

# **DS-6210U5C4 Base Station**

## **Owner's Manual**

**Version: V00**

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## 1. Checking Items in the Package

| No. | Item                                | Qty. (PCS) |
|-----|-------------------------------------|------------|
| 1   | Base Station Controller Unit (BSCU) | 1          |
| 2   | Channel Unit (CHU)                  | 4          |
| 3   | Power Support Unit (PSU)            | 2          |
| 4   | Fan Unit                            | 1          |
| 5   | Divider Unit (DIU)                  | 1          |
| 6   | Combiner Unit (COM)                 | 1          |
| 7   | Cabinet Kit                         | 1          |

Figure 1-1 Packing List

## 2. Product Controls



Devices except for CHU, BSCU, PSU and ICB are optional.

### 2.1 Interface Units of 4-carrier Base Station

The interface units on the top of the cabinet consist of the antenna connector, extended interface board (EIB) and power supply interface. See [Figure 2-1](#).

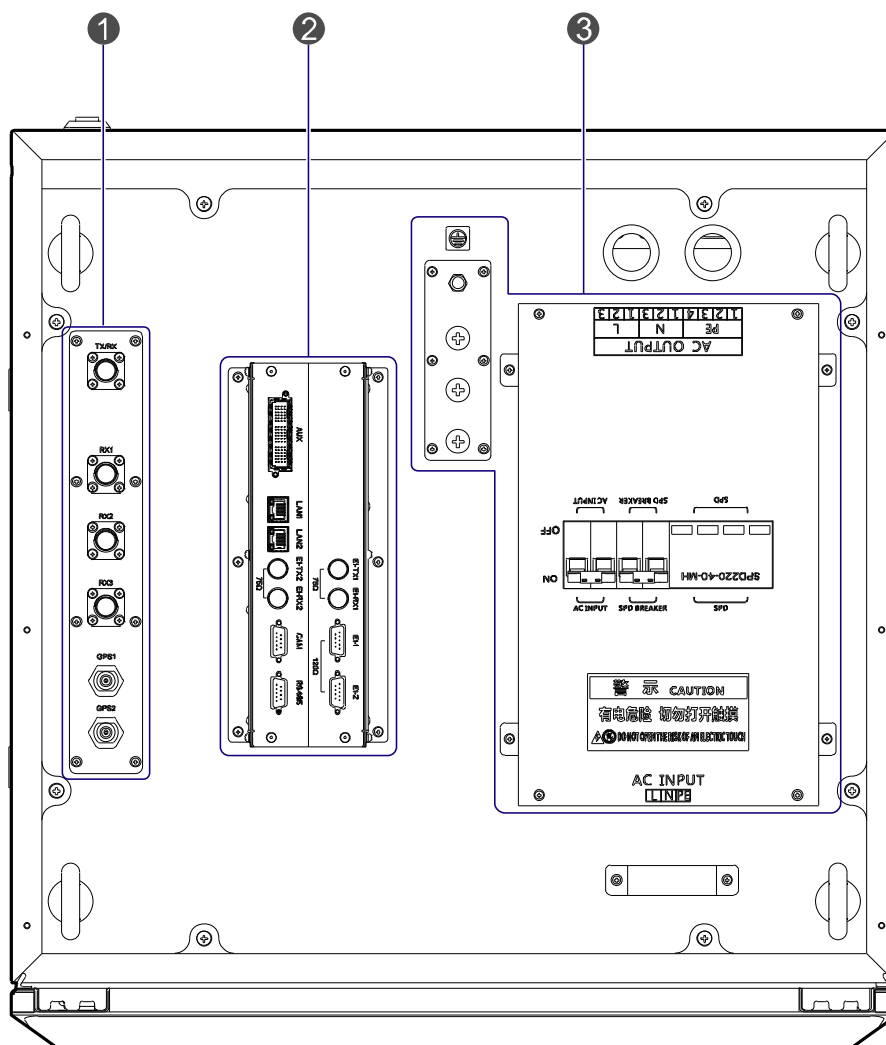


Figure 2-1 Interface Units of 4-carrier Base Station

| No. | Name              | Description                                       |
|-----|-------------------|---------------------------------------------------|
| 1   | Antenna Connector | It contains the GPS antenna connector, RX antenna |

| No. | Name                   | Description                                                                                |
|-----|------------------------|--------------------------------------------------------------------------------------------|
|     |                        | connector and TX antenna connector.                                                        |
| 2   | EIB                    | It contains the core network interface, cabinet expansion interface and monitor interface. |
| 3   | Power Supply Interface | /                                                                                          |

Table 2-1 Descriptions on Interface Units of 4-carrier Base Station

### 2.1.1 Antenna Connector

The antenna connector is illustrated below.

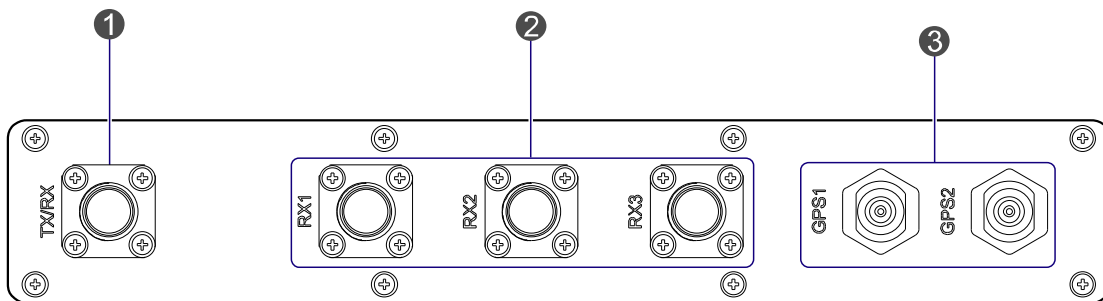


Figure 2-2 Antenna Connector of 4-carrier Base Station

| No. | Name                  |       | Description          |
|-----|-----------------------|-------|----------------------|
| 1   | TX Antenna Connector  | TX/RX | N-connector (female) |
| 2   | RX Antenna Connector  | RX1   | N-connector (female) |
|     |                       | RX2   |                      |
|     |                       | RX3   |                      |
| 3   | GPS Antenna Connector | GPS1  | N-connector (female) |
|     |                       | GPS2  |                      |

Table 2-2 Descriptions on Antenna Connector of 4-carrier Base Station

### 2.1.2 EIB

The EIB is illustrated below.

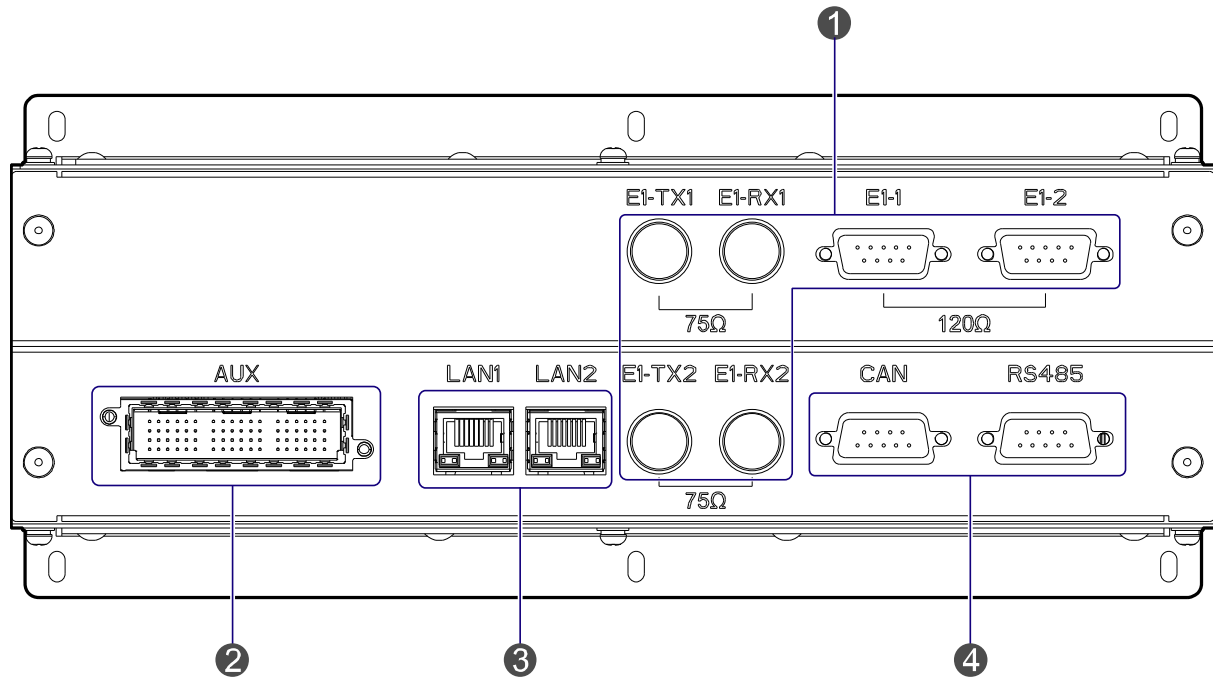


Figure 2-3 EIB of 4-carrier Base Station

| No. | Name                        |        | Description                |
|-----|-----------------------------|--------|----------------------------|
| 1   | E1 Interface                | E1-TX1 | BNC-connector (female)     |
|     |                             | E1-RX1 | BNC-connector (female)     |
|     |                             | E1-1   | DB9-connector (female)     |
|     |                             | E1-2   | DB9-connector (female)     |
|     |                             | E1-TX2 | BNC-connector (female)     |
|     |                             | E1-RX2 | BNC-connector (female)     |
| 2   | Cabinet Expansion Interface | AUX    | Dedicated 72-pin interface |
| 3   | Ethernet Interface          | LAN1   | RJ-45 connector            |
|     |                             | LAN2   | RJ-45 connector            |
| 4   | Monitor Interface           | CAN    | DB9-connector (female)     |
|     |                             | RS485  | DB9-connector (female)     |

Table 2-3 Descriptions on EIB of 4-carrier Base Station

## Core Network Interface

The core network interface contains the 4-path E1 interface and 2-path Ethernet interface.

## Cabinet Expansion Interface

The cabinet expansion interface has 8-path extended signals. It is applied to connect to four interconnect relay units of another cabinet, in case of interconnecting two cabinets.

## Monitor Interface

The monitor interface includes one CAN-BUS interface and one RS485 interface.

## 2.1.3 Power Supply Interface

The power supply interface is illustrated below.

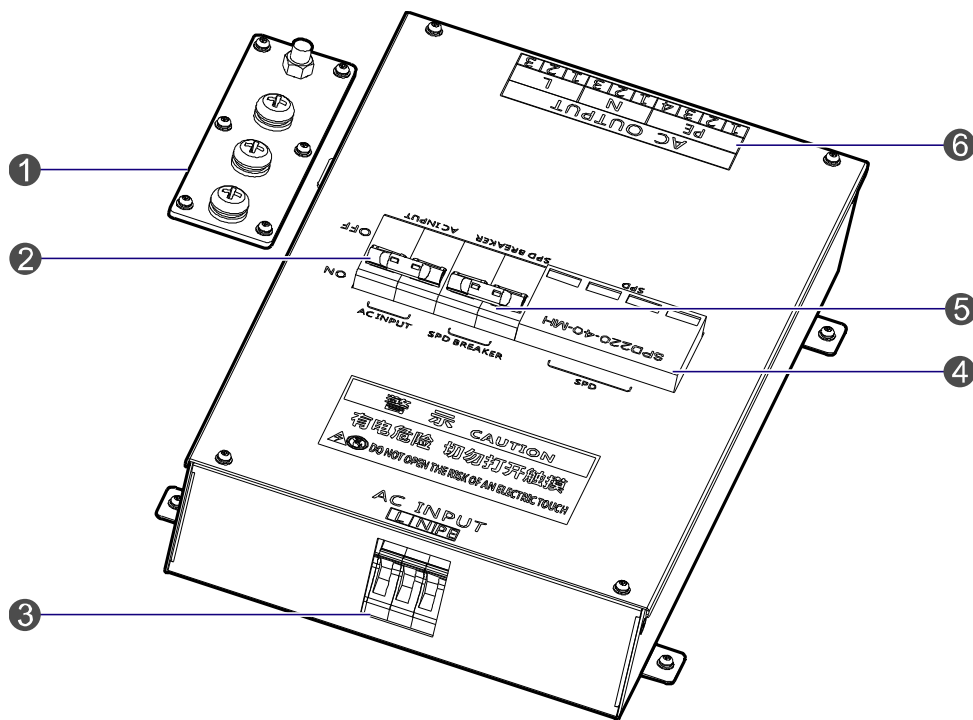


Figure 2-4 Power Supply Interface of 4-carrier Base Station

| No. | Name              | No. | Name                          |
|-----|-------------------|-----|-------------------------------|
| 1   | Ground Bar        | 2   | AC Input Breaker              |
| 3   | AC Input Terminal | 4   | Surge Protection Device (SPD) |
| 5   | SPD Breaker       | 6   | AC Output Terminal            |

Table 2-4 Descriptions on Power Supply Interface of 4-carrier Base Station

## 2.2 Cartridge

In accordance with the IEC60297 standard, the cartridge is 19 inches in width and 7U in height. Each cartridge can accommodate four CHUs, two BSCUs and two PSUs.

The slot 5 and slot 6 of the main chassis are available for the BSCU. See [Figure 2-5](#).

|             |             |             |             |                  |                  |             |             |
|-------------|-------------|-------------|-------------|------------------|------------------|-------------|-------------|
| C<br>H<br>U | C<br>H<br>U | C<br>H<br>U | C<br>H<br>U | B<br>S<br>C<br>U | B<br>S<br>C<br>U | P<br>S<br>U | P<br>S<br>U |
| 01          | 02          | 03          | 04          | 05               | 06               | 07          | 08          |

Figure 2-5 Full Configuration for MC

## 2.3 Channel Unit (CHU)

The CHU logically includes power amplification, TX excitation unit, baseband signal processing unit and diversity receiver. See [Figure 2-6](#).

