



iSite BTS3006C
V300R005

Maintenance Manual

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Safety Precautions

1 Overview

1.1 Guide

This section describes the safety precautions to be taken while installing and maintaining Huawei network equipment.



Before any operation, read the operation instructions and precautions carefully to prevent accidents. The Caution, Warning, and Danger notes in manuals are merely supplements to the basic safety precautions.

Before installing and maintaining Huawei products:

- | Be familiar with the safety operations
- | Undergo relevant training
- | Get qualified for the related operations.

Abide by the local safety regulations. The safety precautions in this manual only serve as supplements to these regulations.

Take precautions and follow specific safety instructions to operate Huawei products and equipment. Huawei is not liable for any damages caused by violating:

- | Universal safety regulations
- | Safety codes on design, production and equipment use

The operation personnel installing and maintaining Huawei products should:

- | Undergo training
- | Master the correct operation methods
- | Keep various safety precautions in mind.

1.2 Symbols

The symbols in this manual, indicate the safety precautions to be taken during the installation and maintenance.

Safety prompts fall into four categories: Danger, Warning, and Caution.

The safety level is to the right of the symbol. The safety instructions are below the symbol.



DANGER

Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING

Indicates a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.



CAUTION

Indicates a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.

2 Toxic Articles

2.1 Beryllium Oxide



WARNING

Some equipment parts contain toxic beryllium oxide. These parts include the power amplifier circuit and combiner circuit.

- ! If the parts are damaged it may lead to the leakage of beryllium oxide which may cause injures to the human body. Take necessary precautions.
- ! Keep the damaged parts in a safe place to prevent beryllium oxide leakage from mechanical damages.
- ! Do not discard the parts containing beryllium carelessly. Follow the local safety regulations to perform chemical treatment or special waste treatment on them.

2.2 Hydrochloride



WARNING

Some equipment parts contain hydrochloride. If burnt, these parts generate toxic gas.

Prevent the damaged parts from burning.

Do not discard the damaged parts at random. Follow the local safety regulations to perform chemical treatment or special waste treatment on them.

2.3 Hydrofluoride



WARNING

Some equipment parts contain hydrofluoride. The burning of these parts generates toxic gas.

Prevent the equipment parts from burning.

Do not discard the equipment parts at random. Follow local regulations to perform chemical treatment or special waste treatment on them.

3 Electrical Safety

3.1 High Voltage



DANGER

High voltage power supply provides electricity for equipment operation. Direct contact or indirect contact of damp objects with high-voltage wires or main power supply can be fatal.

- | Follow the local safety regulations to install AC power supply equipment. The people engaged in providing the AC power supply must be qualified for high-voltage and AC operations.
- | Remove electrical conductors such as watches, bracelets, and rings before the operation.
- | If you find that the cabinet is wet, switch off power supply at once.
- | Keep the equipment dry in humid places.

**WARNING**

Improper high-voltage operations may result in fire and electric shocks. Follow the local safety codes to lay AC cables. Only trained and qualified personnel are allowed to perform high-voltage operations.

3.2 Power Cable

**CAUTION**

Never install or remove electrified power cables. The contact of power cable with conductors may cause electric spark or arc, causing fire or eye injury.

- | Turn off the power before installing and removing power cables.
- | Before connecting the cables, make sure that the cables and the cable tags are correct.

3.3 Fuse

**CAUTION**

Never install or remove electrified fuses.

- | Only the technicians qualified for high-voltage operations can install or remove fuses.
- | Switch off the power before replacing AC fuses.

3.4 Tools

**WARNING**

High-voltage and AC operations require special tools instead of general-purpose or makeshift tools.

3.5 Drilling Holes



WARNING

Do not drill holes on the cabinet. Improper drilling may damage cables inside the cabinet. The metal filings resulting from the drilling may fall into the cabinet and cause short-circuits in the circuit board.

-
- | Wear insulated gloves and move the cables inside the cabinet.
 - | Protect your eyes from the dispersed metal filings.
 - | Prevent metal filings from falling into the cabinet.
 - | Drill at proper places to avoid affecting the electromagnetic shielding performance of the cabinet.
 - | After drilling, remove all the metal filings immediately.

3.6 Thunderstorm



DANGER

Never work on high-voltage and AC or work on steel towers and masts in thunderstorms.

Thunderstorms generate powerful electromagnetic fields in air. Ground the equipment properly to avoid thunder stroke.

3.7 Static Electricity



CAUTION

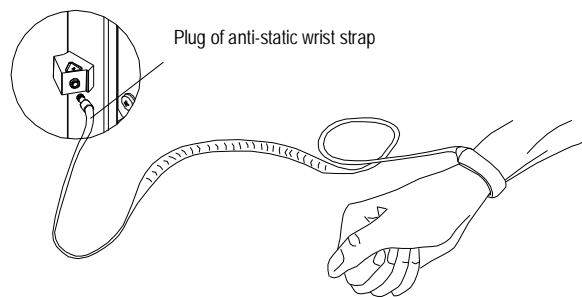
Static electricity generated in the human body may damage the electrostatic-sensitive parts on the circuit board, such as large-scale integrated circuit (IC).

-
- | In dry climate, the electrostatic charge carried by the human body may go up to 30 kV. The charge may remain in the human body for a long period. When an operator with electrostatic charge contacts with an electrostatic-sensitive part, the electric discharge may damage the part.
 - | Before coming into contact with any equipment such as, hand-held plug-in boards, circuit boards, or IC chips, wear an anti-static wrist strap with one end well grounded to protect sensitive parts from static electricity on your body.
 - | Before touching any board or module, discharge the static electricity in your body by wearing an anti-static wrist strap.
 - | Add a resistance of over $1M\Omega$ between the strap and the grounding point to protect yourself from electric shock. The resistance over $1M\Omega$ is reliable in terms of electrostatic voltage discharging. Check the anti-static wrist strap regularly. Never replace the cable of the anti-static wrist strap with other cables.

- l Prevent electrostatic-sensitive boards or modules from touching the object with static electricity or the object that may easily generate static electricity. For example, when rubbing on an object of insulating materials such as packing and conveyer, an electrostatic-sensitive part takes electric charge. When touching a human body or when connected to the ground, the discharge may damage the part.
- l Electrostatic-sensitive boards or modules should contact only good conductors, such as anti-static packing bags. Pack the board with an anti-static bag for stock or transport.
- l Before connecting any measurement device to boards or modules, ground it to discharge its static electricity.
- l Do not place boards or modules near strong DC magnetic field, for example, the cathode ray tube of a scope. Keep a distance of 10 cm at least.
- l The damage caused by static electricity is accumulative in effect. If the damage is slight, the part does not fail. However, as the damage occurs repeatedly, the part may suddenly fail. The damage caused by electrostatic discharge on the part may be explicit or implicit. The implicit damage is not visible. However, it makes the part vulnerable to over-voltage and high-temperature.

Figure 1 shows how to wear an anti-static wrist strap.

Figure 1 Wearing an anti-static wrist strap



3.8 Labels on Power Supply Cables



Before connecting the cables, check the labels on them.

3.9 Leakage of Current



To avoid large leakage of current, ground the equipment before powering it on.

Before connecting the AC input power supply, connect the protection-grounding terminal of the equipment housing to the earth. The purpose is to avoid the electric shock on human body resulting from leakage of current. The leakage of current is caused by the EMI filter earth capacitance of the equipment AC power supply input terminal and the Y capacitance of the primary power supply.

3.10 Flammable Air



DANGER

Do not place the equipment in an environment with flammable, explosive air or smog. Never operate any digital equipment in this environment.

It is extremely dangerous to operate any digital equipment in this environment.

4 Microwave and Magnetic Field

4.1 Introduction

Antennas in service generate electromagnetic radiation. Standing too close to the antenna is against the safety codes.

Only trained professionals can install and maintain antennas.

The radiation design of the equipment should meet the IEEE C95.1-1991 recommendation.

When working near a full-power transmitting antenna, keep the following safety regulations in mind.

4.2 Definitions of Environment

There are two kinds of environment under electromagnetic radiation.

1 Controlled environment

In such areas, people are aware of the potential danger of the radio frequency radiation.

1 Uncontrolled environment

In such areas, people are unaware of the potential danger of the radio frequency radiation. They cannot evade the radiation. The area may include living or working places.

4.3 Minimal Distance Formula

This section shows how to calculate the minimal safety distance.

Use the following formula to calculate the minimal safety distance from various antennas.

$$r_{\min} = \sqrt{\frac{N10^{\frac{(G-L)}{10}} P_{\text{out}}}{4\pi W}}$$

The elements in the formula include:

- | R_{\min} is the minimal safety distance. Its unit is meter.
- | N is the number of frequency carriers.
- | P_{out} is the output power of the frequency carrier. Its unit is W.
- | L is the loss from transmitting party to the receiving party. Its unit is dB.
- | G is the antenna gain. Its unit is dB.
- | W is the greatest field power density permitted. Its unit is W/m^2 .

In the uncontrolled environment, the greatest field power density permitted is $f/150$, in which f is the frequency, and its unit is MHz. Its tested value is the mean value measured when the testing time is over 30 minutes.

In the controlled environment, the greatest field power density permitted is $f/30$, and its tested value is the mean value measured when the testing time is over 6 minutes.

Table 1 shows the minimal safety distance on the axial line of the antenna field calculated by the above formula.

Table 1 Typical minimal safety distance

Frequency	f (MHz)	1800
Frequency output power	P_{out} (W)	40
Loss from the transmitting party to the receiving party	L (dBm)	5.5
Antenna gain	G (dBm)	18
Number of frequency carriers	N	2
Power density/uncontrolled environment	W (W/m^2)	12
Power density/controlled environment	W (W/m^2)	60
Uncontrolled environment	r_{\min} (m)	3.1
Controlled environment	r_{\min} (m)	1.4

4.4 Operation Codes



WARNING

When operating on the high intensity radio frequency signal equipment, keep in mind that the high-intensity microwave is harmful to human health.

5 Laser



WARNING

The laser beam inside optical fibers may injure your eyes.

When installing and maintaining optical fibers, keep your eyes away from them and avoid looking at the optical fiber outlet.

6 High Temperature



WARNING

The temperature of some equipment parts may be high. Do not touch the surface to avoid being scalded.

When the equipment is running in the tropical environment, the temperature benchmark of the parts is 45°C. In that case:

- | The temperature rise is within 30°C or the highest temperature is 75°C when the equipment is running normally.
- | The temperature rise is within 55°C or the highest temperature is 100°C when a fault occurs.

The temperature for radiator of the transmitter RF power amplifier and the power supply radiator can reach the above-mentioned high temperature.

7 Working High above the Ground

7.1 General Operation



WARNING

Prevent objects from falling, when working from a higher altitude.

Follow the local safety regulations when working from a higher altitude:

- | The workers should be trained.
- | Take care of the machines and tools at hand and prevent them from falling.
- | Put a tool back into the tool bag right after use.
- | Put on a helmet and safety belt.
- | Put on cold-proof clothes in cold areas beforehand.

- l Check all the hoisting gears beforehand.

7.2 Safety Codes on Ladder Use

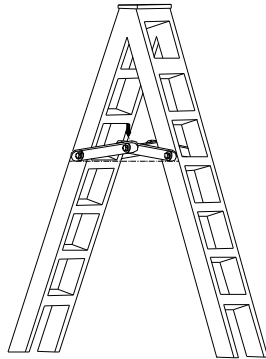
Check the ladder beforehand to make sure that the ladder is safe for use. Overweight on the ladder is strictly prohibited.

You need to hold or secure the ladder in the following cases:

- l If the ladder slants over 5 m horizontally,
- l If the two legs of the ladder are over 3 m away, or
- l If the environment is dangerous.

Be sure to spread A-shaped ladders fully, as shown in Figure 2.

Figure 2 Spread A-shaped ladder



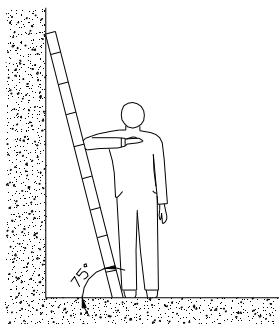
The slant of the ladder is 75° at best.

Measure the slant with the Angle Square or with arms, as shown in Figure 3.

When using the ladder, place the wider end of the ladder against the ground or take protective measures on the base part of the ladder against skid.

Place the ladder against a stable and level ground. Never place a ladder on slippery objects such as cartons and stones.

Figure 3 Ladder slant



When climbing the ladder,

- | Make sure that the gravity center of your body is within the ladder range.
- | Keep both feet and at least one hand on the ladder.
- | Do not climb beyond highest fourth step.

To climb to a rooftop, the length of the ladder should be 1 meter higher than the eave, as shown in Figure 5.

Figure 4 Using the long ladder in a safe way

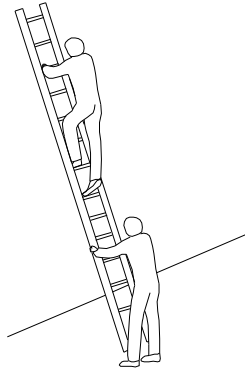
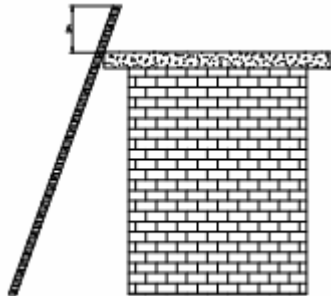


Figure 5 Ladder placement when the ladder is 1 meter higher than the eave



8 Other Items

8.1 Weight Hoisting



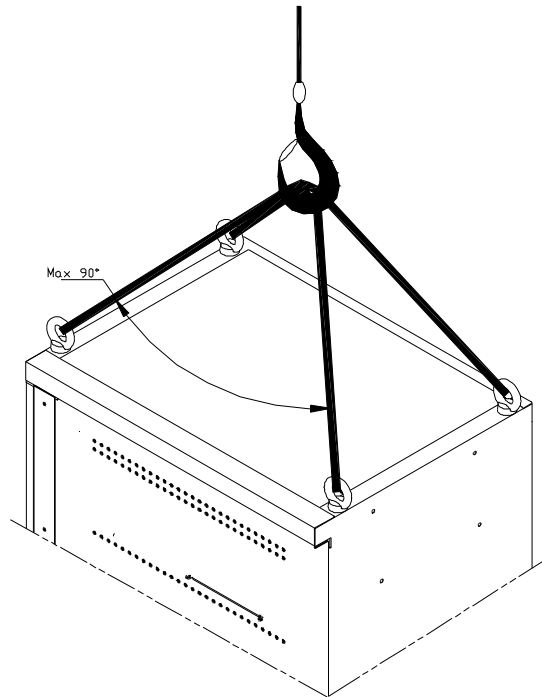
WARNING

Exclude access to the areas under the gib arm and the goods in suspension during weight hoisting.

Comply with the following regulations:

- | The weight-hoisting workers must be trained and qualified.
- | The weight-hoisting tools must be functional and complete.
- | The weight-hoisting tools must be fixed securely onto a weight-bearing object or wall.
- | Use concise commands to avoid faulty operation.
- | Make sure that the included angle of the cables for hoisting the cabinet is within 90° to prevent the cable from breaking.

Figure 6 Weight hoisting



8.2 Heavy Object Portage



WARNING

When carrying heavy objects such as the cabinets, be careful not to get bruised by them.

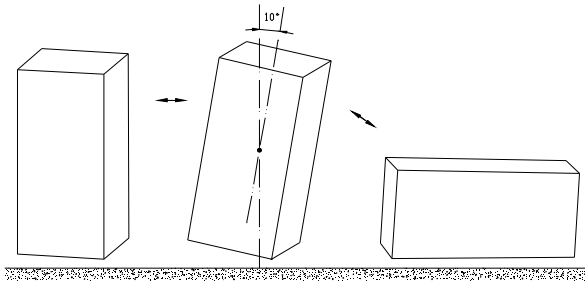
Two or three people are required to perform the following tasks:

- | Installing and maintaining BTS cabinets
- | Slanting, tilting, and erecting the cabinet

When the cabinet center of gravity slants over 10°, the cabinet may be off balance under gravity.

Figure 7 shows how to lay or erect a cabinet.

Figure 7 Laying or erecting a cabinet



8.3 Sharp Edge of Objects



WARNING

When handling equipment, wear gloves for protection against sharp objects.

8.4 Binding of Signal Wires



CAUTION

Bind signal wires separately at least 150 mm from the cables of strong current or high voltage.

8.5 Having Companions in Maintenance and Commissioning



CAUTION

Ensure that there are qualified people for assistance during maintenance and commissioning of the equipment.

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About This Document

Purpose

This manual describes the procedures for the BTS3006C maintenance.

Related Versions

The following table lists the versions of the product that is described in this document.

Product Name	Version
iSite BTS3006C	V300R005

Intended Audience

The manual is intended for BTS operators.

Organization

This document consists of four chapters and two appendixes. It is organized as follows:






Chapter	Description
1 Preparations for Maintenance	This chapter introduces the preparations that have to be made for routine maintenance.
2 Routine Maintenance	This chapter describes the BTS3006C routine maintenance items and maintenance guidelines.
3 Emergency Maintenance	This chapter describes the methods and procedures for emergency maintenance on the BTS3006C.
4 Replacing Modules and Parts	This chapter describes the procedures for replacing modules, parts, and cables.

Chapter	Description
A Requirements for Antenna Spacing	This appendix lists the requirements for the installation spacing of omni-directional antenna and directional antenna in different situations.
B Engineering Labels for Antenna System	This appendix lists the engineering labels for the antenna system.
C Glossary	Lists the glossary involved in this manual.
D Acronyms and Abbreviations	Lists the acronyms and abbreviations involved in this manual.

Conventions

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.
 CAUTION	Indicates a potentially hazardous situation that, if not avoided, could cause equipment damage, data loss, and performance degradation, or unexpected results.
 TIP	Indicates a tip that may help you solve a problem or save time.
 NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in boldface . For example, log in as user root .
<i>Italic</i>	Book titles are in <i>italics</i> .
Courier New	Terminal display is in Courier New.

Command Conventions

Convention	Description
Boldface	The keywords of a command line are in boldface .
<i>Italic</i>	Command arguments are in <i>italics</i> .
[]	Items (keywords or arguments) in square brackets [] are optional.
{ x y ... }	Alternative items are grouped in braces and separated by vertical bars. One is selected.
[x y ...]	Optional alternative items are grouped in square brackets and separated by vertical bars. One or none is selected.
{ x y ... } *	Alternative items are grouped in braces and separated by vertical bars. A minimum of one or a maximum of all can be selected.

GUI Conventions

Convention	Description
Boldface	Buttons, menus, parameters, tabs, windows, and dialog titles are in boldface . For example, click OK .
>	Multi-level menus are in boldface and separated by the ">" signs. For example, choose File > Create > Folder .

Keyboard Operation

Format	Description
Key	Press the key. For example, press Enter and press Tab .
Key 1+Key 2	Press the keys concurrently. For example, pressing Ctrl+Alt+A means the three keys should be pressed concurrently.
Key 1, Key 2	Press the keys in turn. For example, pressing Alt, A means the two keys should be pressed in turn.

Mouse Operation

Action	Description
Click	Select and release the primary mouse button without moving the pointer.

Action	Description
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Update History

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Updates in Issue 01 (2007-01-24)

Initial commercial release.

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1 Preparations for Maintenance

About This Chapter

The following table lists the sections of this chapter.

Section	Description
1.1 Understanding the BTS Information	Introduces the basic information that maintenance engineers need to learn before the maintenance.
1.2 Preparing Tools and Spare Parts	Describes the tools and devices that you need to prepare for maintenance.

1.1 Understanding the BTS Information

Before carrying out related maintenance tasks, familiarize yourself with the following information related to the BTS:

- | Current faults and alarms
- | Hardware configuration
- | Software version
- | Transmission and networking
- | TS consolidation equipment, if any
- | Local environment
- | Spare parts

1.2 Preparing Tools and Spare Parts

Prepare the following maintenance tools and parts:

- | Frequency test device
The frequency test device consists of a frequency generator, a spectrum analyzer, and various connectors and cables.
A frequency tester is mandatory.
- | Power test device
The power test device is used to measure and analyze the output power. The output power determines the effect of downlink coverage.
A power meter is mandatory.
- | Antenna and feeder test device
The antenna and feeder test device is used to measure the standing wave ratio, to return loss and cable insertion loss, and to locate faults.
The Site Master is mandatory.
- | Other devices

Table 1-1 lists other devices used in routine maintenance.

Table 1-1 List of other devices

Universal Tools	Fastening Tools	<ul style="list-style-type: none">▮ Three Phillips screwdrivers (4', 6', and 8')▮ Three straight screwdrivers (4', 6', and 8')▮ Four adjustable wrenches (6', 8', 10', and 12')▮ A set of combination wrenches (17', and 19')▮ A set of inner hexagon spanners
	Small Tools	<ul style="list-style-type: none">▮ A pair of sharp nose pliers (8')▮ A pair of pincer pliers (8')
	Auxiliary Means	Electric soldering iron

2 Routine Maintenance

About This Chapter

The following table lists the sections of this chapter.

Section	Description
2.1 Routine Maintenance Items	Introduces the routine maintenance items.
2.2 Maintenance Guidelines to the Major Equipment	Describes the guidelines to routine maintenance on the major equipment of the BTS3006C.
2.3 Maintenance Guidelines to the Auxiliary Devices	Describes the guidelines to routine maintenance on the auxiliary devices of the BTS3006C.
2.4 Maintenance Guidelines to the Antenna System	Describes the guidelines to routine maintenance on the antenna system of the BTS3006C.
2.5 BTS Routine Maintenance Record	Lists the BTS3006C Routine Maintenance Record.

2.1 Routine Maintenance Items

According to the actual conditions, select the following maintenance items:

- ┆ Routine Maintenance Items for the Major Equipment
- ┆ Routine Maintenance Items for the Auxiliary Equipment
- ┆ Routine Maintenance Items for the Antenna System

2.1.1 Routine Maintenance Items for the Major Equipment

Table 2-1 lists the routine maintenance items for the major equipment.

Table 2-1 Routine maintenance items for the major equipment

Maintenance Item	Operating Frequency	Reference
Querying and handling current faults and alarms	Each time site maintenance is performed	Section 2.2.1 "Querying and Handling the Current Faults and Alarms"
Call test	Every month	Section 2.2.2 "Call Test"
Short message test	Every month	Section 2.2.3 "Short Message Test"
Packet Data Service Test	Every month	Section 2.2.4 "Packet Data Service Test"
Checking the Tx power	Each time site maintenance is performed	The transmit power of the DDRM is consistent with that configured in the BSC.
Checking the VSWR	Each time site maintenance is performed	Section 2.2.5 "Checking the VSWR"
Checking the exterior of the cabinet	Every month	<ul style="list-style-type: none"> ┆ The battery capacity meets the requirements and the battery is correctly connected. ┆ The performance parameters of the rectifier meet the requirements.
Checking the lock and door of the cabinet	Every month	<ul style="list-style-type: none"> ┆ The lock is functional. ┆ The door is easy to open and close.
Cleaning the cabinet	Every month	<ul style="list-style-type: none"> ┆ The cabinet surface is clean. ┆ The subracks are not dusty.
Cleaning the fan box	Every year	<p>If there is too much dust on the surface of the fan box or inside the fan box, clean the fan box.</p> <p>For details, refer to section 2.2.6 "Cleaning the Fan Box."</p>

Maintenance Item	Operating Frequency	Reference
Checking the module running status	Every week	The module indicators are normal. For the status and meaning of module indicators, refer to the <i>iSite BTS3006C Hardware Description Manual</i> .
Checking the fan	Every week	The fan is operating normal, without abnormal sound.
Checking trunk transmission	Every month	Section 2.2.7 "Checking the Trunk Transmission"
Checking equipment wiring	Every month	Section 2.2.8 "Checking the Equipment Wiring"
Checking the lightning protector of the power supply	Every month	Check that the lightning protector of the DC/AC power supply is operational.

2.1.2 Routine Maintenance Items for the Auxiliary Equipment

Table 2-2 lists the maintenance items for the auxiliary equipment.

Table 2-2 Routine maintenance items for the auxiliary equipment

Maintenance Item	Operating Frequency	Reference
Checking alarm collection devices	Every quarter	Section 2.3.1 "Checking the Alarm Collection Devices"
Checking the grounding status of the equipment	Every quarter	Ensure that the grounding is normal.
Testing the grounding resistance	Every year	Measure the grounding resistance with a ground resistance meter. Conduct the test before the rainy season. The grounding resistance should be less than 10 ohms.
Checking the battery	Every year	<ul style="list-style-type: none"> † The battery capacity passes the check and the battery is correctly connected. † The performance parameters of the rectifier pass the check.

2.1.3 Routine Maintenance Items for the Antenna System

Table 2-3 lists the maintenance items for the antenna system.

Table 2-3 Routine maintenance items for the antenna system

Maintenance Item	Operation Frequency	Remarks	Reference
Checking the tower	Every quarter	Carry out a comprehensive check when a strong wind (force 8 and above), an earthquake, or any destructive accident happens.	Section 2.4.1 "Checking the Tower"
Checking the pole	Every quarter		Section 2.4.2 "Checking the Pole"
Checking the antenna	Every month		Section 2.4.3 "Checking the Antenna"
Checking the feeder	Every month		Section 2.4.4 "Checking the Feeder"

2.2 Maintenance Guidelines to the Major Equipment

2.2.1 Querying and Handling the Current Faults and Alarms

Procedure

 **NOTE**

Pay attention to the recent history alarms.

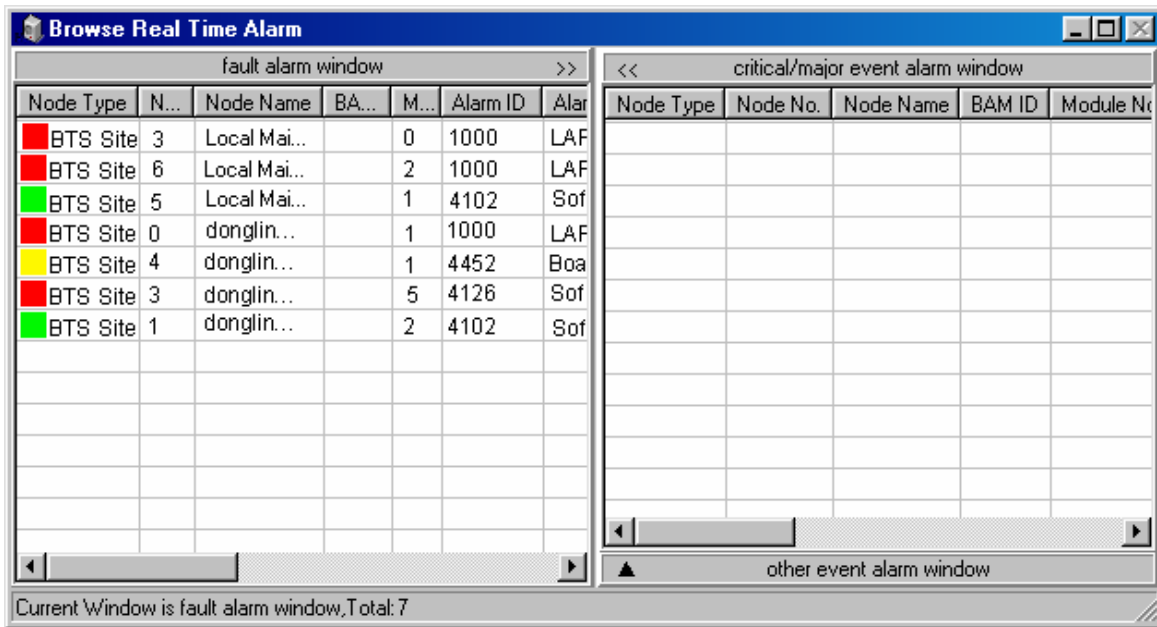
To query the current faults and alarms, do as follows:

Step 1 Choose **Start > Task > Alarm > Browse Real Time Alarm**.

The **Browse Real Time Alarm** window is displayed, as shown in Figure 2-1.

You can view all the current alarm information, including the node type, node ID, node name, BAM ID, module ID, alarm type, alarm ID, and alarm name.

Figure 2-1 Browse Real Time Alarm window

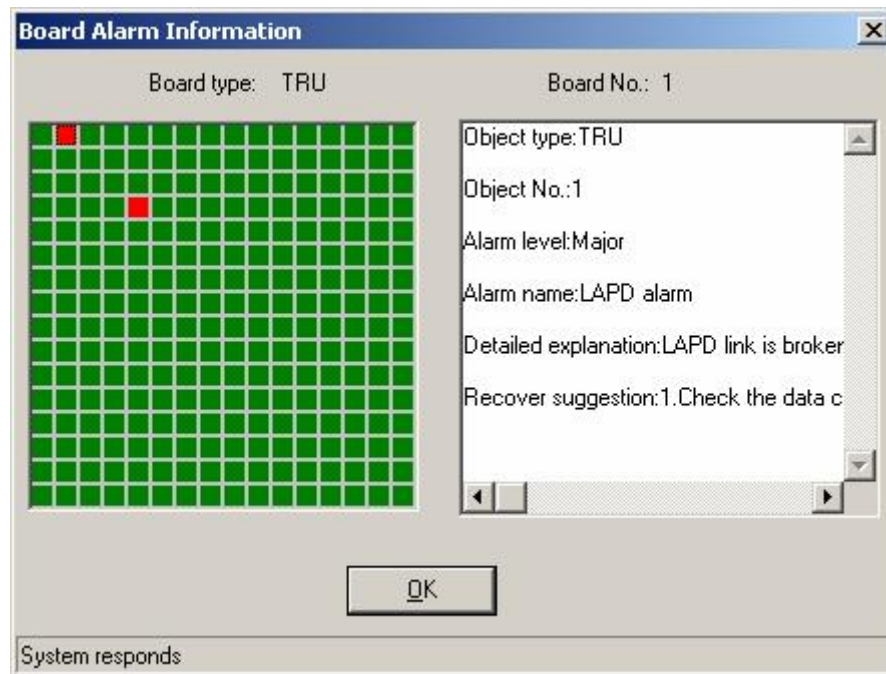


Step 2 Query alarm information of a specific module as follows:

1. Choose **Start > Task > BTS Maintenance**.
2. Select **Site > Board**, and double-click **Board Management**.
The **Board Maintenance** dialog box is displayed.
3. Right-click the module to be viewed and choose **Board Alarm** from the shortcut menu.
4. Click the red square.

The detailed alarm information is display on the right of the window, as shown in Figure 2-2.

Figure 2-2 Module alarm information



 **NOTE**

Each square in the left pane of the window represents an alarm. Green indicates normal, and red indicates an alarm.

5. The TRU module is located in the DDRM module.

Step 3 Rectify the faults by following the given suggestions.

----End

Reference Standards

The test results must meet the following conditions:

- I No alarms occur in hardware, environment, trunk transmission, or power supply.
- I The collected traffic statistics results are within the normal range.

 **NOTE**

To query alarms and traffic statistics results on the Operation and Maintenance Center (OMC) client, refer to the BSS online help.

2.2.2 Call Test

This section describes the call test and its reference standards.

Procedure

To test the call service, do as follows:

Step 1 Conduct a conversation test.

1. Power on the legal test MS, which is located in the coverage area of the tested BTS.
2. Use the test MS to call another MS or a fixed phone.
3. Use another MS or a fixed phone to call the test MS.

Step 2 Conduct a coverage test.

Select proper roads in the coverage area of the BTS to test the coverage influence, and then record the test results.

Step 3 Conduct a handover test.

1. Power on the test MS defined legally within the coverage area of the BTS to be tested.
2. Use the test MS to make a call to another MS or a fixed telephone.
3. Move the test MS to another sector or cell.
4. Move the test MS back to the sector to be tested and end the call.
5. Use another MS or a fixed telephone to make a call to the test MS.
6. Move the test MS to another sector or cell.

----End

Reference Standards

1 Conversation test

The test results must meet the following conditions:

- The test MS can normally originates or terminates calls.
- The conversation between MSs is normal and the voice is clear.
- The call between the test MS and a fixed phone succeeds. The conversation between the test MS and the fixed phone is normal and the voice is clear.

1 Coverage test

The test results must comply with the engineering design.

1 Handover test

When the MS is moving to the target sector or cell, the voice transmission should be continuous and clear.

2.2.3 Short Message Test

This section describes the short message test and its reference standards.

Procedure

To test the short message service, do as follows:

Step 1 Conduct a short message service (SMS) test as follows:

1. Power on a registered test MS within the coverage area of the BTS to be tested.
2. Use the test MS to send short messages to other MSs.
3. Use other MSs to send short messages to the test MS.
4. Send short messages to the test MS when the test MS is in a call.

Step 2 Conduct a coverage test.

Select proper roads in the coverage area of the BTS to test coverage effect and record the test results.

Step 3 Conduct a handover test as follows:

1. Power on a registered test MS within the coverage area of the BTS to be tested.
2. Use the test MS to send short messages to other MSs when the test MS is moving at the edge of two neighboring cells.
3. Use other MSs to send short messages to the test MS when the test MS is moving at the edge of two neighboring cells.

----End

Reference Standards

- 1 Short message test
The test MS normally receives and sends short messages.
- 1 Coverage test
The test results comply with the engineering design.
- 1 Handover test
The test MS receives and sends short messages normally during the handover.

2.2.4 Packet Data Service Test

This section describes the procedure for testing packet data services and the test reference standards.

Procedure

To test the packet data service, do as follows:

Step 1 Conduct a packet data service test as follows:

1. In the coverage area of the BTS to be tested, power on a registered test MS that supports GPRS and MMS services.
2. Use the test MS to load data.
3. Use the test MS to browse a WAP website.
4. Use the test MS to receive an MMS or email from other MSs.
5. Use the test MS to send an MMS or email to other MSs.

Step 2 Conduct a coverage test.

Select proper roads in the coverage area of the BTS to test the coverage effect and record the test results.

----End

Reference Standards

- 1 Packet data services test
 - The test MS can browse and download data normally.
 - The test MS can send or receive an MMS or an email to or from other MSs.

I Coverage test

The test results comply with the engineering design.

2.2.5 Checking the VSWR

This section describes the procedure for checking the Voltage Standing Wave Ratio (VSWR) and the reference standards.

Procedure

To check the VSWR, do as follows:

- Step 1** Check the alarm indicators VSWRA and VSWRB on the DDPM to see whether there is a VSWR alarm.

You can also check whether there is a VSWR alarm on the Site Maintenance Terminal System.

- Step 2** If a VSWR alarm occurs, use an antenna analyzer to test the VSWR on site.

In normal conditions, the VSWR is smaller than 1.5.

 **NOTE**

Before conducting the VSWR test, prepare the jumper and the spare parts and adjust the analyzer before conducting the VSWR test.

----End

Reference Standards

There is no VSWR alarm on the Site Maintenance Terminal System.

2.2.6 Cleaning the Fan Box

To ensure the long-term stability of the equipment, Huawei recommends that all fan boxes should be cleaned once every year.

 **CAUTION**

The replacement of a fan box seriously affects the heat dissipation of the system. Therefore, Huawei recommends that you should replace the fan box quickly. If the replacement takes a long time, the module may be damaged because of overhigh temperature.

Before replacing a fan box, disconnect the cable of the fan box and wait until the fan stops running.

Procedure

To clean the fan box, do as follows:

- Step 1** Use the tools such as clean cloth, antistatic brush, and cleaner to clean the spare parts of the fan box.

Step 2 Open the front door of the BTS3006C cabinet.

Step 3 Disconnect the cable of the fan box on the DDRM panel.

**NOTE**

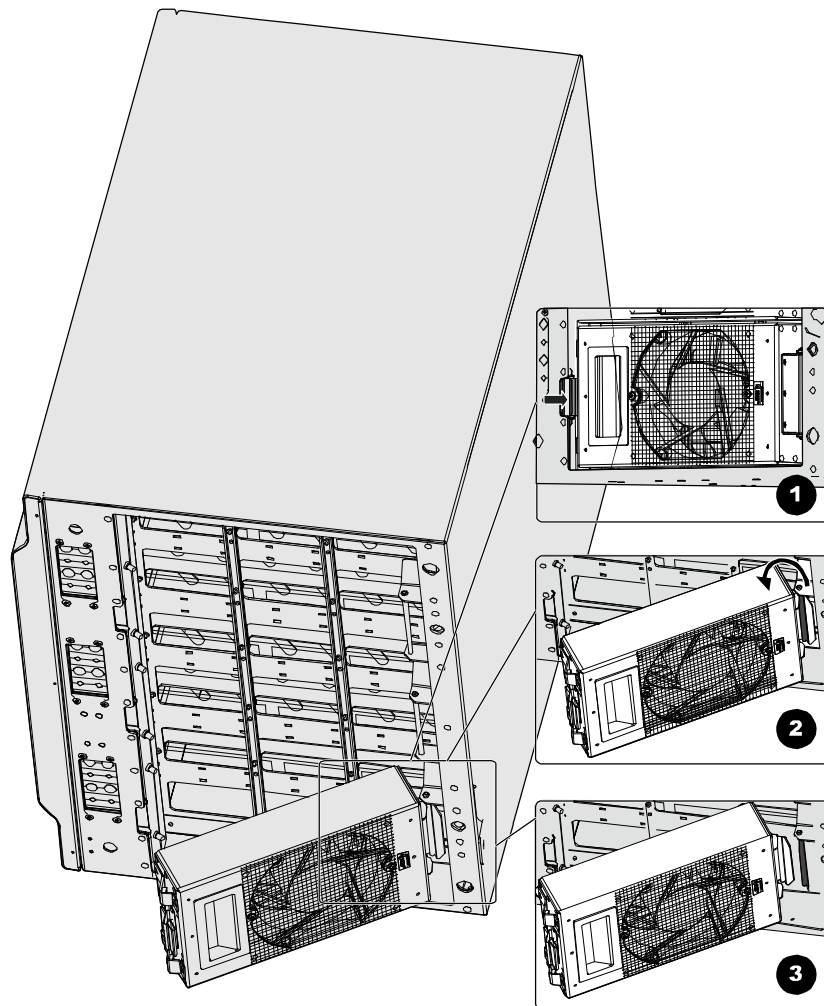
Each DDRM module of the BTS3006C is configured with a fan box. The DDRM module supplies power to fan boxes through cables.

Step 4 Use a cross screwdriver to loosen the two screws that fix the fan box.

Step 5 Remove the fan box from the cabinet, as shown in Figure 2-3.

1. Press the spring piece in the front of the fan box.
The front part of the fan box is disconnected from the bottom of the cabinet.
2. Hold the fan box and remove the pothook of the fan box from the hanging pole of the cabinet.

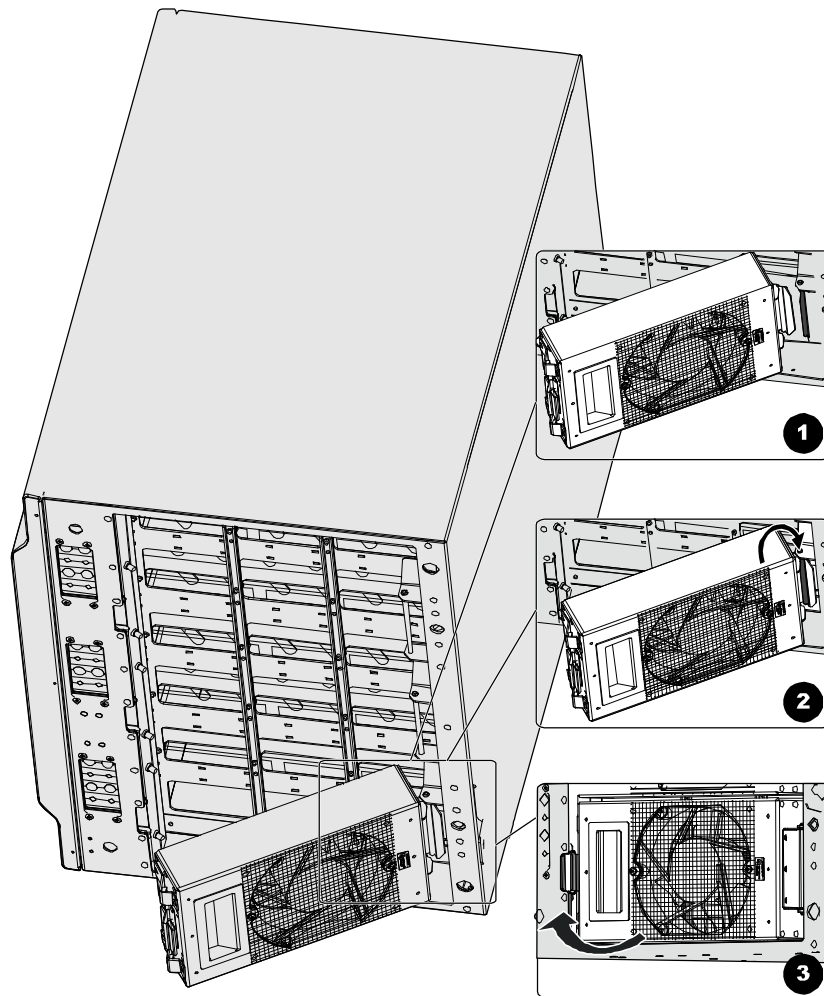
Figure 2-3 Removing the fan box from the cabinet



Step 6 Install the clean fan box on the cabinet, as shown in Figure 2-4.

1. Determine the position where the fan box should be installed on the DDRM.
2. Hold the notch of the fan and hook the sheet metal at the rear of the fan up to the beam under the installed DDRM.
3. Rotate the fan clockwise until the leaf spring on the front side of the fan is securely fixed to the sheet metal at the bottom of the cabinet.

Figure 2-4 Installing the fan box



Step 7 Tighten the screws that fix the fan box.

Step 8 Connect the cable of the fan box on the DDRM panel.

Step 9 Perform Step 4 through Step 8 to replace other fan boxes until all the fan boxes have been replaced.

Step 10 Use tools such as clean cloth, antistatic brush, and cleaner to clean the fan boxes that have been removed from the cabinet.

These fan boxes are used as spare fan boxes.

----End

Reference Standards

There is no dust in the fan boxes.

2.2.7 Checking the Trunk Transmission

This section describes the procedure for checking the trunk transmission and the reference standards.

Procedure

To check the trunk transmission, do as follows:

- Step 1** Ensure that there is no transmission alarm displayed on the Site Maintenance Terminal System.
- Step 2** Ensure that the trunk cable connector connects well.
- Step 3** Ensure that the trunk cable plug is in good condition.
- Step 4** Ensure that the trunk cable is not damaged or broken.
- Step 5** Ensure that the labels on both ends of the trunk cable are clear.

----End

Reference Standards

No alarms relevant to the transmission system are reported.

2.2.8 Checking the Equipment Wiring

This section describes the procedure for checking the equipment wiring and the reference standards.

Procedure

To check the equipment wiring, do as follows:

- Step 1** Ensure that the plugs of the unused power cables are wrapped by a plastic cover.
This is to avoid a short circuit.
- Step 2** Ensure that there are legible labels on both ends of the cable.
- Step 3** Ensure that there are extra cables left near the plug.
- Step 4** Check RF cable connectors to avoid abnormal VSWR caused by loose contact.
- Step 5** Ensure that RF jumpers are routed by layers and sectors.
- Step 6** Ensure that the horizontal part of the RF cable is placed in the cabling trough.
- Step 7** Ensure that the RF jumpers are placed in parallel straight to the junction between the cabinet and the feeder.
- Step 8** Ensure that the jumpers are in good condition.

----End

Reference Standards

The check results must meet the following standards:

- | The cables are bundled neatly and tightly. Cable ties are evenly spaced in the same direction.
- | Cable layout facilitates maintenance and future capacity expansion.

2.3 Maintenance Guidelines to the Auxiliary Devices

2.3.1 Checking the Alarm Collection Devices

This section describes how to check the alarm collection devices and the reference standards.

Procedure

To check the alarm collection devices, do as follows:

Step 1 Check whether the following alarm collection devices are operating normally:

- | Temperature and humidity sensor
- | Fire alarm sensor
- | Anti-theft sensor

Step 2 Simulate changes in environment variations and check whether alarms are reported on the Site Maintenance Terminal System.

----End

Reference Standards

The environment alarm information can be collected.

2.3.2 Testing the Grounding Resistance

This section describes the procedure for testing the grounding resistance and the reference standards.

Procedure

Measure the grounding resistance with the ground resistance meter.

Reference Standards

The grounding resistance must be less than 10 ohms or meet the local engineering design.

2.4 Maintenance Guidelines to the Antenna System

2.4.1 Checking the Tower

This section describes the procedure for checking the tower and the reference standards.

Procedure

To check the tower, do as follows:

- Step 1** Ensure that there is no damage or sinking at the base of the tower.
- Step 2** Measure the height and verticality of the tower.
- Step 3** Ensure that the mechanical bolts are connected tightly.
- Step 4** Check anti-rust and anti-corrosion conditions.

----End

Reference Standards

For details, refer to chapter 5 "Checking Installation" in the *iSite BTS3006C Hardware Installation Manual*.

2.4.2 Checking the Pole

Procedure

To check the pole, do as follows:

- Step 1** Check the installation of pole fasteners.
- Step 2** Check the stress resistivity of the pole, staying wires and anchors.
- Step 3** Check the verticality of the pole.
- Step 4** Check anti-corrosion and anti-rust conditions.

----End

Reference Standards

For details, refer to chapter 9 "Checking Installation" in the *iSite BTS3006C Hardware Installation Manual*.

2.4.3 Checking the Antenna

Procedure

To check the antenna, do as follows:

- Step 1** Ensure that the antenna is protected within the coverage area of the lightning rod.

Generally, the coverage area refers to the area that falls within the angle of 45° from the top of the lightning rod. In areas prone to thunderstorms, the coverage area is reduced to an area that falls within the angle of 30° from the top of the lightning rod.

- Step 2** Ensure that the antenna stand is safely installed on the tower or the rooftop.
- Step 3** If the BTS is installed with the omni-directional antenna, check the antenna according to the omni-directional antenna standards stated in "Reference Standards."
- Step 4** If the BTS is installed with the directional antenna, check the antenna according to the directional antenna standards stated in "Reference Standards."

----End

Reference Standards

The check results of the omni-directional antenna must meet the following standards:

- | The top of the antenna sheathing is high or slightly higher than the stand top.
- | The omni-directional antennas stand upright with an error less than ! 2°.
- | The length of the antenna outside the tower platform is equal to or greater than 2 m.
- | The horizontal distance between the omni-directional antenna and the antenna lightning rod is equal to or greater than 2.5 m.
- | For the requirements for the antenna spacing, refer to Appendix A "Requirements for Antenna Spacing."
- | When two antennas are installed horizontally, the horizontal spacing between the transmit and the receive antennas is equal to or greater than 5 m.
- | When two antennas are installed vertically, the vertical spacing between the transmit and the receive antennas are equal to or greater than 0.2 m.
- | According to the diversity Rx requirement of the omni-directional antenna, the horizontal spacing between the transmit and the receive antennas must be equal to or greater than 4 m.

The check results of the directional antenna must meet the following standards:

- | The error of the azimuth angle is smaller than or equal to ! 5° and that of the pitch angle is smaller than or equal to ! 0.5°.
- | The antennas are free from interference from the tower structure in the forward direction. The length of the antenna outside the tower platform is equal to or greater than 1 m.
- | For the requirements for the antenna spacing, refer to Appendix A "Requirements for Antenna Spacing."
- | The horizontal spacing between the transmit and the receive antennas in the same sector is equal to or greater than 3 m in a horizontal installation.
- | The vertical spacing between the transmit and the receive antennas in the same sector is equal to or greater than 0.2 m in a vertical installation.
- | The horizontal spacing between the transmit and the receive antennas in different sectors is equal to or greater than 0.2 m.
- | According to the diversity Rx requirement of the directional antenna, the horizontal spacing between the transmit and the receive antennas must be equal to or greater than 4 m.

2.4.4 Checking the Feeder

Procedure

To check the feeder, do as follows:

- Step 1** Ensure that the feeder and the jumper are labeled as required.
- Step 2** Ensure that the feeder is not folded or twisted and that there is no naked cable.
- Step 3** Check the feeder fixing clips.
- Step 4** Check the feeder connectors.
- Step 5** Ensure that the feeder is connected properly and that the sectors are correct.
- Step 6** Check the feeder grounding from the tower to the cabinet.
- Step 7** Check the feeder grounding from the rooftop to the cabinet.
- Step 8** Check the feeder connection inside the equipment room.
- Step 9** Check the feeder grounding cable and the terminal of the feeder grounding clip.
- Step 10** Ensure that the feeder is grounded every 20 m by a lightning protection clip if the feeder is longer than 60 m.

----End

Reference Standards

The check results must meet the following standards:

- l The feeders and feeder labels are arranged neatly in the same direction. For the description of the feed labels, refer to Appendix B "Engineering Labels for Antenna System."
- l The bending radius of the feeder is not shorter than 20 times the diameter.
- l The spaces between feeder fixing clips are the same and the clips are in the same direction.
- l There are no loose feeder connectors.
- l The grounding parts are safely bundled and waterproofed.



CAUTION

When the feeder approaches the outside of the feeder encapsulated window, keep the waterproof curve away from the window.

-
- l The feeders are arranged neatly without crossover, and with the same bending radius.
 - l When the front of the cabinet is parallel with the cabling direction of the lead-in feeders, the feeders in each sector must be arranged in one row and the arranging sequences of all rows must be the same. When the front of the cabinet is perpendicular to the cabling direction of the lead-in feeders, the feeders in each sector must be arranged in one column and the arranging sequences of all columns must be the same.

- l The grounding cable of the feeder must be routed from up to down, with the angle less than 15°.
- l The terminals of the feeder grounding clips must be fixed to the nearest steel plates of the tower.

2.5 BTS Routine Maintenance Record

2.5.1 BTS Weekly Maintenance Record

Table 2-4 shows the BTS Weekly Maintenance Record.

Table 2-4 BTS Weekly Maintenance Record

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Environment condition	qNormal qAbnormal		
Temperature condition	qNormal qAbnormal		
Humidity condition	qNormal qAbnormal		
Dust-proof condition	qNormal qAbnormal		
Heat exchanger running status	qNormal qAbnormal		
Module running status	qNormal qAbnormal		
Fault description and handling			

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Remaining problems			
Checked by the shift leader			

2.5.2 BTS Monthly Maintenance Record

Table 2-5 shows the BTS Monthly Maintenance Record.

Table 2-5 BTS Monthly Maintenance Record

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Call test	q Normal q Abnormal		
Short message test	q Normal q Abnormal		
Packet data service test	q Normal q Abnormal		
Exterior and door lock of the cabinet	q Normal q Abnormal		
AC lightning arrester	q Normal q Abnormal		
Antenna and feeder	q Normal q Abnormal		
Trunk transmission and equipment wiring	q Normal q Abnormal		
Cabinet cleaning	q Normal q Abnormal		

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Fault description and handling			
Remaining problems			
Checked by the shift leader			

2.5.3 BTS Quarterly Maintenance Record

Table 2-6 shows the BTS Quarterly Maintenance Record.

Table 2-6 BTS Quarterly Maintenance Record

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Equipment grounding	q Normal q Abnormal		
Antenna tower and pole	q Normal q Abnormal		
Drive test	q Normal q Abnormal		
VSWR test	q Normal q Abnormal		
Alarm collection device	q Normal q Abnormal	Fill in this item if any alarm collection	

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
		device exists.	
Fault description and the handling			
Remaining problems			
Checked by the shift leader			

2.5.4 BTS Yearly Maintenance Record

Table 2-7 shows the BTS Yearly Maintenance Record.

Table 2-7 BTS Yearly Maintenance Record

Site name:			
Maintenance time:		Maintenance personnel:	
Maintenance item	Maintenance status	Remarks	Maintenance personnel
Channel running status	q Normal q Abnormal		
Fan drawer cleaning	q Normal q Abnormal		
Batteries	q Normal q Abnormal		

Check base station power output	qNormal qAbnormal		
Check the earth resistance and grounding cables	qNormal qAbnormal		
Check the waterproof status of antenna and feeder connectors and lightning-proof grounding cards	qNormal qAbnormal		
Check the firmness of the antennas and tower-top amplifier and the tilting angle of the directional antennas	qNormal qAbnormal		
Fault description and handling			
Remaining problems			
Checked by the shift leader			

2.5.5 BTS Unexpected Fault Handling Record

Table 2-8 shows the BTS Unexpected Fault Handling Record.

This record serves as a basis for future reference to equipment maintenance. The customers can modify the list of items according to the actual conditions of the local office, and compile several sheets of records into a handbook.

3 Emergency Maintenance

About This Chapter

The following table lists the sections of this chapter.

Section	Description
3.1 Overview of Emergency Maintenance	Introduces the maintenance suggestions that BTS3006C emergency maintenance can provide for major BTS problems.
3.2 Emergency Maintenance Procedures	Describes the procedures for emergency maintenance on the BTS3006C.
3.3 Handling the Faults in an Individual BTS in Emergency Cases	Describes typical faults in an individual BTS and how to rectify the faults in emergency cases.
3.4 Handling the Faults in Associated BTSs in Emergency Cases	Describes typical faults in multiple BTSs and how to rectify the faults in emergency cases.
3.5 Handling Cell Service Disruption in Emergency Cases	Describes cell service interruption problems and how to solve them in emergency cases.
3.6 Handling the Alarms of Main Modules in Emergency Cases	Describes module alarms and how to handle them in emergency cases.
3.7 Data Backup and Restoration	Describes how to back up and restore data in emergency cases.
3.8 Maintenance Record	Lists the maintenance record.

3.1 Overview of Emergency Maintenance

This chapter describes how to handle serious problems in an individual BTS or multiple BTSs in emergency cases. It provides guides for on-site maintenance engineers to solve the problems and resume the system in time.

3.1.1 Application Scenarios

This manual applies to the following situations:

- | Handling the Faults in an Individual BTS in Emergency Cases
- | Handling the Faults in Associated BTSs in Emergency Cases
- | Handling Cell Service Disruption in Emergency Cases
- | Handling the Alarms of Main Modules in Emergency Cases



NOTE

To rectify the faults that do disrupt the services of the entire BTS3006C, refer to the "Alarm Online Help" in the BSS online help.

3.1.2 Basic Principles of Emergency Maintenance

You must adhere to the following basic principles of emergency maintenance:

- | Prepare the handling plan.

The purpose of emergency maintenance is to quickly recover services and clear faults. The maintenance personnel must prepare the handling plans by referring to the emergency maintenance materials of the BTS3006C.

- | Handle emergencies according to the handling plan.

When an emergency occurs, the maintenance personnel must check the hardware and transmission devices of the BTS3006C. This is to check whether the emergency has occurred due to faults in the BTS3006C. If so, handle the emergency according to the prepared plans or the procedures described in this manual.

- | Collect and provide feedback.

After handling the emergency, collect the information of the faults and alarms. Then deliver the corresponding emergency handling reports, equipment alarm files to Huawei for fault analysis and location. This will help Huawei to improve after-sales services.

3.1.3 Points to Remember

During the emergency maintenance, consider the following points:

- | Generally, emergency operations and maintenance have a great impact on normal services of the system. Maintenance must be done by experienced operators or under their guidance.
- | If the fault has a great impact on the network, the maintenance personnel must contact Huawei Customer Service Center or Huawei Regional Office for immediate technical support.

For details about Huawei Customer Service Center, refer to page 2 in the Title Page of this manual.

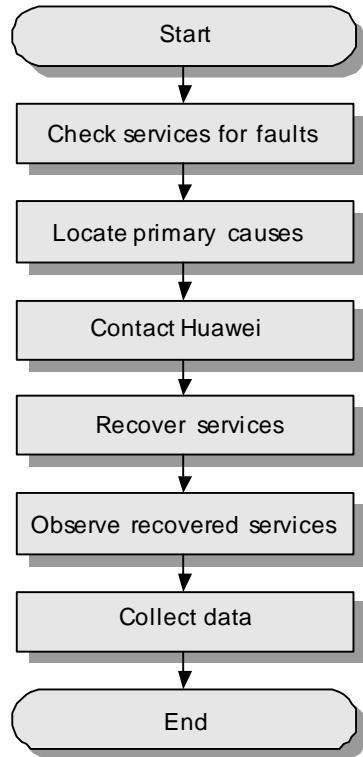
3.2 Emergency Maintenance Procedures

The subsequent topics describe the recommended emergency maintenance sequence.

3.2.1 Emergency Maintenance Flowchart

Figure 3-1 shows the process of handling emergency maintenance.

Figure 3-1 Process of handling emergency maintenance



3.2.2 Checking Services for Faults

Based on the alarm information and topology view on the Operation and Maintenance Center (OMC), check the symptoms of emergency faults to see whether the faults are in an individual BTS or in all associated BTSs.

3.2.3 Locating the Causes

Locate the preliminary causes and keep a record, as shown in Table 3-1.

Table 3-1 On-site information record in emergency cases

Item	Description
Occurring time	
Fault scope	

Item	Description
Critical alarms	
Abnormal performance measurement items	
Faulty modules indicated by indicators	
BSC host software and Site Maintenance Terminal System version	
OMC version	
BTS version	
Operation log information	
State query information	
Signaling tracing information	

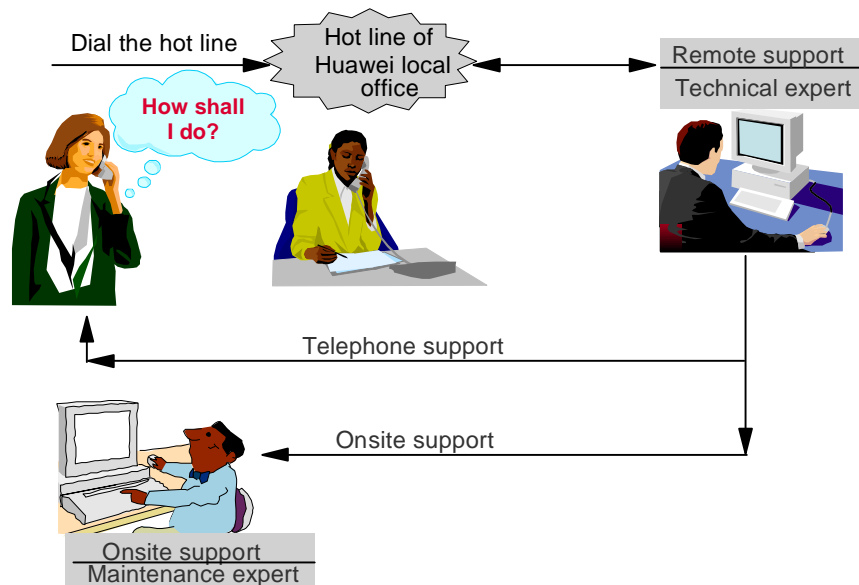
 **NOTE**

To facilitate troubleshooting, collect and record the fault information as much as possible.

3.2.4 Contacting Huawei

Huawei provides hot line, remote technical support, and local technical support, as shown in Figure 3-2.

Figure 3-2 Process of Huawei emergency service handling



Hot Line

Huawei technical support center: +86-0755-28560998

Website: <http://gcrms.huawei.com> or <http://support.huawei.com>

 **NOTE**

Overseas customers can visit the website or directly contact Huawei local technical support engineers.

Remote Technical Support

According to the information provided through the hot line, technical support engineers log in to the remote maintenance terminal to access the faulty BTS.

- 1 For common problems, technical support engineers provide remote support through telephone.
- 1 For complicated problems, maintenance engineers provide on-site support.

On-Site Technical Support

Huawei maintenance engineers take immediate actions to recover services on site.

 **NOTE**

Huawei provides 24-hour customer services.

3.2.5 Recovering Services

Contact the remote or on-site technical support to locate faults and recover the services. If you cannot locate the causes in time, take necessary measures, such as switchover, resetting, and module replacement.

 **NOTE**

- 1 Back up the system data before recovering the services. For details, refer to section 3.7 "Data Backup and Restoration."
- 1 Record the current information first if the configuration of the hardware, such as cables and module slots, needs to be modified.
- 1 Record all the operations and relevant information during the recovery of the services.

3.2.6 Observing Recovered Services

After the services are recovered, ensure that the system is operating normally. Arrange maintenance personnel to observe the services till the transmission traffic peaks so that problems, if any, can be solved in time.

To ensure that the system is operating normally, perform the following steps:

- Step 1** Check whether the dialing test succeeds.
- Step 2** Check the status of indicators on the BSC modules.
- Step 3** Check whether there are alarms.
- Step 4** Check on the BSC maintenance terminal the status of the modules, clock, CIC, and signaling links.
- Step 5** Check on the BTS maintenance terminal the status of the modules and the occupation of channels.
 - 1 If many SDCCHs are occupied while few TCHs are occupied, faults probably occur.
 - 1 If all the TCHs on a TRX in a DDRM are occupied for less than 30 seconds, the DDRM may be faulty. You need to focus on this fault.

**NOTE**

As soon as the services are recovered, many SDCCHs are occupied but few TCHs are occupied. This is a normal situation.

Step 6 Check the registration of the traffic and check whether the following traffic statistics results are normal:

- | CPU occupation rate
- | Performance measurement of the MTP links
- | Integral performance measurement of the BSC
- | Performance measurement of the cells

**NOTE**

For the thresholds and the procedure for querying the statistic items, refer to the BSS online help.

----End

3.2.7 Collecting Data

After the services are recovered, collect the information regarding the BTS3006C operation, the environment, and engineering. Then fill the maintenance record as described in "3.8.2 Troubleshooting Record Table."

3.2.8 Performing Emergency Maintenance

After completing the maintenance, send the information of the recovery to Huawei technical support.

3.3 Handling the Faults in an Individual BTS in Emergency Cases

3.3.1 Overview

This section describes typical faults in an individual BTS and how to rectify them. The faults are as follows:

- | Abnormal Power Supply
- | Abnormal Transmission
- | Data Mistakenly Modified on the BSC
- | BSC Hardware Faults
- | BSC Data Configuration Error
- | Abnormal BTS Voltage Control
- | Abnormal BSC Clock

3.3.2 Abnormal Power Supply

Fault Symptoms

The symptoms of the fault are as follows:

- | The link between the BTS and the BSC is broken, leading to remote maintenance failures.
- | Power alarms on the BSC are reported, such as the internal power alarm.

Handling Suggestions

Check whether the BTS reports abnormal power alarms.

If the BTS reports an abnormal voltage alarm, infer that the service interruption is caused by abnormal power supply. Restore the external power supply as soon as possible.

If the BTS reports no abnormal voltage alarm, check the status of the BTS equipment on site:

Step 1 Use a multimeter to measure the voltage at the power intake.

Check whether there is power input.

- | Yes => Go to Step 2.
- | No => Check whether the power cable is properly connected.

Step 2 Ensure that the external power voltage is normal.

- | Yes => Infer that the fault occurs in the BTS equipment.
 1. Switch off the external power supply.
 2. Check that:
 - The power cable connection on the BTS cabinet is tight.
 - There is no burnout in the power supply path of the cabinet.
 - The power cable distribution is correct.
- | No => Contact the personnel concerned to solve the problem.

----End

3.3.3 Abnormal Transmission

Fault Symptoms

The symptoms of the fault are as follows:

- | The link between the BTS and the BSC is disrupted, or the connection between the BTS and the BSC is unstable.
- | The E1 remote alarm is frequently reported.
- | The DMCM transmission status indicator flashes.
- | The handshake between the BSC and the BTS fails.
- | The BSC reports alarms regarding the common channels, transmission links, clock, and cell status, such as the LAPD_OML alarm and site out-of-service alarm. These alarms are frequently reported and cannot be cleared.

Handling Suggestions

Handle the alarm as follows:

Step 1 Check whether the service interruption is caused by improper data modification.

- | Check whether the transmission configuration data is modified.
- | Check whether the data configuration is consistent with the physical connection.
If the data configuration is not consistent with the physical connection, modify the data or perform reconnection.

Step 2 Check whether the data of the transmission network is modified.

Step 3 For abnormal E1 links, check whether the fault is due to the error in the transmission network. Use the following methods:

- | Perform a terminal loopback on the BSC side. Then check whether the LIU indicator on the DMCM panel is off.
 - Yes => Infer that the transmission is normal.
 - No => Infer that the transmission is abnormal.
- | Perform a remote loopback on the BSC side. Then check whether the LIU indicator on the BIE is off.
 - Yes => Infer that the transmission is normal.
 - No => Infer that the transmission is abnormal.

Step 4 If the fault occurs in the E1 on the BTS side, do as follows:

- | Check whether the E1 cables are broken.
- | Check whether the E1 jumpers are normal.
- | Replace the E1 cable connectors and check the status of the E1 link again.

Step 5 If the E1 fails on the BSC side, go to Step 4.

----End

3.3.4 Data Mistakenly Modified on the BSC

Fault Symptoms

The symptoms of the fault are as follows:

- | The BTS cannot be maintained on the remote site maintenance system.
- | The OML setup fails.

Handling Suggestions

To handle the fault, do as follows:

- Step 1** Check that the data to be negotiated between the BTS and the BSC, such as the E1 property is consistent.
- Step 2** Check the data that affect the normal running of services according to the records in the BSC operation log.
- Step 3** Back up the system data of the BSC.
- Step 4** Check all the data according to the operations recorded in the BSC operation log to find the incorrect data.
- Step 5** Correct the data errors based on the *BSC Data Configuration Manual*.

Step 6 After the system recovers, check whether the BTS services are normal.

----End

3.3.5 BSC Hardware Faults

Relevant Information

Faults in some hardware of the BSC lead to service faults such as transmission faults, for example, interface module (BIE) faults and faults in the port connecting with the BTS.



NOTE

The interface module of the BSC32 is the BIE.

Fault Symptoms

The symptoms of the fault are as follows:

- | The BSC reports alarms due to hardware faults, such as BIE faults and highway faults.
- | The services of all the BTSs connected to only one interface module of the BSC are disrupted. The links between the BSC and the OMC are broken.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Rectify the fault by referring to the alarm information reported.

Step 2 After the BSC hardware faults are cleared, perform a call test to see whether services of the faulty BTS are recovered.

- | If yes, the alarm handling is complete.
- | If no, refer to section 3.3.4 "Data Mistakenly Modified on the BSC."

----End

3.3.6 BSC Data Configuration Error

Fault Symptoms

The symptoms of the fault are as follows:

- | The BTS can be maintained on the remote site maintenance system, but the cell or transmission link cannot be set up.
- | The cell is set up while the frequency is falsely configured. This may also lead to failure in accessing the GSM network.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether the data on the BSC is modified.

The LAPD_OML is broken several minutes after operation on the BSC.

Step 2 Check the data relevant for the configuration of the OML on the BSC, focusing on the **LAPD semi-permanent connection table**, **LAPD signaling connection table**, and **Relay circuit table**.

Step 3 Connect the faulty BTS to a normal BIE port. Select **Fourth Level Reset** on the **Site Reset Hierarchically** window and click **OK**.

Check whether the fault is due to the error in the data configuration on the BSC. For details, refer to section 3.3.4 "Data Mistakenly Modified on the BSC."

 **NOTE**

If the associated BTSs that have faults are under the same module of the BSC, reset this module and reload the data, but do not reset the entire BSC.

Perform resetting after midnight.

----End

3.3.7 Abnormal BTS Voltage Control

Fault Symptoms

The symptoms of the fault are as follows:

- | Some modules are reset repeatedly. The fan speed lowers.
- | The BSC reports alarms in common channel, transmission link, and cell status.
- | The BTS3006C reports the DDRM voltage alarm and abnormal –48 V DC power supply alarm.

Handling Suggestions

The unstable power supply is the main symptom. The maintenance engineer must perform the following on-site checks:

Step 1 Check whether the power supply through the external power cabinet is normal.

Step 2 Check whether the voltage of the storage battery is normal.

Step 3 Plug out the storage battery port on the panel of the external power cabinet. Measure the voltage of the storage battery when it is not loaded. If the voltage is abnormal, replace the storage battery.

Step 4 Check whether a short circuit occurs to the external power cabinet.

For the load of the external power cabinet, refer to the operation guide to the external power cabinet.

| If yes and if the air breaker of the power distribution box is shut down, replace the external power cabinet.

| If no, check whether the external power cabinet reports alarms. If there are alarms, replace the external power cabinet.

Step 5 Use a multimeter to check the voltage of the power supply.

The voltage of the BTS3006C ranges from –40 V DC to –60 V DC and from 150 V AC to 300 V AC.

Step 6 If the external power supply is normal, switch off the external power, and then check whether

the connection between the external power cables and the cabinet is normal.

Step 7 If the external power supply is stable, replace the modules, which frequently incur automatic reset, and then check that the fault is cleared.

----End

3.3.8 Abnormal BSC Clock

For details about handling abnormal BSC clock, refer to section 3.6.8 "Clock Critical Alarm."

3.4 Handling the Faults in Associated BTSs in Emergency Cases

3.4.1 Overview

This section describes typical faults in multiple BTSs and how to rectify the faults, which are as follows:

- | Abnormal Power Supply
- | Abnormal Transmission
- | Data Mistakenly Modified on the BSC
- | Services Interrupted in Associated BTSs
- | Optical Connection Error Between Combined Cabinets or Between Cabinet Groups
- | BSC Data Configuration Error
- | Abnormal BTS Voltage Control
- | Abnormal BSC Clock

3.4.2 Abnormal Power Supply

Fault Symptoms

The symptoms of the fault are as follows:

- | The link between the BTSs in the same area and the BSC is broken.
- | The BSC alarm console reports the alarms related to the BTSs on the common channels, transmission links, and cell status. These alarms cannot be recovered.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether there is abnormal power supply in the area, for example, power interruption caused by natural disasters.

Step 2 Check the power supply to the BTSs on site.

If the power supply to the BTSs is cut off, adopt necessary measures to restore power supply to the BTSs.

----End

3.4.3 Abnormal Transmission

Fault Symptoms

The symptoms of the fault are as follows:

- | The link between the BTS and the BSC is broken, or the connection between the BTS and the OMC is unstable.
- | The E1 remote alarm is frequently reported.
- | The DMC transmission status indicator flashes.
- | The BSC reports the alarms related to the BTSs on common channels, transmission links, and cell status. These alarms are frequently generated, cleared, or cannot be cleared at all.

Handling Suggestions

To handle the fault, do as follows:

- Step 1** Check with the maintenance personnel whether they have modified the transmission network physically.
- Step 2** Conduct both terminal loopback and remote loopback at the BTS and the BSC to check whether the transmission network is normal.
- Step 3** If the transmission network is abnormal, contact the concerned maintenance personnel.

----End

3.4.4 Data Mistakenly Modified on the BSC

Fault Symptoms

The symptoms of the fault are as follows:

- | The BSC is unable to set up cells or channels.
- | The BSC reports alarms related to the BTSs on common channels, transmission links, and cell status. These alarms are frequently generated, cleared, or cannot be cleared at all.

Handling Suggestions

Check whether the data on the BSC is modified by viewing the operations recorded in the operational log on the BSC. Check the data negotiated between the BTS and the BSC, such as the E1 property.

If the disrupted services in the BTS are due to mistakenly modified data on the BSC side, clear the faults as follows:

- Step 1** Back up the current system data of the BSC.
- Step 2** Check the data that affect the normal running of services according to the records in the BSC operation log.

Step 3 Modify the incorrect data.

Step 4 After the system is recovered, check whether the services of the BTS are normal.

----End

3.4.5 Services Interrupted in Associated BTSs

Analyze the data configuration, alarm information, and topology view at an OMC Client. Then check whether there is any association between a large number of BTSs and disrupted services in one of the following situations:

- | The BTSs are deployed in the same area.
- | The BTSs are situated in a cascaded network.
- | The BTSs are connected to the same BSC, or even to the same interface module at the BSC.

Fault Symptoms

The symptoms of the fault are as follows:

- | There is association between the BTSs and disrupted services in the cascaded network.
- | The link between the BTSs and the BSC is broken.
- | The BSC reports alarms on common channels, transmission links, and cell status.

Relevant Information

The transmission failure on a certain BTS will cause service interruption on all the BTSs connected to this BTS.

Handling Suggestions

Step 1 Check the E1 configuration parameters and E1 status of the first upper level faulty BTS. After the fault is cleared, check the services of the lower level BTSs.

Step 2 Check whether the fault is caused by BTS data modification errors. For details, refer to section 3.3.4 "Data Mistakenly Modified on the BSC."

----End

3.4.6 Optical Connection Error Between Combined Cabinets or Between Cabinet Groups

Fault Symptoms

- | The BTS service in the combined cabinets or cabinet groups deteriorates or is disrupted.
- | The main or extension cabinets in the combined cabinets or cabinet groups report LAPD alarms.
- | The main control module of the upper-level cabinet of the combined cabinets or cabinets groups reports the critical hardware failure alarm, abnormal SFPA/SFPB sending alarm, abnormal SFPA/SFPB receiving alarm, SFPA/SFPB local alarm, or SFPA/SFPB remote alarm.

Handling Suggestions

Step 1 Check whether the optical cable between combined cabinets or between cabinet groups is aging or the connection between the optical cable and the optical module is loose.

Step 2 Handle each alarm according to "Alarm Online Help" in the BSS online help.

----End

3.4.7 BSC Data Configuration Error

Fault Symptoms

The symptoms of the fault are as follows:

- | Both cells and common channels can be set up, but MSs cannot access the network.
- | Services are disrupted in most or all the BTSs connected to the same BSC.

Handling Suggestions

Check whether the data on the BSC is modified by viewing the operations recorded in the operational log on the BSC. Check whether the global parameters of the BSC are modified including parameters on access, power control, and algorithm.

If the disrupted services in the BTS are caused by mistakenly modified data on the BSC, clear the fault as follows:

Step 1 Back up the current system data of the BSC.

Step 2 Check the data that affect the normal running of services according to the records in the BSC operation log.

Step 3 Modify the incorrect data.

Step 4 After the system is recovered, check whether the services of the BTS are normal.

----End

3.4.8 Abnormal BTS Voltage Control

For details about handling methods, refer to section 3.3.7 "Abnormal BTS Voltage Control."

3.4.9 Abnormal BSC Clock

For details about handling methods, refer to section 3.6.8 "Clock Critical Alarm."

3.5 Handling Cell Service Disruption in Emergency Cases

3.5.1 Network Access Failure

Fault Symptoms

The MS is within the coverage of the cell, but it cannot access the GSM network.

Handling Suggestions

To handle the fault, do as follows:

- Step 1** Ensure a correct setting and normal subscription of the MS.
- Step 2** Ensure that the MSC/VLR and the HLR on the network side run normally and that there is no network access failure in other cells.
- Step 3** Ensure that the DDRM in this cell works normally (the status of all channels is I or A). If no, unblock the DDRM or the cell through the remote Site Maintenance System.
- Step 4** Check for faults on the network side.
- Step 5** Check whether the cell data configuration on the BSC side is normal.
For example, if the lower threshold of the RACH access level is too high or if the cell is not allowed to be accessed.
- Step 6** Trace the signaling.
- Step 7** Check the output power of the BTS.
- Step 8** Select Fourth Level Reset on the Site Reset Hierarchically window and click OK.
- Step 9** If the problem is still not solved, replace the DDRM.

----End

3.5.2 Calling Failure

Fault Symptoms

The MS can access the network, but it cannot initiate a call or incurs difficulties in initiating a call.

Handling Suggestions

To handle the fault, do as follows:

- Step 1** Perform the steps as described in section 3.5.1 "Network Access Failure."
- Step 2** Check whether the fault is caused by paging congestion, transmission code error, improper setting of the location update counter.
- Step 3** Check whether the problem occurs in the same DDRM or none of the MSs in the whole cell can initiate a call.
 - 1 If the problem occurs in the same DDRM, replace the faulty module.

- I If none of the MSs in the whole cell can initiate a call, check the following items:
 - The data configuration, especially the CGI of the MSC and the BSC
 - Parameters in cell access allowed
 - Cell system message

----End

3.5.3 Called Failure

Fault Symptoms

The MS can initiate a call but cannot receive a call. It cannot receive paging. The problem may be located on the Um, Abis, or A interface.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Perform the steps as described in section 3.5.1 "Network Access Failure" and section 3.5.2 "Calling Failure."

Step 2 Check whether the problem occurs in the MS or in the SIM card.

Step 3 In **A Interface message tracing**, check the paging messages delivered by the MSC.

If the paging messages are abnormal, check the data configuration on the MSC.

Step 4 In **Abis Interface message tracing**, check the paging messages delivered by the BSC.

If the paging messages are abnormal, check the data configuration on the BSC, focusing on the parameters in **System message table** and **Cell attribute table**.

Step 5 If the problem persists, replace the DDRM.

----End

3.5.4 MSC Data Error

Fault Symptoms

The error in the data configuration on the MSC may lead to abnormal services in one or more cells.

Handling Suggestions

Check whether the data is modified on the MSC, for example, the CGI.

3.6 Handling the Alarms of Main Modules in Emergency Cases

3.6.1 Overview

Table 3-2 shows the major modules and related module alarms that affect BTS services.

Table 3-2 Modules and related module alarms that affect BTS services

Module	Related Alarm	Remarks
DMCM	Clock Reference Abnormal	Hardware faults in the DMCM may cause service interruption of the entire BTS, if there is no standby module. Refer to "Alarm Online Help" in the BSS online help for handling suggestions on other alarms of the DMCM.
	Hardware Critical Alarm	
	Internal Power Alarm	
	Master Clock Alarm	
DDRM	LAPD Alarm	Refer to "Alarm Online Help" in the BSS online help for handling other alarms.
	DDRM Communication Alarm	
	Clock Critical Alarm	
	Repeat Download of DDRM Version	
	Hardware Faults	
	Abnormal Channel Status	
DDPM	VSWR Alarm	Refer to "Alarm Online Help" in the BSS online help for handling of other alarms.
	LNA Fault	
Optical connection between combined cabinets or between cabinet groups	Abnormal SFP/SFPB Sending or Receiving Alarm	Refer to "Alarm Online Help" in the BSS online help for handling other alarms.
	SFPA or SFPB Local Alarm	
	SFPA or SFPB Remote Alarm	
	Hardware Critical Alarm	
	LAPD Alarm	

3.6.2 Clock Reference Abnormal

Fault Symptoms

The faulty BTS clock differs from other BTS clocks, causing abnormal handover (HO), network selection, and reselection. The probable causes are as follows:

- | Faulty clock module
- | Abnormal BTS clock reference source due to high transmission bit error rate
- | Abnormal upper level clock reference

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether **E1 terminal alarm** or **E1 remote alarm** exists in the alarm management system.

If yes, handle the alarms. For details, refer to the BSS online help.

Then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 Measure and calibrate the accuracy of the DMCM clock. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Using a frequency meter, test the frequency offset of the transmission link clock of the BTS3006C. Check whether the measured frequency offset is greater than 0.05 PPM.

- | Yes => Infer that the transmission link clock is abnormal. The E1 transmission link, optical transmission link or clock source is not available. Perform a loopback test on the transmission link segment by segment for troubleshooting. The alarm handling is complete.
- | No => Infer that the transmission link clock is normal. Go to Step 4.

Step 4 Select **Fourth Level Reset** on the **Site Reset Hierarchically** window and click **OK**. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 5.

Step 5 Replace the DMCM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.3 Hardware Critical Alarm

Fault Symptoms

The alarm is generated when the DMCM does not run normally. The probable causes are as follows:

- | The hardware of the master clock module is faulty.
- | The records in the flash memory are erased and written incorrectly.
- | Chip initialization fails.

- | The FPGA is abnormal.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Reset the main control module. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => If the tributary number is 18, go to Step 2.
- | No => If the tributary number is 19, go to Step 3.
- | No => If the tributary number is another one, go to Step 4.

Step 2 Replace optical module A of the DMCM with a module supported by the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 3 Replace optical module B of the DMCM with a module supported by the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Replace the main control module. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.4 Internal Power Alarm of the DMCM

Fault Symptoms

The DMCM runs abnormally when the alarm is generated. The probable causes are:

- | The range of the input power supply is abnormal.
- | The internal power supply of the DMCM is abnormal.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether the voltage of the power supply for the cabinet is in the range of -40 V DC to -60 V DC or in the range of 150 V AC to 300 V AC.

- | Yes => Go to Step 2.
- | No => Check the external power supply. The alarm handling is complete.

Step 2 Replace the DMCM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.5 Master Clock Alarm

Fault Symptoms

The master clock module is abnormal when the alarm is generated. The possible reason is that the 13M Hz crystal oscillator of the master clock module or the testing module is faulty.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Reset the DMCM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 Replace the DMCM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.6 LAPD Alarm

Fault Symptoms

All the services of the DDRM are disrupted when the alarm is generated. The probable causes are as follows:

- | E1 fault
- | Faulty TS or transmission error
- | Errors in the data configuration on the BSC
- | Faulty LAPD of the RSL on the DDRM
- | Faulty hardware of DDRM
- | Faulty DBUS
- | Incorrect setting of the DIP switch on the DMCM

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether there is **E1 terminal alarm** or **E1 remote alarm**. If yes, handle the alarms. For details, refer to the BSS online help. Then check whether the **LAPD alarm** is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 If the 64K TS crossing or compressing device is used in transmission, check whether the data of the TS compressing device on the OMC is the same with the actual data. If no, reconfigure

it, and then check whether the **LAPD alarm** is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Check whether the OMC reports **DBUS alarm**. If yes, handle the alarm. For details, refer to the BSS online help. Check whether the **LAPD alarm** is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Check whether the LAPD corresponding to the BSC is faulty. If yes, replace the faulty LAPD and check if the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 5.

Step 5 Check whether the data of the corresponding links are configured correctly. If no, modify the data, and then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 6.

Step 6 Reset the DDRM on the remote site maintenance system or the Site Maintenance Terminal System. Then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

Step 7 Reset the DMCM on the remote site maintenance system or the Site Maintenance Terminal System. Then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.7 DDRM Communication Alarm

Fault Symptoms

All the services of the DDRM are disrupted when the alarm is generated. The probable causes are:

- | The DDRM is faulty.
- | The DDRM is manually reset or powered off.
- | The DMCM is faulty.
- | The DBMB backplane is faulty.
- | The DDRM data is configured on the BSC, but no DDRM is placed in the BTS.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Check whether the DDRM is placed in the BTS when the DDRM data is configured.

- | Yes => Go to Step 2.
- | No => Insert the DDRM or modify the data configuration. The alarm handling is complete.

Step 2 Check whether the DDRM is manually reset or powered off.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Check whether the connection of the communication cable is loose.

- | