condensing) |
| MTBF | 203,000 hours |
| Weight | Net weight: 8.8 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |

## 1.4.7 M18000X-48XS2CQ-CB

### Module Appearance

Figure 1-22 Appearance of the M18000X-48XS2CQ-CB



### External Port

It provides 48 SFP+ ports and two QSFP28 ports. The SFP+ ports support 10G SFP+ and Gigabit SFP modules. The QSFP28 ports support 100G QSFP28 and 40G QSFP+ modules. Hot swapping of the M18000X-48XS2CQ –CB, SFP, SFP+, QSFP+ and QSFP28 modules is supported.

The M18000X-48XS2CQ-CB supports 10G SFP+ and Gigabit SFP modules. The 10G SFP+ modules cannot be used as Gigabit modules. When Gigabit SFP modules are used in Port 25-40, Gigabit enforcing mode is supposed to be configured.

The M18000X-48XS2CQ-CB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 modules cannot be used as 40G modules.

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| SFP+ port LED | 1F-48F | Off | The port is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |
| QSFP28 port LED | 49F-50F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected. |

| | | | |
|---|---|---|---|
| | | Blinking | The port is transmitting and receiving data. |

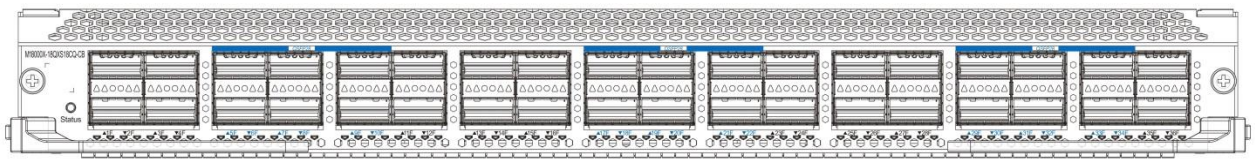
### Specifications

| | |
|---|---|
| Model | M18000X-48XS2CQ-CB |
| CPU | Quad-core CPU, each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 1 GB |
| SDRAM | DDRIII 4GB |
| Port Type | Provides 48 SFP+ ports that support 10G SFP+ modules and Gigabit SFP modules, and two QSFP28 ports that support 100G QSFP28 modules, 40G QSFP+ modules. |
| Transmission Medium | 1000BASE-SX(850nm) MMF<br>1000BASE-LX(1310nm) SMF<br>1000BASE-LH (1310nm) SMF<br>1000BASE-ZX(1550nm) SMF<br>10GBASE-SR(850nm) MMF<br>10GBASE-LR(1310nm) SMF<br>10GBASE-ER(1550nm) SMF<br>10GBASE-ZR(1550nm) SMF<br><br>40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF<br><br>100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, Link/ACT |
| Hot Swapping | Supported |
| Power Consumption | 275W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10%-90% RH (non-condensing) |
| MTBF | 279,000 hours |
| Weight | Net weight: 7.75 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |

## 1.4.8 M18000X-18QXS18CQ-CB

### Module Appearance

Figure 1-23 Appearance of the M18000X-18QXS18CQ-CB



### External Port

It provides 18 QSFP+ ports and 18 QSFP28 ports. The QSFP+ ports support 40G QSFP+ and 40G-4x10G optical interface modules. The QSFP28 ports support 100G QSFP28 and 40G QSFP+ modules as well as 40G-4x10G optical interface modules. Hot swapping of the M18000X-18QXS18CQ -CB, QSFP+ and QSFP28 modules is supported.

The M18000X-18QXS18CQ-CB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 modules cannot be used as 40G modules.

## LED

When QSFP28 modules are in use, if the first port LED stays solid green, the port is connected at 100Gbps.

When QSFP28 modules are in use, if all the port LEDs stay solid green, the port is connected at 4x25Gbps.

When QSFP+ modules are in use, if the first port LED stays solid green, the port is connected at 40Gbps.

When QSFP+ modules are in use, if all the port LEDs stay solid green, the port is connected at 4x10Gbps.

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| QSFP+ port LED | 1F-4F,11F-16F, 23F-28F,35-36F | Off | The port is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |
| QSFP28 port LED | 5F-10F,17F-22F, 29F-34F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |

## Specifications

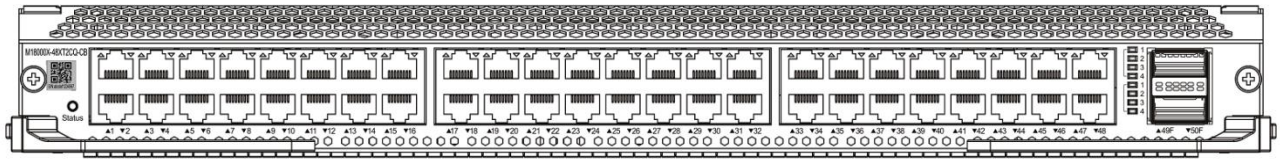
| | |
|---|---|
| Model | M18000X-18QXS18CQ-CB |
| CPU | 10-core CPU, each core with the clock speed of 1.1G |
| BOOTROM | 8 MB |
| Flash Memory | 1 GB |
| SDRAM | DDRIII 4GB |
| Port Type | Provides 18 QSFP+ ports that support 40G QSFP+ modules and 40G-4x10G optical interface modules, and 18 QSFP28 ports that support 100G QSFP28 modules, 40G QSFP+ modules and 40G-4x10G optical interface modules. |
| Transmission Medium | 40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF<br><br>100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, Link/ACT |
| Hot Swapping | Supported |
| Power Consumption | 570W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 203,000 hours |
| Weight | Net weight: 8.8 kg |
| Dimensions | 429 mm x 522 mm x 50 mm |

| | |
|---|---|
| (W x D x H) | |

## 1.4.9 M18000X-48XT2CQ-CB

Figure 1-24 Appearance of the M18000X-48XT2CQ-CB

### Module Appearance



### External Port

It provides 48 10G RJ45 ports and two QSFP28 ports. The RJ45 ports support 1G/10G auto-negotiation and full duplex. The QSFP28 ports support 100G QSFP28 modules and 40G QSFP+ modules. Hot swapping of M18000X-48XT2CQ-CB, QSFP+ and QSFP28 modules and crossover cables is supported.

The M18000X-48XT2CQ-CB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 modules cannot be used as 40G modules.

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational |
| RJ45 port LED | 1F-48F | Off | The port is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |
| QSFP28 port LED | 49F-50F | Off | The port link is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |

### Specifications

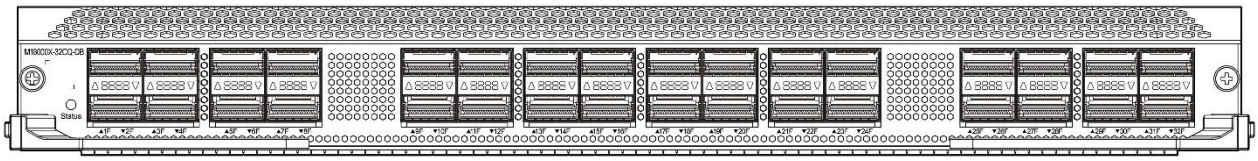
| | |
|---|---|
| Model | M18000X-48XT2CQ-CB |
| CPU | Quad-core CPU, each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 1 GB |
| SDRAM | DDRIII 4GB |
| Port Type | Provides 48 1G/10G RJ45 copper ports, and two QSFP28 ports that support 100G QSFP28 modules and 40GQSFP+ modules. |
| Transmission Medium | 1000BASE-T CAT-5 UTP crossover cables<br>10G BAST-E CAT-6 crossover cables<br><br>40GBASE-SR4 MMF<br>40GBASE-LR4 SMF<br><br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF<br><br>100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, Link/ACT |

| | |
|---|---|
| Hot Swapping | Supported |
| Power Consumption | 304W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 279,000 hours |
| Weight | Net weight: 8.2 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |

## 1.4.10 M18000X-32CQ-DB

### Module Appearance

Figure 1-25 Appearance of the M18000X-32CQ-DB Module



### External Port

It provides 32 QSFP28 ports. The QSFP28 ports support 100G QSFP28 and 40G QSFP+ modules. Hot swapping of the M18000X-32CQ-DB and QSFP28/QSFP+ modules is supported.

M18000X-32CQ-DB supports 100G QSFP28 and 40G QSFP+ modules. The 100G QSFP28 module cannot be used as a 40G module.

### LED

When QSFP28 modules are in use, if the port LED stays solid green, the port is connected at 100Gbps.

When QSFP+ modules are in use, if the port LED stays solid green, the port is connected at 40Gbps.

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |
| QSFP28 port LED | 1F-32F | Off | The port is NOT connected. |
| | | Solid green | The port is connected. |
| | | Blinking | The port is transmitting and receiving data. |

### Specifications

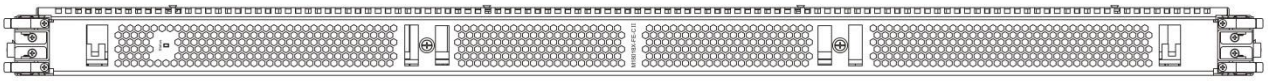
| | |
|---|---|
| Model | M18000X-32CQ-DB |
| CPU | Quad-core CPU, each core with the clock speed of 1.5G |
| BOOTROM | 8 MB |
| Flash Memory | 8 GB |
| SDRAM | DDR4 4GB |
| Port Type | 32 QSFP28 ports, supporting 100G QSFP28 modules |
| Transmission | 40GBASE-SR4 MMF |

| | |
|---|---|
| Medium | 40GBASE-LR4 SMF<br>40GBASE-LSR4 MMF<br>40GBASE-ER4 SMF<br><br>100GBASE-SR4 MMF<br>100GBASE-LR4 SMF<br>100GBASE-iLR4 SMF<br>100GBASE-eSR4 MMF |
| LED | Status, Link/ACT |
| Hot Swapping | Supported |
| Power Consumption | 795W |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40 to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 200,000 hours |
| Weight | Net weight: 9.6 kg |
| Dimensions (W x D x H) | 429 mm x 522 mm x 50 mm |
| | If M18000X-32CQ-DB is used with switch fabric module, only FE1-FE5 can be used. |

## 1.4.11 M18018X-FE-C II

### Module Appearance

Figure 1-26 Appearance of the M18018X-FE-C II Module



### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

### Specifications

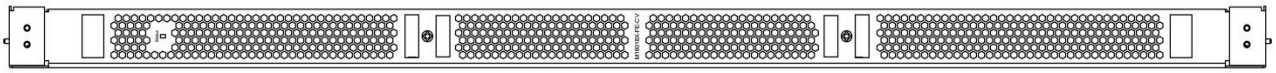
| | |
|---|---|
| Model | M18018X-FE-C II |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 512 GB |
| SDRAM | DDRIII 1 GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 270W |
| Hot Swapping | Supported |

| | |
|---|---|
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 275,000 hours |
| Weight | Net weight: 9.3 kg |
| Dimensions (W x D x H) | 47.76 mm x 270 mm x 877.5 mm |

## 1.4.12 M18018X-FE-C V

### Module Appearance

Figure 1-27 Appearance of the M18018X-FE-C V Module



### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

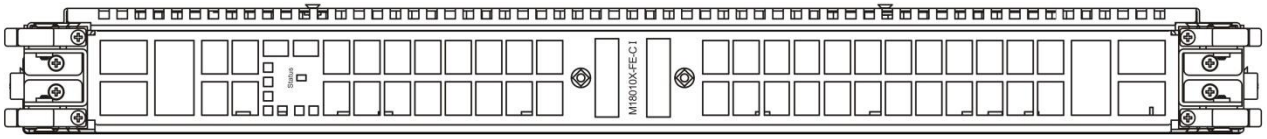
### Specifications

| | |
|---|---|
| Model | M18018X-FE-C V |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 512 MB |
| SDRAM | DDRIII 4 GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 606W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0 to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 226,000 hours |
| Weight | Net weight: 10.25 kg |
| Dimensions (W x D x H) | 47.76 mm x 270 mm x 877.5 mm |

## 1.4.13 M18010X-FE-C I

### Module Appearance

Figure 1-28 Appearance of the M18010X-FE-C I Module




### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

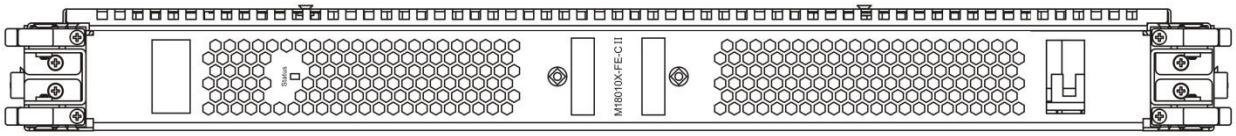
### Specifications

| | |
|---|---|
| Model | M18010X-FE-C I |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 512 MB |
| SDRAM | DDRIII 1 GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 156W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 441,000 hours |
| Weight | Net weight: 5.1 kg |
| Dimensions (W x D x H) | 47.5 mm x 291 mm x 479.4 mm |

## 1.4.14 M18010X-FE-C II

### Module Appearance

Figure 1-29 Appearance of the M18010X-FE-C II Module



### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

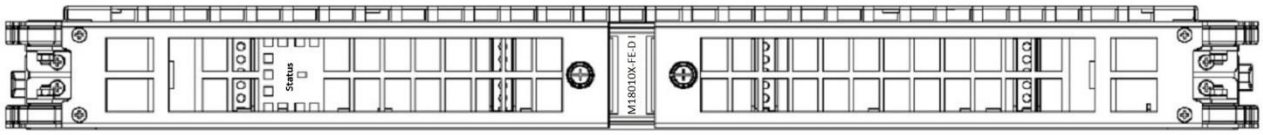
### Specifications

| | |
|---|---|
| Model | M18010X-FE-C I |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 512 MB |
| SDRAM | DDRIII 1 GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 273W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C(-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 272,000 hours |
| Weight | Net weight: 5.6 kg |
| Dimensions (W x D x H) | 47.76 mm x 291 mm x 479.4mm |

## 1.4.15 M18010X-FE-D I

### Module Appearance

Figure 1-30 Appearance of the M18010X-FE-D I Module




### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |

| | | | |
|---|---|---|---|
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

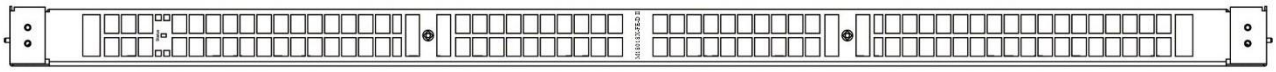
### Specifications

| | |
|---|---|
| Model | M18010X-FE-D I |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 16GB (EMMC) |
| SDRAM | DDRIII 2GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 350W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 272,000 hours |
| Weight | Net weight: 6.0 kg |
| Dimensions (W x D x H) | 47.5 mm x 291 mm x 479.4 mm |

## 1.4.16 M18018X-FE-D II

### Module Appearance

Figure 1-31 Appearance of the M18010X-FE-D II Module



### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

### Specifications

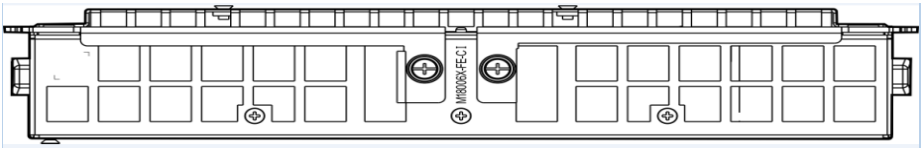
| | |
|---|---|
| Model | M18010X-FE-D II |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 16GB (EMMC) |
| SDRAM | DDRIII 4GB |
| External port | N/A |
| LED | Status |

| | |
|---|---|
| Power Consumption | 589W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 226,000 hours |
| Weight | Net weight: 9.64 kg |
| Dimensions (W x D x H) | 47.76 mm x 270 mm x 877.5 mm |

## 1.4.17 M18006X-FE-C I

### Module Appearance

Figure 1-32 Appearance of the M18006X-FE-C I Module



### External Port

- N/A

### LED

| LED | Identification on the panel | Status | Meaning |
|---|---|---|---|
| System LED | Status | Off | The module is NOT receiving power. |
| | | Solid red | The module is faulty. |
| | | Blinking green | Initialization is in progress. Continuous blinking indicates errors. |
| | | Solid green | The module is operational. |

### Specifications

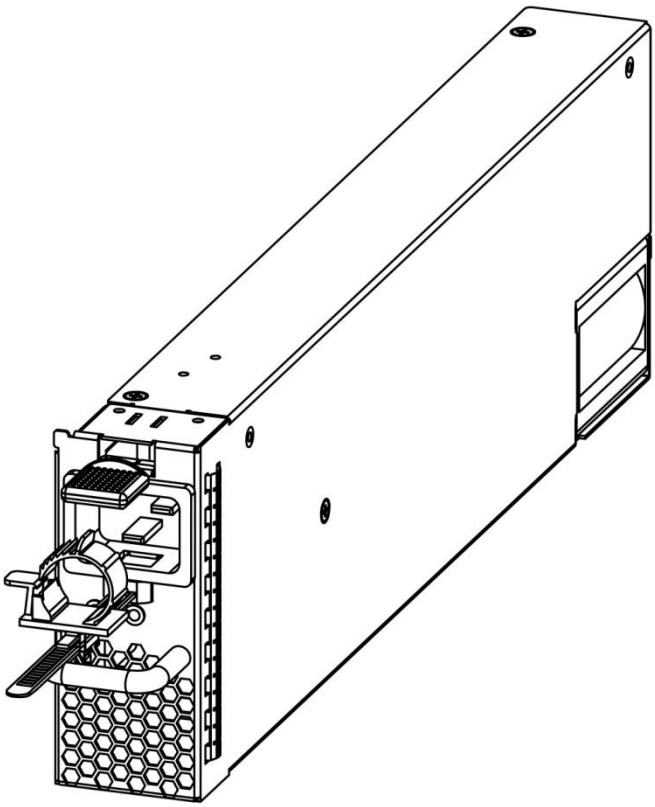
| | |
|---|---|
| Model | M18006X-FE-C I |
| CPU | Quad-core CPU , each core with the clock speed of 1.0G |
| BOOTROM | 8 MB |
| Flash Memory | 1GB |
| SDRAM | DDRIII 2GB |
| External port | N/A |
| LED | Status |
| Power Consumption | 150W |
| Hot Swapping | Supported |
| EMC Standards | GB9254-2008 CLASS A |
| Safety Standards | GB4943-2011 |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Operating Humidity | 10% to 90% RH (non-condensing) |
| MTBF | 860,000 hours |
| Weight | Net weight: 2.94 kg |

| | |
|---|---|
| Dimensions (W x D x H) | 47.5 mm x 245.8 mm x 261.4 mm |

## 1.4.18 RG-PA2700I

### Module Appearance

Figure 1-33 Appearance of the RG-PA2700I Module



### External port

The RG-PA2700I module provides 54 VAC input to the overall system of the RG-NN18010-X and RG-N18018-X switch. The front panel of the power supply module provides a 3-pin power port, which can be connected to standard 16A power cord.

### LED

| LED | | Meaning |
|---|---|---|
| IN | OUT | |
| Solid green | Solid green | The module is operational |
| Off | Off | There is no power input. |
| Solid green | Solid red | Undervoltage |
| Solid green | Solid red | Overvoltage. |
| Solid green | Solid red | Overcurrent. |
| Solid green | Solid orange | Temperature alarm |
| Solid green | Solid red | Over-temperature fault |

### Specifications

| | |
|---|---|
| Module Model | RG-PA2700I |
| Rated Voltage Range | 100 VAC to 240VAC; 50/60Hz |

| | |
|---|---|
| Max Voltage Range | 90 VAC to 290VAC; 47/63Hz |
| Max Power Output | 100VAC to 105VAC power: 1,200W<br>105VAC to 176VAC power: 1,450W<br>175VAC to 200VAC power: 2,400W<br>200VAC to 240VAC power: 2,700W |
| High Current DC Parameter | 192VDC to 350VDC power: 2,700W |
| Input Leakage Current | ≤3.5mA |
| Weight | Net weight: 2.05 kg (Single module; power cord excluded) |
| Power Cord Requirement | 16A power cord |

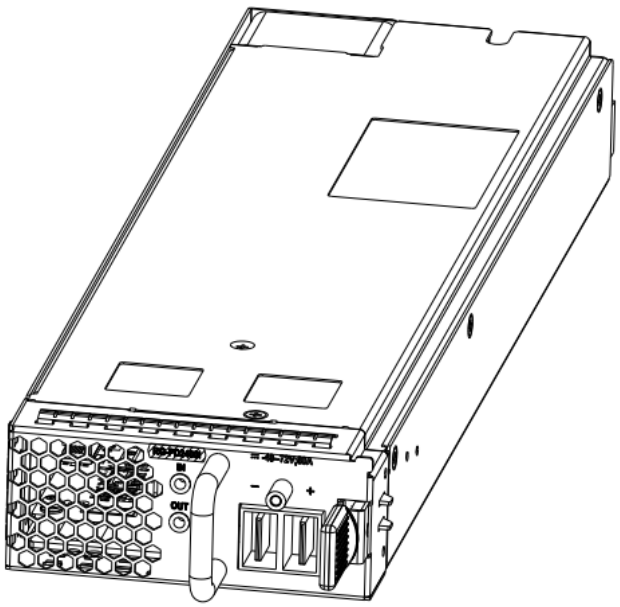
When you plug in the power cord, please fasten the anti-loose buckle to the power cord to prevent loosening.

Please do not insert RG-PA2700I into RG-N18006-X.

## 1.4.19 RG-PD2400I

### Module Appearance

Figure 1-34 Appearance of the RG-PA2400I Module



### External port

The RG-PD2400I module provides 54 VDC input to the overall system of the RG-N18010-X switch. The front panel of the power supply module provides a power port, which can be connected to standard 60A power cord.

### LED

| LED | | Meaning |
|---|---|---|
| IN | OUT | |
| Solid green | Solid green | The module is operational |
| Off | Off | There is no power input. |
| Solid green | Solid red | Undervoltage. |
| Solid green | Solid red | Overvoltage. |
| Solid green | Solid red | Overcurrent. |
| Solid green | Solid orange | Temperature alarm |
| Solid green | Solid red | Over-temperature fault |

### Specifications

| | |
|---|---|
| Module Model | RG-PD2400I |
| Rated Voltage Range | -40 VDC to -72VDC |
| Max Voltage Range | -40 VDC to -72VDC |
| Max Power Output | 2,400W |
| Weight | Net weight: 2.05 kg (Single module; power cord excluded) |
| Power Cord Requirement | 60A power cord |

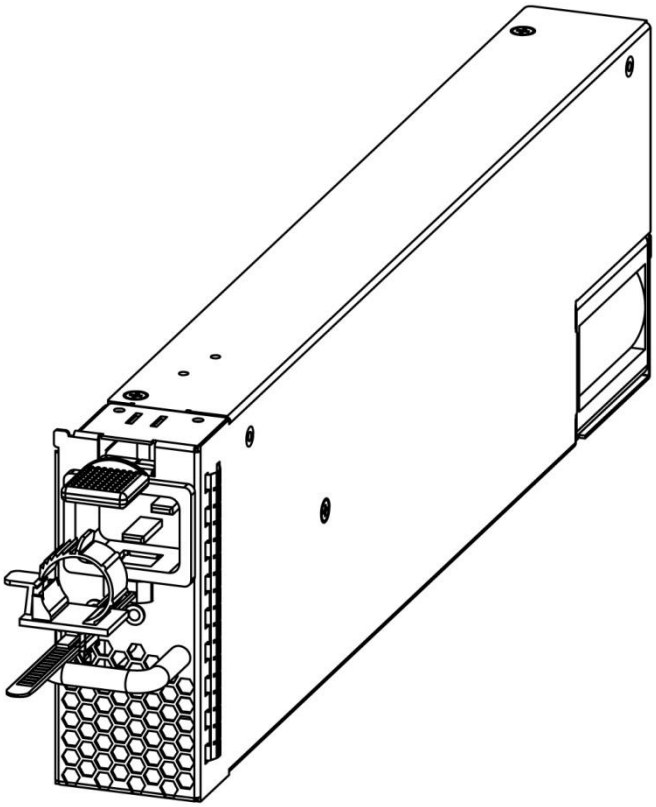
When you plug in the power cord, please fasten the anti-loose screw to the power cord to prevent loosening.

Please do not insert RG-PA2400I into RG-N18006-X.

## 1.4.20 RG-PA3000I-F

### Module Appearance

Figure 1-35 Appearance of the PA3000I-F Module



### External port

The RG-PA3000I-F module provides 54 VDC input to the overall system of the RG-N18006-X switch. The front panel of the power supply module provides a power port, which can be connected to standard 16A power cord.

### LED

| LED | | Meaning |
|---|---|---|
| IN | OUT | |
| Solid green | Solid green | The module is operational |
| Off | Off | There is no power input. |
| Solid green | Solid red | Undervoltage. |

| | | |
|---|---|---|
| Solid green | Solid red | Overvoltage. |
| Solid green | Solid red | Overcurrent. |
| Solid green | Solid orange | Temperature alarm |
| Solid green | Solid red | Over-temperature fault |

### Specifications

| | |
|---|---|
| Module Model | RG-PA3000I-F |
| Rated Voltage Range | 100-240V~; 50/60Hz |
| Max Voltage Range | 90-290V~; 47-63Hz |
| Max Power Output | 100-105V~ Power: 1200W<br>105-176V~ Power:1450W<br>176-205V~ Power: 2400W<br>205-240V~ Power: 3000W |
| HVDC | 192VDC-210VDC Power: 2400W<br>210VDC-320VDC Power: 3000W |
| Leakage Current | ≤3.5mA |
| Weight | Net weight: 2.1 kg (Single module; power cord excluded) |
| Power Cord Requirement | 16A power cord |

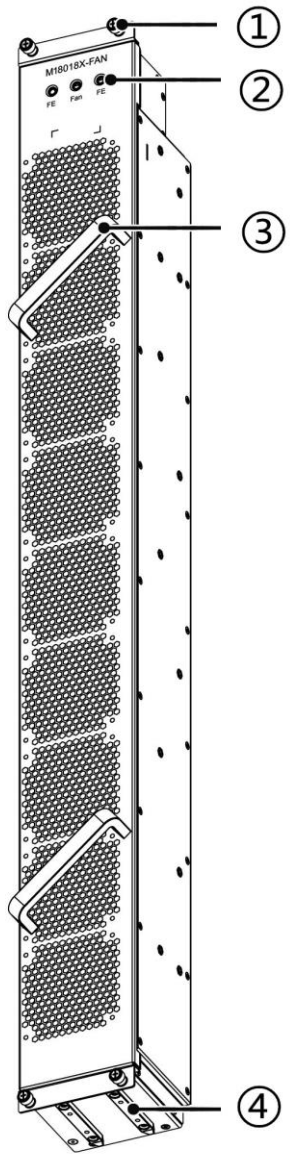
When you plug in the power cord, please fasten the anti-loose screw to the power cord to prevent loosening.

Please do not insert RG-PA3000I-F into RG-N18010-X or RG-N18018-X.

## 1.4.21 M18018X-FAN

### Module Appearance

Figure 1-36 Appearance of the M18018X-FAN Module




Note:
① Captive screws of the fan tray
② Fan status LED
③ Fan handle
④ Nylon slide

## Composition

The M18018X-FAN is the fan for service, management and switch fabric modules on the RG-N18018-X. There are three M18018X-FAN trays drawing air out to form convection for heat dissipation.

## Specifications

| | |
|---|---|
| Power | 633.3 W |
| Weight | 7.65 KG |
| Dimension (W x D x H) | 95.72 mm x 133.26 mm x 924.65 mm |

## LED

| LED | Status | Meaning |
|---|---|---|

| | | |
|---|---|---|
| Status | Off | The fan is NOT receiving power or fails. |
| | Solid green | The fan is operational. |
| | Solid red | The fan is faulty. |
| FE (two—one on the left and one on the right) | Off | The corresponding switch fabric module is NOT receiving power. |
| | Solid red | The corresponding switch fabric module is faulty. |
| | Blinking green | The corresponding switch fabric module is being initialized. But continuous blinking indicates abnormal module. |
| | Solid green | Initialization is complete for the corresponding switch fabric module. And the module is operational. |

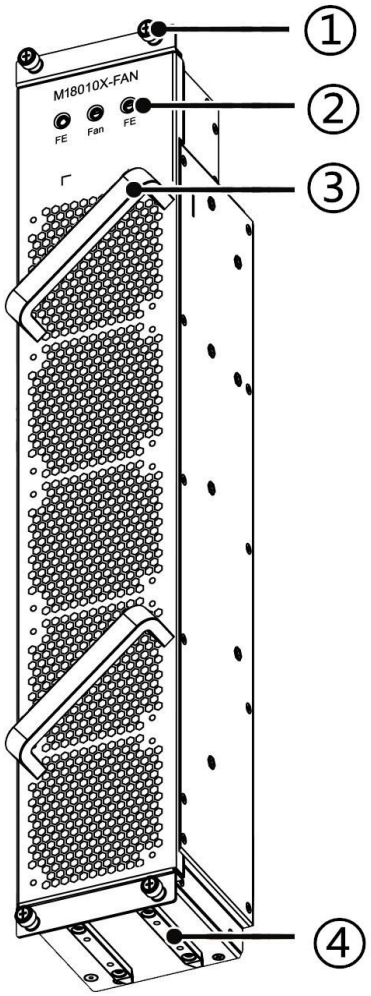
### Features

| Function | Meaning |
|---|---|
| Status Monitoring | Rotational speed monitoring, failure alarm |
| Automatic Speed-adjustment | Speed-adjustment controlled by temperature |
| Hot Swapping | Hot swapping is supported by the fan tray. |

## 1.4.22 M18010X-FAN

### Module Appearance

Figure 1-37 Appearance of the M18010X-FAN Module



Note: ① Captive screws of the fan tray
② Fan status LED
③ Fan handle
④ Nylon slide

### Composition

The M18010X-FAN is the fan for service, management and switch fabric modules on the RG-N18010-X. There are three M18010X-FAN trays drawing air out to form convection for heat dissipation.

### Specifications

| | |
|---|---|
| Power | 425 W |
| Weight | 4.4 KG |
| Dimension (W x D x H) | 96.02 mm x 102.8 mm x 496.4 mm |

### LED

| LED | Status | Meaning |
|---|---|---|
| Status | Off | The fan is NOT receiving power or fails. |
| | Solid green | The fan is operational. |
| | Solid red | The fan is faulty. |
| FE (two—one on the left and one on the right) | Off | The corresponding switch fabric module is NOT receiving power. |
| | Solid red | The corresponding switch fabric module is faulty. |
| | Blinking green | The corresponding switch fabric module is being initialized. But continuous blinking indicates abnormal module. |
| | Solid green | Initialization is complete for the corresponding switch fabric module. And the module is operational. |

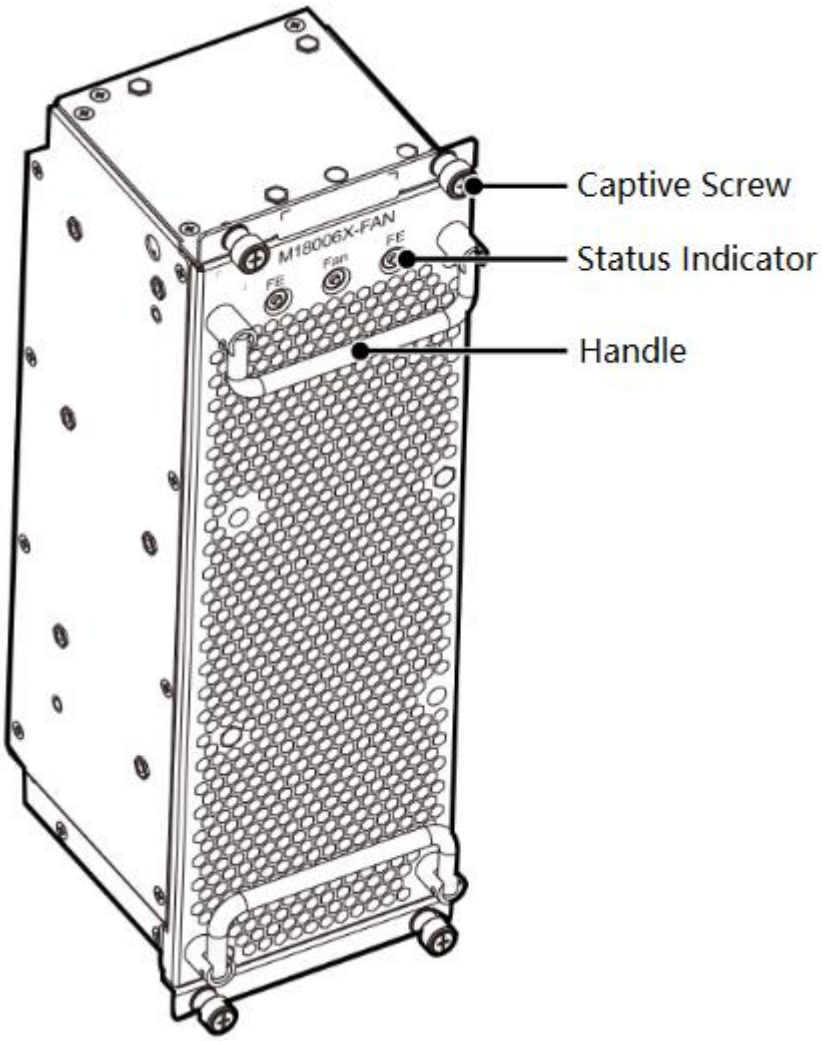
### Features

| Function | Meaning |
|---|---|
| Status Monitoring | Rotational speed monitoring, failure alarm |
| Automatic Speed-adjustment | Speed-adjustment controlled by temperature |
| Hot Swapping | Hot swapping is supported by the fan tray. |

## 1.4.23 M18006X-FAN

Module Appearance

Figure 1-38 Appearance of the M18006X-FAN Module




## Composition

The M18006X-FAN is the fan for service, management and switch fabric modules on the RG-N18006-X. There are three M18006X-FAN trays drawing air out to form convection for heat dissipation.

## Specifications

| | |
|---|---|
| Power | 247 W |
| Weight | 2.7 KG |
| Dimension (W x D x H) | 96.02 mm x 114.6 mm x 302.8 mm |

## LED

| LED | Status | Meaning |
|---|---|---|
| Status | Off | The fan is NOT receiving power or fails. |
| | Solid green | The fan is operational. |
| | Solid red | The fan is faulty. |
| FE (two—one on the left and one on the right) | Off | The corresponding switch fabric module is NOT receiving power. |
| | Solid red | The corresponding switch fabric module is faulty. |
| | Blinking green | The corresponding switch fabric module is being initialized. But continuous blinking indicates abnormal module. |
| | Solid green | Initialization is complete for the corresponding switch fabric module. And the module is operational. |

## Features

| Function | Meaning |
| --- | --- |
| Status Monitoring | Rotational speed monitoring, failure alarm |
| Automatic Speed-adjustment | Speed-adjustment controlled by temperature |
| Hot Swapping | Hot swapping is supported by the fan tray. |

# 2 Preparation before Installation

## 2.1 Safety Suggestions

To avoid body injury and equipment damage, please carefully read the safety suggestions before you install RG-N18000-X.

The following safety suggestions do not cover all possible dangers.

### 2.1.1 General Suggestions

- Take security measures (such as wearing an anti-static wrist strap) to ensure safety.
- Keep the chassis clean, free from any dust. Please do not place the switch at a damp place to prevent the moisture from entering the switch.
- Make sure the installation site is dry and flat. Take skid-proof measures.
- Do not place the equipment in a walking area.
- Do not wear loose clothes or any other things that may be caught by the chassis during installation and maintenance.
- Moving or lifting the switch and its components requires team work. Be careful not to get hurt.

### 2.1.2 Safety Precautions for Removal

RG-N18000-X is large and heavy. When you handle them, please pay attention to the following requirements:

- Avoid moving the equipment frequently.
- Turn off all power supplies and unplug all power cables before you remove the equipment.
- At least four people are needed to move the equipment. Do not attempt to move the equipment by one people only.
- Keep balance when moving the equipment, and avoid injuring your leg and feet or spraining your waist.

Do not move the equipment by grasping the panel, power supply handle, ventilation holes of the chassis, as they are not designed to bear the weight of the entire equipment. This may cause damage or even injure you.

Remove all supervisor modules, service modules and power modules before you move the device, to reduce the chassis weight.

The device must be installed and used in the restricted access location.

### 2.1.3 Electrical Safety

- Please observe local regulations and specifications when performing electrical operations. Relevant operators must be qualified.
- Please carefully check for any potential danger in the working area, for example, ungrounded power supply, unreliable grounding of the power supply and damp/wet ground or floor.
- Find out the location of the emergency power supply switch in the room before installation. First cut off the power supply in case of an accident.
- Be sure to make a careful check before you shut down the power supply.
- Do not place the equipment in a damp/wet location. Do not let any liquid enter the chassis

Any nonstandard and inaccurate electrical operation can cause an accident such as fire or electrical attack, thus causing severe even fatal damages to human bodies and equipment.

Direct or indirect touch through a wet object on high-voltage and mains supply can bring a fatal danger.

### 2.1.4 Static Discharge Damage Prevention

Although much has been done in RG-N18000-X to prevent static electricity, great damage may be caused to the circuitry and equipment when the static electricity exceeds a certain limit. In the communication network of the RG-N18000-X, electrostatic induction may come from the following sources: External electric field produced by the high-voltage supply cable, lightning, etc; internal systems such as the indoor floor and the entire structure.

To prevent damage from static electricity, you must pay attention to the following:

- Properly ground the equipment.

- Take dust prevention measures in the room.
- Maintain an appropriate humidity.
- Always wear an anti-static wrist strap when you touch any circuit board.
- Try to hold a circuit board by its edges. Do not touch any components or the PCB.
- Use an anti-static shielding bag to properly store the board.
- Do not let any clothes touch a circuit board. An antistatic wrist strap can only prevent human static electricity from damaging the circuit board, but cannot prevent any static electricity on clothes.

The N18000 series switches are equipped with an anti-static wrist strap. For the RG-N18018-X, RG-N18010-X and RG-N18007 switches, the anti-static wrist strap socket locates at the lower-right corners of the front and back panels.

## Wearing an Anti-Static Wrist Strap

The N18000 series switches are equipped with an anti-static wrist strap. To protect electronic components against static electricity, wear an anti-static wrist strap close to your skin and keep it properly grounded while installing swappable modules.

Use an anti-static wrist strap as follows:

Ensure that the switch is properly grounded.

Put your hand in the anti-static wrist strap.

Tighten the buckle till the trap is closely attached to your skin.

For safety, use a multimeter to measure the resistance between yourself and the ground, which should be within the range from 1 to 10 Ω.

Make sure that the switch is properly grounded when the anti-static wrist strap is connected to the ground through the chassis jack.

Figure 2-1 Preventing EMI on RG-N18018-X

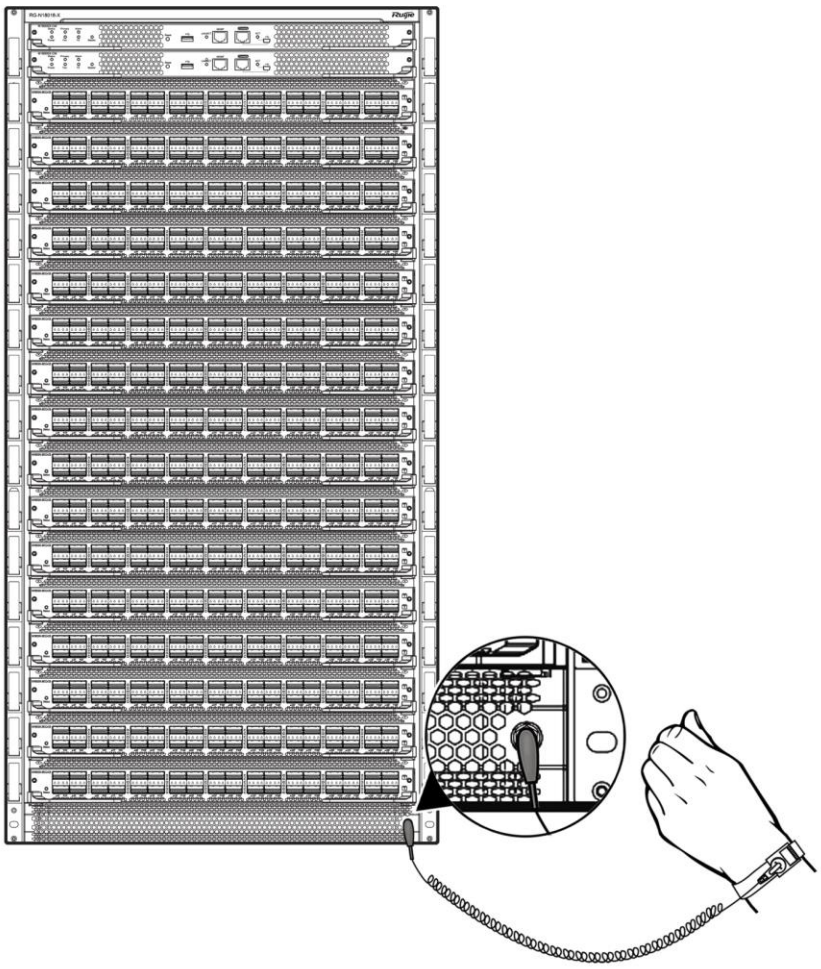
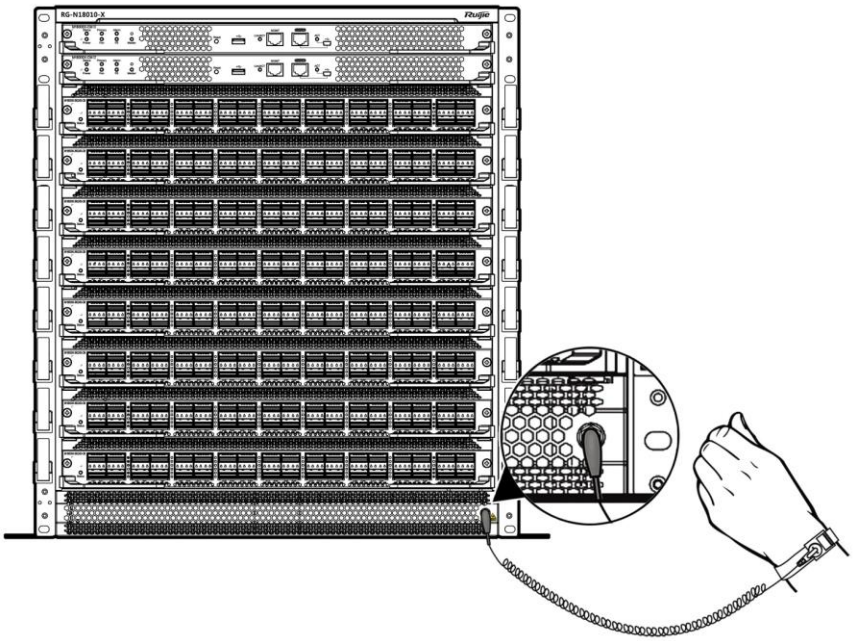


Figure 2-2 Preventing EMI on RG-N18010-X



## 2.1.5 Laser Safety

Among the modules supported by RG-N18000-X, there are a great number of optical modules that are Class I laser products.

Precautions:

- When a fiber transceiver works, ensure that the port has been connected with a fiber or is covered with a dust cap so as to keep out dust and avoid burning your eyes.
- Do not stare into any fiber port.

Do not stare into any fiber port under any circumstances, as this may cause permanent damage to your eyes.

## 2.2 Installation Site Requirements

RG-N18000-X must be used in the room. To ensure normal operation and a prolonged useful life of the equipment, the installation site must meet the following requirements.

### 2.2.1 Load Bearing Requirements

Evaluate the load bearing requirements for the ground according to the weight of the switch and its components (such as the cabinet, chassis, single board and power supply). Make sure the installation site meet the requirements.

### 2.2.2 Space Requirements

- It is recommended that the width of the machine room corridor be greater than 0.8m to ensure enough space for moving of chassis and plugging and removing of modules.
- Please do not install the switch against the wall. Instead, please leave some space around the switch for heat dissipation and switch maintenance.

### 2.2.3 Ventilation Requirements

See *RG-N18000-X* in *Product Overview* for their heat dissipation and ventilation respectively. Sufficient space (10 cm at least) must be reserved at the air intakes and exhaust vents for ventilation. After connecting various cables, you should bundle the cables or place them in the cable management bracket to avoid blocking air intakes.

Remove all foam packaging materials and protective plastics before you power on RG-N18000-X.

### 2.2.4 Temperature Requirements

To ensure the normal operation and a prolonged useful life of the RG-N18000-X, you must maintain an appropriate temperature in the equipment room. Too high or low temperature for a long period of time may damage the equipment.

- In an environment with high temperature, the equipment is subjected to even greater harm, as its performance may degrade significantly and its useful life may be shortened in the case of long-term exposure that expedites the aging process.

Temperature Requirements of the RG-N18000-X

| Operating Temperature | Storage Temperature |
|---|---|
| 0ºC to 40ºC(32°F to 104°F) | -40ºC to 70ºC(-40°F to 158°F) |

The ambient temperature is measured at the point that is 1.5m above the floor and 0.4m before the equipment when there is no protective plate in front or back of the equipment rack.

### 2.2.5 Humidity Requirements

To ensure the normal operation and a prolonged use life of the RG-N18000-X, you must maintain an appropriate humidity in the equipment room. Too high or low humidity for a long period of time may damage the equipment.

- In an environment with high relative humidity, the insulating material may have bad insulation or even leak electricity, and sometimes the materials may suffer from mechanical performance change and metallic parts may get rusted.
- On the other hand, in an environment with low relative humidity, the insulating strip may dry and shrink, and static electricity may occur easily and endanger the circuit on the equipment.

Humidity Requirements of the RG-N18000-X

| Operating Humidity | Storage Humidity |
|---|---|
| 10% to 90% (non-condensing) | 5% to 95% (non-condensing) |

The ambient humidity is measured at the point that is 1.5m above the floor and 0.4m before the equipment when there is no protective plate in front or back of the equipment rack.

### 2.2.6 Cleanness Requirements

Dust poses the top threat to the running of the equipment. The indoor dust falling on the equipment may be adhered by the static electricity, causing bad contact of the metallic joint. Such electrostatic adherence may occur more easily when the relative humidity is low, not only affecting the use life of the equipment, but also causing communication faults. The following table shows the requirements for the dust content and granularity in the equipment room.

| Substance | Concentration Limit (particles/$m^3$) |
|---|---|
| Dust particles (diameter ≥0.5μm) | ≤$3.5 \times 10^6$ |
| Dust particles (diameter ≥5μm) | ≤$3 \times 10^4$ |

The air filter of the RG-N18010-X/N18014 must be cleaned at interval to ensure good ventilation and dust prevention.

Apart from dust, the salt, acid and sulfide in the air in the equipment room must also meet strict requirements; as such poisonous substances may accelerate the corrosion of the metal and the aging of some parts. The equipment room should be protected from the intrusion of harmful gases (for example, $SO_2$, $H_2S$, $NO_2$ and $Cl_2$), whose requirements are listed in the following table.

| Gas | Average ($mg/m^3$) | Maximum ($mg/m^3$) |
|---|---|---|
| $SO_2$ | 0.3 | 1.0 |
| $H_2S$ | 0.1 | 0.5 |
| $NO_2$ | 0.5 | 1.0 |
| $Cl_2$ | 0.1 | 0.3 |

The **Average** refers to the average limit of harmful gas in one week. The **Maximum** value is the upper limit of the harmful gas measured in one week for up to 30 minutes every day.

### 2.2.7 Power Requirements

When the RG-N18018-X can use the following power supplies:

- RG-PA2700I and RG-PA3000-F power modules adopt 90 to 290 VAC/ 47 to 63 Hz input.

Input power shall be larger than the actual power consumption of entire system. For example, the N18018-X chassis is installed with two M18000X-CM II , two M18000X-36QXS-CB and two M18018X-FE-C II modules, the total power consumption of the device would be: 2x96W (M18000X-CMII) + 2x482W (M18000X-36QXS-CB) + 3x633.3W (M18018X-FAN)+ 2x270W(M18018X-FE-C II) = 3,596W. It is recommended that you adopt two RG-PA2700I modules.

The following table lists the power consumption of each module:

| RG-N18000-X Series Modules | Maximum Power Consumption (W) |
|---|---|
| M18018X-CM II | 96 |
| M18000X-CM II-C | 96 |
| M18006X-CM II | 65 |
| M18000X-CM X | 70 |
| M18018X-FAN | 633.3 |
| M18010X-FAN | 425 |
| M18006X-FAN | 247 |
| M18000X-36CQ-CB | 903 |
| M18000X-18CQ-CB | 475 |
| M18000X-36QXS-CB | 482 |
| M18000X-48XS2CQ-CB | 275 |
| M18000X-18QXS18CQ-CB | 570 |
| M18000X-12QXS12CQ-CB | 384 |

| | |
|---|---|
| M18000X-6QXS6CQ-CB | 212 |
| M18000X-48XT2CQ-CB | 304 |
| M18000X-32CQ-DB | 795 |
| M18000X-48CQ-CE | 795 |
| M18018X-FE-C II | 270 |
| M18018X-FE-C V | 606 |
| M18010X-FE-C I | 156 |
| M18010X-FE-C II | 273 |
| M18006X-FE-C I | 150 |
| M18018X-FE-D II | 589 |
| M18010X-FE-D I | 350 |
| M18010X-FE-E II | 380 |

The RG-N18018-X provides N+M redundancy of power supply. You are recommended to use multiple power supplies for the equipment to ensure its continuous and stable operation by avoiding the impact of unexpected power failures on the equipment.

When the dual power supply is applied, the type of the power supply should be identical.

If a power supply system is equipped with a leakage protector (also referred to as "leakage current switch" or "leakage current breaker"), the rated leakage action current of each leakage protector is greater than twice of the theoretical maximum leakage current of all the power supplies in the system. For example, if a system is equipped with eight identical power supplies, the leakage current of each power supply is equal to or less than 3 mA, and the leakage current of the system totals 24 mA. A leakage protector with 30 mA rated action current supports less than five power supplies (that is, Action current of the leakage protector/2/Maximum leakage current of each power supply = 30/2/3 = 5). In other words, the leakage protector with 30 mA rated action current supports no more than four power supplies. In this case, the eight power supplies in the system require at least two leakage protectors with 30 mA rated action current and each leakage protector supports four power supplies. If power supplies in a system differ in models, the rated leakage action current of each leakage protector divided by two is greater than the sum of maximum leakage current of all the power supplies. The rated leakage non-action current of a leakage protector shall be 50% of the leakage action current. Take a leakage protector with 30 mA rated leakage action current as an example. The rated leakage non-action current shall be 15 mA. When the leakage current is below 15 mA, the protector shall not act. Otherwise, misoperation may easily occur due to high sensitivity and thus the leakage protector trips, devices are powered off, and services are interrupted.

To guarantee personal safety, the rated leakage action current of each leakage protector in the system must be equal to or less than 30 mA (human body safety current is 30 mA). When twice of the total leakage current of the system is greater than 30 mA, the system must be equipped with two or more leakage protectors.

For the leakage current value of each power supply model, see the power supply model parameter table in Chapter 1.

## 2.2.8 System Grounding Requirements

A good grounding system is the basis for the stable and reliable operation of the RG-N18018-X. It is the key to prevent lightning stroke and resist interference. Please carefully check the grounding conditions on the installation site according to the grounding requirements, and perform grounding properly as needed.

### Safety Grounding

The equipment using AC power supply must be grounded by using the yellow/green safety grounding cable. Otherwise, when the insulating resistance decreases the power supply and the enclosure in the equipment, electric shock may occur.

The building installation shall provide a means for connection to protective earth, and the equipment is to be connected to that means.

### Lightning Grounding

The lightning protection system of the facility is a separate system that consists of the lightning rod, down lead conductor and the connector to the grounding system, which usually shares the power reference ground and yellow/green safety cable ground. The lightning discharge ground is for the facility only, irrelevant to the equipment.

For lightning protection, see Appendix C.

### EMC Grounding

The ground required for EMC design includes shielding ground, filter ground, noise and interference suppression, and level reference. All the above constitute the comprehensive grounding requirements. The grounding resistance should be less than 1Ω. Two grounding points are reserved at the right back of the chassis. The grounding point is pasted with a conspicuous warning label.

### 2.2.9 EMI Consideration

Various interference sources, from either outside or inside the equipment or application system, affect the system in the conductive ways such as capacitive coupling, inductive coupling, and electromagnetic radiation. There are two types of electromagnetic interferences: radiated interference and conducted interference, depending on the type of the propagation path. When the energy, often RF energy, from a component arrives at a sensitive component via the space, the energy is known as radiated interference. The interference source can be both a part of the interfered system and a completely electrically isolated unit. Conducted interference results from the electromagnetic wire or signal cable connection between the source and the sensitive component, along the cable the interference conducts from one unit to another. Conducted interference often affects the power supply of the equipment, but can be controlled by a filter. Radiated interference may affect any signal path in the equipment, and is difficult to shield.

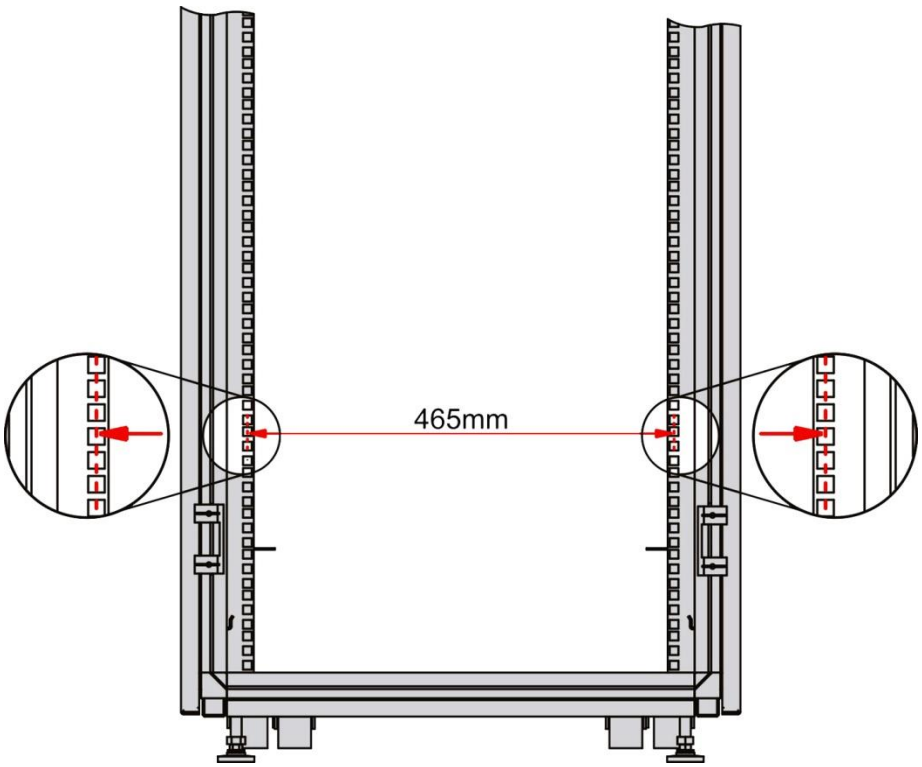
- Effective measures should be taken for the power system to prevent the interference from the electric grid.
- The working ground of the routers should be properly separated and kept as far as possible from the grounding device of the power equipment or the anti-lightning grounding device.
- Keep the equipment away from high-power radio transmitter, radar transmitting station, and high-frequency large-current device.
- Measures must be taken to isolate static electricity.

## 2.3 Cabinet Mounting

Make sure the cabinet complies with the following conditions:

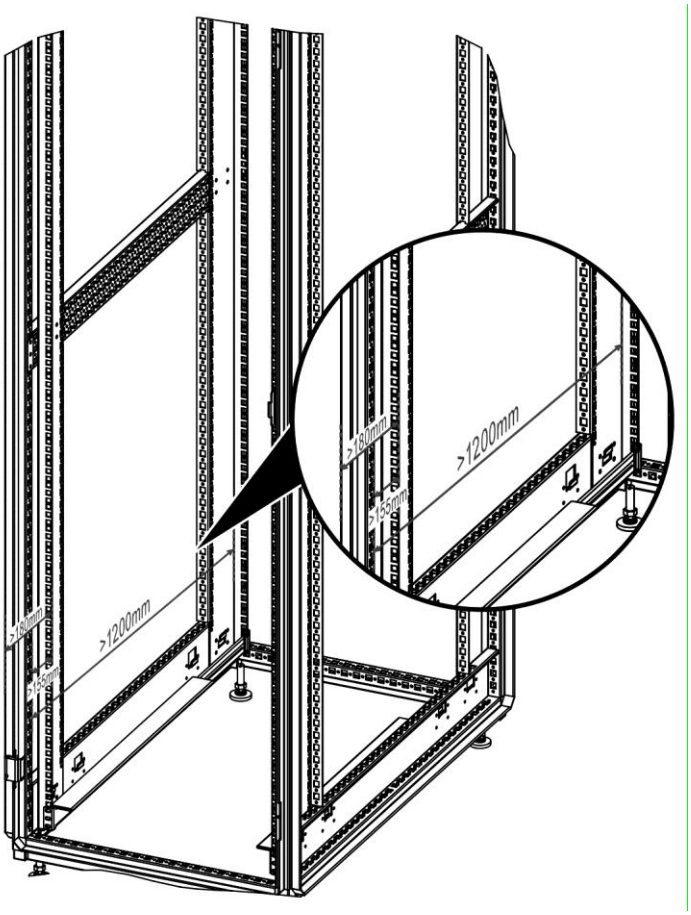
- Install the switch in a 19-inch cabinet in 4-port form hold.
- Be sure the distance between two square hole strips, one on each side, is 465 mm.

Figure 2-3 19-inch Cabinet




- Be sure that the square hold strip is at least 180 mm far from the outboard front door and the door is at most 25 mm thick to ensure a minimum available distance of 155 mm. The front door is at least 1,200 mm far from the back door,

Figure 2-4 Cabinet Dimensions




- Be sure that the slide rail in the cabinet is enough to bear the weight of a RG-N18000-X and its installation accessories.
- Be sure that the cabinet provides an earthing terminal for the switch to be grounded.
- Be sure that the front and back doors of the cabinet have porosities greater than 50% for good ventilation and heat dissipation.

## 2.4 Installation Tools

| | |
|---|---|
| **Common Tools** | Cross screwdriver, straight screwdriver, related electric and optical cables<br>Bolts, diagonal pliers, straps |
| **Special Tools** | Anti-static glove, stripping pliers, crimping pliers, crimping pliers for the crystal head, wire cutter |
| **Fiber Optic Cleaning Tools** | Air-laid paper, optical fiber microscope |
| **Meter** | Multimeter, bit error rate tester (BERT), optical power meter |

The tool kit is customer supplied.

## 2.5 Precaution for Fiber Connection

Before connecting fiber cables, make sure the model of the optical transceiver and fiber type match the optical port. The transmit port on the local device should be connected to the receive port on the peer device and vice versa.

## 2.6 Unpacking Requirements

### Goods Checklist

| | |
|---|---|
| **Chassis Carton** | Device panels are installed and operational.<br>Fans, screwdriver, wrench, anti-static wrist strap, yellow/green grounding wires, quick installation guide, slide rail, packing list |
| **Module Carton** | Modules, packing list, documentation |

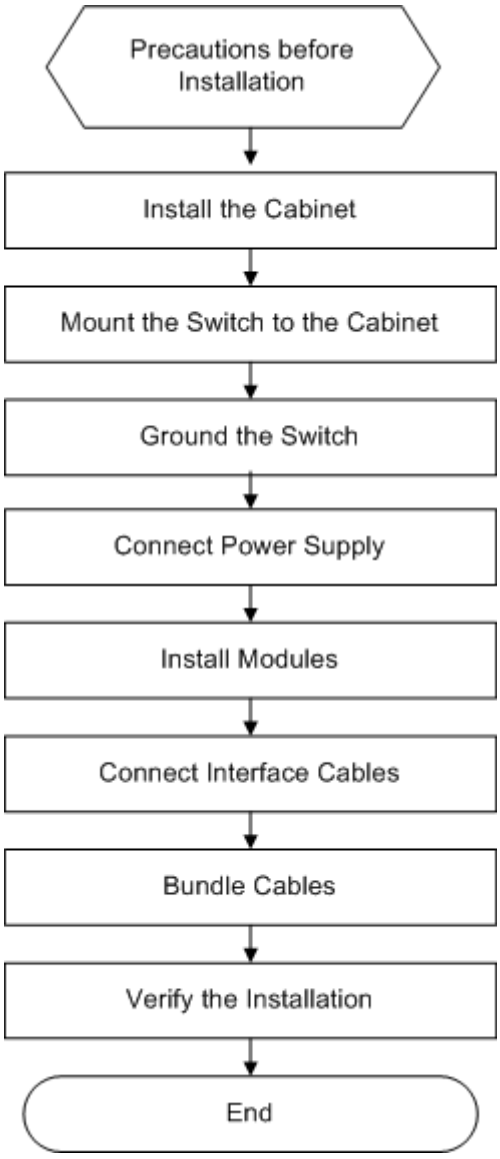
A normal delivery should contain the above mentioned items, which may differ from the actual delivery, depending on purchase contracts. Please check your goods carefully against the packing list or purchase contract. If you have any questions or there are any errors, please contact your distributor.

# 3 Product Installation

RG-N18000-X series Ethernet switch must be used and fixed in the room.

Make sure you have carefully read part 2 and this part, and be sure that the requirements set forth in part 2 have been met.

## 3.1 Installation Procedure




## 3.2 Installation Verification

The RG-N18000-X is complicated equipment, so you must carefully plan and arrange the installation location, networking mode, power supply, and wiring before installation. Verify the following before installation:

- The installation location is of a good air flow.
- The installation location meets the temperature and humidity requirements of the equipment.
- The qualified power supply is available at the installation location.
- The related network cables have already been deployed at the installation location.
- The selected power supply meets the system power.

## 3.3 Mounting the Cabinet

### Precautions

When you install the cabinet, pay attention to the following:

- All expansion bolts for fastening the cabinet base to the ground should be installed and tightened in sequence from bottom up (large plain washer, spring washer, and nut), and the installation holes on the base and the expansion bolts should be well aligned.
- After the cabinet is installed, it should be stable and still.
- After the cabinet is installed, it should be vertical to the ground.
- When multiple cabinets are put side by side in the room, they should be aligned in a straight line, with an error less than 5 mm.
- The front/back doors of the cabinet should be properly installed. You can open and close them smoothly. The locks should work normally, and all keys should be complete.
- There should be no unnecessary formal labels inside the cabinet and on various boards.
- Blank panels should be installed completely.
- Fastening screws of various devices in the cabinet of the same model should be ready and tightened.
- Various boards of the equipment should be installed securely, and the fastening screws on the panel should be tightened.
- All wiring inlets at the top and bottom of the cabinet should be installed with rodent-resistant nets where the seams should be no more than 1.5 cm in diameter, to prevent rodents and other small animals from entering the cabinet.
- Antistatic wrist straps should be provided in the cabinet.

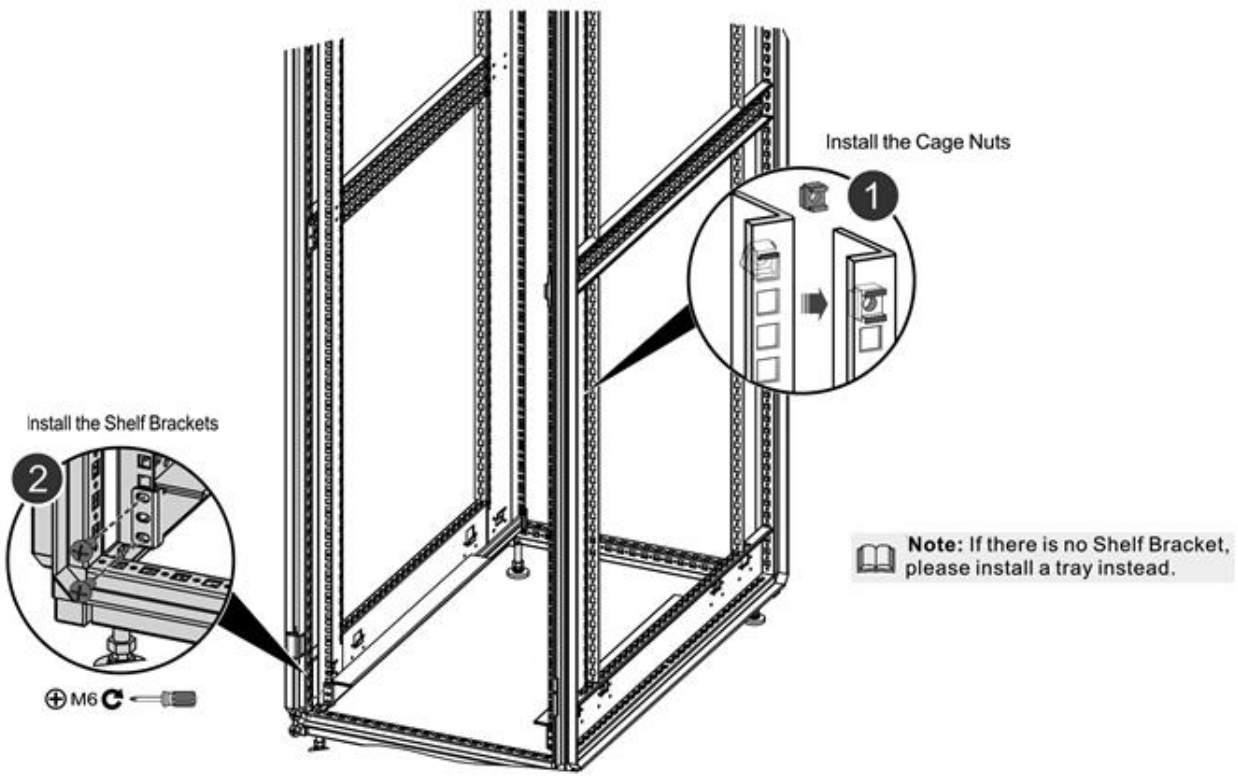
### Installation Steps

1) Reserve sufficient space for front and back doors of the cabinet for maintenance.
2) Mount the cabinet at the designed location as planned.
3) Install the appropriate cable management bracket and cables.
4) Install the tray and wiring layer on the rack according to the configuration of one rack with one cabinet installed or one rack with multiple cabinets installed.

### Installing Slide Rails

Before installing a slide rail, you need to have some knowledge of standard 19-inch cabinets of IEC60297. The height of standard cabinets is measured in Rack Unit (RU, 1 RU = 44.45 mm (1.75 inch)). 1 RU is equal to the height of three holes (see Figure 3-1). The hole in the middle is an auxiliary installation hole, and the other holes are standard installation holes. Note that the space between neighboring standard installation holes is a little smaller than that between an auxiliary installation hole and its neighboring standard installation hole. When installing a slide rail for the RG-N18000-X series, ensure that the plane to carry the chassis should be installed on the plane of delimiters (entire-U delimiter) of the two neighboring RUs, as shown in Figure 3-1.

Figure 3-1 Slide Rail




Before installing a slide rail, make sure that the weight capacity of the slide rail meets requirements.

There are variable kinds of slide rails. The rail appearance and installation is subject to actual conditions.

In order to keep the cabinet balanced, please install the slide rail to as low a position as possible in the cabinet if only one RG-N18000-X switch is installed. If you are mounting multiple device to the cabinet, mount the heaviest device in the lowest position of the cabinet first and proceed to mount the rest of the devices from bottom to top.

It is recommended to install the power socket after planning on available space properly. Otherwise, there may be problems for operation.

## 3.4 Mounting the Switch to a Cabinet

### Precautions

Before mounting RG-N18018-X into the cabinet, first verify that the front and back brackets of the cabinet are at the right locations. If the bracket is too far forward, the front panel of the equipment may be too close to the front door, so that the front door cannot be closed when network cables and pigtail fibers are connected. Usually, you should reserve at least 10mm between the front panel of the equipment and that of the cabinet after installation. Before mounting into a cabinet, you need to address the following conditions:

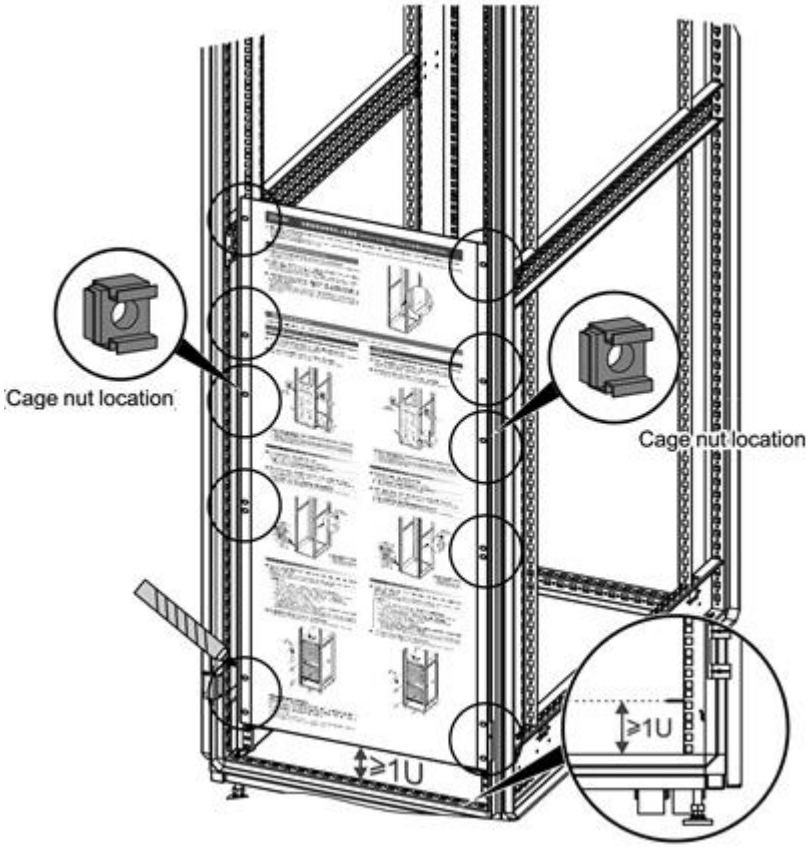
- Fasten the cabinet.
- Remove angle blocks installed in the bottom of the cabinet. Install L-shaped slide rails stored in the accessory box. Separate the left and right rails.
- Remove any obstacle in the frame and the surrounding environment.
- Prepare the equipment and move it to the place near the cabinet where you can handle it easily.

Five people are recommended to carry or lift the switch. One is responsible for directing and the other four carrying or lifting the switch.

### Installation Steps

Measure the cabinet height and locate the position on the bracket for installing the slide rail. Then locate the position on the other bracket through the carrying plane and mark the locations. Install seven cage nuts on the marked square holes on each bracket as shown in Figure 3-2.

Figure 3-2 Slide Rail Installation Positions




Place the switch on the slide rail, and drive it smoothly into the cabinet until the front bracket reaches the square hole strip. Align the installation holes on the bracket with the cage nuts on the square hole strip, and mount them with screws.

Figure 3-3 Mounting the RG-18018X Switch into a 19-Inch IEC Cabinet

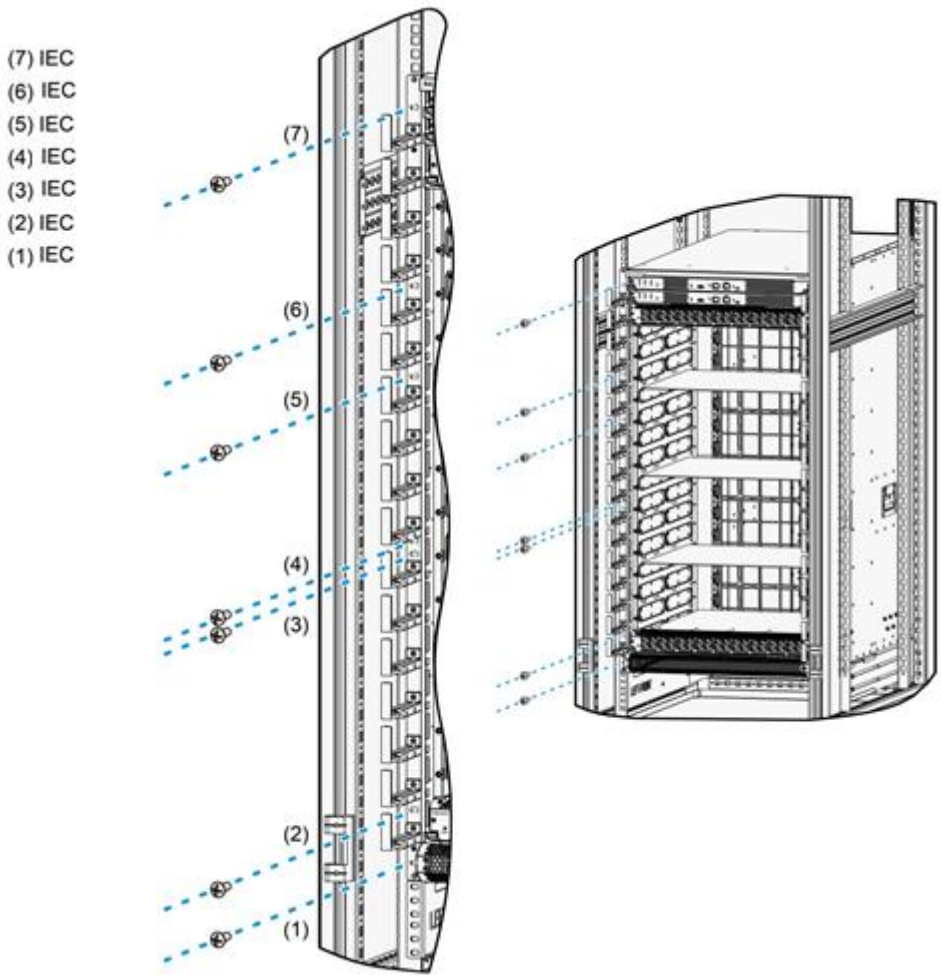
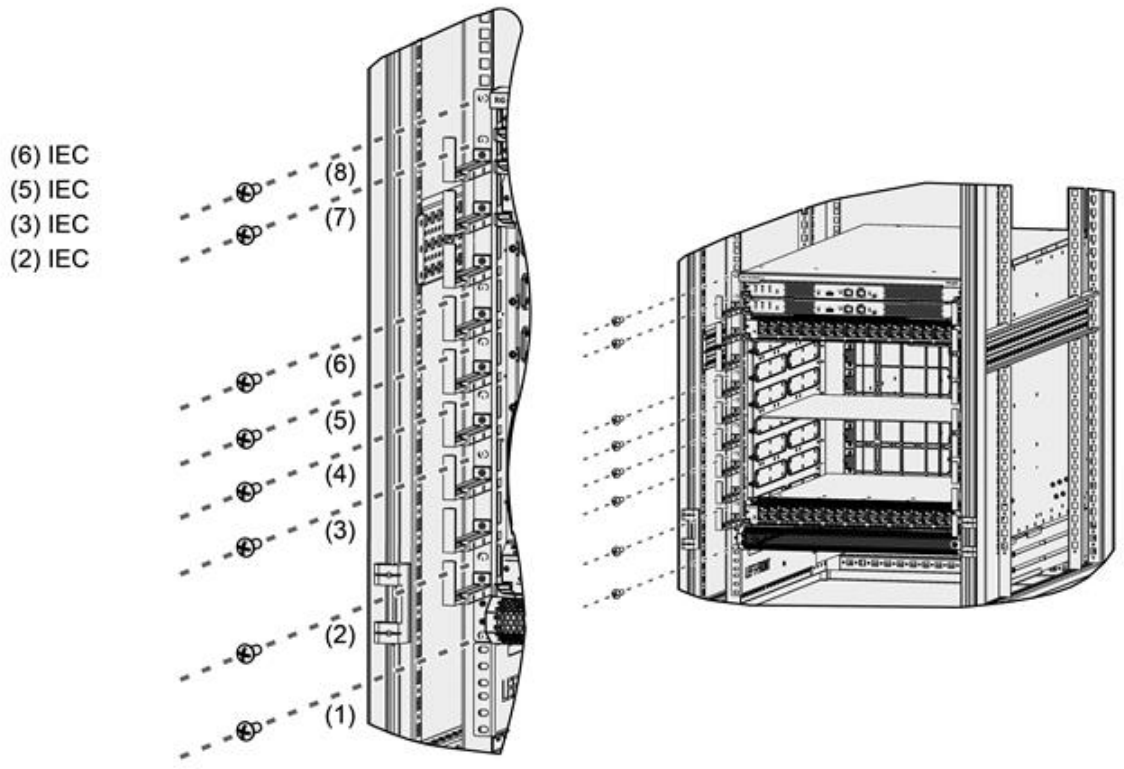



Figure 3-4 Mounting the RG-18010X Switch into a 19-Inch IEC Cabinet




## 3.5 Connecting the System Ground

A good grounding system protects your switch against lightning strikes and interferences and ensures its normal operation and reliability.

### Precaution

- The sectional area of the grounding wire should be determined according to the possible maximum current. Cables of good conductor should be used.
- Do not use bare wire.
- The grounding resistance for combined grounding should be less than 1Ω.

### Connecting the System Ground

To connect the system ground, follow these steps:

1) Remove the screws on the rear of the switch. There are two screws on N18018-X, four on N18010-X and one on RG-N18006-X.

2) Attach the one end of the grounding wire to the switch with the screws. Connect the other end of the grounding wire to the grounding wire of the cabinet.

To guarantee the security of the person and the device, the RG-N18000-X must be well-grounded. The grounding resistance shall be less than 1Ω.

A service person shall check whether or not the socket-outlet from which the equipment is to be powered provides a connection the building protective earth. If not, the service person shall arrange for the installation of a protective earthing conductor from the separate protective earthing terminal to the protective earth wire in the building.

The socket-outlet shall be installed near the equipment and shall be easily.

When installing the unit, always make the ground connection first and disconnect it last.

The cross-sectional area of protective earthing conductor shall be at least 2.5 $mm^2$ (12AWG).

## 3.6 Installing Power Supply

The RG-N18000-X series switches provide RG-PA2700I and RG-PA3000I-F for AC power supplies and RG-PD2400I for DC power supplies. Before performing the following procedures, wear an anti-static wrist strap close to your kin and keep it grounded well.

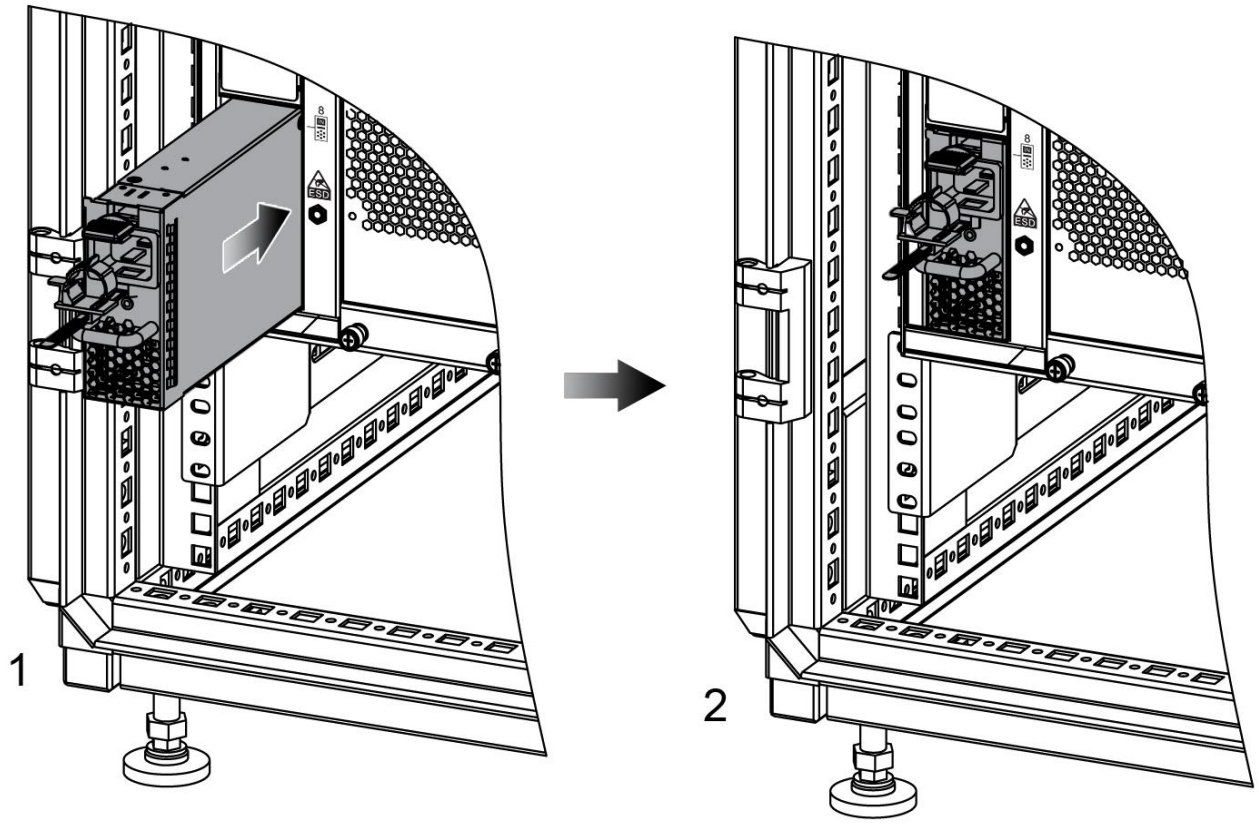
- The RG-N18018-X power system provides 16 power supply slots. It is recommended that you configure N+M power supply redundancy.
- The RG-N18010-X power system provides 16 power supply slots. It is recommended that you configure N+M power supply redundancy.
- The RG-N18006-X power system provides 4 power supply slots. It is recommended that you configure N+M power supply redundancy.
- When RG-N18018-X is powered up by more than one source, the power must be in the same model.
- If you want to carry or lift the power module, please hold the bottom of the module with your hand instead of carrying the module by the handle. Otherwise, the module may be damaged.
- Before inserting or removing the power module, please verify whether the switch is well mounted. The switch is high, avoid switch tumble when you are inserting or removing the power module.
- If you want to hot swap a power supply, please make sure that the interval between two operation is greater than 30 seconds.
- Please do not touch the connecting finger part of the power supply which is removed after power off in case that capacitor discharge is not full.

- Install the AC power system

1. Loosen the filler panel covering the power slot at the rear of the chassis.

Insert the power module into the slot along the rail until the rear connector of the power module stays in good contact with the rear panel.

Figure 3-5 Installing Power Supply




- The total power of power supplies of the RG-N18000-X must be greater than the working power of the host. Otherwise, some modules may fail to start.

The host power is the summation of the power of all working modules, including the supervisor module, service module and fan. For the power consumption of each module, see the module specifications.

## 3.7 Installing Fan

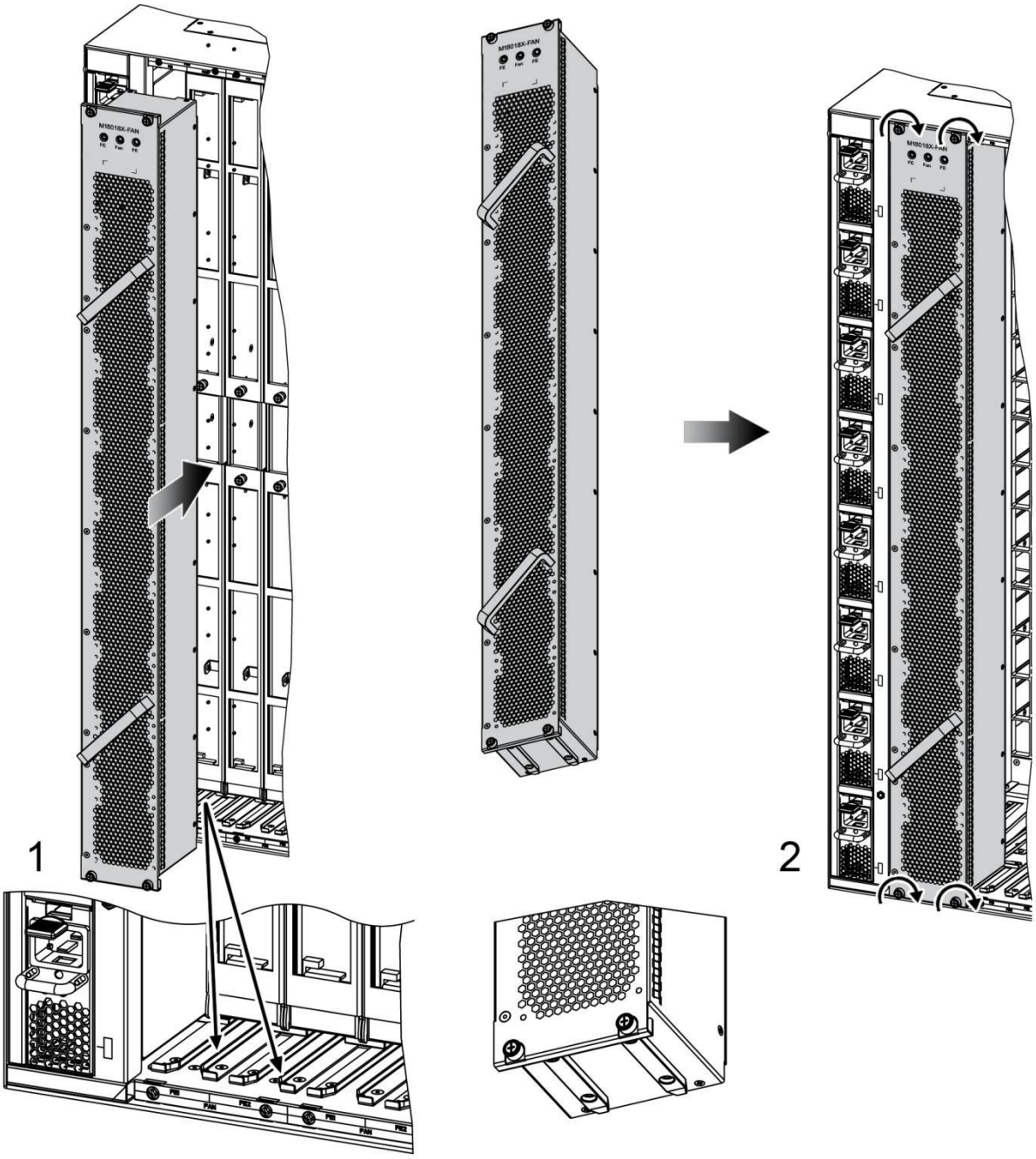
RG-N18018-X adopts M18018X-FAN module for heat dissipation, RG-18010X adopts M18010-FAN module and RG-18006X adopts M18006-FAN module. Before the following procedures, wear an anti-static wrist strap close to your skin and have it properly grounded.

- Steps for installing the fan tray:

1) Install the fan tray into the fan slot in the rear panel of RG-N18018-X. Note the instruction on the fan tray to ensure that the fan tray is installed properly.

2) Tighten the captive screws on the fan tray with a screwdriver.

Figure 3-6 Installing Fan



## 3.8 Installing Switch Fabric Module

An N18000-X series switch adopts the CLOS architecture midplane-free design, and the switch fabric module and service module are orthogonally interconnected. The switch fabric module resides in the fan tray. Therefore, remove the fan tray before installing the switch fabric module.

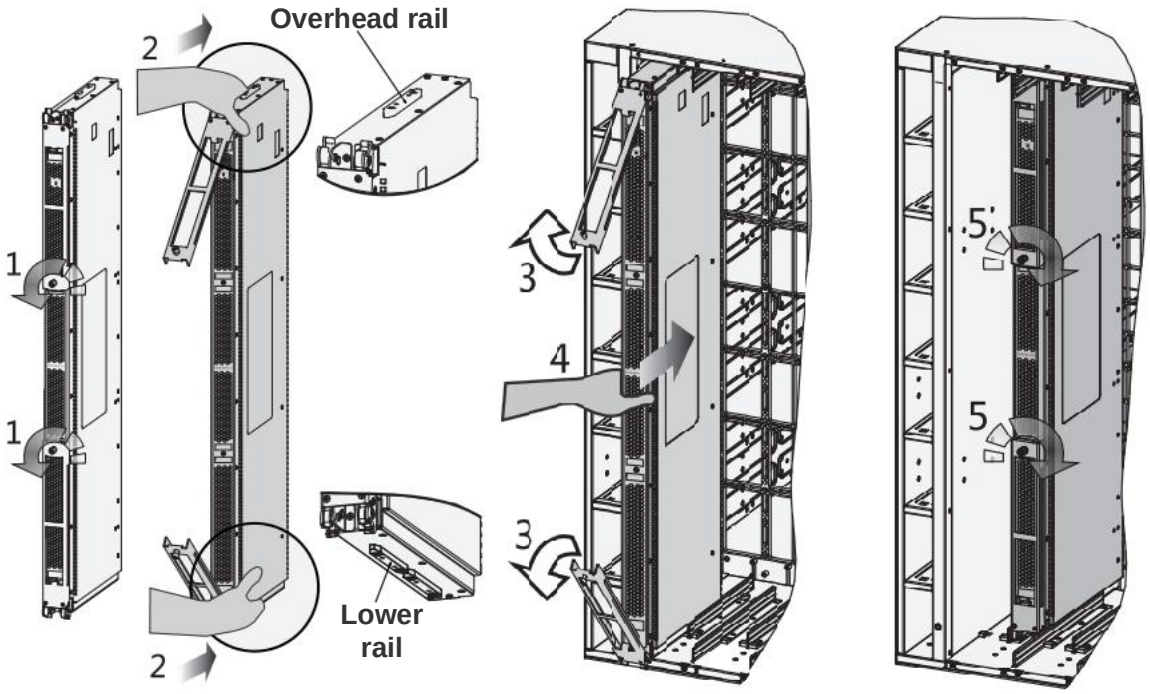
### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the fan tray, see *Replacing Fan* for details.
3. Take out the supervisor module from the package.

### Steps

1. Align the overhead and lower rails of the switch fabric module respectively with the upper and lower rails of the chassis, expand the ejector lever, insert the switch fabric module into the chassis, and ensure that the angle between the switch fabric module and the ejector lever is 45°.
2. Push the switch fabric module inward until it totally fits in, and then fold the ejector lever.
3. Manually align the captive screws on the switch fabric module and use a Philips screwdriver to fasten the screws, to secure the switch fabric module.

Figure 3-7 Installing Switch Fabric Module




- Install the switch fabric module to the chassis with the side attached with the UP label facing upward, so that the overhead rail fits in with the upper rail of the chassis.
- When pushing the switch fabric module inward, apply even force to the upper and lower sides. Do not apply excessive force to prevent the slots and connectors being damaged.
- If the switch fabric module can no longer be pushed inward but the ejector lever cannot be folded, do not push it forcibly. Instead, pull the ejector lever to remove the switch fabric module and push it inward again.
- When the switch fabric module fits into the slot of the chassis, apply even force to fold the ejector lever.
- After taking the switch fabric module out of the carton, place the carton in a specified area neatly.

## 3.9 Installing Supervisor Module

N18000-X series switch adopts CLOS architecture midplane-free design. N18000-X has two supervisor module slots.

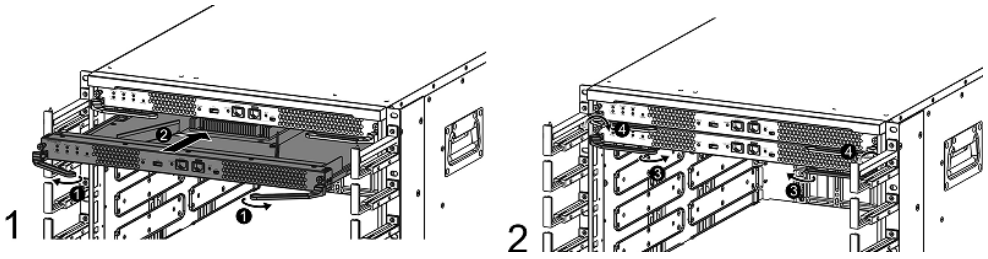
### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the supervisor module from the package.

### Steps

1. Pull out the levers on both sides of the supervisor module. Support the bottom of the supervisor module with one hand and hold the supervisor module with the other hand to insert the supervisor module into the slot along the rail.
2. Drive the levers close to the supervisor module, and the supervisor module will hit the back panel. The supervisor module will be fastened.

Figure 3-8 Installing Supervisor Module




In order to ensure the reliability of the system ventilation and heat dissipation performance and address the requirement of the dust-filter, filler panel needs to be installed in the slot where no service module or service module has been installed.

If you want to remove the module when the device is electrified, you need to insert the new module or install the filler panel within 10 minutes.

Do not hold the edge of the PCB or collide the components on the PCB.

Do not plug/unplug a service module, service module or switch fabric module forcedly, use the ejector.

## 3.10 Installing Service Module

N18000-X series switch adopts CLOS architecture midplane-free design. N18018-X has 16 service module slots N18010-X has eight service module slots, and N18006-X has four service module slots.

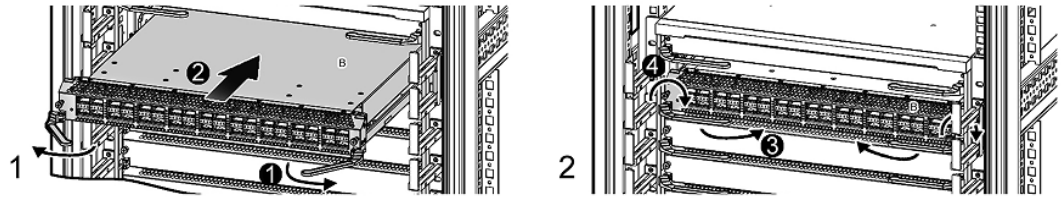
### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the service module from the package.

### Steps

1. Pull out the levers on both sides of the service module. Support the bottom of the service module with one hand and hold the service module with the other hand to insert the service module into the slot along the rail.
2. Drive the levers close to the service module, and the service module will hit the back panel. The service module will be fastened.

Figure 3-9 Installing Service Module




In order to ensure the reliability of the system ventilation and heat dissipation performance and address the requirement of the dust-filter, filler panel needs to be installed in the slot where no service module or service module has been installed.

If you want to remove the module when the device is electrified, you need to insert the new module or install the filler panel within 10 minutes.

Do not hold the edge of the PCB or collide the components on the PCB.

Do not plug/unplug a service module, service module or switch fabric module forcedly, use the ejector.

### 3.10.1 Installing M18000X-48CQ-CE Module

M18000X-48CQ-CE cannot be used with switch fabric modules except E-class modules, e.g., M18010X-FE-E II.

M18000X-48CQ-CE only supports the chassis of version 2.0.

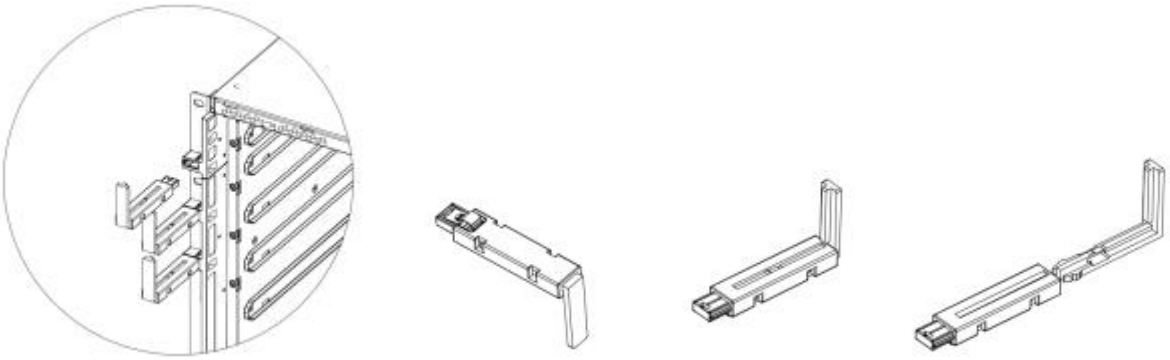
#### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the service module from the package.

#### Steps

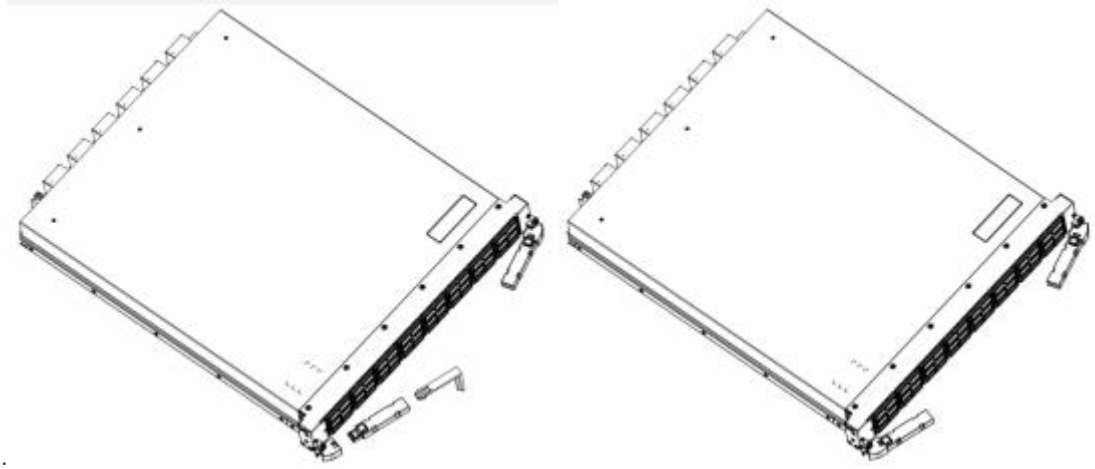
1. Remove a pair of cable management bracket.

Figure 3-10 Removing Cable Management Brackets



2. Insert the cable management bracket into the ejector handle on each side of the panel

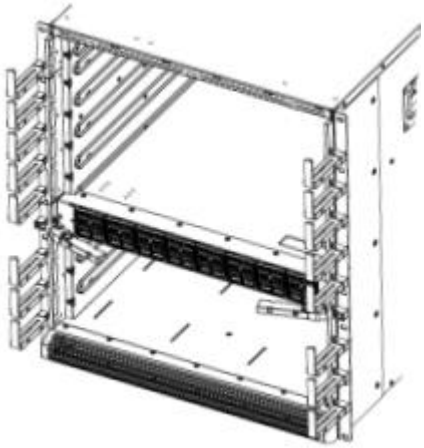
Figure 3-11 Inserting Cable Management Brackets



.

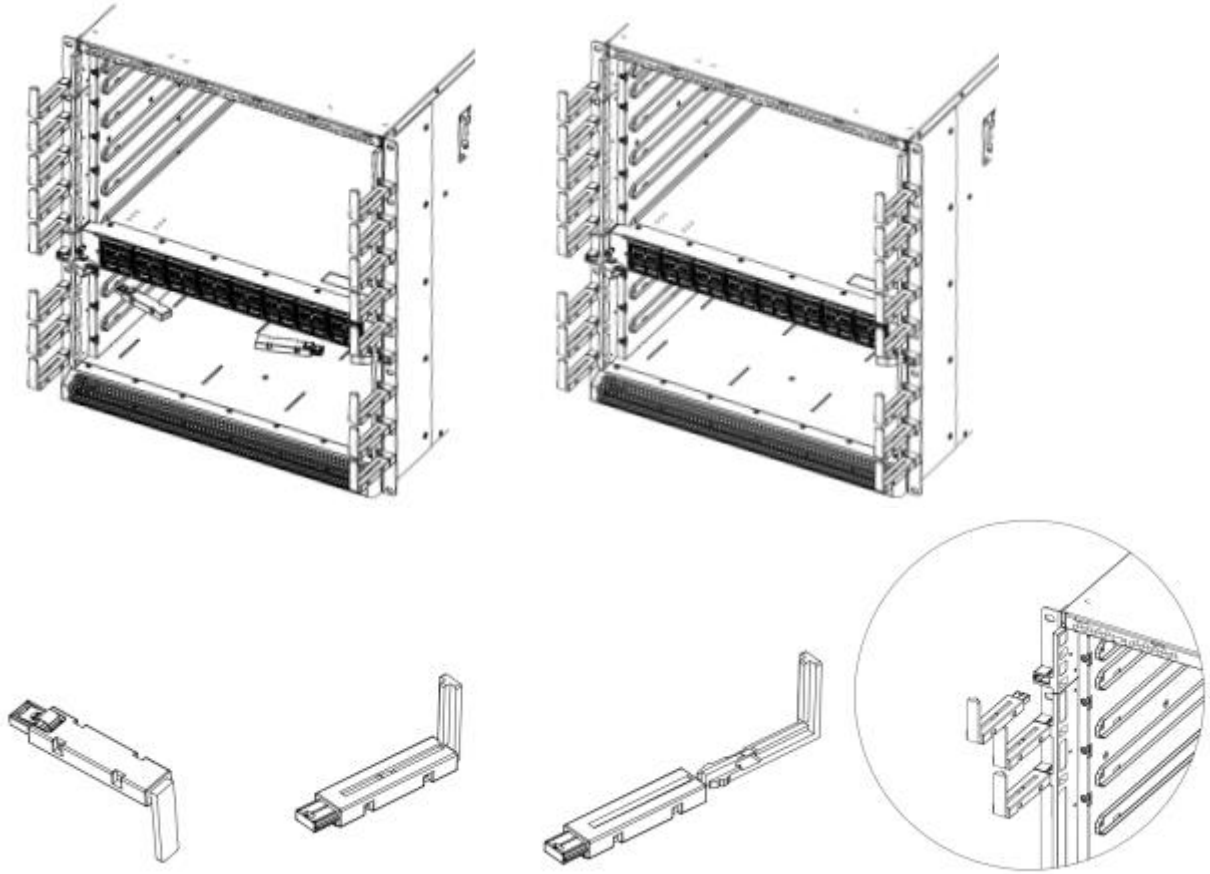
3. Rotate the handle away from the front of the module. Use one hand to hold the front of the module, place your other hand under the module to support its weight. Align the back of the module to the guides in the open slot and slide the module all the way into the slot. Rotate the lever all the way to the front of the chassis. Make sure that the lever engages behind the front of the slot so that the module fully seats onto the connectors on the midplane.

Figure 3-12 Sliding Module into Slot



4. Remove the cable management brackets and install them back onto the chassis.

Figure 3-13 Removing Cable Management Brackets



In order to ensure the reliability of the system ventilation and heat dissipation performance and address the requirement of the dust-filter, filler panel needs to be installed in the slot where no service module or service module has been installed.

If you want to remove the module when the device is electrified, you need to insert the new module or install the filler panel within 10 minutes.

Do not hold the edge of the PCB or collide the components on the PCB.

Do not plug/unplug a service module, service module or switch fabric module forcedly, use the ejector.

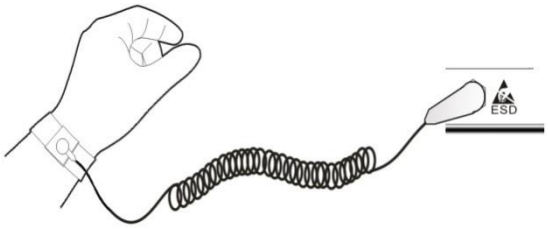
## 3.11 Installing Swappable Interface Modules (Optional)

Make sure the optical modules connected to both ends of a fiber are the same type while replacing swappable optical modules.

### Preparation

1. Wear an anti-static wrist strap to your wrist and tighten the lock. Make sure it is properly grounded.
2. Take out the SFP+/SFP/QSFP+/QSFP28 module you want to install from packing bag. Do not touch the connecting finger on the module.

Figure 3-14 Wearing an Anti-Static Wrist Strap



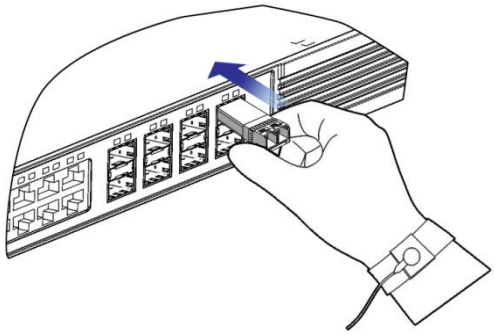

## 3.11.1 Installing SFP+/SFP Modules

To avoid damaging components due to operation errors, read this section carefully before installing SFP+/SFP modules.

To install the SFP/SFP+ module, do as follows:

1. Turn up the handle of the module into the top bail-clasp latch. Hold both sides of the module and push the module into place (You can feel that the module is placed in position with a click sound).

Figure 3-15 Installing the SFP/SFP+ Module



2. Use the fiber optical patch cord to connect the SFP/SFP+ module to the fiber optical network. Select the patch cord with the connector corresponding to the port.

After the patch cord is connected, the Link/ACT Status LED is on. Otherwise, please check connection of the patch cord.

### Precaution

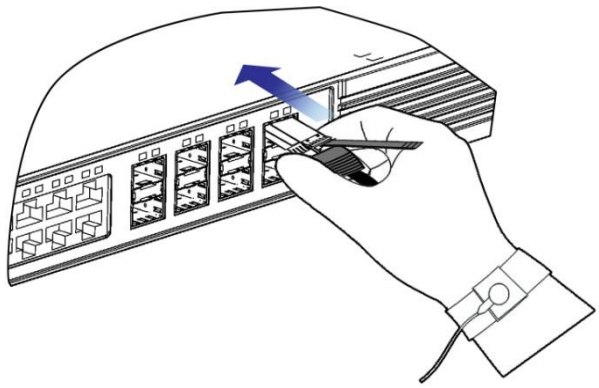
- If the SFP/SFP+ module cannot be inserted to the end, do not push it forcefully. Please try the other end of the module.
- Do not touch the connecting finger on the module.
- Do not squeeze, bend or fold the optical fiber, which may cause system performance degradation or data loss.
- Do not remove the protective rubber plug from SFP+/SFP module before connecting fibers.
- Do not insert the SFP+/SFP module with a fiber into a slot. Unplug the fiber before installing the module.

## 3.11.2 Installing SFP+ Cables

To avoid damaging components due to operation errors, read this section carefully before installing SFP+ cables.

1. To install the SFP+ copper module, do as follows: You can install the SFP+ copper module with power on. Hold the connector of a copper cable module with one hand and carry the cable to the front panel of the switch with the other. Push the module gently into the SFP+ module slot until you hear a click, indicating the module is correctly installed.

Figure 3-16 Installing SFP+ Copper Module



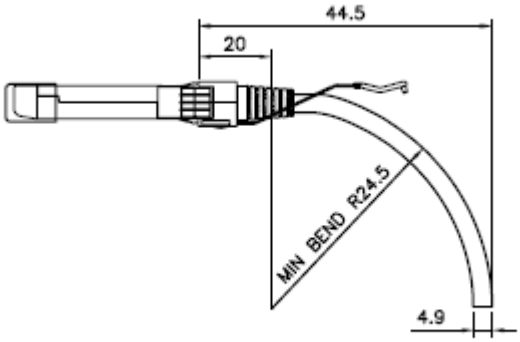
2. After you connect the copper module to the Ethernet network through the connector, the Link/ACT status is on. Otherwise, please check the connector.

### Precaution

- If the SFP+ module cannot be inserted to the end, do not push it forcefully. Please try the other end of the module.
- Do not touch the connecting finger on the module.
- Do not squeeze, bend or fold the copper cable, which may cause system performance degradation or data loss.

After the cable is plugged, make sure that the bending radius is greater than 5 times of the cable diameter. Too small bending radius may cause damage to the copper cable. For example. If the cable diameter is 4.9mm, the bending radius should be 24.5mm at least, as shown in figure 3-13:

Figure 3-17 Bending Radius and Cable Diameter




Use an SFP+ cable to connect two SFP+ ports close to each other. Take the following steps to install the SFP+ module:

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the SFP+ module you want to install from the packing bag.
3. Plug the SFP+ cable to the SFP+ port through the connector. Pay attention to the proper end for connection.

During the operation, make sure that the cable's bending radius is no less than eight times as much as its diameter.

## 3.11.3 Installing 40-Gigabit QSFP+ Modules

To avoid damaging components due to operation errors, read this section carefully before installing 40-Gigabit QSFP+ modules.

Take the following steps to install 40-Gigabit QSFP+ modules:

1. Turn up the handle of the module into the top bail-clasp latch. Hold both sides of the module and push the module into place (You can feel that the module is placed in position with a click sound), as shown in Figure 3-14

2. Push the module gently into the QSFP+ module slot until you hear a click, indicating the module is correctly installed, as shown in Figure 3-15.

Figure 3-18 Installing the QSFP+ Module Equipped with a Bail- clasp Latch

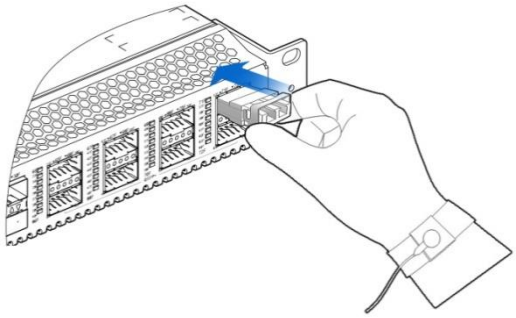
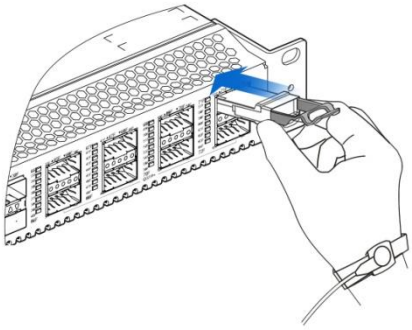


Figure 3-19 Installing the QSFP+ Module Equipped with a Pull Tap



3. Use the fiber optical patch cord to connect the 40G QSFP+ module to the fiber optical network. Select the patch cord with the connector corresponding to the port.
4. After the patch cord is connected, the Link/ACT Status LED is on. Otherwise, please check connection of the patch cord.

### Precaution

- Pay attention to the proper end of the QSFP+ module for installation. If the QSFP+ module cannot be inserted to the end, do not push it forcefully. Please try the other end of the module.
- It is recommended that you do not remove the protective rubber plug from QSFP+ module before connecting fibers.
- It is recommended that you do not insert the QSFP+ module with a fiber into the slot. Unplug the fiber before installing the module.
- Do not touch the connecting finger on the module.
- Do not squeeze, bend or fold the optical fiber, which may cause system performance degradation or data loss.

## 3.11.4 Installing 100-Gigabit QSFP28 Modules

To avoid damaging components due to operation errors, read this section carefully before installing 100-Gigabit QSFP28 modules.

Take the following steps to install 100-Gigabit QSFP28 modules:

1. Turn up the handle of the module into the top bail-clasp latch. Hold both sides of the module and push the module into place (You can feel that the module is placed in position with a click sound), as shown in Figure 3-16.
2. Push the module gently into the QSFP+ module slot until you hear a click, indicating the module is correctly installed, as shown in Figure 3-17.

Figure 3-20 Installing the QSFP28 Module Equipped with a Bail- clasp Latch

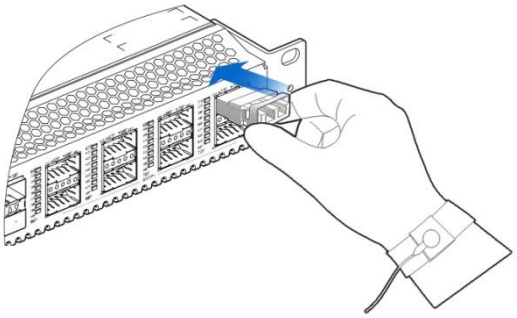
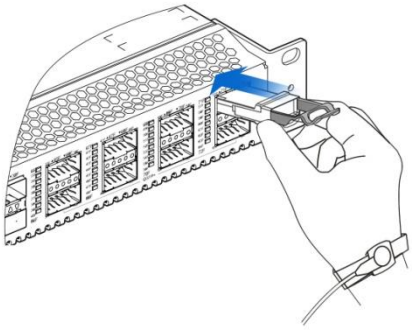


Figure 3-21 Installing the QSFP28 Module Equipped with a Pull Tap



3. Use the fiber optical patch cord to connect the 100G QSFP28 module to the fiber optical network. Select the patch cord with the connector corresponding to the port.
4. After the patch cord is connected, the Link/ACT Status LED is on. Otherwise, please check connection of the patch cord.

### Precaution

- Pay attention to the proper end of the QSFP28 module for installation. If the QSFP28 module cannot be inserted to the end, do not push it forcefully. Please try the other end of the module.
- It is recommended that you do not remove the protective rubber plug from QSFP+ module before connecting fibers.
- It is recommended that you do not insert the QSFP+ module with a fiber into the slot. Unplug the fiber before installing the module.
- Do not touch the connecting finger on the module.
- Do not squeeze, bend or fold the optical fiber, which may cause system performance degradation or data loss.

## 3.12 Connecting the Power Cord

Connect the power cord to the location as required according to the identification on the RG-PA2700I and RG-PA3000I-F power module panel.

Make sure the socket is powered off before the power cord is connected.

- Connect the AC power cord

1. Insert the AC power plug into the power module socket.
2. Take out the anti-loose buckle.
3. Install the anti-loose buckle on the front panel of the power module
4. Fasten the anti-loose buckle to the power cord.
5. Connect the other end of the power cord to an external power socket.

Please use the 3-pin power cord. The cross-sectional area of each pin is 1.5 $mm^2$ or 14 AWG minimum.

16A power cords are available for the RG-N18000-X AC power supply. Adopt the proper socket and verify the AC power supply capacity in the machine room.

Connect the power cord to the location as required according to the identification on the RG-PA2700I AC power module panel.

Make sure the socket is powered off before the power cord is connected.

- Connect the DC power cord

1. Insert the DC power plug into the power module socket.
2. Fasten the anti-loose screw of the power cord onto the power panel.
3. Connect the other end of the power cord to an external power socket.

Please use the 2-pin power cord. The cross-sectional area of each pin is 6 AWG minimum.

6-AWG power cords are available for the RG-N18000-X DC power supply. Adopt the proper socket and verify the DC power supply capacity in the machine room.

## 3.13 Installation Verification

- Verify if the external power supply matches the distribution panel of the cabinet.
- After installing the equipment, verify if the front/back cabinet doors can be closed.
- Verify that the cabinet has been fastened completely, and does not move or tilt.
- Verify that the equipment has been installed in the cabinet, and all the cables have been fastened to the cabinet.
- Verify that the fan meets the requirement, and the captive screws are tightly fastened.
- Verify that the power supply is properly selected.
- Verify that the power module is inserted properly.
- Please do not power up the switch by yourself and do not perform live-line maintenance.
- Verify that there is no potential danger in the working area, for example, the power supply is not grounded well, or the ground is wet.
- Please do not place the switch at a damp place to prevent the moisture from entering the switch.
- Be sure of the location of the emergency power switch. If an emergency occurs, cut off the power first.
- Verify that all power supplies are turned off if you want to turn off the power.
- Verify that the power cord is connected properly.
- Verify that the power cord is long enough to avoid being stretched.
- Verify that the rated current of the external power socket is greater 16A and that the socket is grounded well.
- Verify that each power module is connected to a power socket.
- Verify that the vacant slot is covered with a filler panel for ventilation and heat dissipation.

# 4 System Debugging

## 4.1 Establishing the Configuration Environment

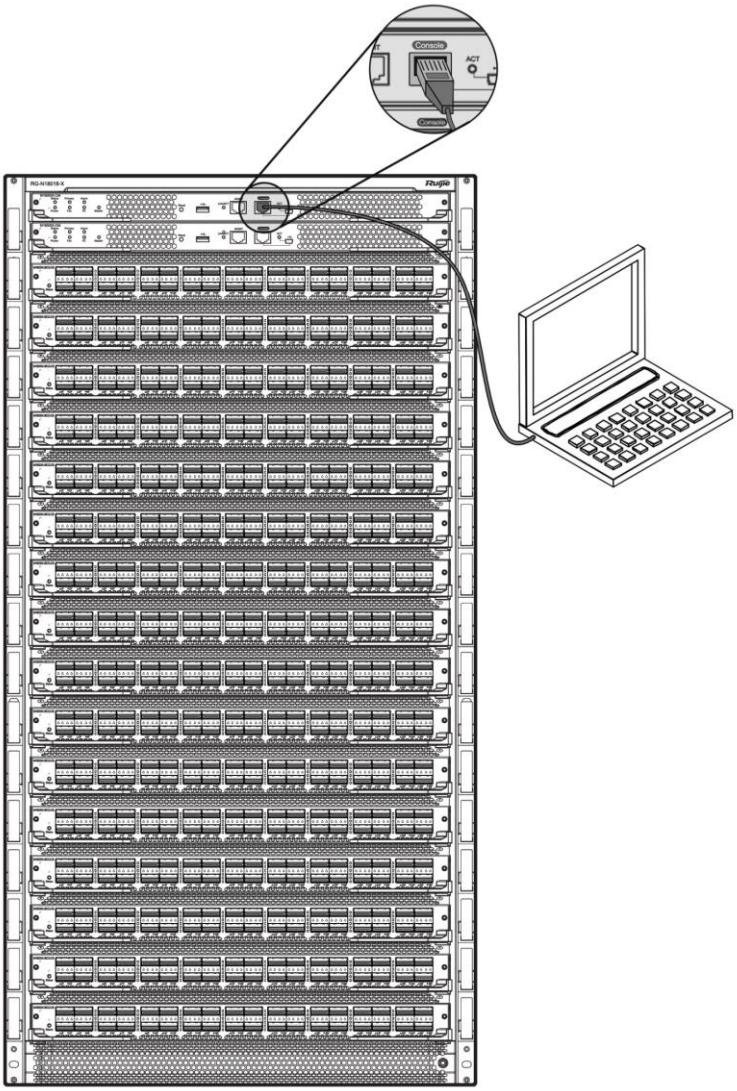
### Establishing the Configuration Environment

If you log in to the switch for the first time, please use the Console port.

### Connecting the Console Cable

1) Connect one end of the DB-9 jack of the console cable to the serial port of the PC.
2) Connect one end of the console cable RJ45 to the Console port of the switch.

Figure 4-1 Connecting Switch and PC through Console Port




### Setting Terminal Parameters

- Start the PC and run the terminal simulation program on the PC, such as Terminal on Windows 3.1 or HyperTerminal on Windows 95/98/NT/2000/XP.
- Set terminal parameters. The parameters are as follows: baud rate 9600, data bit 8, parity check none, stop bit 1, and flow control as none. Details are as follows:

1) Choose **Start** > **Programs** > **Accessories** > **Communications** > **Hyperterminal**. The hyperterminal window appears.

2) Click Cancel. A window appears as shown in Figure 4-2.

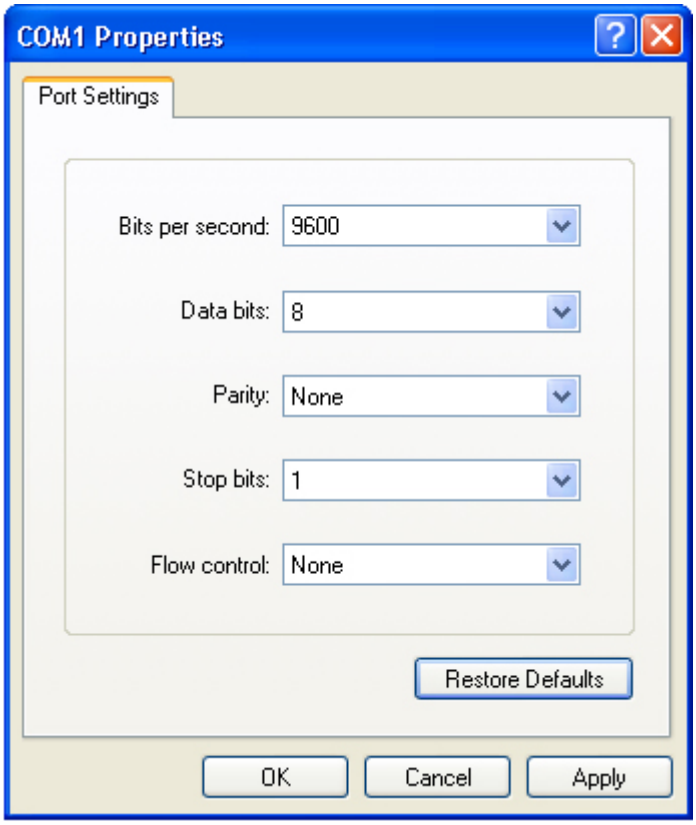
Figure 4-2


3) In the Connectivity Note window, type the name of the new connection and click OK. A window appears as shown in Figure 4-3. In the Connect Using field, select the serial port you want to use.

Figure 4-3


4) After selecting the serial port, click OK. The Serial Port Parameter Setting window is displayed, as shown in Figure 4-4. Set the baud rate to 9600, data bit to 8, parity check to none, stop bit to 1, and flow control to none.

Figure 4-4




5) After setting the serial port parameters, click OK. The Hyperterminal window appears..

## 4.2 Power-on Startup

### Checking Before Power-on

- The switch is fully grounded.
- The power cable is correctly connected.
- The power supply voltage complies with the requirement of the switch.
- The console cable is correctly connected; the terminal (can be a PC) used for configuration is already started; the parameters are already configured.

### Checking After Power-on (Recommended)

After power-on, you are recommended to perform the following checks to ensure the normal operation of follow-up configurations.

- Check that information appears on the terminal interface.
- Check that the device indicator is normal.

# 5 Monitoring and Maintenance

## 5.1 RG-N18000-X Monitoring

### Indicators

When the RG-N18018-X is running, you can monitor the status of each module by inspecting the status LED of the appropriate module.

- When the Alarm LED of the master supervisor module is red, it means the system has a fault, in which case you can log in to the management software to perform troubleshooting.
- When the Alarm LED of the master supervisor module is yellow, it means the system temperature exceeds the alarm temperature, affecting the system operation performance. However, the system can continue running. In this case, you can log in to the management software to perform troubleshooting.
- When the Status LED of the fan tray is red, it means that the fan tray is not power-on or the fan tray is faulty, you can log in to the management software to perform troubleshooting.
- When the Status LED of a module is OFF, RED, or blinking, it means that the module is faulty, in which case you need to find out the cause, and turn off the power when necessary.

### CLI Commands

The RG-N18018-X allows you to monitor various system statuses by executing the appropriate CLI commands, including:

- Module in-position status
- Port configuration information and status
- Fan and power supply working status
- Temperature status

For the monitoring commands, see RG-N18000-X series Software Configuration Guide.

RG-N18018-X supports remote maintenance. If RG-N18018-X and the Internet are connected, the user can log in to the RG-N18018-X via Telnet and maintain RG-N18018-X remotely through various monitoring commands.

## 5.2 Hardware Maintenance

### Module Maintenance

To replace a module, do replacement according to the instructions provided in Sections of Installing Modules and Removing Modules.

### Cooling System Maintenance

- The fan in the equipment is provided with the fault monitoring signals. When the fan fails, an appropriate alarm will occur.
- To replace the fan, first loosen the captive screw on the fan tray.
- Replace the failed fan with a good one.
- Tighten the captive screws of the fan tray.

Complete fan replacement within 30 seconds when the device is electrified.

### Power Supply Maintenance

When the AC power supply fails, you only need to remove the anti-loose buckle, disconnect the power cable, unplug the power module, replace it with a good one, and then connect the power cables and tighten the anti-loose buckle.

When the DC power supply fails, you only need to remove the anti-loose screw, disconnect the power cable, unplug the power module, replace it with a good one, and then connect the power cables and tighten the anti-loose buckle.

### Replacing Fuses

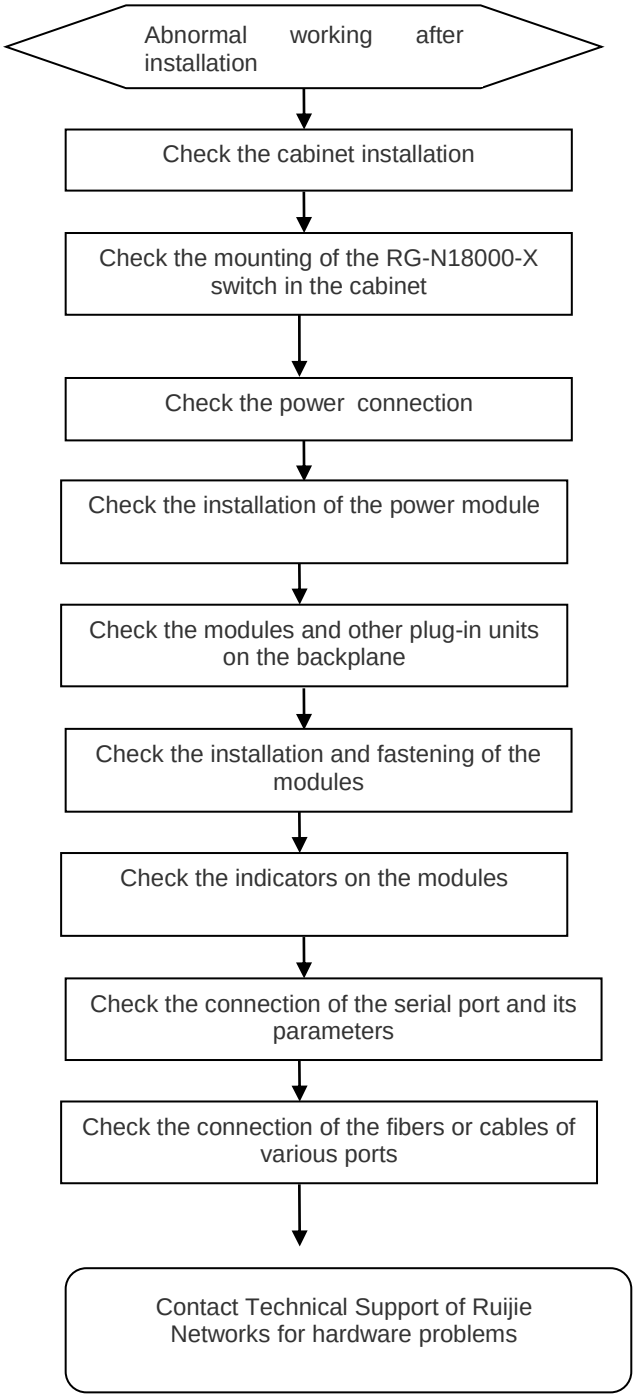
To replace the old fuse wire with the correspondent new one, please contact the technical support representatives of Ruijie Networks. The following table lists the specifications for the module fuses.

| Module | Fuse Slot Number | Fuse Specification |
|---|---|---|
| M18000X-CMII, M18006X-CM II | F1 | 5A/125V |

| | | |
|---|---|---|
| M18000X-CM II-C | F1 | 5A/125V |
| M18000X-CM X | F1 | 5A/125V |
| M18000X-36CQ-CB | F1, F2, F3, F4 | 30A/125V |
| M18000X-32CQ-DB | F1, F2, F3, F4 | 30A/125V |
| M18000X-18CQ-CB | F1 | 30A/125V |
| M18000X-36QXS-CB | F1 | 30A/125V |
| M18018X-FE-C II | F1 | 15A/85V |
| M18018X-FE-C V | F1, F2 | 30A/125V |
| M18018X-FE-D II | F1 | 15A/85V |
| M18010X-FE-C I | F1 | 15A/85V |
| M18010X-FE-C II | F1 | 15A/85V |
| M18010X-FE-D I | F1 | 15A/85V |
| M18006X-FE-C I | F1 | 15A/85V |
| M18010X-FE-E II | F1 | 30A/125V |
| | F2 | 5A/125V |
| M18000X-48XS2CQ-CB | F1 | 15A/85V |
| M18000X-18QXS18CQ-CB | F1 | 30A/125V |
| M18000X-12QXS12CQ-CB | F1 | 20A/125V |
| M18000X-6QXS6CQ-CB | F2 | 15A/85V |
| M18000X-48XT2CQ-CB | F1 | 15A/85V |
| M18000X-48CQ-CE | F1, F2, F3, F4 | 30A/125V |
| | F5 | 15A/85V |
| M18018X-FAN | F1 | 30A/125V |
| | F2 | 1.5A/63V |
| | F1-F18 | 3A/125V |
| M18010X-FAN | F1 | 15A/85V |
| | F1-F10 | 3A/125V |
| M18006X-FAN | F1 | 10A/125V |
| | F1=F6 | 3A/125V |

# 6 Troubleshooting

## 6.1 General Installation Troubleshooting Flow




## 6.2 Common Troubleshooting Procedures

### Fault 1: The AC power module does not work.

Fault Description:

The Status LED of each service module is OFF, the Power LED of the fan tray is OFF, and the fan does not work.

The LED on the panel of the power module is OFF. The fan does not work.

Troubleshooting:

First place the switches of all the power modules to OFF. Check if the cables of the cabinet have been correctly connected. Check whether the power cables are tightly connected to the cabinet power sockets and power modules. Check whether the power modules are installed correctly. If necessary, pull out the power modules and check whether the connectors on the backboard of the power system are tightened.

### Fault 2: An exception occurs to the LEDs when service modules are powered on.

Fault Description:

The Status LED of the service module is OFF, blinking, or RED. The Link/ACT LED of the service module is solid ON when no network cable or fiber is plugged.

Troubleshooting:

Check if the service module is firmly inserted. If so, install the service module again and ensure that it is inserted into place before you tighten the fastening screws. If the service module still does not work, check if the connector of the slot on the backplane is loose. If yes, insert the service module to another slot for a try. If the slot and connection are not the cause, return the service module for repair.

### Fault 3: The LED is abnormal after a service module works for some time.

Fault Description:

The Status LED of the service module is OFF or RED. The Link/ACT LED of the service module is solid ON when no network cable or fiber is plugged. The fault remains after restart.

Troubleshooting:

Check if the service module gets loose. If so, install the service module again and ensure that it is inserted into place before you tighten the fastening screws. If the module still does not work, check if the connector of the slot on the backplane is loose and check if the slide rail of the slot is deformed. If so, insert the service module to another slot for a try. If the slot and connection are not the cause, return the service module for repair.

### Fault 4: The LED of the supervisor module is abnormal.

Fault Description:

The LED of the supervisor module becomes abnormal after the supervisor module is powered on or works for some time. For example, the Status LED is blinking or OFF, and the Alarm LED is red.

Troubleshooting:

Check if the supervisor module gets loose. If so, install the supervisor module again and ensure that it is inserted into place, before you tighten the fastening screws. If the supervisor module still does not work, check if the connector of the slot on the backplane is loose and check if the slide rail of the slot is deformed. If yes, insert the module to another slot for a try. If the slot and connection are not the cause, return the supervisor module for repair.

When the Alarm LED is red, the cause may be the fault of another module in the system, in which case you can check other modules (for example, service module, fan, power, and overheating) for any alarm. If yes, you should first handle the faults of other modules. You can also identify the faults by logging in to the management software.

### Fault 5: The fan tray does not work or the LED is abnormal.

Fault Description:

After the system starts, the fans in the fan tray do not work or the status LED is OFF.

Troubleshooting:

Check if the connection between the fan tray and the backplane is secure and if the connector gets loose. If the connection is secure, you need to replace the fan tray.

### Fault 6: The serial port console has no output.

Fault Description:

After the system is started, the serial port console does not display any information.

Troubleshooting:

Check whether serial port cables are connected correctly and whether the connected serial port is identical with that configured on the super terminal. Check whether the configuration of the serial port on the super terminal is the same as that described in *RG-N18000-X Software Configuration Guide*. If not, modify the serial port configuration parameters. If there is still no serial port printed information, please contact Ruijie Customer Service Department for technical support.

### Fault 7: The serial port console outputs illegible characters.

Fault Description:

The serial port console outputs illegible characters.

Troubleshooting:

Such problem is related to the settings of the serial port. Check if the settings of such parameters as the baud rate match those in *RG-N18000-X series Software Configuration Guide*.

### Fault 8: The newly-inserted service module fails to be powered on.

Fault Description:

The system is running, yet all LEDs on the panel of the newly-inserted service modules are OFF, and the port is faulty.

Troubleshooting:

Check whether the service module is connected correctly and whether the summary power of the newly-inserted service module and other modules in the system exceeds the maximum power. If so, please add more power modules to provide the enough power for the power supply. If all checkings are OK, but the newly-inserted service module still cannot be powered on, please contact Ruijie Customer Service Department for technical support.

### Fault 9: The link cannot be set up between fiber interfaces

Fault Description:

The system runs normally. After the fiber interface is inserted into the optical module and the optical fiber is properly connected, the link cannot be set up.

Troubleshooting:

First confirm whether the interface is a copper/fiber combo interface. If yes, it should be configured in fiber mode. Then, do as follows:

1) Check whether the receiving and sending ends are wrongly connected. The sending end of the fiber interface needs to be connected to the receiving end of the other fiber interface. You can check by changing the sequence in which the two optical fibers are connected on the optical module.
2) Check whether the optical module wavelength of the two sides are consistent. For example, an optical module of 1310nm wavelength cannot be connected to an optical module of 1550nm wavelength.
3) Check whether the distance between the two sides exceeds the length indicated on the optical module.
4) Check whether the rates of the two sides match and whether the optical fiber type meets requirements. In addition, for ports supporting different rates, check whether rate modes are configured correctly.

If above mentioned methods do not take effect, please contact Ruijie Networks for technology assistance.

# 7 Replacing Modules

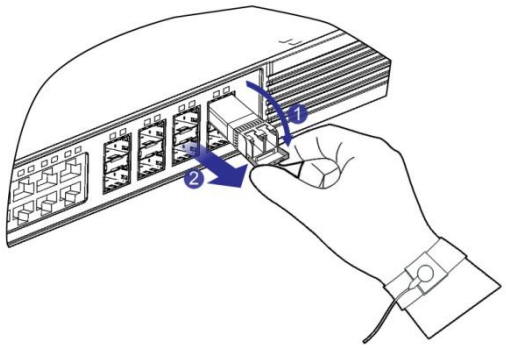
## 7.1 Replacing Swappable Interface Modules (Optional)

### 7.1.1 Replacing SFP+/SFP Modules

Take the following steps to remove SFP/SFP+ modules:

1) Unplug the optical fiber.
2) Turn down the handle of the module until it is horizontal. Pull the tab to take out the SFP/SFP+ module, as shown in Figure 7-1.

Figure 7-1 Replacing the SFP/SFP+ Module



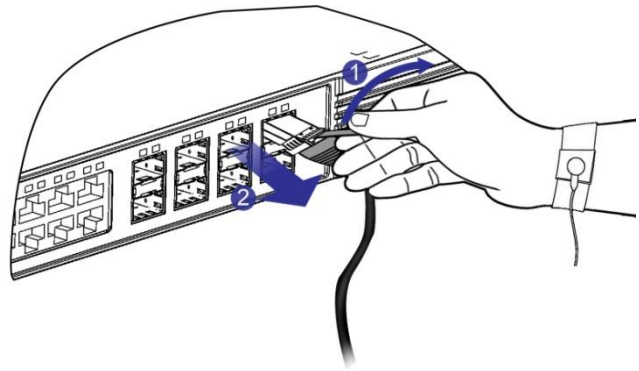

**Precaution**

- Unplug the optical fiber before replacing the module.
- Do not pull out the module forcefully without turning down the handle of the module.
- Immediately install the dust plug to the module port and the switch fiber port.

### 7.1.2 Replacing SFP+ Cables

Pull the tap out and unlock the module. Take out the SFP+ module gently, as shown in Figure 7-2

Figure 7-2 Replacing the SFP+ Cable




**Precaution**

- Pull the tab out before unplugging the cables. Otherwise, the module or the slot can be damaged.
- Immediately install the dust plug to the module port and the switch fiber port.

### 7.1.3 Replacing 40-Gigabit QSFP+ Modules

1) Unplug the optical fiber.

2) If you want to remove the module equipped with a bail-clasp latch, turn down the handle of the module until it is horizontal and pull the bail-clasp latch to take out the QSFP+ module, as shown in Figure 7-3. If you want to remove the module equipped with a pull tab, pull the tab to take out the QSFP+ module gently, as shown in Figure 7-3:

Figure 7-3 Replacing the QSFP+ Module Equipped a Bail-clasp Latch

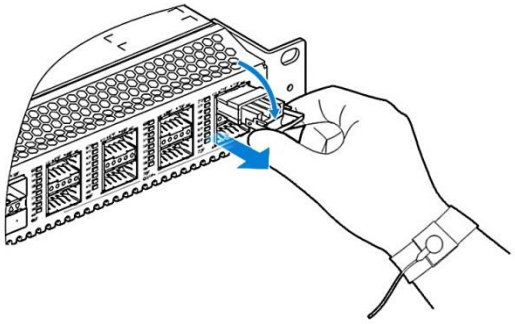
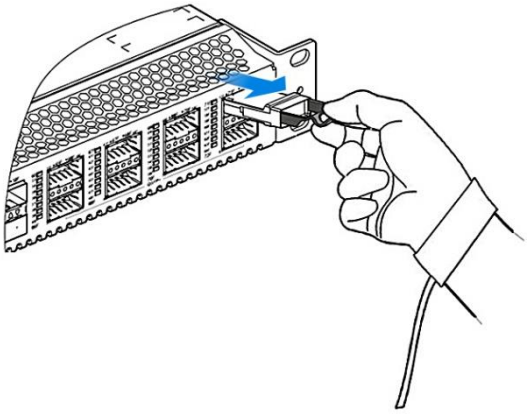


Figure 7-4 Replacing the QSFP+ Module Equipped with a Pull-tab Latch



### Precaution

- Unplug the optical fiber before replacing the module.
- Do not pull out the module forcefully without turning down the handle of the module.
- Immediately install the dust plug to the module port and the switch fiber port.

## 7.1.4 Replacing 100-Gigabit QSFP28 Optical Modules

1) Unplug the optical fiber.

2) If you want to remove the module equipped with a bail-clasp latch, turn down the handle of the module until it is horizontal and pull the bail-clasp latch to take out the QSFP28 module, as shown in Figure 7-6. If you want to remove the module equipped with a pull tab, pull the tab to take out the QSFP28 module gently, as shown in Figure 7-6:

Figure 7-5 Replacing the QSFP28 Optical Module Equipped a Bail-clasp Latch

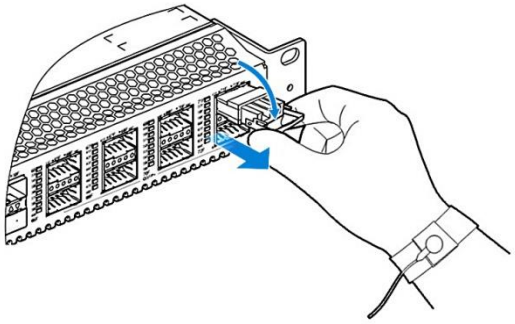
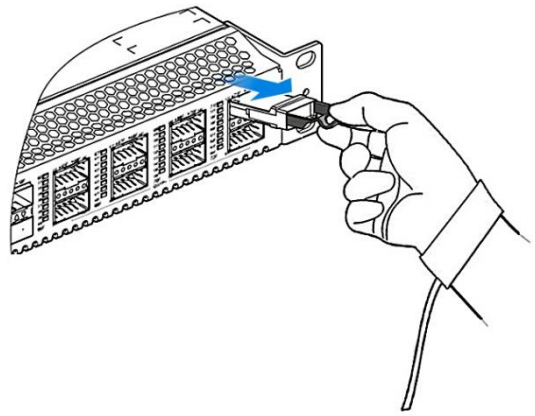


Figure 7-6 Replacing the QSFP28 Optical Module Equipped with a Pull-tab Latch



### Precaution

- Unplug the optical fiber before replacing the module.
- Do not pull out the module forcefully without turning down the handle of the module.
- Immediately install the dust plug to the module port and the switch fiber port.

## 7.2 Replacing Supervisor Module

### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the supervisor module from the package.

Take the following steps to replace the supervisor module:

1. Unplug all cables/fibers such as fibers and RJ45 twisted pairs from the panel.
2. Hold down levers on both sides of the panel and pull out the lever.
3. Drag the lever to pull the supervisor module out, Before the supervisor module is about to be removed from the chassis, support the bottom of the supervisor module with one hand and hold the supervisor module with the other hand, so as to prevent the supervisor module from falling.
4. Pull out the levers on both sides of the supervisor module. Support the bottom of the supervisor module with one hand and hold the supervisor module with the other hand to insert the supervisor module into the slot along the rail.
5. Drive the levers close to the supervisor module, and the supervisor module will hit the back panel. The supervisor module will be fastened.

Figure 7-7 Replacing the Supervisor Module

- In order to ensure the reliability of the system ventilation and heat dissipation performance and address the requirement of the dust-filter, filler panel needs to be installed in the slot where no supervisor module or service module has been installed.
- If you want to remove the module when the device is electrified, you need to insert the new module or install the filler panel within 10 minutes.
- Do not hold the edge of the PCB or collide the components on the PCB
- Do not plug/unplug a supervisor module, service module or switch fabric module forcedly, use the ejector.

## 7.3 Replacing Service Module

### Preparation

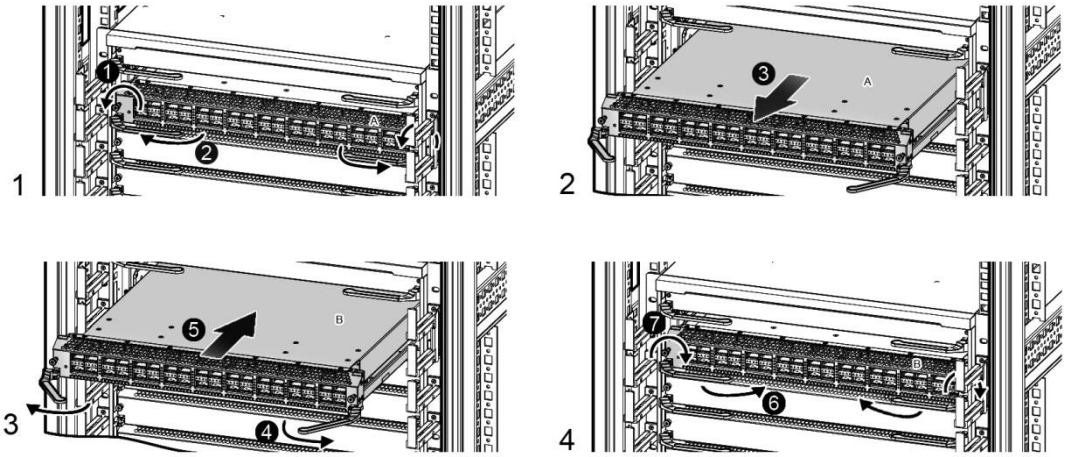
1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the supervisor module from the package.

Take the following steps to replace the service module:

1. Unplug all cables/fibers such as fibers and RJ45 twisted pairs from the panel.
2. Hold down levers on both sides of the panel and pull out the lever.
3. Drag the lever to pull the service module out, Before the service module is about to be removed from the chassis, support the bottom of the service module with one hand and hold the service module with the other hand, so as to prevent the service module from falling.

4. Pull out the levers on both sides of the service module. Support the bottom of the service module with one hand and hold the service module with the other hand to insert the service module into the slot along the rail.
5. Drive the levers close to the service module, and the service module will hit the back panel. The service module will be fastened.

Figure 7-8 Replacing the Service Module




In order to ensure the reliability of the system ventilation and heat dissipation performance and address the requirement of the dust-filter, filler panel needs to be installed in the slot where no service module or service module has been installed.

If you want to remove the module when the device is electrified, you need to insert the new module or install the filler panel within 10 minutes.

Do not hold the edge of the PCB or collide the components on the PCB.

Do not plug/unplug a service module, service module or switch fabric module forcedly, use the ejector.

## 7.4 Replacing Power Module

### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the power module from the package.
3. Please power off the module before replacing it.

After hot swapping a module, please wait for at least 30 seconds for the next operation.

Before inserting or replacing the power module, please verify whether the switch is well mounted. Prevent the switch from tumbling down when you are inserting or replacing the power module.

Do not touch the connecting finger on the power module which has been removed to avoid being electrocuted in case of incomplete discharge.

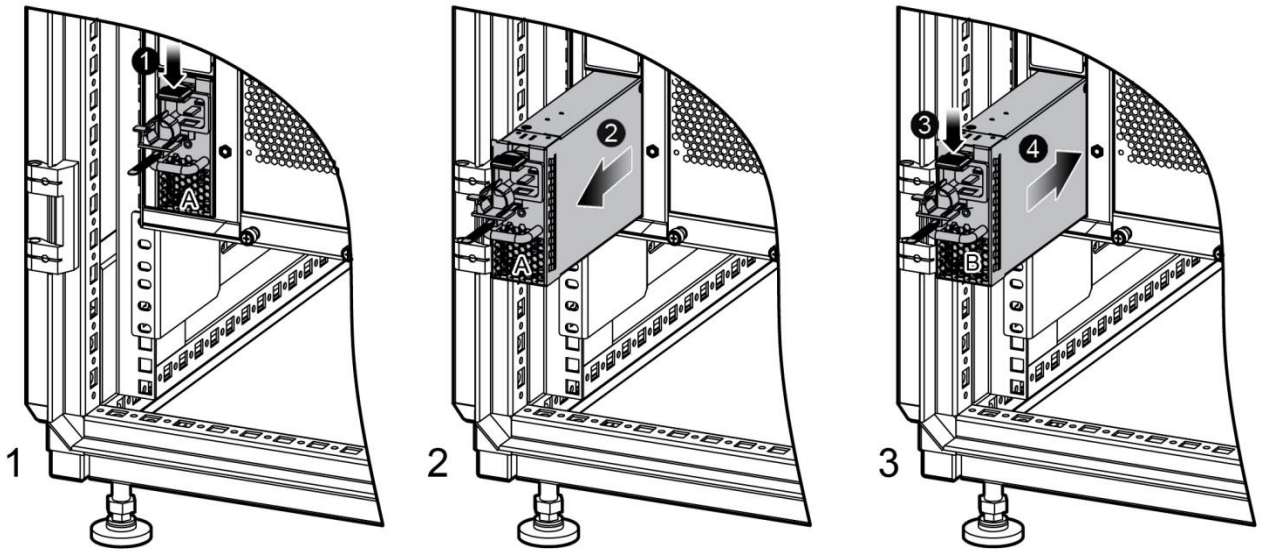
Take the following steps to remove the power module:

1. Loosen the neon buckle, and unplug the cable. Separate the pigtail plug of the cable from the connector of the power module. Press the button with the right hand.

While pressing the button, drag the power module panel also with the right hand, and support the bottom of the power module with your left hand, then to pull out the power module.

2. Insert the power module into the slot until it hits the back panel.

Figure 7-9 Replacing the Power Module




Note: A: Power modules to be removed B: Power module to be installed

## 7.5 Replacing Fan

⚠ Do not touch any bare wire, terminal or the power instruction on the switch.

⚠ The fan tray supports hot swapping, If you want to remove the fan tray when the switch is operational, do not remove the fan tray until the fan stops rotating, Besides, do not put your hands inside the fan tray.

⚠ If you remove the fan tray when the switch is operational, install another fan tray quickly to ensure normal operation of the switch and avoid damage to the switch.

### Preparation

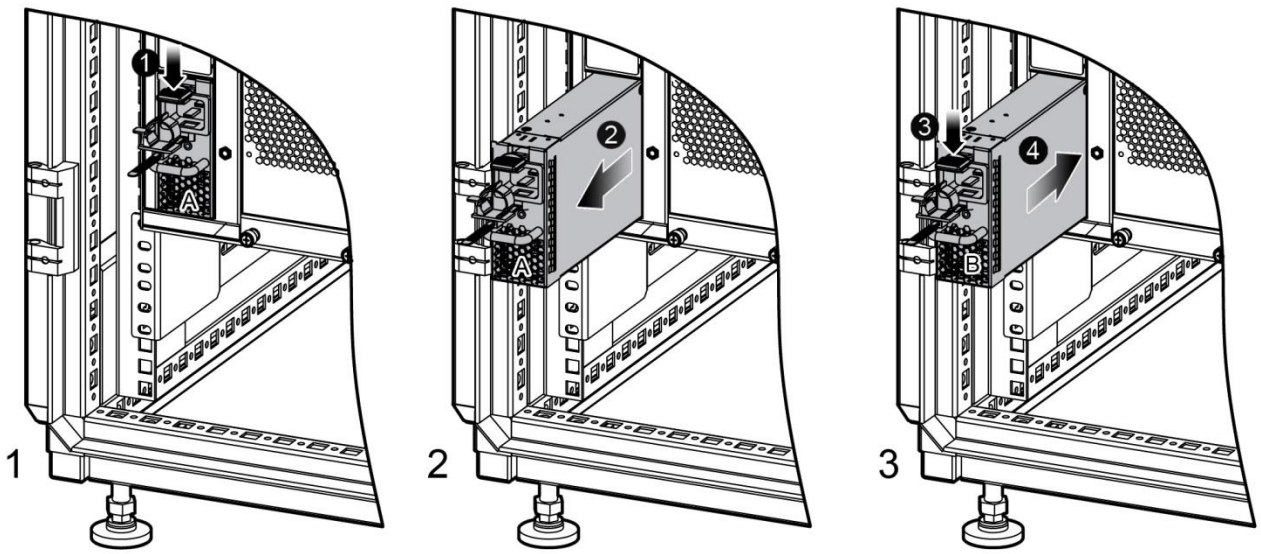
1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the fan module from the package.

Take the following steps to remove the fan module:

1. Unloosen the captive screws on the fan tray with the Phillips screwdriver.
2. Pull out the fan tray and put it in the anti-static shielding bag.

Insert the fan tray into the slot along the slide rail until the fan tray hits the back panel.
Tighten the captive screws on the fan tray with the Phillips screwdriver.

Figure 7-10 Replacing the Fan



## 7.6 Replacing Switch Fabric Module

The switch fabric module resides in the fan tray. Therefore, remove the fan tray before replacing the switch fabric module. The N18000-X series switch employs the 2+1 fan tray redundancy solution. Therefore, replace the switch fabric modules in the fan trays one by one, to ensure that the other two fan trays are working.

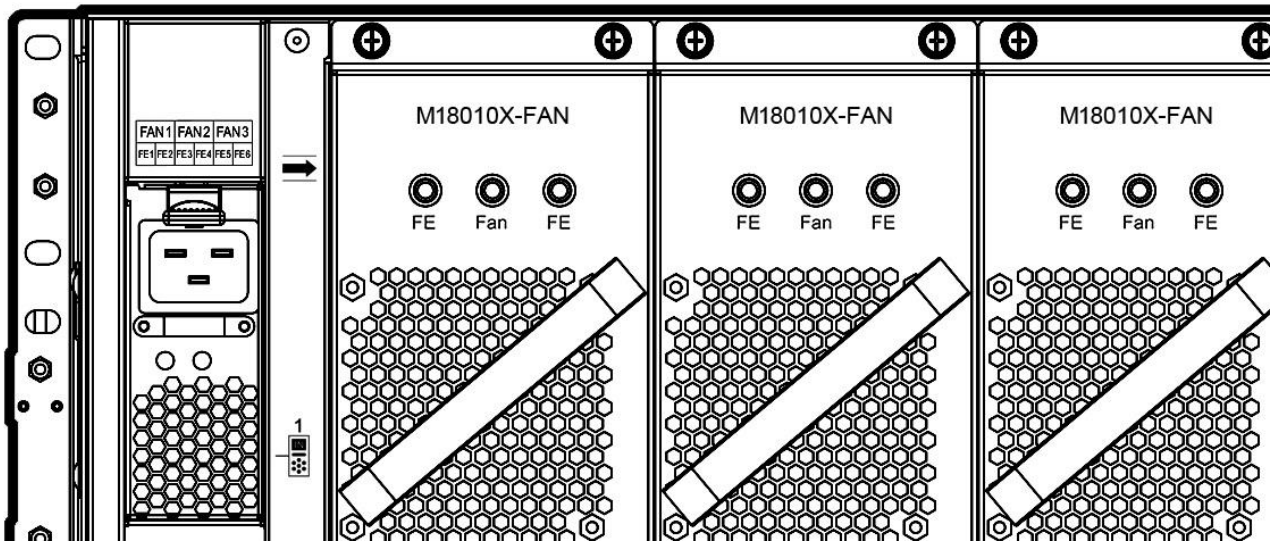
### Preparation

1. Wear an anti-static wrist strap close to your skin and have it properly grounded.
2. Take out the fan tray, see *Replacing Fan* for details.
3. Take out the supervisor module from the package.

### Steps

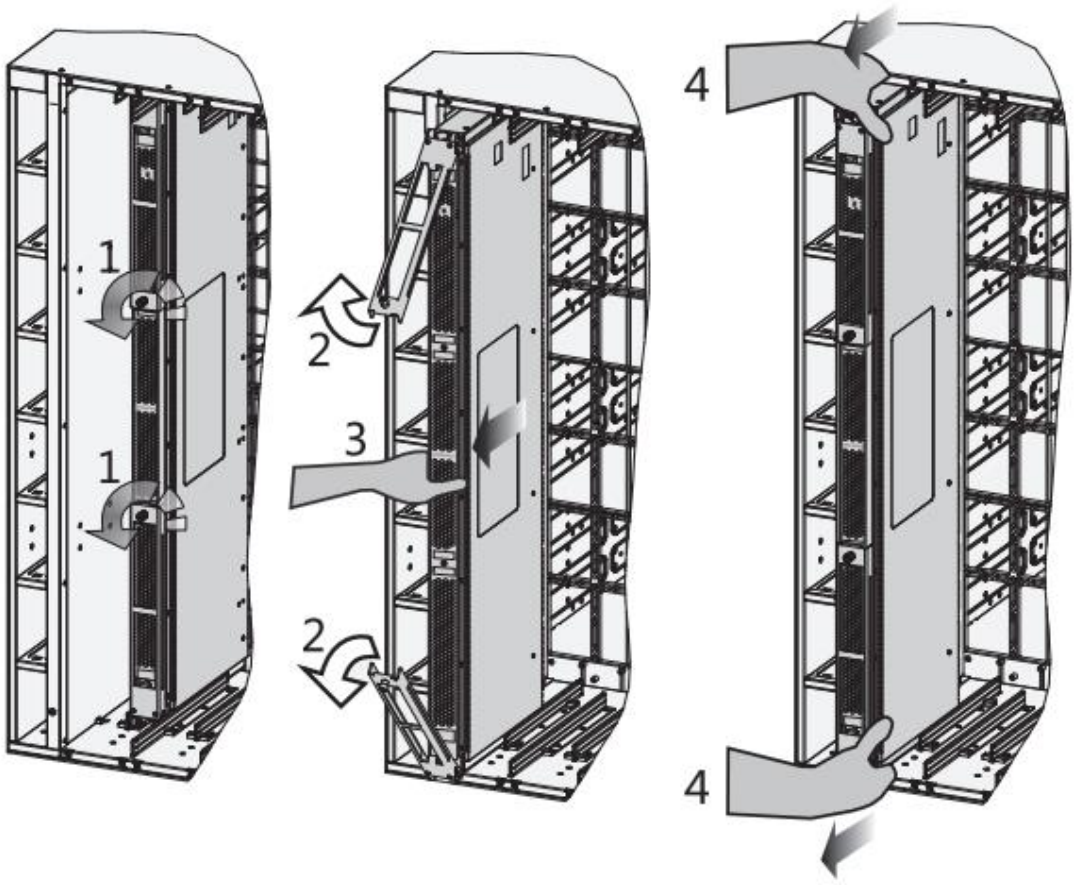
The following figure shows the switch fabric module layout. Each fan tray houses two switch fabric modules. The FE switch fabric modules need to be deployed from left to right. FAN1 on the left houses FE1 and FE2.

Figure 7-11 Switch Fabric Module




1. Use a Philips screwdriver to loosen the two captive screws on the switch fabric module anticlockwise.
2. Use both hands to expand the ejector lever with even force.
3. Pull out a part of the switch fabric module, and then use both hands to hold the top and bottom of the FE switch fabric module and remove the switch fabric module horizontally.
4. For installation of an switch fabric module, see section 0 "Installing Switch Fabric Module."

Figure 7-12 Replacing the Switch Fabric Module




After the switch fabric module is removed, do not hold the switch fabric module by the ejector lever, to prevent damage caused by sudden fall-off of the switch fabric module.

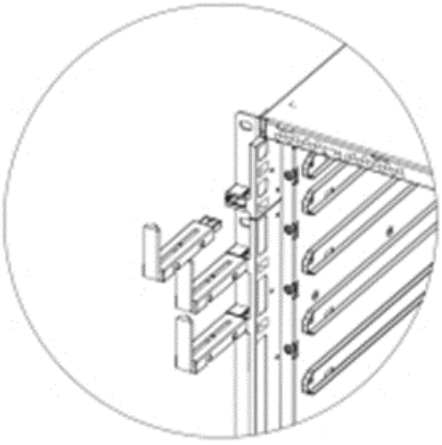
Raise the switch fabric module only after it is totally removed from the cabinet. Protect the front-end high-speed connector and place the removed switch fabric module in an anti-static shielding bag.

If the switch fabric module is replaced when the switch is working, install a new switch fabric module in time to ensure proper running of the switch and prevent the switch being damaged.

## 7.7 Replacing Cable Management Bracket

The cable management bracket is removable.

Figure 7-13 Replacing Cable Management Bracket



# 8 Cables

This chapter describes the precautions and simple steps for cable connection and bundling. See *Appendix D cabling Recommendations in Installation* for detailed cabling and bundling.

## 8.1 Connecting the External Port Cables

### Precautions

- Correctly distinguish single-mode and multi-mode fibers and ports.
- Avoid bends of small radius at the connector.

### Simple Connection Steps

1) Connect one end of the RJ45 connector for configuring Ethernet cables to the Ethernet interface of the device module and the other end to the NMS or a control terminal; or connect one end of the standard RJ45 serial port cable to the serial port of the device module and the other end to the NMS or a control terminal.
2) Insert the single-mode or multi-mode fiber into the appropriate interface according to the identification on the panel of the module. Distinguish the Rx/Tx end of the fiber.
3) Insert the twisted pair with the RJ45 port into the appropriate interface according to the identification on the panel of the module. Distinguish the crossover cable and straight-through cable.
4) Connect the cables and fibers of each module in sequence.

## 8.2 Bundling the Cables

### Precautions

- The power cables and other cables should be bundled in a visually pleasing way.
- When you bundle fibers, make sure that the fibers at the connectors have natural bends or bends of large radius.
- Do not bundle fibers and twisted pairs too tightly, as this may press hard the fibers and affect their useful life and transmission performance.

### Simple Bundling Steps

1) Bundle the drooping part of the fibers and twisted pairs of each module, and lead them to both sides of the chassis for convenience.
2) On the both sides of the chassis, fasten the fibers and twisted pairs to the cabinet cable management ring or bracket.
3) For the power cables, you should bundle them closely along the bottom of the chassis, in a straight line wherever possible.

# Appendix A Connectors and Media

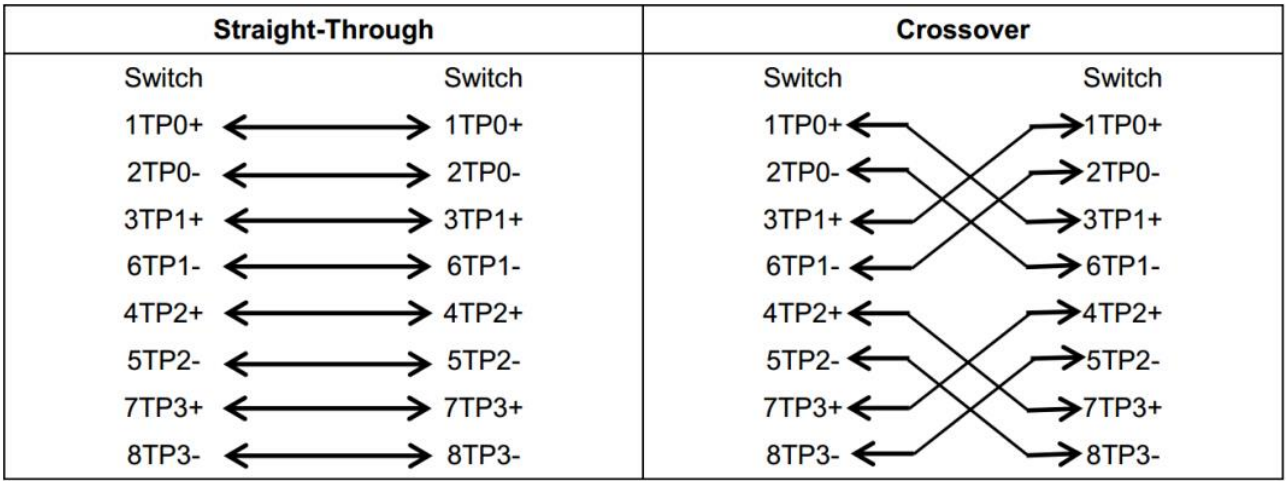
## 1000BASE-T/100BASE-TX/10BASE-T

The 1000BASE-T/100BASE-TX/10BASE-T is a 10/100/1000 Mbps auto-negotiation port that supports auto MDI/MDIX.

Compliant with IEEE 802.3ab, 1000BASE-T requires Category 5e 100-ohm UTP or STP (STP is recommended) with a maximum distance of 100 meters (328 feet).

1000BASE-T requires all four pairs of wires be connected for data transmission, as shown in Figure A-1

Figure A-1 1000BASE-T Connection



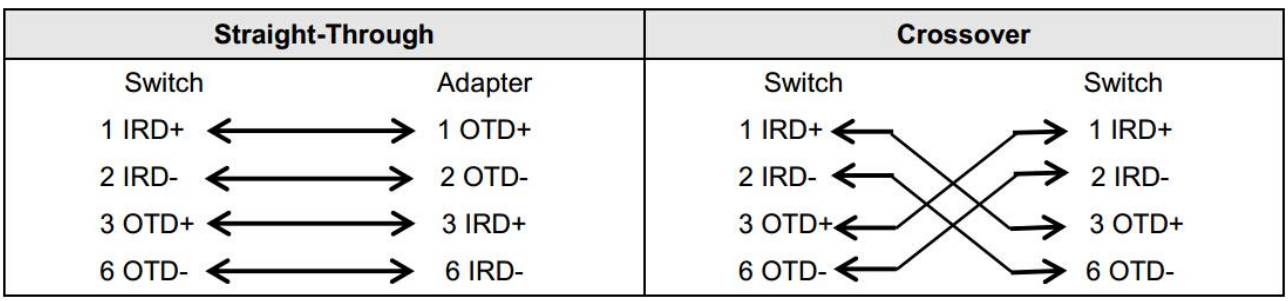

10BASE-T uses Category 3, 4, 5 100-ohm UTP/STP and 1000BASE-T uses Category 5 100-ohm UTP/STP for connections. Both support a maximum length of 100 meters. Figure A-2 shows100BASE-TX/10BASE-T pin assignments.

Figure A-2 100BASE-TX/10BASE-T Pin Assignments.

| Pin | Socket | Plug |
|---|---|---|
| 1 | Input Receive Data+ | Output Transmit Data+ |
| 2 | Input Receive Data- | Output Transmit Data- |
| 3 | Output Transmit Data+ | Input Receive Data+ |
| 6 | Output Transmit Data- | Input Receive Data- |
| 4,5,7,8 | Not used | Not used |

Figure A-3 shows wiring of straight-through and crossover cables for 100BASE-TX/10BASE-T.

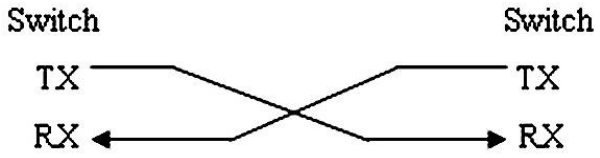
Figure A-3 100BASE-TX/10BASE-T Connection




## Fiber Connection

You can choose to use single mode or multimode fibers according to the transceiver module types. Figure A-4 shows connection of fiber cables.

Figure A-4 Fiber Connection


Switch
Switch
TX
TX
RX
RX

# Appendix B Mini-GBIC, 10G and 40G Module

We provide 1000M SFP modules (Mini-GBIC modules), 10G SFP+ modules, 40G QSFP+ modules and 100G QSFP28 modules. According to the interface type of the switch module. You can select modules to suit your specific needs. The following models and technical specifications of some 1000M SFP modules, 10G SFP+ modules and 40G QSFP+ modules are listed for your reference. For detailed specifications, please refer to *Mini-GBIC, SFP Series Modules Specifications, 10G SFP+ Series Modules Specifications* and *40G QSFP+ Series Modules Specifications*.

### Models and Technical Specifications of the Mini-GBIC (SFP) Module

| GBIC/SFP | Wavelength (nm) | Optical Fiber Type | DDM Supported (Yes/No) | Intensity of Transmitted Light (dBm) | | Intensity of Received Light (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | min | max | min | max |
| FE-SFP-LX-MM1310 | 1310 | MF | Yes | -22 | -14 | -30 | -14 |
| FE-SFP-LH15-SM1310 | 1310 | SF | Yes | -15 | -8 | -28 | -8 |
| MINI-GBIC-SX-MM850 | 850 | MF | No | -9.5 | -3 | -17 | 0 |
| MINI-GBIC-LX-SM1310 | 1310 | SF | No | -9.5 | -3 | -20 | -3 |
| GE-eSFP-SX-MM850 | 850 | MF | Yes | -9.5 | -3 | -17 | 0 |
| GE-eSFP-LX-SM1310 | 1310 | SF | Yes | -9.5 | -3 | -20 | -3 |
| MINI-GBIC-LH40-SM1310 | 1310 | SF | Yes | -2 | 3 | -22 | -3 |
| MINI-GBIC-ZX50-SM1550 | 1550 | SF | Yes | -5 | 0 | -22 | -3 |
| MINI-GBIC-ZX80-SM1550 | 1550 | SF | Yes | 0 | 4.7 | -22 | -3 |
| MINI-GBIC-ZX100-SM1550 | 1550 | SF | Yes | 0 | 5 | -30 | -9 |

### Cabling Specifications

| GBIC/SFP | Wavelength (nm) | Media Type | Core Size (μm) | Maximum Cabling Distance |
|---|---|---|---|---|
| FE-SFP-LX-MM1310 | 1310 | MF | 62.5/125 | 2km |
| FE-SFP-LH15-SM1310 | 1310 | SF | 9/125 | 15km |
| MINI-GBIC-SX-MM850 | 850 | MF | 62.5/125 | 275m |
| | | | 50/125 | 550m |
| MINI-GBIC-LX-SM1310 | 1310 | SF | 9/125 | 10km |
| GE-eSFP-SX-MM850 | 850 | MF | 62.5/125 | 275m |
| | | | 50/125 | 550m |
| GE-eSFP-LX-SM1310 | 1310 | SF | 9/125 | 10km |
| MINI-GBIC-LH40-SM1310 | 1310 | SF | 9/125 | 40km |
| MINI-GBIC-ZX50-SM1550 | 1550 | SF | 9/125 | 50km |
| MINI-GBIC-ZX80-SM1550 | | | | 80km |
| MINI-GBIC-ZX100-SM1550 | | | | 100km |

### Models and Technical Specifications of the 10G SFP+ Module

The existing 10G SFP+ optical modules:

| Model | Wavelength (nm) | Optical Fiber Type | Core Size (μm) | Modular Bandwidth (MHz•km) | Max Cabling distance | Intensity of Transmitted Light (dbm) | | Intensity of Received Light (dbm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | min | max | min | max |
| XG-SFP-SR-MM850 | 850 | MF (LC interface) | 62.5 | 200 | 33m | -5 | -1 | -7.5 | 0.5 |
| | | | | 160 | 26m | | | | |
| | | | 50 | 2000 | 300m | | | | |
| | | | | 500 | 82m | | | | |
| | | | | 400 | 66m | | | | |
| XG-SFP-LR-SM1310 | 1310 | SF (LC interface) | 9 | N/A | 10km | -8.2 | 0.5 | -10.3 | 0.5 |
| XG-SFP-ER-SM1550 | 1550 | SF (LC | 9 | N/A | 40km | -4.7 | 4 | -11.3 | -1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | interface) | | | | | | | |

The existing 10 G SFP+ copper modules:

| Model | Module Type | Connector Type | Copper Cable Length(m) | Conductor Wire Diameter (AWG) | Data Rate(Gb/s) | DDM Supported (Yes/No) |
|---|---|---|---|---|---|---|
| XG-SFP-AOC1M | Active | SFP+ | 1 | \ | 10.3125 | No |
| XG-SFP-AOC3M | Active | SFP+ | 3 | \ | 10.3125 | No |
| XG-SFP-AOC5M | Active | SFP+ | 5 | \ | 10.3125 | No |

### Models and Technical Specifications of the 40G QSFP+ Module

The existing 40G QSFP+ optical modules:

| Model | Wavelength (nm) | Optical Fiber Type | Core Size (μm) | Modular Bandwidth (MHz·km) | Max Cabling Distance | DDM Supported (Yes/No) | Intensity of Transmitted Light (dbm) | Intensity of Received Light (dbm) |
|---|---|---|---|---|---|---|---|---|
| 40G-QSFP-SR-MM850 | 850 | MF (MPO interface) | 50 | 2000 | 100m (OM3) | Yes | -7.6 to 2.4 (Perlane) | -9.5 to 2.4 (Perlane) |
| | | | 50 | 4700 | 150m (OM4) | | | |
| 40G-QSFP-LR4-SM1310 | 1310 | LC | 9 | N/A | 10km | Yes | -7.0 to 2.3 (Perlane) | -13.7 to 2.3 (Perlane) |

The existing 40G QSFP+ copper modules:

| Model | Module Type | Connector Type | Copper Cable Length (m) | Conductor Wire Diameter (AWG) | Data Rate(Gb/s) | Support DDM (Yes/No) |
|---|---|---|---|---|---|---|
| 40G-QSFP-STACK3M | Passive | QSFP+ | 3 | 28 | 4lanes x 10.3125 (Perlane) | No |

### Models and Technical Specifications of the 100G QSFP28 Module

The existing 100G QSFP28 optical modules:

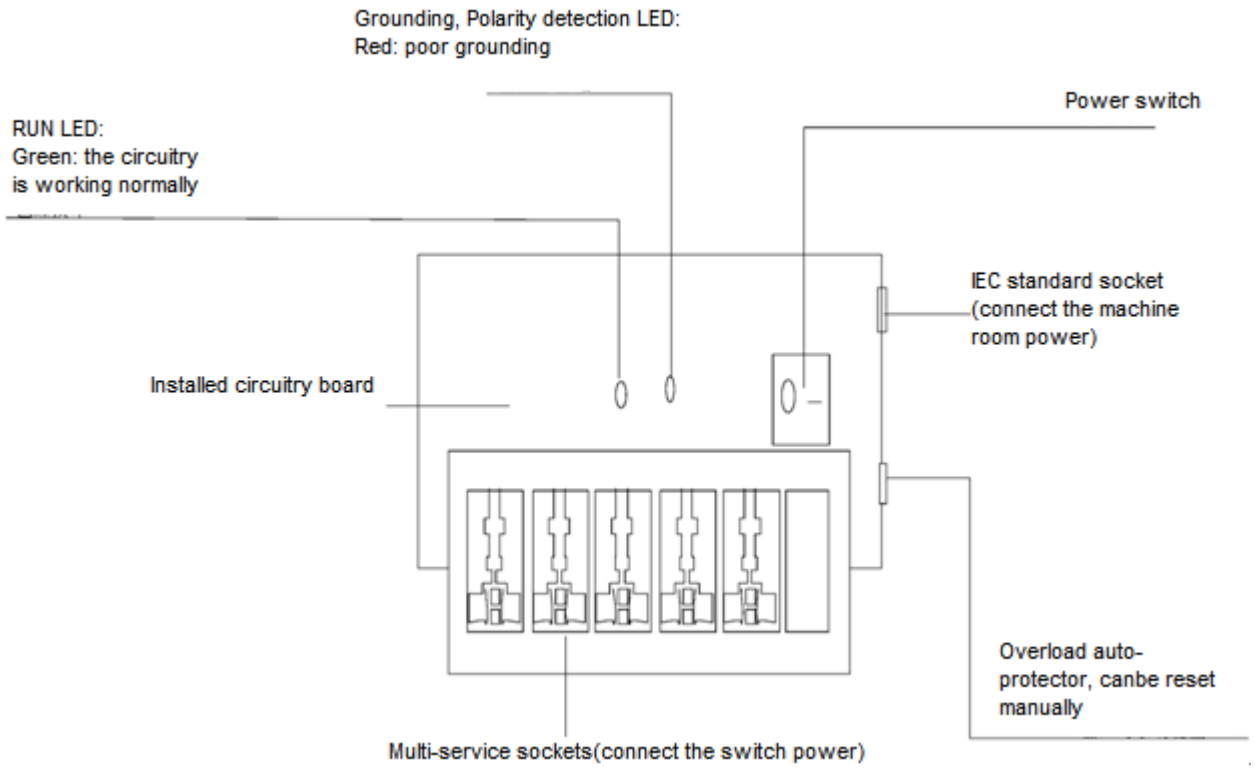
| Model | Wavelength (nm) | Optical Fiber Type | Core Size (μm) | Modular Bandwidth (MHz·km) | Max Cabling Distance | DDM Supported (Yes/No) | Intensity of Transmitted Light (dbm) | Intensity of Received Light (dbm) |
|---|---|---|---|---|---|---|---|---|
| 100G-QSFP-SR-MM850 | 850 | MF (MPO connector) | 50 | 2000 | 70m (OM3) | Yes | -8.4 to 2.4 | -10.3 to 2.4 |
| | | | 50 | 4700 | 100m (OM4) | | | |
| 100G-QSFP-LR4-SM1310 | 1310 | LC | 9 | N/A | 10km | Yes | -4.3 to 4.5 | -10.6 to 4.5 |

# Appendix C Switch Lightning Protection

## Installing AC Power Arrester (lightning protection cable row)

The external lightning protection cable row shall be used on the AC power port to prevent the switch from being struck by lightning when the AC power cable is introduced from the outdoor and directly connected to the power port of the switch. The lightning protection cable row is fixed on the cabinet, operating table or the wall in the machine room using the line buttons and screws.

Figure C-1 Schematic Diagram for the Power Arrester




The power arrester is not provided and the user shall purchase it to address the practical requirement.

Precautions for installation:

- Make sure that the PE terminal of the power arrester has been well-grounded;
- After connecting the switch AC power plug to the socket of the power arrester (lightning protection socket), lightning protection function implements if the RUN LED is Green and the ALARM LED is OFF.
- If the ALARM LED on the power arrester is Red, you shall check what the reason is, poor grounding connection or the reversed connection of the Null and Live lines: Use the multimeter to check the polarity of the power socket for the arrester when the LED is Red, if the N line is on the left and the L line is on the right, the arrester PE terminal is not grounded; if the L line is on the left and the N line is on the right, the polarity of the arrester power cable shall be reversed; if the LED is still Red, it is confirmed that the arrester PE terminal has not been grounded.

## Installing the Ethernet Port Arrester

During the switch usage, the Ethernet port arrester shall be connected to the switch to prevent the switch damage by lightning before the outdoor network cable connects to the switch.

Tools: Cross or straight screwdriver, Multimeter, Diagonal pliers

Installation Steps:

1) Tear one side of the protection paper for the double-sided adhesive tape and paste the tape to the framework of the Ethernet port arrester. Tear the other side of the protection paper for the double-sided adhesive tape and paste the

Ethernet port arrester to the switch framework. The paste location for the Ethernet port arrester shall be as close to the grounding terminal of the switch.

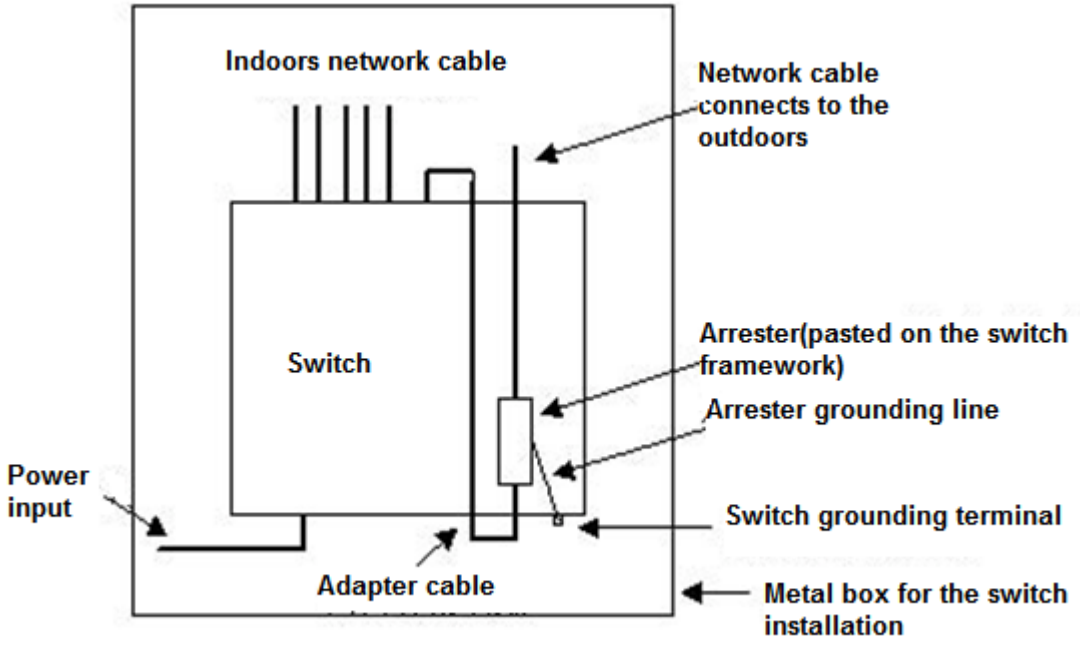
2) Based on the distance of the switch grounding terminal, cut the grounding line for the Ethernet port arrester and firmly tighten the grounding line to the grounding terminal of the switch.

3) Use the multimeter to check whether the grounding line for the arrester is in good contact with the switch grounding terminal and the framework.

4) According to the description on the Ethernet Port Arrester Hardware Installation Guide, connect the arrester using the adapter cable(note that the external network cable is connected to the end of IN, while the adapter cable connected to the switch is connected to the end of OUT) and observe whether the LED on the borad is normal or not.

5) Use the nylon button to bundle the power cables.

Figure C-2 Schematic Diagram for the Ethernet port Arrester Installation




The Ethernet port arrester is only for the 10M/100M copper Ethernet ports with the RJ-45 connector;

The Ethernet port arrester is not provided, the user can purchase them to address their own pratical requirements. For the detailed information during the arrester installation, please refer to Ethenet Port Arrester Hardware Installation Guide, which contains the technical specification and the maintenance and installation of the arrester.

You may pay attention to the following conditions during the actual installation to avoid influencing the performance of the Ethernet port arrester:

- Reversed direction of the arrester installation. You shall connect the external network cable to the “IN” end and connect the switch Ethernet port to the “OUT” end.
- Poor arrester grounding. The length of the grounding line should be as short as possible to ensure that it is in good contact with the switch grounding terminal. Use the multimeter to confirm the contact condition after the grounding.
- Incomplete arrester installation. If there is more than one port connected to the peer device on the switch, it needs to install the arresters on all connection ports for the purpose of the lightning protection.

# Appendix D Cabling Recommendations in Installation

When RG-N18000-X series switches are installed in standard 19-inch cabinets, route cable bundles upward or downward along the sides of the rack depending on the actual situation in the equipment room. All cable connectors should be placed at the bottom of the cabinet rather than be exposed outside of the cabinet. Power cords should be routed upward or downward beside the cabinet close to the location of the DC power distribution cabinet, AC power outlet, or lightning protection box.

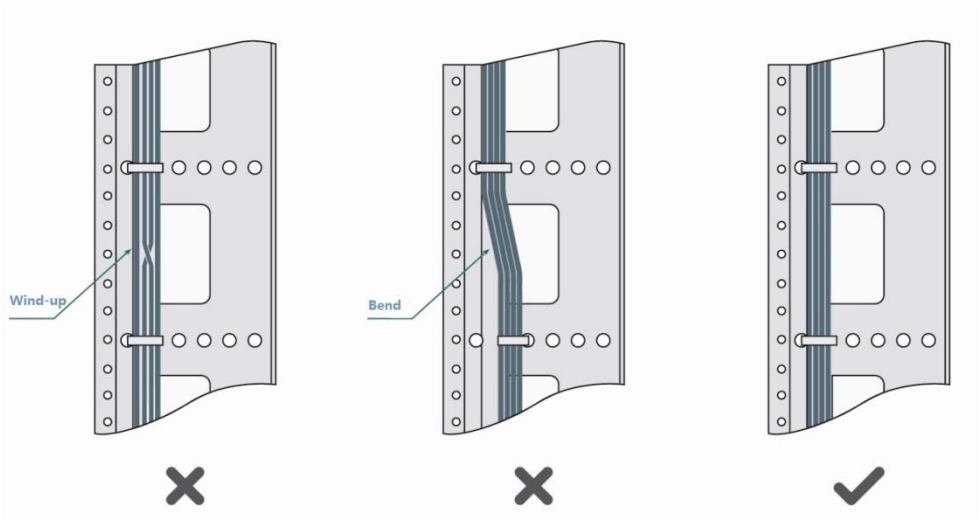
## Required Minimum Cable Bend Radius

- The minimum bend radius of a power, communication or flat cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 7 times the overall diameter.
- The minimum bend radius of a coaxial cable should be 7 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 10 times the overall diameter.
- The minimum bend radius of a high-speed cable, such as an SFP+ cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 10 times the overall diameter. Required minimum fiber bend radius
- The diameter of a fiber tray to hold fibers cannot be less than 25 times the diameter of the fiber.
- When moving an optical fiber, the bend radius of the fiber should be equal to or greater than 20 times the diameter of the fiber.
- During cabling of an optical fiber, the bend radius of the fiber should be equal to or greater than 10 times the diameter of the fiber.

## Precautions for Cable Bundling

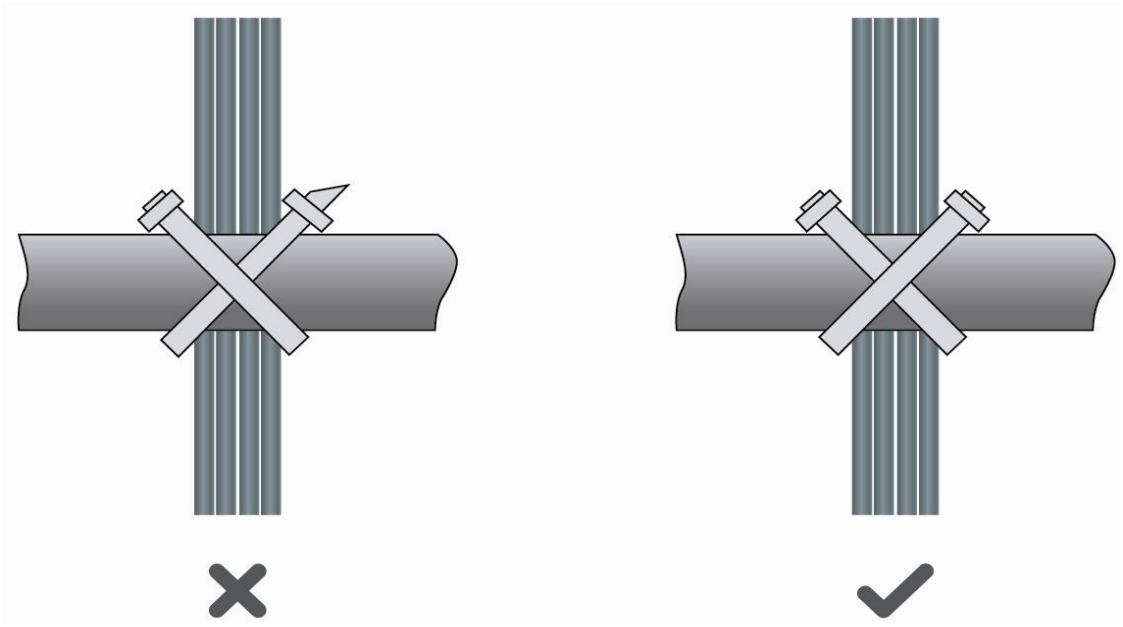
- Before bundling cables, correctly mark labels and stick the labels to cables where appropriate.
- Cables should be neatly and properly bundled, as shown in Figure D-1.

Figure D-1 Bundling Cables



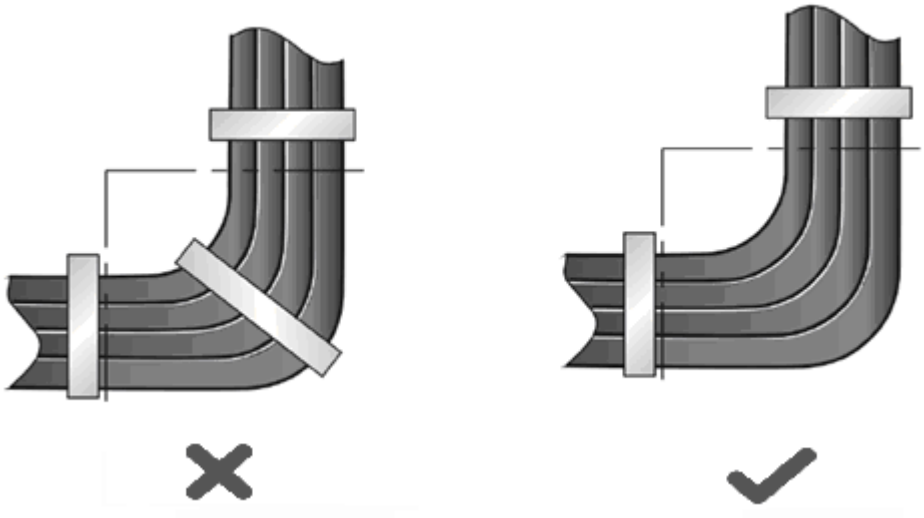

- Route and bundle power, signal, ground cables separately. When the cables are close to each other, cross them. When power cables run parallel to signal cables, the distance between them must b
- All cable trays and their accessories shall be smooth and free from sharp edges.
- Holes in metal, through which cables pass shall have smooth, well-rounded surfaces or be protected with insulating bushings.
- Use proper cable ties to bind cables together. Do not tie two or more cable ties to bind cables.
- Cut off excess cable tie cleanly with no sharp edges after bundling cables, as shown in Figure D-2.

Figure D-2 Cutting off Excess Cable Tie



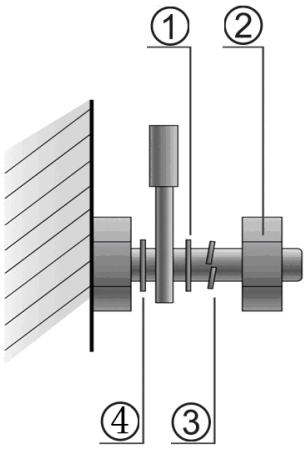
- If cables are to be bent, bind them first but do not tie cable ties within the bend to avoid stress on the cables, which may otherwise cause the wires inside to break, as shown in Figure D-3.

Figure D-3 Do Not Tie Cable Ties within the Bend



- Wrap up unnecessary or excess cables and bind them to the appropriate rack position, where device operation is not affected and no damages occur to the device and cables during debugging.
- Do not bind power cords to the rails for moving parts.
- Leave a certain length of the cable connecting moving parts, such as the ground wire of the cabinet door, to avoid stress on the cable; When moving parts are in place, ensure the excess cable length shall not contact heat sources, sharp corners or edges. If heat sources are unavoidable, use high-temperature cables instead.
- When using screws to fasten cable lugs, the bolts or nuts shall be tightened and prevented from loosening, as shown in Figure D-4.

Figure D-4 Fastening Cable Lugs




**Note**

1. Flat washer
2. Nut
3. Spring washer
4. Flat washer

- When using a stiff cable, fix it near the cable lug to avoid stress on the lug and cable.
- Do not use self-tapping screws to fasten terminals.
- Bundle cables of the same type and running in the same direction into groups. Keep cables clean and straight.
- Cables shall be tied according to the following table.

| Diameter of Cable Bundle (mm) | Space between Bundles (mm) |
|---|---|
| 10 | 80 to 150 |
| 10 to 30 | 150 to 200 |
| 30 | 200 to 300 |

- Do not tie knots for cables or cable bundles.
- The metal parts of the cold-pressed terminal blocks, such as air circuit breakers, shall not be exposed outside of the blocks.

# Appendix E Site Selection

- The machine room should be at least 5km away from the heavy pollution source such as the smelter, coal mine and thermal power plant, 3.7km away from the medium pollution source such as the chemical industry, rubber industry and electroplating industry, and 2km away from the light pollution source such as the food manufacturer and leather plant. If the pollution source is unavoidable, the machine room should be located on the windward side of the pollution source perennially with advanced protection.
- The machine room should be at least 3.7km away from the sea or salt lake. Otherwise, the machine room must be sealed, with air conditioner installed for temperature control. Saline soil cannot be used for construction. Otherwise, you should select devices with advanced protection against severe environment.
- Do not build the machine room in the proximity of livestock farms. Otherwise, the machine room should be located on the windward side of the pollution source perennially. The previous livestock house or fertilizer warehouse cannot be used as the machine room.
- The machine room should be firm enough to withstand severe weather conditions such as windstorm and heavy rain as well as away from dust. If the dust is unavoidable, keep the door and window away from the pollution source.
- The machine room should be away from the residential area. Otherwise, the machine room should meet the construction standard in terms of noise.
- Make sure the air vent of the machine room is away from the sewage pipe, septic tank, and sewage treatment tank. Keep the machine room under positive pressure to prevent corrosive gas from entering the machine room to corrode components and circuit boards. Keep the machine room away from industrial boiler and heating boiler.
- The machine room had better be on the second floor or above. Otherwise, the machine room floor should be 600mm higher than the highest flood level ever recorded.
- Make sure there are no cracks or holes in the wall and floor. If there are cable entries in the wall or window, take proper sealing measures. Ensure that the wall is flat, wear-resistant, and dust-free, which should be up to the standard for flame retarding, soundproofing, heat absorption, dust reduction, and electromagnetic shielding.
- Keep the door and the window closed to make the machine room sealed.
- The steel door is recommended for soundproofing.
- Sulfur-containing materials are forbidden.
- Pay attention to the location of the air conditioner. Keep the air conditioner from blowing wind straight toward the device or blowing water drops from the window or air vent toward the device.