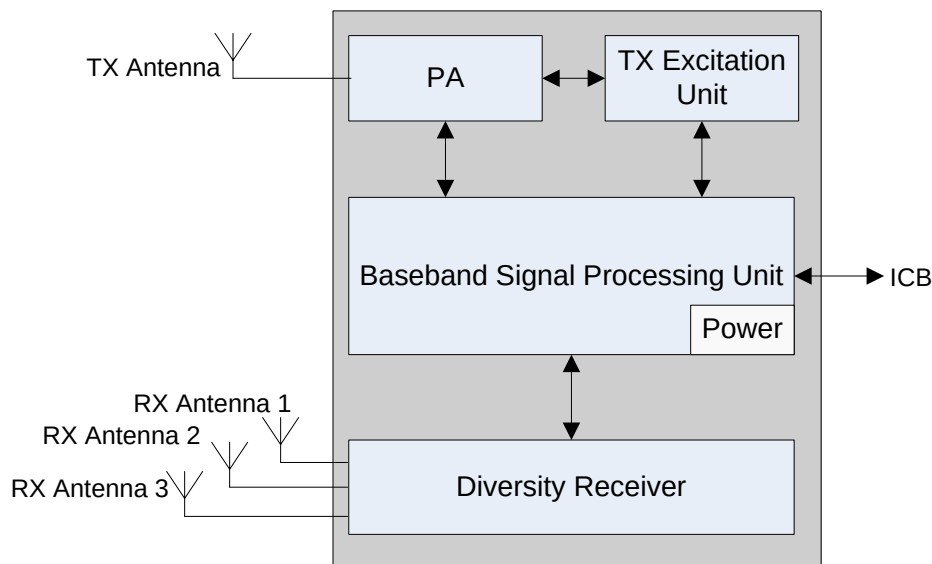


Figure 2-6 Logical Architecture of CHU

### 2.3.1 Function

The CHU processes and converts protocols on the physical layer and data link layer of the DMR air interface. Physically, it consists of channel control board (CHB), TX board (TXB) and RX board (RXB).

- CHB: capable of signaling processing, channel encoding/decoding, interleaving and de-interleaving, modulation/demodulation, RF signal loop-back test and fail-soft.
- TXB: capable of modulation, upward frequency conversion, filtering and D/A conversion from carrier baseband signal to RF signal, as well as the downlink signal amplification.
- RXB: capable of filtering, demodulation, downward frequency conversion, AGC and A/D conversion from three-path carrier signal to baseband signal, as well as uplink signal amplification.

## 2.3.2 Front Panel

The front panel of the CHU is illustrated below.

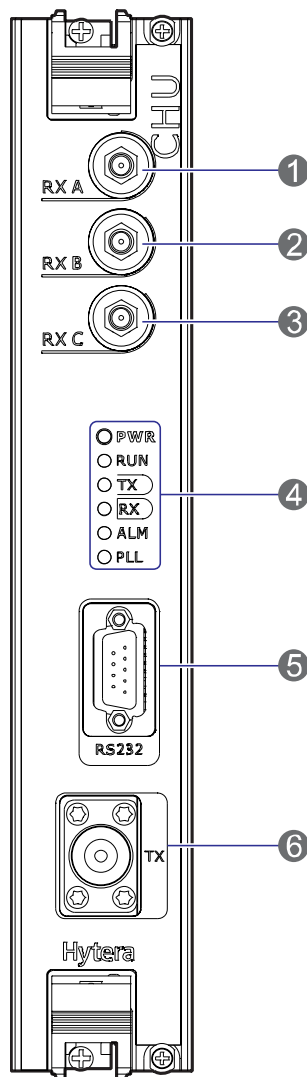


Figure 2-7 Front Panel of CHU

| No. | Name | Description                | Remarks                |
|-----|------|----------------------------|------------------------|
| 1   | RXA  | Diversity RX antenna input | SMA-connector (female) |

| No. | Name  | Description                | Remarks                |
|-----|-------|----------------------------|------------------------|
| 2   | RXB   | RX antenna input           | SMA-connector (female) |
| 3   | RXC   | Diversity RX antenna input | SMA-connector (female) |
| 4   | LEDs  | LED indicator              | /                      |
| 5   | RS232 | Debug interface            | DB9-connector (female) |
| 6   | TX    | Transmission               | N-connector (female)   |

Table 2-5 Description on Front Panel of CHU

### 2.3.3 LED Indicator

The CHU indicators are described in [Table 2-6](#).

| LED Indicator | Color | Status   | Description (in working mode)                  | Description (in sleep mode)                  |
|---------------|-------|----------|------------------------------------------------|----------------------------------------------|
| PWR           | Green | On       | The CHU is powered on.                         | The CHU is powered on.                       |
|               |       | Off      | The CHU is powered off.                        | The CHU is powered off.                      |
| RUN           | Green | Flashing | The CHU runs properly.                         | \                                            |
|               |       | Off      | The CHU does not run properly.                 | The CHU is in sleep mode.                    |
| TX            | Green | On       | Data is present on downlink slot 2 of the CHU. | \                                            |
|               |       | Off      | Data is present on downlink slot 1 of the CHU. | The CHU is in sleep mode.                    |
| RX            | Green | On       | Data is present on the uplink of the CHU.      | Data is present on the uplink of the CHU.    |
|               |       | Off      | No data is present on the uplink of the CHU.   | No data is present on the uplink of the CHU. |
| ALM           | Red   | On       | The CHU software is faulty.                    | The CHU software is faulty.                  |
|               |       | Off      | The CHU runs properly.                         | The CHU runs properly.                       |
| PLL           | Red   | On       | An alarm is given for PLL unlock.              | An alarm is given for PLL                    |

| LED Indicator | Color | Status | Description (in working mode) | Description (in sleep mode) |
|---------------|-------|--------|-------------------------------|-----------------------------|
|               |       |        |                               | unlock.                     |
|               |       | Off    | The CHU runs properly.        | The CHU runs properly.      |

Table 2-6 Descriptions on CHU Indicators

### Note

In sleep mode, the CHU can receive inbound data. However, if the downlink channel is in use, the CHU will turn to operation mode; if the downlink channel is released, the CHU will turn to sleep mode.

## 2.4 Base Station Controller Unit (BSCU)

The BSCU logically consists of GPS board, main control board, synchronizing buffer, Ethernet switch, micro processor unit and power supply. See [Figure 2-8](#).

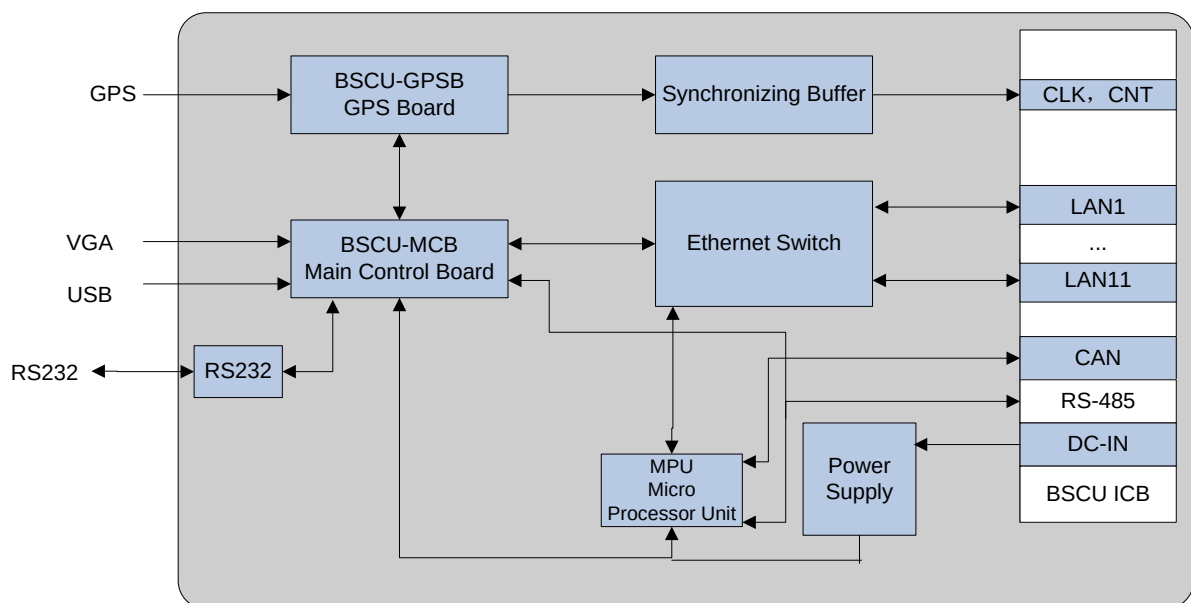


Figure 2-8 Logic Architecture of BSCU

### 2.4.1 Function

The BSCU is to manage the wireless link resources within the coverage and allocate them for different call services.

## 2.4.2 Front Panel

The front panel of the BSCU is illustrated below.

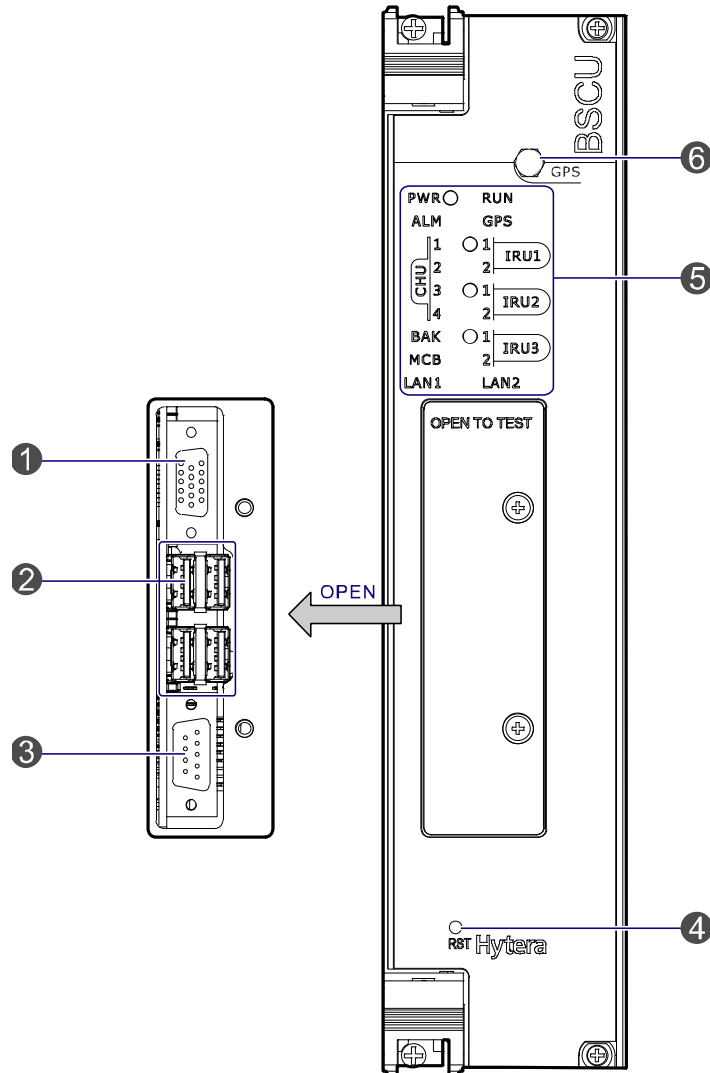


Figure 2-9 Front Panel of BSCU

| No. | Name                 | Qty. | Description   | Description             |
|-----|----------------------|------|---------------|-------------------------|
| 1   | Video graphics array | 1    | For debugging | DB15-connector (female) |
| 2   | USB Interface        | 4    | For debugging | A-connector (female)    |
| 3   | RS232 Interface      | 1    | For debugging | DB9-connector (male)    |

| No. | Name          | Qty. | Description      | Description            |
|-----|---------------|------|------------------|------------------------|
| 4   | RST Key       | 1    | BSCU reset       | /                      |
| 5   | LEDs          | 1    | LED indicator    | /                      |
| 6   | SMA Interface | 1    | GPS signal input | SMA-connector (female) |

Table 2-7 Descriptions on Front Panel of BSCU

## 2.4.3 LED Indicator

The BSCU indicators are described in [Table 2-8](#).

| LED Indicator | Color | Status           | Description                                                               |
|---------------|-------|------------------|---------------------------------------------------------------------------|
| PWR           | Green | On               | The BSCU is powered on.                                                   |
|               |       | Off              | The BSCU is powered off.                                                  |
| RUN           | Green | Flashing rapidly | The BSCU is working in master mode.                                       |
|               |       | Flashing slowly  | The BSCU is working in slave mode.                                        |
|               |       | Off              | The BSCU is being initialized or malfunctions.                            |
| GPS           | Green | Flashing         | Functions are disabled locally.                                           |
|               |       | On               | Functions are disabled via GPS.                                           |
|               |       | Off              | Functions are enabled via GPS.                                            |
| ALM           | Red   | On               | The BSCU is alarming.                                                     |
|               |       | Off              | The BSCU works properly.                                                  |
| CHU1~4        | Green | On               | The link between BSCU and CHU is present.                                 |
|               |       | Flashing         | Data is being transmitted or received over the link between BSCU and CHU. |
|               |       | Off              | The link is abnormal or not connected between BSCU and CHU.               |
| IRU1~3        | Green | On               | The link between BSCU and IRU is present.                                 |
|               |       | Flashing         | Data is being transmitted or received over the link                       |

| LED Indicator | Color | Status   | Description                                                                                   |
|---------------|-------|----------|-----------------------------------------------------------------------------------------------|
|               |       |          | between BSCU and IRU.                                                                         |
|               |       | Off      | The link is abnormal or not connected between BSCU and IRU.                                   |
| BAK           | Green | On       | The link between the standby BSCU and active BSCU is present.                                 |
|               |       | Flashing | Data is being transmitted or received over the link between the standby BSCU and active BSCU. |
|               |       | Off      | The link is abnormal or not connected between the standby BSCU and active BSCU.               |
| MCB           | Green | On       | The link between BSCU and MCB is present.                                                     |
|               |       | Flashing | Data is being transmitted or received over the link between BSCU and MCB.                     |
|               |       | Off      | The link is abnormal or not connected between BSCU and MCB.                                   |
| LAN1~2        | Green | On       | The link between BSCU and LNA is present.                                                     |
|               |       | Flashing | Data is being transmitted or received over the link between BSCU and LAN.                     |
|               |       | Off      | The link is abnormal or not connected between BSCU and LAN.                                   |

Table 2-8 Descriptions on BSCU Indicators

## 2.5 Power Supply Unit (PSU)

The PSU consists of power monitor board, power module and LED indicators.

### 2.5.1 Function

Functions are described in [Table 2-9](#).

| No. | Item                                        | Description                                                                                                                                          |
|-----|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | External Power Supply Input                 | 90~264V AC 47~63Hz                                                                                                                                   |
| 2   | Voltage Output (for main device)            | 13.5V DC                                                                                                                                             |
| 3   | Voltage Output (for CHU PA)                 | HVCC (13.5V DC)                                                                                                                                      |
| 4   | Voltage Output (for other CHU power supply) | LVCC (13.5V DC)                                                                                                                                      |
| 5   | Voltage Output (for BSCU)                   | BSC_V (13.2V DC)                                                                                                                                     |
| 6   | I/O Interface                               | It is connected to 2 BSCUs and outputs three channel signals. The first two are used for resetting PSU, and the last for installation status of PSU. |
| 7   | Monitor Interface                           | It is connected to 2 BSCUs.                                                                                                                          |
|     |                                             | It is connected to 2 BSCUs.                                                                                                                          |

Table 2-9 Descriptions on PSU

## 2.5.2 Front Panel

The front panel of the PSU is illustrated below.

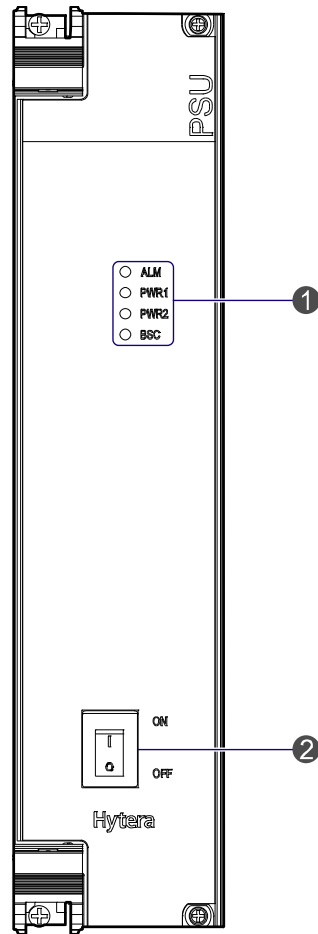


Figure 2-10 Front Panel of PSU

| No. | Name           | Qty. | Description   |
|-----|----------------|------|---------------|
| 1   | LEDs           | 1    | LED indicator |
| 2   | ON/ OFF Switch | 1    | Power switch  |

Table 2-10 Descriptions on Front Panel of PSU

### 2.5.3 LED Indicator

The PSU indicators are described in [Table 2-11](#).

| LED Indicator | Color | Status          | Description           |
|---------------|-------|-----------------|-----------------------|
| ALM           | Red   | Glowing solidly | A major alarm exists. |
|               |       | Flashing        | A minor alarm exists. |
|               |       | Off             | No alarm exists.      |

| LED Indicator | Color | Status           | Description                                                         |
|---------------|-------|------------------|---------------------------------------------------------------------|
| PWR1          | Green | Glowing solidly  | The first power module outputs normally.                            |
|               |       | Flashing slowly  | The first power module outputs HVCC or LVCC alarm.                  |
|               |       | Flashing rapidly | The first power module outputs HVCC and LVCC alarm simultaneously.  |
|               |       | Off              | The first power module is not installed.                            |
| PWR2          | Green | Glowing solidly  | The second power module outputs normally.                           |
|               |       | Flashing slowly  | The second power module outputs HVCC or LVCC alarm.                 |
|               |       | Flashing rapidly | The second power module outputs HVCC and LVCC alarm simultaneously. |
|               |       | Off              | The second power module is not installed.                           |
| BSC           | Green | Glowing solidly  | The voltage for the BSC is normal.                                  |
|               |       | Flashing         | An alarm is issued due to over-voltage or low voltage for the BSC.  |
|               |       | Off              | The first or second power module is not installed.                  |

Table 2-11 Descriptions on PSU Indicators

**Note**

The power module has two outputs including HVCC and LVCC.

## 2.6 Interconnect Backboard (ICB)

It connects the power, synchronization clock module, signaling gateway, voice and data gateway, monitor module and I/O interface.

### 2.6.1 Front View

The front side and interfaces of the ICB are described below.

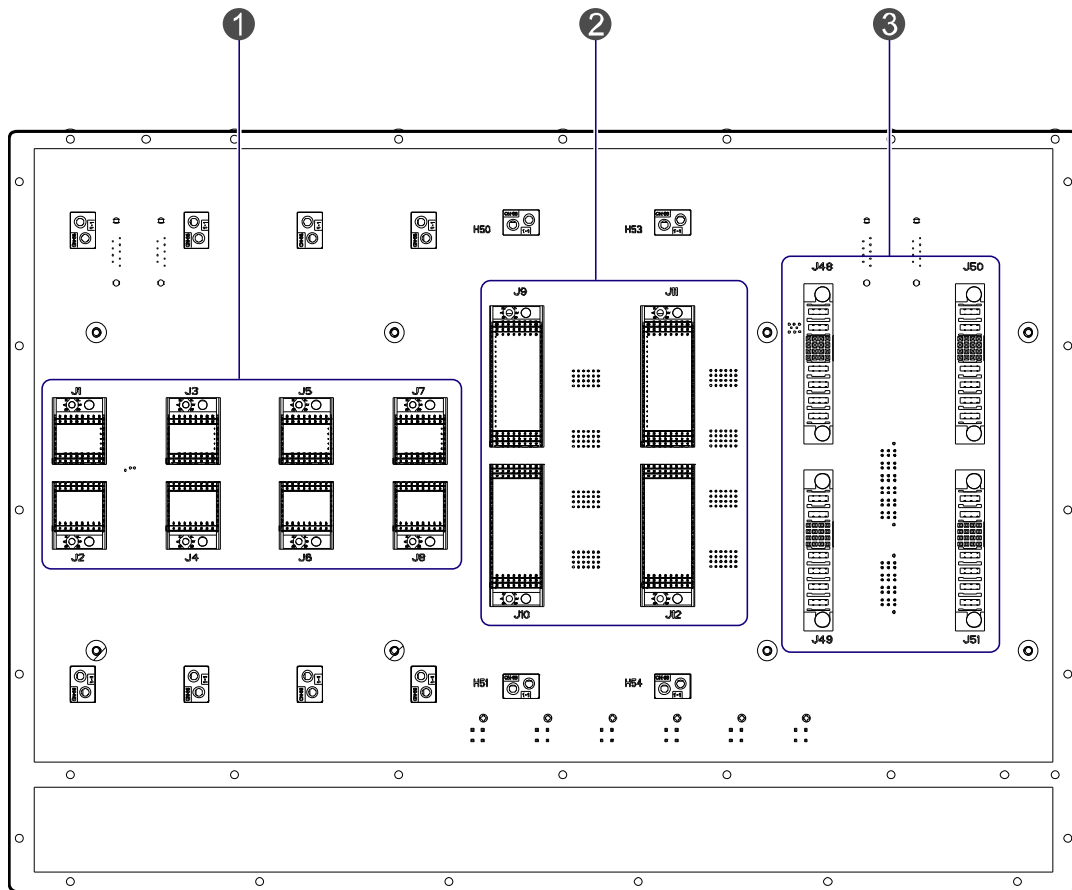


Figure 2-11 Front View of ICB

| No. | Name           | Qty. | Description                  |
|-----|----------------|------|------------------------------|
| 1   | CHU Interface  | 4    | For signal from CHU to ICB.  |
| 2   | BSCU Interface | 2    | For signal from BSCU to ICB. |
| 3   | PSU Interface  | 2    | For signal from PSU to ICB.  |

Table 2-12 Descriptions on Front Interfaces of ICB

## 2.6.2 Rear View

The rear view and interfaces of the ICB are described below.

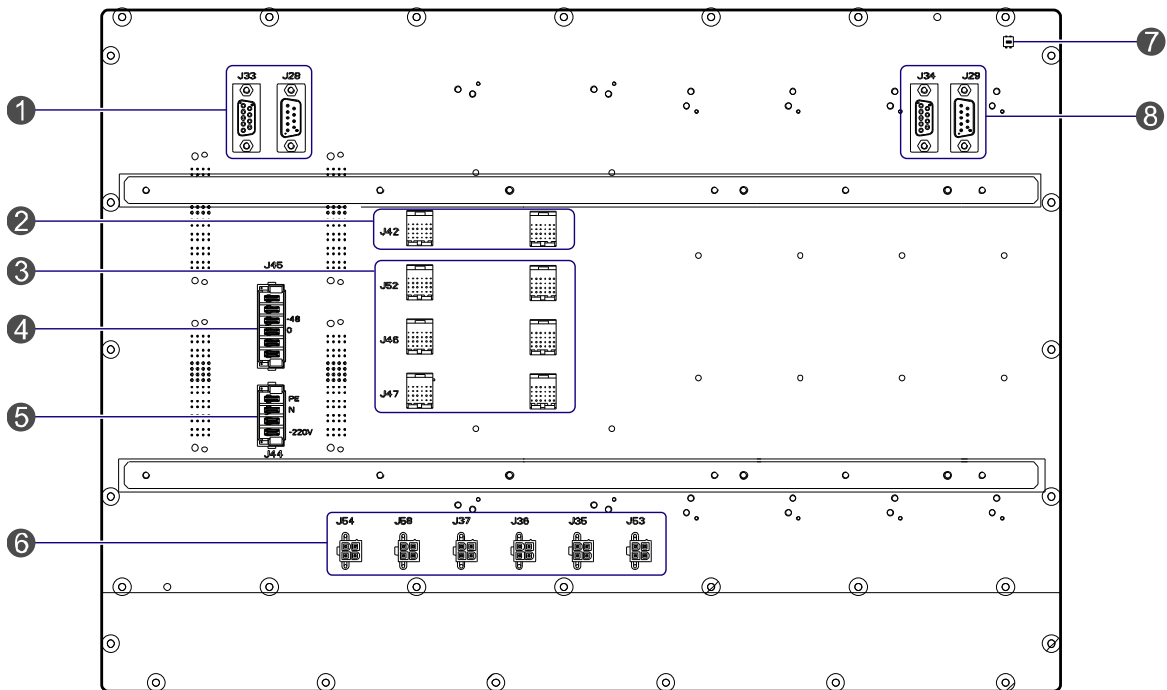


Figure 2-12 Rear View of ICB

| No. | Name                              | Qty. | Description                                                                                                                                                          |
|-----|-----------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Monitor Interconnection Interface | 2    | CAN-BUS, DB9-connector (male/female)                                                                                                                                 |
| 2   | EC Interface                      | 2    | For interconnecting two cartridges in the cabinet.                                                                                                                   |
| 3   | EIB Interface                     | 6    | For interconnecting two EC cartridges and four IRUs between two cabinets. It also works as the signal interface from EIB to ICB in the core network interface board. |
| 4   | DC Power Inlet                    | 1    | DC power input: -48V                                                                                                                                                 |
| 5   | AC Power Inlet                    | 1    | AC power input: 110V/220V                                                                                                                                            |
| 6   | Power Outlet                      | 6    | DC power (+13.2V) for FAN and DIU.                                                                                                                                   |
| 7   | DIP Switch                        | 1    | For setting the cartridge address.                                                                                                                                   |
| 8   | Monitor Interconnection Interface | 2    | RS485 bus, DB9-connector (male/female)                                                                                                                               |

Table 2-13 Descriptions on Rear Interfaces of ICB

The settings of the DIP switch are described in [Table 2-14](#).

| No. | 4 | 3   | 2 | 1   | Description                             | Note         |
|-----|---|-----|---|-----|-----------------------------------------|--------------|
| 1   | X | ON  | X | ON  | Address for the main chassis            | X: reserved. |
| 2   | X | ON  | X | OFF | Address for the first extended chassis  |              |
| 3   | X | OFF | X | ON  | Address for the second extended chassis |              |
| 4   | X | OFF | X | OFF | Address for the third extended chassis  |              |

Table 2-14 DIP Switch Settings for ICB

## 2.7 FAN

The FAN consists of a fan cartridge and a pluggable fan tray, and can accommodate six fans. In the fan tray, three temperature sensors are installed.

### 2.7.1 Front Panel

The front panel of the FAN is illustrated below.

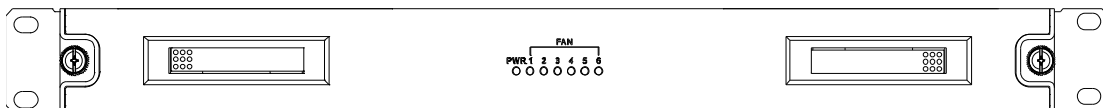


Figure 2-13 Front Panel of FAN

### 2.7.2 LED Indicator

The FAN indicators are described in [Table 2-15](#).

| Name | Color | Status | Description                                   |
|------|-------|--------|-----------------------------------------------|
| PWR  | Red   | On     | The FAN is powered on.                        |
|      |       | Off    | The FAN is powered off.                       |
| 1~6  | Green | On     | The fan works properly.                       |
|      |       | Off    | The fan is out of operation or not installed. |

| Name | Color | Status   | Description        |
|------|-------|----------|--------------------|
|      |       | Flashing | The fan is faulty. |

Table 2-15 Descriptions on FAN Indicators

## 2.7.3 Rear Panel

The rear panel of the FAN is illustrated below.

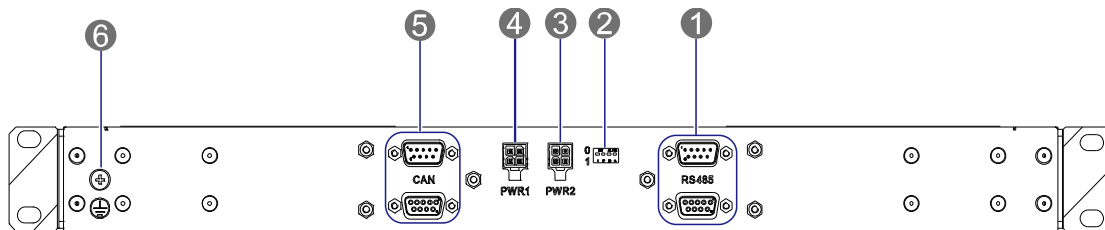


Figure 2-14 Rear Panel of FAN

| No. | Name                    | Qty. | Description                                                                            |
|-----|-------------------------|------|----------------------------------------------------------------------------------------|
| 1   | RS485 Monitor Interface | 2    | For connecting ICB and DIU. DB9-connector (male/female)                                |
| 2   | DIP Switch              | 1    | For setting the FAN address. For details, please refer to <a href="#">Table 2-17</a> . |
| 3   | Power Inlet 1           | 1    | For connecting ICB.                                                                    |
| 4   | Power Inlet 2           | 1    | For connecting ICB.                                                                    |
| 5   | CAN Monitor Interface   | 2    | For connecting ICB and DIU. DB9-connector (male/female)                                |
| 6   | Ground Interface        | 1    | /                                                                                      |

Table 2-16 Descriptions on Rear Panel of FAN

The settings of the DIP switch are described in [Table 2-17](#).

| No. | 1 | 2 | 3   | 4  | Description            | Remarks      |
|-----|---|---|-----|----|------------------------|--------------|
| 1   | X | X | ON  | ON | The first FAN address  | X: reserved. |
| 2   | X | X | OFF | ON | The second FAN address |              |

| No. | 1 | 2 | 3   | 4   | Description            | Remarks |
|-----|---|---|-----|-----|------------------------|---------|
| 3   | X | X | ON  | OFF | The third FAN address  |         |
| 4   | X | X | OFF | OFF | The fourth FAN address |         |

Table 2-17 DIP Switch Settings for FAN

## 2.8 Divider Unit (DIU)

The DIU is 3U or 1U in height. The logical diagram is shown below.

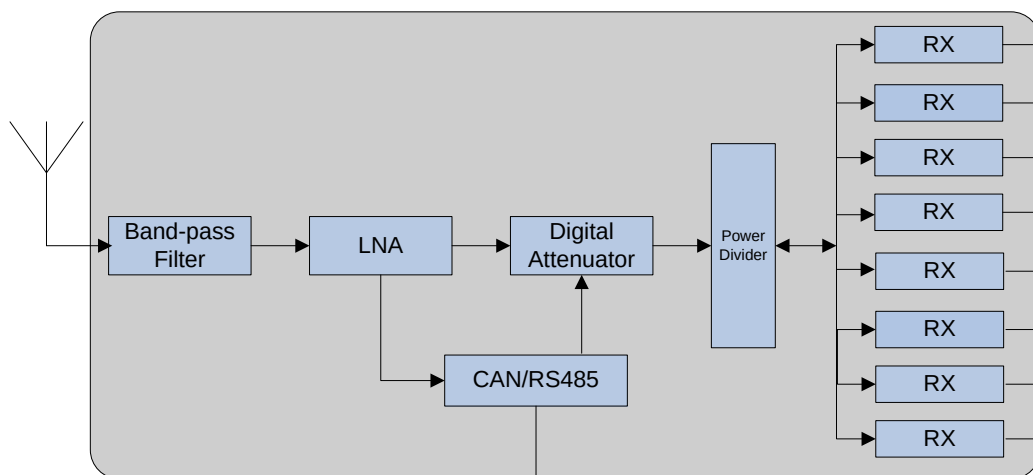


Figure 2-15 Logical Diagram of DIU

### 2.8.1 Function

The DIU is to assign the received signal to each transceiver.

### 2.8.2 Front Panel

The front panel of the DIU is illustrated below.

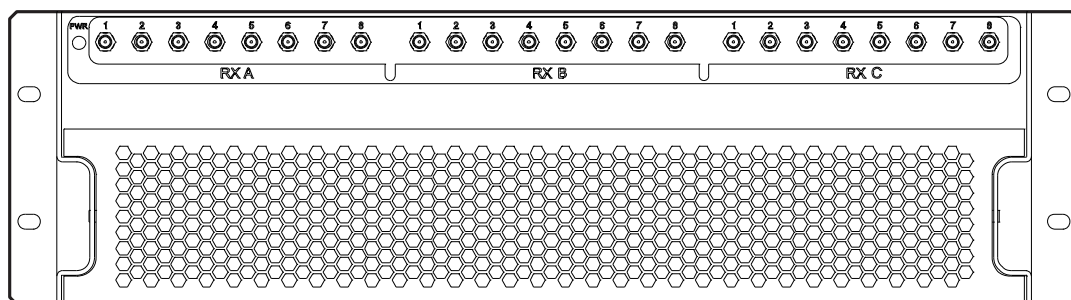


Figure 2-16 Front Panel of DIU

| No. | Name | Qty. | Description                 | Remarks                |
|-----|------|------|-----------------------------|------------------------|
| 1   | RXA  | 8    | Diversity RX antenna output | SMA-connector (female) |
| 2   | RXB  | 8    | RX antenna output           | SMA-connector (female) |
| 3   | RXC  | 8    | Diversity RX antenna output | SMA-connector (female) |

Table 2-18 Descriptions on Front Panel of DIU

### 2.8.3 Rear Panel

The rear panel of the DIU is illustrated below.

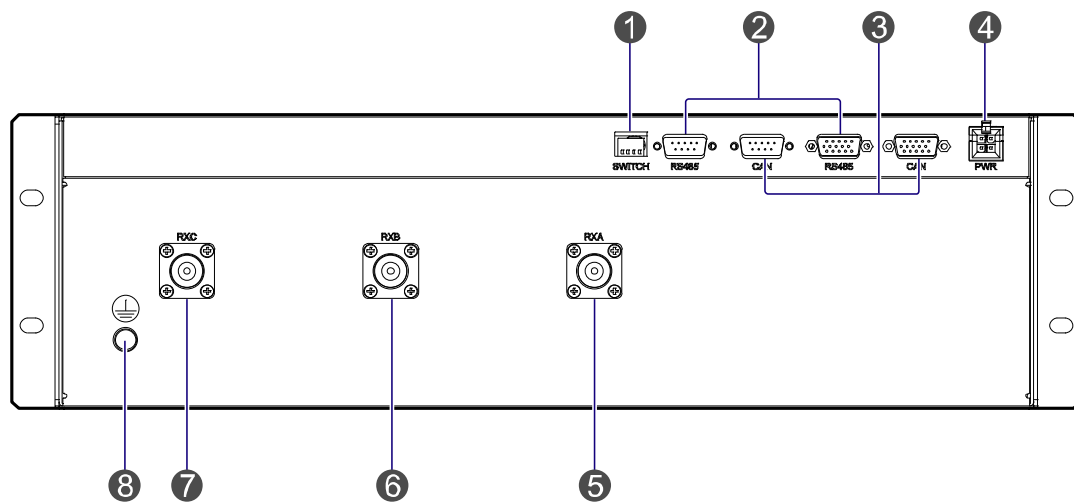


Figure 2-17 Rear Panel of DIU

| No. | Name                                                                                | Qty. | Description            | Remarks              |
|-----|-------------------------------------------------------------------------------------|------|------------------------|----------------------|
| 1   | SWITCH                                                                              | 1    | DIP switch             | /                    |
| 2   | RS485                                                                               | 2    | Monitor interface      | /                    |
| 3   | CAN-BUS                                                                             | 2    | Monitor interface      | /                    |
| 4   | PWR                                                                                 | 1    | Power inlet            | /                    |
| 5   | RXA                                                                                 | 1    | Diversity RX antenna A | N-connector (female) |
| 6   | RXB                                                                                 | 1    | RX antenna B           | N-connector (female) |
| 7   | RXC                                                                                 | 1    | Diversity RX antenna C | N-connector (female) |
| 8   |  | 1    | Ground interface       |                      |

Table 2-19 Descriptions on Rear Panel of DIU

The settings of the DIU address are described in [Table 2-20](#).

| No. | 1   | 2   | 3 | 4 | Description            | Remarks      |
|-----|-----|-----|---|---|------------------------|--------------|
| 1   | ON  | ON  | X | X | The first DIU address  | X: reserved. |
| 2   | ON  | OFF | X | X | The second DIU address |              |
| 3   | OFF | ON  | X | X | The third DIU address  |              |
| 4   | OFF | OFF | X | X | The fourth DIU address |              |

Table 2-20 DIU Address Settings

## 2.9 Router

### 2.9.1 Function

The router is a device that forwards message flow or packet data. However, if the IP-EI is employed, no router will be required.

### 2.9.2 Front Panel

The front panel of the router is illustrated below.

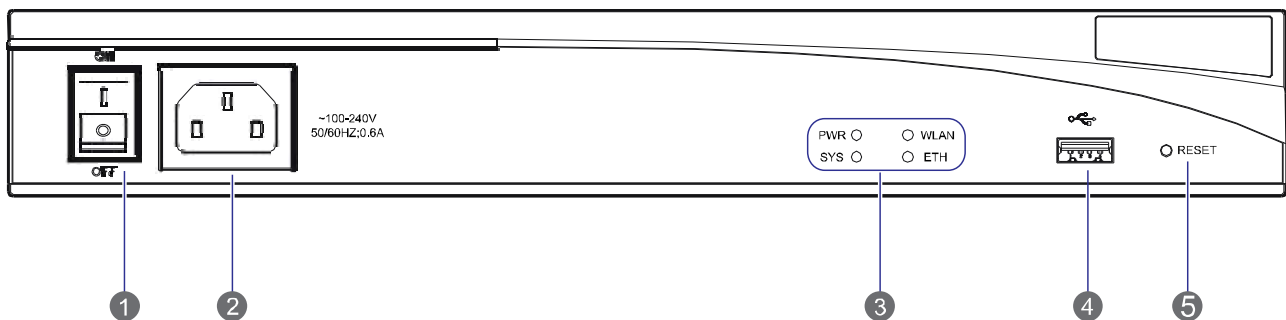


Figure 2-18 Front Panel of Router

| No. | Name          | No. | Name         | No. | Name |
|-----|---------------|-----|--------------|-----|------|
| 1   | Power Switch  | 2   | Power Socket | 3   | LEDs |
| 4   | USB Interface | 5   | RESET Button | /   | /    |

Table 2-21 Descriptions on Front Panel of Router

## 2.9.3 Rear Panel

The rear panel of the router is illustrated below.

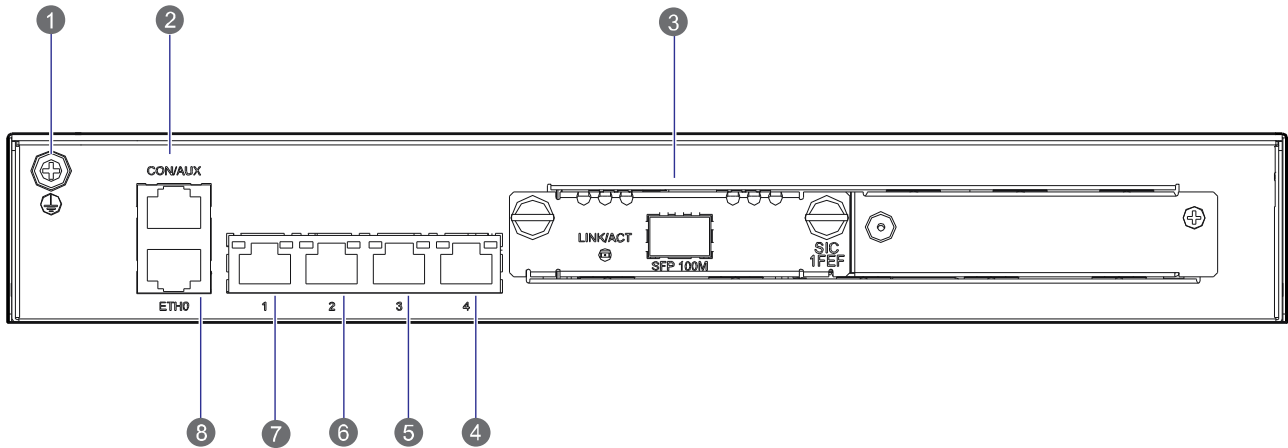


Figure 2-19 Rear Panel of Router

| No. | Name                       | No. | Name                                   |
|-----|----------------------------|-----|----------------------------------------|
| 1   | Ground Terminal            | 2   | Console /Auxiliary Interface (CON/AUX) |
| 3   | Fixed Ethernet Interface 0 | 4   | Fixed Switch Interface 1               |
| 5   | Fixed Switch Interface 2   | 6   | Fixed Switch Interface 3               |
| 7   | Fixed Switch Interface 4   | 8   | SIC/DSIC Slot                          |

Table 2-22 Descriptions on Rear Panel of Router

## 2.9.4 LED Indicator

The router indicators are described in [Table 2-23](#).

| Name        |     | Status |                  | Description                |
|-------------|-----|--------|------------------|----------------------------|
| Front Panel | PWR | On     |                  | The router is powered on.  |
|             |     | Off    |                  | The router is powered off. |
|             | SYS | Green  | Flashing rapidly | The router is starting.    |
|             |     |        | Flashing slowly  | The router works properly. |

| Name       |      | Status           |                  | Description                                       |
|------------|------|------------------|------------------|---------------------------------------------------|
|            |      | Yellow           | Flashing rapidly | The router is faulty.                             |
|            |      | Off              |                  | The router does not work properly.                |
|            | ETH  | On               |                  | A link is present.                                |
|            |      | Flashing         |                  | Data is being transmitted or received.            |
|            |      | Off              |                  | No link is present.                               |
|            | WLAN | Bootrom Startup  | On               | The extended BOOTROM is present.                  |
|            |      |                  | Flashing         | The basic BOOTROM is present.                     |
|            |      | Router Operation | Flashing rapidly | The router is operating under large traffic load. |
|            |      |                  | Flashing slowly  | The router is operating normally.                 |
|            |      |                  | Off              | The router is faulty.                             |
| Rear Panel | LINK | On               |                  | A link is present.                                |
|            |      | Off              |                  | No link is present.                               |
|            | ACT  | Flashing         |                  | Data is being transmitted or received.            |
|            |      | Off              |                  | No data is being transmitted or received.         |

Table 2-23 Descriptions on Router Indicators

## 2.10 IP-E1

If a router is employed, no IP-EI will be required.

### 2.10.1 Front Panel

The front panel of the IP-EI is illustrated below.

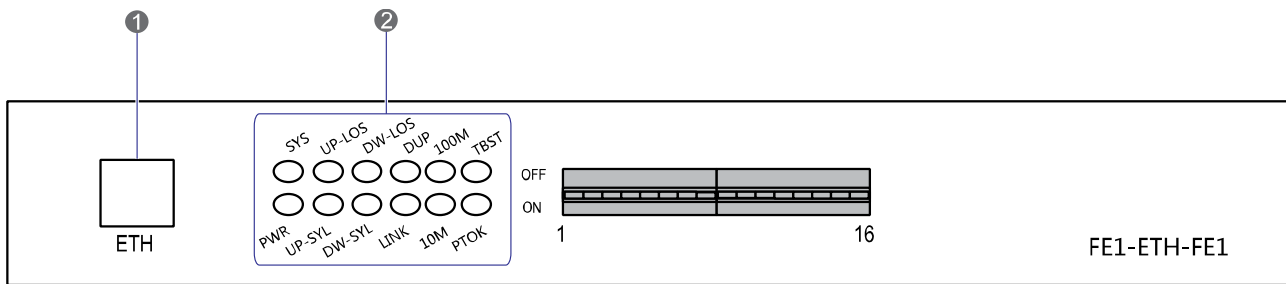


Figure 2-20 Front Panel of IP-E1

## 2.10.2 LED Indicator

The IP-E1 indicators are described in [Table 2-24](#).

| LED Indicator | Name                                    | Status   | Description                                                 |
|---------------|-----------------------------------------|----------|-------------------------------------------------------------|
| PWR           | Power Indicator                         | On       | The IP-E1 is powered on.                                    |
|               |                                         | Off      | The IP-E1 is powered off.                                   |
| SYS           | /                                       | /        | Reserved                                                    |
| LNK           | Ethernet Indicator                      | On       | The network link is connected properly.                     |
|               |                                         | Off      | The network link is disconnected.                           |
| DUP           | Full Duplex/Half Duplex Indicator       | On       | The IP-E1 is working in full duplex mode.                   |
|               |                                         | Off      | The IP-E1 is working in half duplex mode.                   |
| 100M          | Operating Mode and Data TX/RX Indicator | On       | A 100 Mbps link is present.                                 |
|               |                                         | Flashing | Data is being received or transmitted at a rate of 100Mbps. |
| 10M           | Operating Mode and Data TX/RX Indicator | On       | A 10 Mbps link is present.                                  |
|               |                                         | Flashing | Data is being received or transmitted at a rate of 10Mbps.  |
| LOS1          | EI Uplink Alarm Indicator               | On       | The alarm of Local E1 uplink occurs.                        |
|               |                                         | Off      | No alarm exists.                                            |

Table 2-24 Descriptions on IP-E1 Indicators

## 2.10.3 Rear Panel

The rear panel of the IP-E1 is illustrated below.

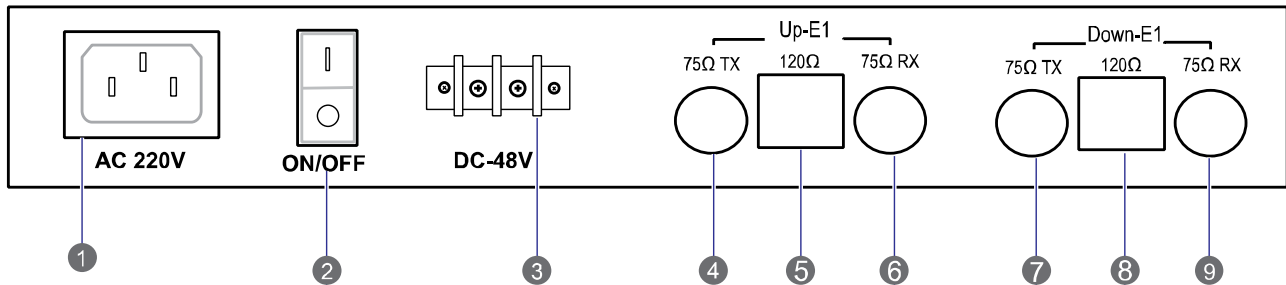


Figure 2-21 Rear Panel of IP-E1

| No. | Name          | Description                                            |
|-----|---------------|--------------------------------------------------------|
| 1   | AC 220V       | AC power inlet (optional)                              |
| 2   | ON/OFF        | Power switch                                           |
| 3   | DC -48V       | DC power inlet (optional)                              |
| 4   | 75Ω/Up(TX)    | E1-75ohm unbalanced port, E1 signal output.            |
| 5   | 120Ω/Up       | E1-120ohm unbalanced port, E1 signal input and output. |
| 6   | 75Ω/Up(RX)    | E1-75ohm unbalanced port, E1 signal input.             |
| 7   | 75Ω/Down(TX)  | E1-75ohm unbalanced port, E1 signal output.            |
| 8   | 120Ω/ Down    | E1-120ohm unbalanced port, E1 signal input and output. |
| 9   | 75Ω/ Down(RX) | E1-75ohm unbalanced port, E1 signal input.             |

Table 2-25 Descriptions on Rear Panel of IP-E1

## 2.11 Combiner (COM)

The combiner is classified into broadband hybrid combiner, manual tune cavity combiner, and auto tune cavity combiner. The broadband hybrid combiner is applied to the 2-carrier base station, while the manual tune cavity combiner is applied to the base station with more than two carriers. The logical diagram of the 4-port combiner is shown in [Figure 2-22](#).

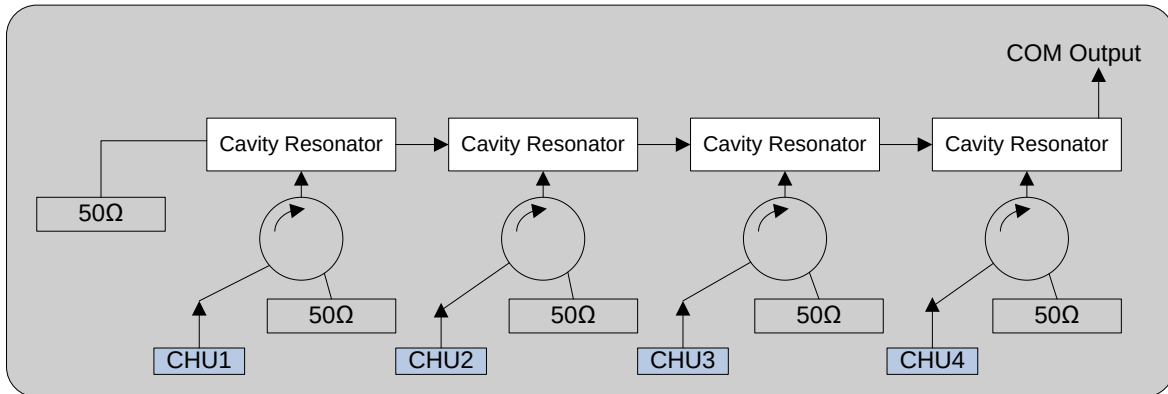


Figure 2-22 Logical Diagram of 4-port Combiner



This section takes one type of combiner as an example.

### 2.11.1 Function

The combiner is used to integrate multiple carriers from the base station sub-system into one output port to transmit by an antenna.

### 2.11.2 Rear Panel

The rear panel of the COM is illustrated below.

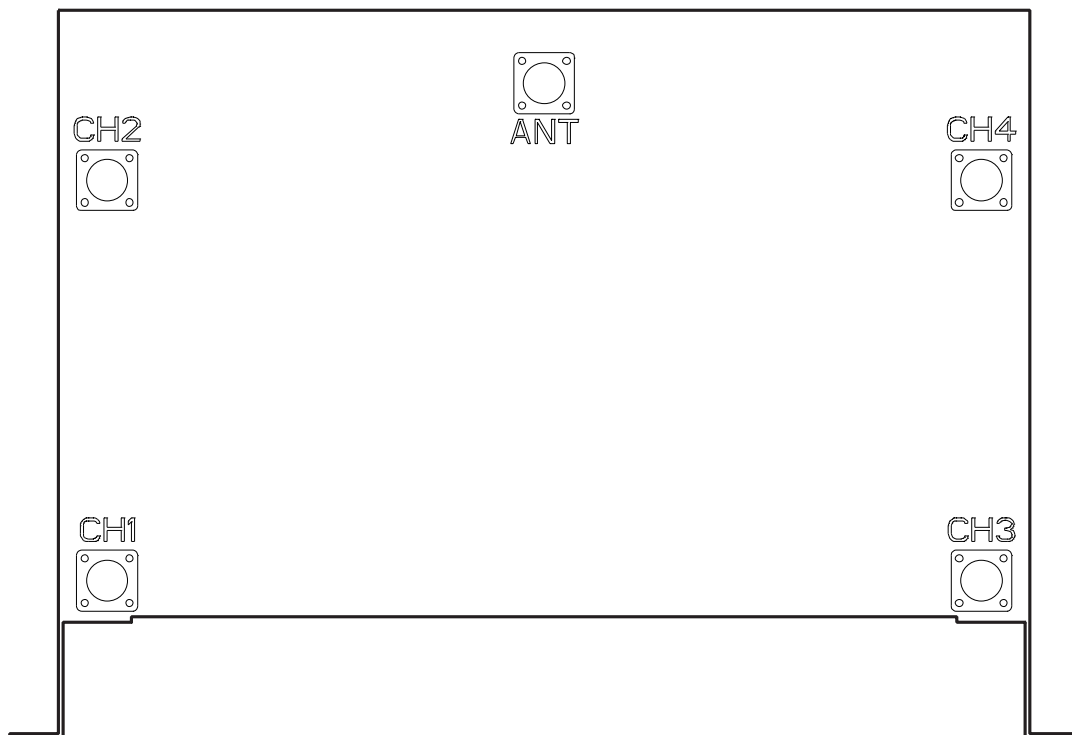


Figure 2-23 Rear Panel of COM

| No. | Name | Description     | Remarks              |
|-----|------|-----------------|----------------------|
| 1   | ANT  | COM output      | N-connector (female) |
| 2   | CH1  | Carrier input 1 | N-connector (female) |
| 3   | CH2  | Carrier input 2 | N-connector (female) |
| 4   | CH3  | Carrier input 3 | N-connector (female) |
| 5   | CH4  | Carrier input 4 | N-connector (female) |

Table 2-26 Descriptions on Rear Panel of COM

## 3. Installation

### 3.1 Cable Layout

The cable layout of base station is shown [Figure 3-1](#).

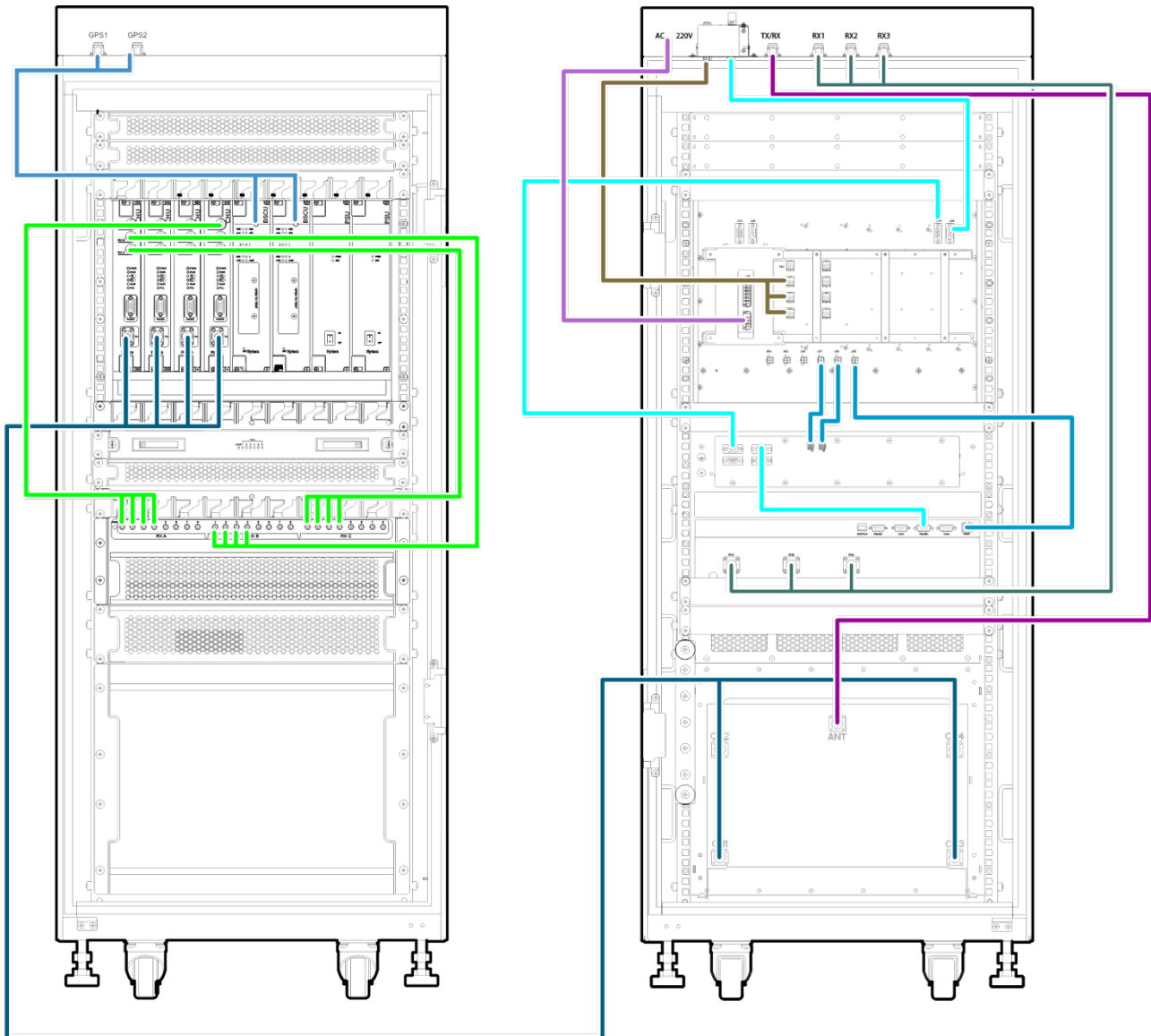


Figure 3-1 Cable Layout

### 3.2 Safety Information

To reduce the chance of accident, please read the safety precautions very carefully before installation, maintenance and operations.

### 3.2.1 Power Supply



#### **Danger:**

Some components of the power system carry hazardous voltage in operation. Direct contact or indirect contact through moist objects with these components will result in fatal injury.

- Never wear conductive objects such as watches, bracelets, rings and etc during operation.
- Do use special tools in high voltage and AC operation.
- Do keep moisture out of the power system during operation in moist environment.
- The equipment should be well earthed in time to avoid damage by lightning strikes in thunderstorm.
- Do turn off the power before assembly or disassembly
- Do verify the compliance of the cable and cable label prior to connection.
- Ensure that the equipment is well earthed before powering on.
- Turn off the power immediately when water or moisture is found on the cabinet,
- Make sure all switches of power distribution box are set to off before installation each module in the cabinet

### 3.2.2 Working at Heights



#### **Warning:**

Cautions shall be taken to prevent objects from falling during working at heights.

- Safety protection measures (e.g. wearing a hamlet or the safety belt) shall be taken.
- The heat-retaining clothes shall be worn before operation in cold areas.
- Make sure that the ladder is safe for use. Overweight on the ladder is strictly prohibited.
- Protective measures shall be taken if the slant of the ladder is more than 5m or the ladder is placed on a high ground (>3m)
- Handle and use all equipment and tools with care to avoid falling.

## 3.3 Installation Preparation

### 3.3.1 Technical Files

The following table lists the files associated with hardware installation.

| File type                           | File Name                                                         | Description                                         |
|-------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|
| Instructional file for installation | Network Planning Drawing                                          | Provided by the R&D engineers or technical sales.   |
|                                     | Site Survey Report                                                | It is filled by the investigation engineer on site. |
| Manuals                             | DS-6210U5C4 PDT Trunking System                                   | Shipped with the equipment                          |
|                                     | DS-6210U5C4 PDT Trunking Base Station Hardware Description Manual |                                                     |
|                                     | DS-6210U5C4 PDT Trunking Base Station Service Manual              |                                                     |
| Other files                         | Packing List                                                      | Shipped with the equipment                          |

Table 3-1 Technical Files

### 3.3.2 Personnel

Only the adequately trained personnel with satisfactory knowledge of the system can carry out the installation and tuning. The number of installation persons is subject to engineering progress and environment.

### 3.3.3 Tools

The following tools and meter are required before installation.

|                      |                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>General Tools</b> | Claw hammer, slot type screwdriver, large Phillips screwdriver, wrench, paper knife, connector board and A type ladder. |
| <b>Special Tools</b> | ESD-preventive wrist strap, cable peeler and crimping pliers.                                                           |
| <b>Meter</b>         | Multimeter                                                                                                              |

Table 3-2 Tools and Meter

## 3.4 Unpacking Inspection

### 3.4.1 Check before Unpacking

After the equipment arrives at the installation site, you should:

- Check against the packing list, including total amount, customer address, and etc.
- Contact us in case of any mistake.
- Check the packaging case is in good condition and not placed upside down.

If the outer package is damaged seriously or soaked, please contact us immediately.

**Note:**

To protect the equipment and investigate the cause, please properly keep the package box, equipment and packing materials, and take photo.

If the above check results are good, unpack and check the equipment.

### 3.4.2 Unpacking Wooden Case

**Caution:**

Keep the wooden case far away from intense shock during transportation.

Never touch the parts with dirty glove during transportation.

| Tools | Claw hammer and straight screwdriver |
|-------|--------------------------------------|
|-------|--------------------------------------|

If space permitting, carry the wooden case into or near the computer room before unpacking. This can prevent the chassis from being damaged.

To unpack the wooden case, do as follows:

**Step 1** Wear the ESD-preventive glove.

**Step 2** Lay the wooden case horizontally on the ground. Do keep the side with frame down.

**Step 3** Use a Claw hammer or a straight screwdriver to pry the tongue, as shown in [Figure 3-2](#).

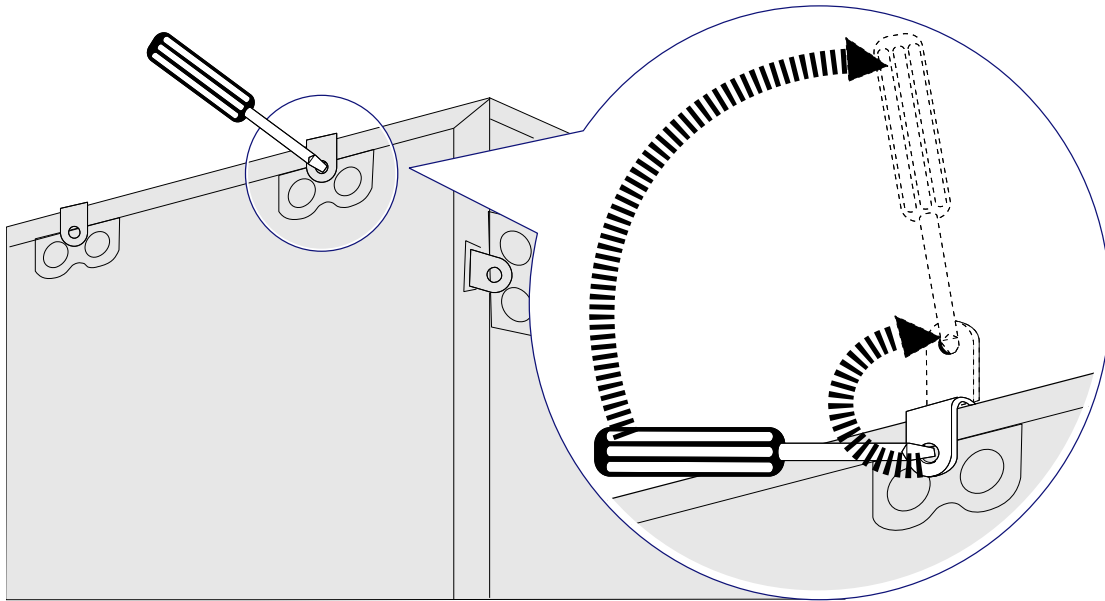


Figure 3-2 Removing the Cover

**Step 4** Remove the cover. The wooden case may contain the carton or cabinet. As for the former, directly take out the carton from the wooden case and unpack as instructed in [3.4.3Unpacking Cartons](#). As for the latter, proceed to the next steps.

### Caution

Pay attention to the nails on the bottom cover, to avoid bodily injuries.

**Step 5** Using the same method, remove the box surrounding the plank.

**Step 6** Remove the foam plate.

**Step 7** Slide the cabinet out of the wooden case slowly.

## 3.4.3 Unpacking Cartons

| Tool | Paper knife |
|------|-------------|
|------|-------------|

To open a carton, do as follows:

**Step 1** Check the type and quantity of articles inside the carton according to labels, and cut the straps along the seam of the carton cover by the paper knife.

### Caution:

Use moderate force to avoid damaging the articles inside.

**Step 2** Remove the foam plates and articles.

### 3.4.4 Inspections

After unpacking all wooden cases and cartons, carefully check the name, type, quantity of goods against the Packing List, and then accept them.

## 3.5 Installing the Cabinet

### 3.5.1 Determine the Installation Position

Determine the installation position of the cabinet according to the installation chart. The available space for maintenance should be preserved and be no less than 600mm around the front and back door, as shown in [Figure 3-3](#) and [Figure 3-4](#).

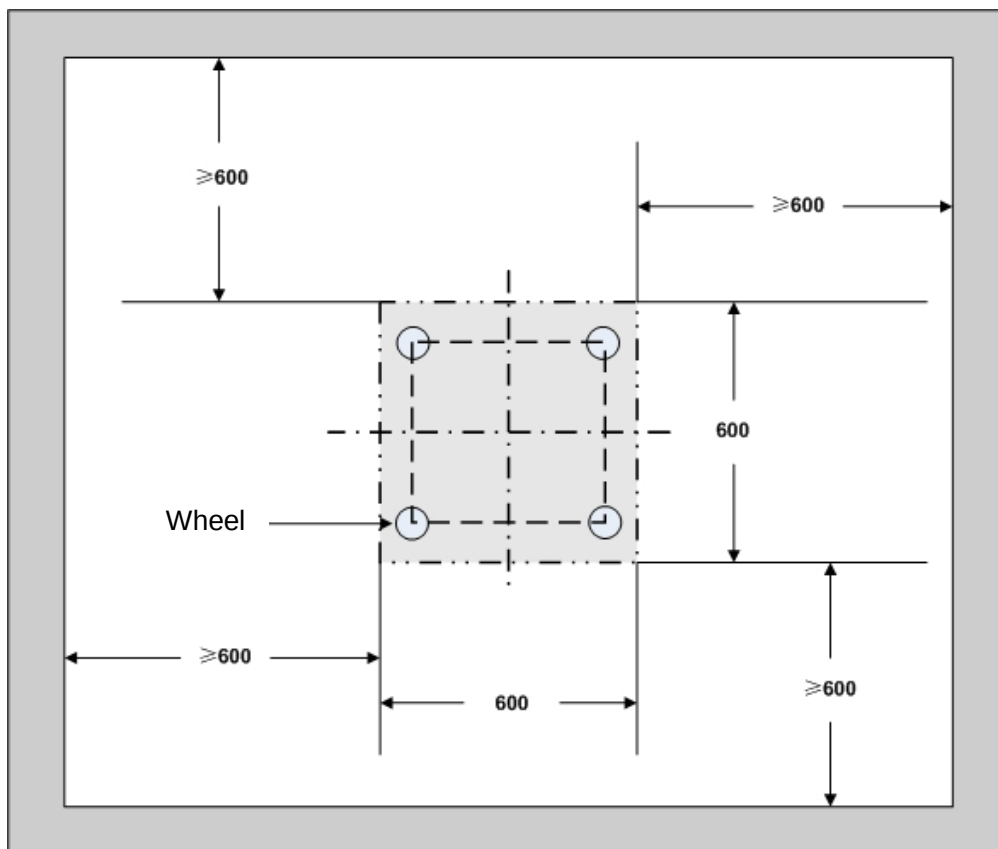


Figure 3-3 Layout of holes for a Single Cabinet

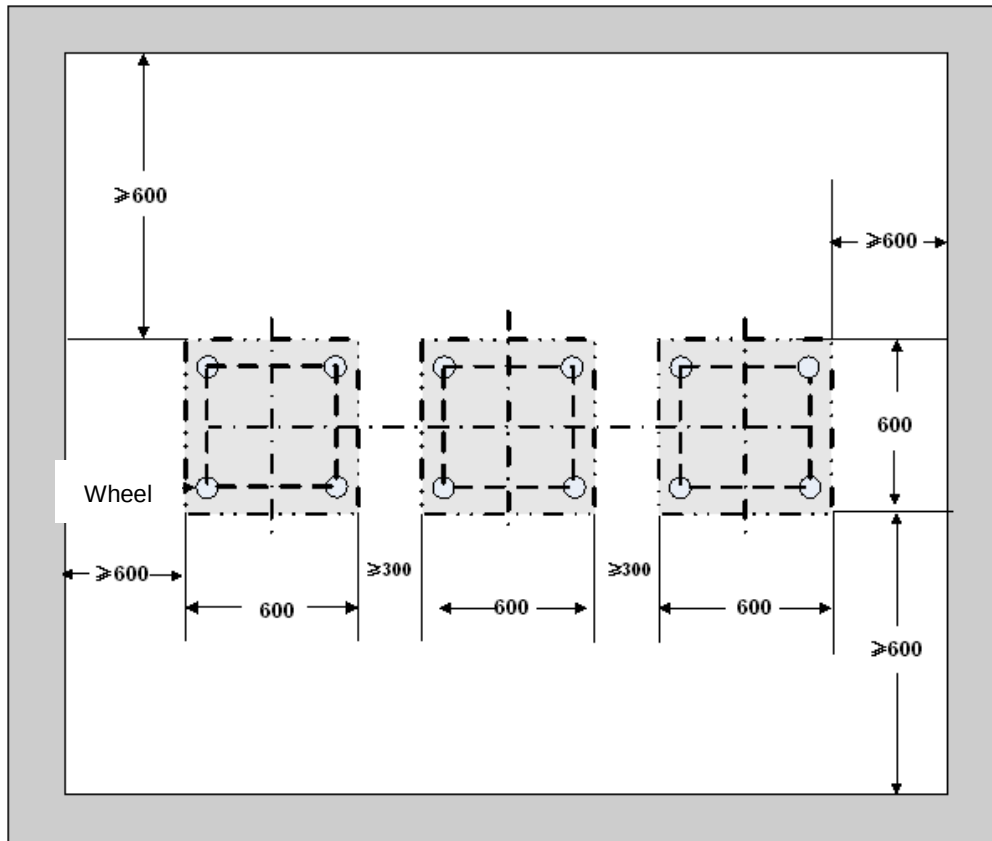


Figure 3-4 Layout of holes for Combined Cabinet

### 3.5.2 Installing the Cabinet

To install the cabinet, do as follows:

**Step 1** Place the cabinet in the planned position.

Fix the cabinet by tightening four bolts at the bottom of the cabinet, as shown in [Figure 3-5](#).

1. Loosen the upper nut counter-clockwise by the spanner.
2. Loosen the lower nut counter-clockwise by the spanner and lift the cabinet to an appropriate height.
3. Tighten the upper nut and screw clockwise.

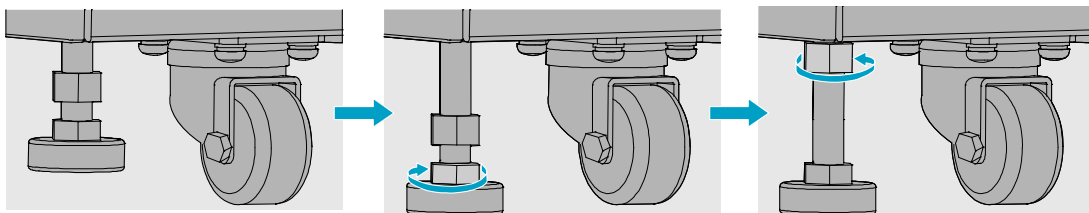


Figure 3-5 Tightening the Bolt

## 3.6 Installing Modules into the Cabinet

### 3.6.1 Module Layout

The position of all modules to be installed is shown in [Figure 3-6](#).

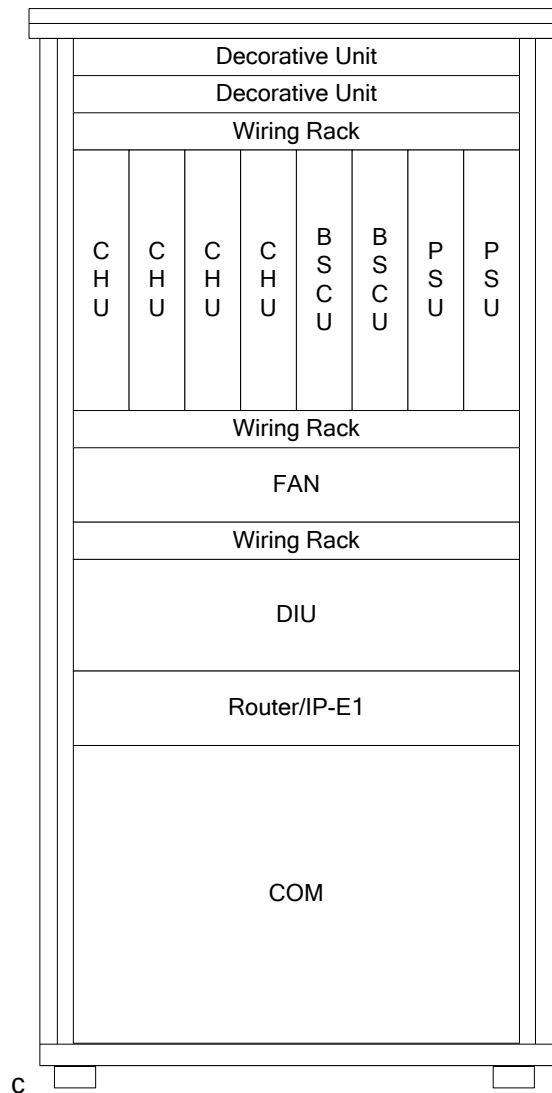


Figure 3-6 of Module Layout

### 3.6.2 Installation Procedures

**Step 1** Open the front and back door, as shown in [Figure 3-7](#).

1. Unlock and remove the key in case of the keyhole in a horizontal position.
2. Firmly press **PUSH** until the door knob is bounced.
3. Turn the door knob to the right.

4. Pull the door knob outwards and open the cabinet door.

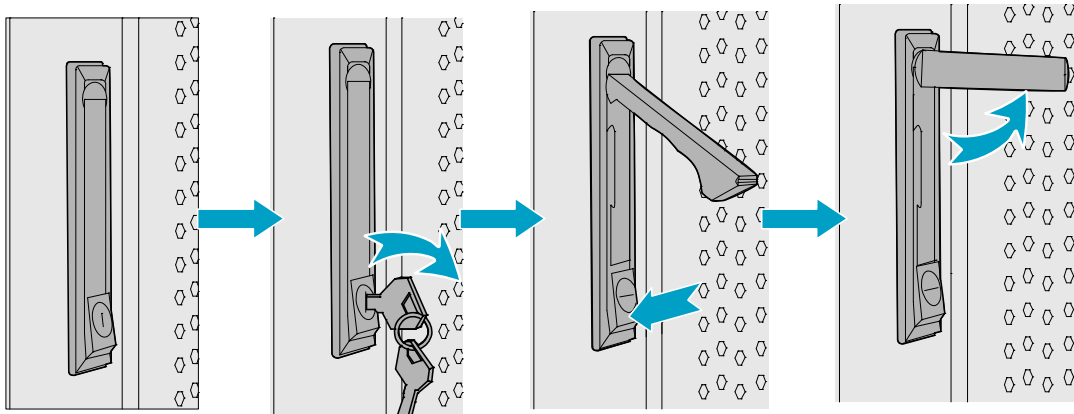


Figure 3-7 Opening the Cabinet Door

**Step 2** Disassemble the side doors as shown in [Figure 3-9](#).

1. Remove the eight screws on the frame.
2. Press down on the two latches and pull out the side door outwards.

**⚠ Caution:**

Care shall be taken to avoid injuries upon pulling out the side door outwards.

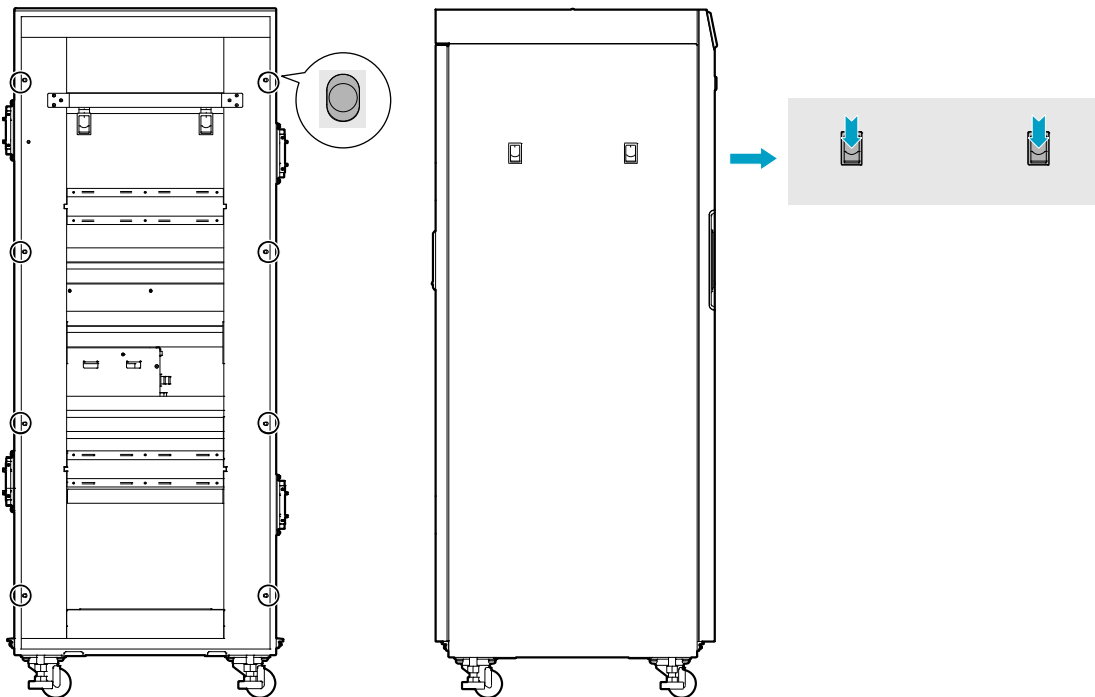


Figure 3-8 Disassembling the Side Door

**Step 3** Insert the modules into the cartridge (take the BSCU installation for example)

 **Note:**

Make sure the power switch is set to OFF before installing the PSU.

1. Loosen the two ejectors as shown in [Figure 3-9](#).

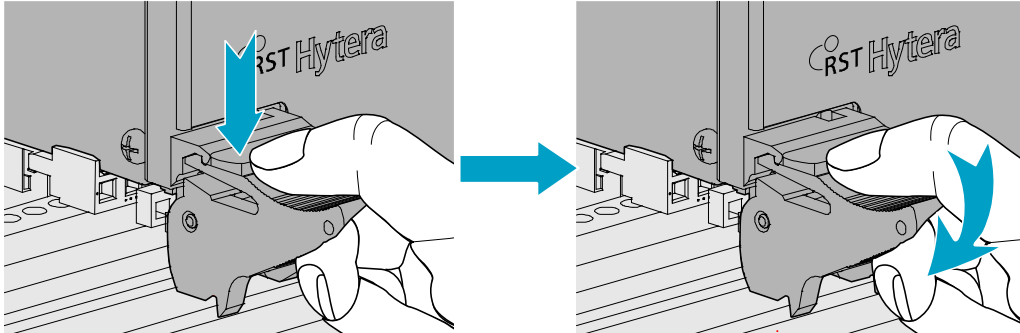


Figure 3-9 Loosening the Ejector

2. Slide the BSCU along the guide rails smoothly as shown in [Figure 3-10 \(1\)](#).
3. Perform the step 1 in a reverse way to lock the two ejectors.
4. Tighten the two screws on the two ejectors and the board respectively as shown in [Figure 3-10 \(2\)](#).

 **Note:**

Loosen the two ejectors and draw out the module in case of removing it during installation.

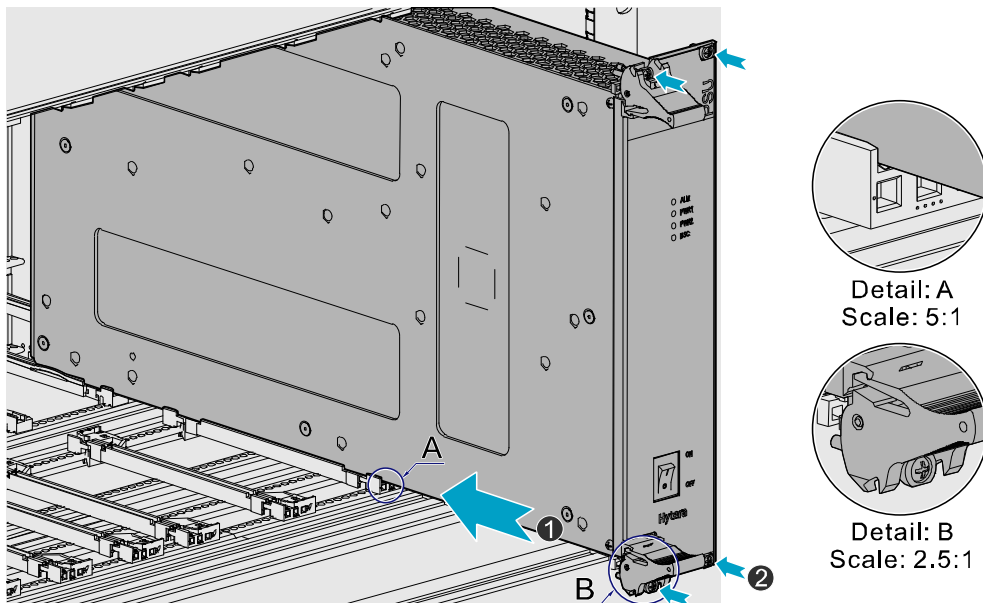


Figure 3-10 Installing the BSCU

**Step 4** Install the FAN as shown in [Figure 3-11](#).

1. Slide the FAN along the guide rails smoothly until a click is heard.
2. Fasten the two screws on the ear of the FAN.

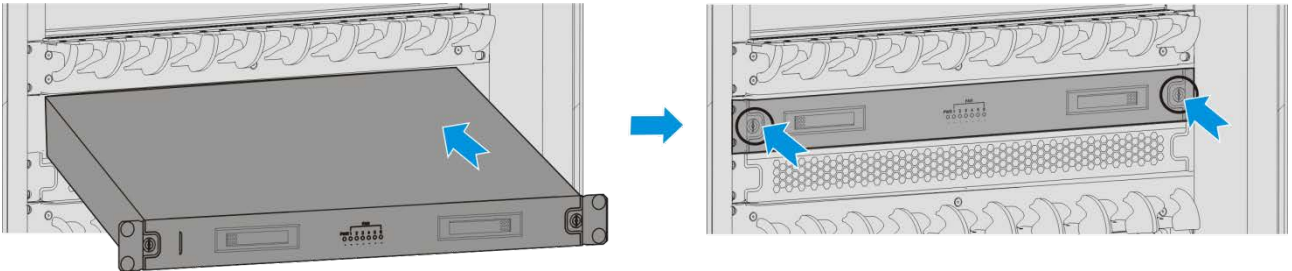


Figure 3-11 Installing the FAN

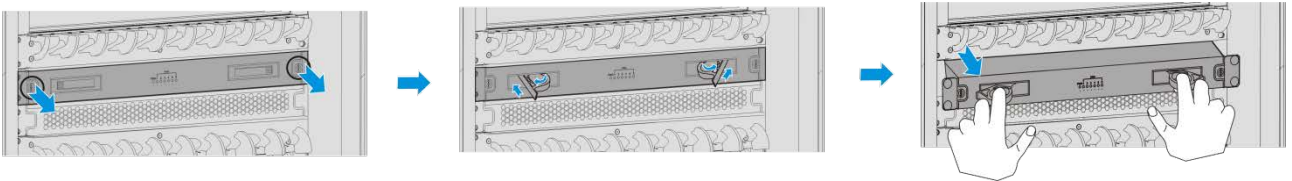


Figure 3-12 Removing the FAN

**Note:**

During installation, if you have to take out the FAN, please first unfasten the screws, and then unlock the first panel, finally pull the FAN out. See [Figure 3-12](#).

**Step 5** Install the DIU as shown in Figure 3-13.

1. Slide the DIU along the guide rails.
2. Fasten all screws to fix the DIU.

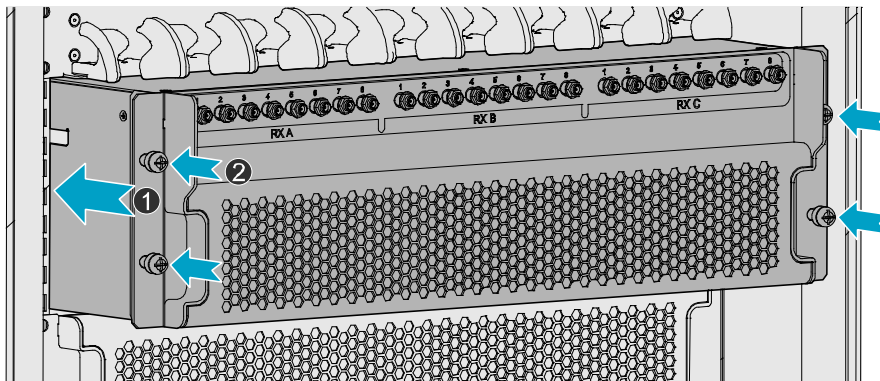


Figure 3-13 Installing the Divider Unit

**Step 6** Install the COM as shown in Figure 3-14.

1. Slide the COM along the guide rails.
2. Fasten the four screws.

**⚠ Caution:**

Handle with care as the COM is heavy.

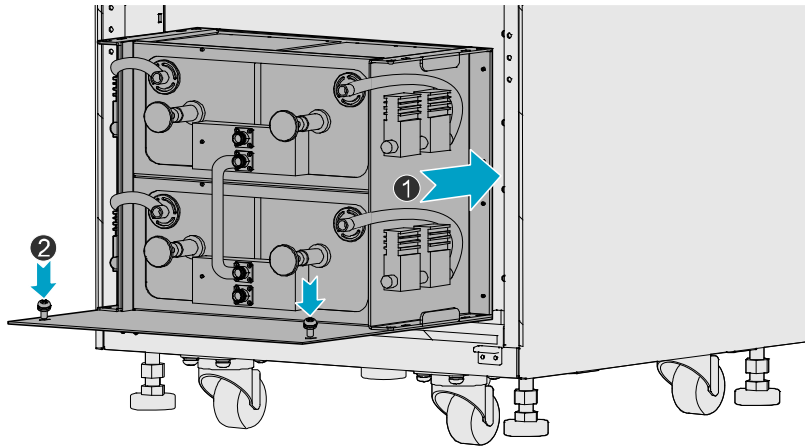


Figure 3-14 Installing the Combiner Unit

**Step 7** Connect all cables as shown in [Figure 3-16](#).

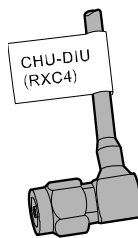


Figure 3-15 Cable Diagram

**Step 8** Install the side doors.

1. Align the side door with the frame and firmly press the latch.
2. Fasten the eight screws.

## 3.7 Installing Cables

### 3.7.1 Equipment Status

The equipment shall be in the following status before connecting cables:

- The cabinet has been installed.
- All modules have been installed and the power switch is set to OFF.

### 3.7.2 Cables

Cables are described in [Table 3-3](#) and their positions are shown in [Figure 3-16](#). Installation positions

are located on top of the cabinet.

| Name                            | Color           | Remark                                                                                                |
|---------------------------------|-----------------|-------------------------------------------------------------------------------------------------------|
| Base Station Ground Cable (40m) | Yellowish green | Lead, 16 mm <sup>2</sup> , 49-core, and 450/750V, outer diameter: 8.1<br>Subject to the actual needs. |
| AC Power Cord (15m)             | Black/white     | 3-core, 300/500V, 3*2.5 mm <sup>2</sup> , Subject to the investigating data on the site               |
| RF Jumpers (3 pcs)              | Black           | 1/2 inch, N-Male to N-Male, 3Pcs                                                                      |

Table 3-3 Cables Description

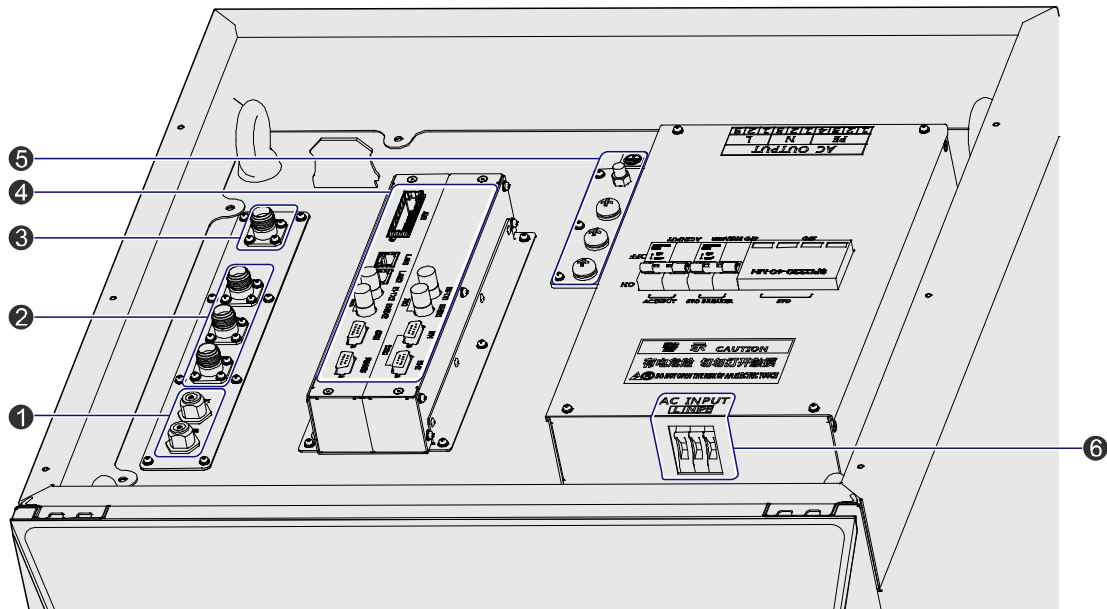


Figure 3-16 External Cable Connection

| No. | Name                  | No. | Name                    |
|-----|-----------------------|-----|-------------------------|
| 1   | GPS Antenna Interface | 2   | RX Interface            |
| 3   | TX Interface          | 4   | Communication Interface |
| 5   | Ground Interface      | 6   | Power Inlet             |

Table 3-4 Descriptions on the interface of external cable connection



**Note:**

- Install the power cable properly.
- Do handle the ground cable gently to avoid possible looseness during installation.

- The Disconnecter is available for shortcut between the live line and null line only.

## 3.8 Examination after Installation

### 3.8.1 Equipment Status

The equipment shall be in the following status prior to hardware examination.

- The cabinet has been installed.
- All modules have been installed.
- The external power has been installed and all cables have been connected.
- All switches of the power distribution box are set to OFF.

### 3.8.2 Examining the Cabinet

The following requirements shall be met after installation.

| No. | Check Item                                                                                                  |
|-----|-------------------------------------------------------------------------------------------------------------|
| 1   | The position of the cabinet should conform to the design drawing.                                           |
| 2   | All modules should be installed correctly.                                                                  |
| 3   | All cables within the cabinet should be connected properly.                                                 |
| 4   | The side door should be installed and the grounding cables should be connected properly.                    |
| 5   | All screws should be tightened. Be sure to put flat washers and spring washers on all bolts correctly.      |
| 6   | The cabinet should be placed horizontally and orderly.                                                      |
| 7   | The surface of the cabinet should be clean and well painted. No dust and other sundries are in the cabinet. |
| 8   | All labels should be correct, clear and not be missed.                                                      |
| 9   | The plastic dust cap on top of the cabinet should be installed properly.                                    |

Table 3-5 Checklist of Cabinet Installation

### 3.8.3 Examining Cables

The following requirements should be met after connection.

| No. | Check Item                                                        |
|-----|-------------------------------------------------------------------|
| 1   | All cables should not be damaged.                                 |
| 2   | All cables are one-piece cables, without any joint in the middle. |
| 3   | Excess grounding cables should be cut off.                        |

Table 3-6 Checklist of Cables

### 3.8.4 Power On and Examination



#### Caution:

First measure the resistance of all power connectors and ground connectors using the multimeter and check whether short circuit occurs.

The procedures are described as follows:

**Step 1** Check the input voltage (220V) from the main power and whether the live line and null line connect correctly.

**Step 2** The switch of the Disconnecter in the BSIU is set to ON.

**Step 3** All switches of the PSU are set to ON.

**Step 4** Check whether all modules are powered properly.

| Name | Normal Power Indication                                                    |
|------|----------------------------------------------------------------------------|
| CHU  | The PWR indicator on the front panel glows and the ALM indicator goes out. |
| BSCU | The PWR indicator on the front panel glows and the ALM indicator goes out. |
| PSU  | The PWR indicator on the front panel glows and the ALM indicator goes out. |
| FAN  | The PWR indicator on the front panel glows.                                |

Table 3-7 Checklist of Power Situation



#### Note:

If the LED on the front panel does not work correctly, please re-power it on or re-insert the module after disconnecting power. If it doesn't solve the problem, please contact us.

### 3.8.5 Environment Examination

The following table lists the check item of environment on site.

| No. | Check Item                                                                                       |
|-----|--------------------------------------------------------------------------------------------------|
| 1   | The equipment room should be clean and tidy.                                                     |
| 2   | No sundries should be placed in the grooves, at the bottom of the cabinet or around the cabinet. |
| 3   | The floor in the equipment room should be free from sundries.                                    |

Table 3-8 Checklist of Environment on Site

## 4. Basic Operations

### 4.1 Powering on

- Step 1** The external power supply is connected.
- Step 2** The switch of the Disconnecter is set to ON.
- Step 3** All switches of the PSU are set to ON.

### 4.2 Powering off

- Step 1** All switches of the PSU are set to OFF.
- Step 2** The switch of the Disconnecter is set to OFF.
- Step 3** Disconnect the external power supply.

## 5. Troubleshooting

| Phenomena                                 | Solution                                  |
|-------------------------------------------|-------------------------------------------|
| The <b>PWR</b> LED does not light up.     | Check the power supply.                   |
| The <b>ALM</b> LED on the PSU glows red.  | Disconnect the power and replace the PSU. |
| The <b>ALM</b> LED on the CHU glows red.  | Replace the CHU.                          |
| The <b>ALM</b> LED on the BSCU glows red. | Replace the BSCU.                         |

Table 5-1 Troubleshooting

## 6. Routine Maintenance

### 6.1 Purpose

Routine maintenance is to ensure stable and reliable operation of the equipment. It can help to know the operation status of the equipment, so as to detect the potential troubles and remove them on time.

The routine maintenance should achieve the following objects:

- Remove all potential troubles to keep the system work properly.
- Ensure all performance and service specifications meet requirements.
- Ensure good collaboration with the entire network.
- Make sure that new equipment or the extended equipment accesses to the network properly.

### 6.2 Tasks

- Clean the equipment room regularly.
- Check the working status of the base station regularly. If the abnormal situation occurs, deal with it in time.
- Clean up the dust regularly.

## A Abbreviations

| Abbr.   | Full Name                                       |
|---------|-------------------------------------------------|
| AGC     | Auto Gain Control                               |
| BSCU    | Base Station Controller Unit                    |
| BSCU-MB | Base Station Controller Unit Main Board         |
| BSS     | Base Station Sub-system                         |
| CAN     | Controller Area Network                         |
| CC      | Call Control                                    |
| CCL     | Call Control Layer                              |
| CHB     | Channel Board                                   |
| CHU     | Channel Unit                                    |
| COM     | Combiner                                        |
| CPCI    | Compact Peripheral Component Interconnect       |
| DIU     | Divider Unit                                    |
| DLL     | Data Link Layer                                 |
| EC      | Extended Chassis                                |
| EIB     | Extended Interface Board                        |
| ETSI    | European Telecommunications Standards Institute |
| FAN     | Fan Unit                                        |
| GPI     | General Purpose Input                           |
| GPIO    | General Purpose Input Output                    |
| GPO     | General Purpose Output                          |
| GPS     | Global Positioning System                       |
| GPSB    | GPS Clock Board                                 |

| Abbr. | Full Name                                   |
|-------|---------------------------------------------|
| ICB   | Interconnect Backboard                      |
| IO    | Input and Output                            |
| IRU   | Interconnect Relay Unit                     |
| LLC   | Logical Link Control                        |
| LNA   | Low Noise Amplifier                         |
| MAC   | Media Access Control                        |
| MC    | Main Chassis                                |
| MCB   | Main Control Board                          |
| MM    | Mobile Management                           |
| MPSC  | Machine-Frame Power Support Component       |
| MPU   | Micro Processor Unit                        |
| PAB   | Power Amplifier Board                       |
| PCI   | Peripheral Component Interconnect           |
| PICMG | PCI Industrial Computer Manufacture's Group |
| PDT   | Professional Digital Trunking               |
| PSB   | Package Switch Board                        |
| PSU   | Power Support Unit                          |
| RFDS  | Radio Frequency Distributing System         |
| RT    | Router                                      |
| RXB   | Receive Board                               |
| TDM   | Time Division Multiplex                     |
| TMA   | Tower Mounted Amplifier                     |
| TSCU  | Trunking Station Control Unit               |
| EXB   | Excitation Board                            |

| Abbr. | Full Name            |
|-------|----------------------|
| VGA   | Video Graphics Array |

**FCC Warning:**

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an controlled environment .This equipment should be installed and operated with minimum distance 2.5 m between the radiator& your body.

**Industry Canada**

This device complies with Industry Canada licence-exempt RSS standard (s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

*Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.*

*L'exploitation est autorisée aux deux conditions suivantes:*

*(1) l'appareil ne doit pas produire de brouillage, et*

*(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

The term "IC:" before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that, the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

*Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.*

This product meets the applicable Industry Canada technical specifications.

*Le présent matériel est conforme aux spécifications techniques applicables d'Industrie Canada.*

This Class A digital apparatus complies with Canadian ICES-003.

IC Radiation Exposure Statement:

This equipment complies with IC RF radiation exposure limits set forth for an controlled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 2.5m between the radiator & your body.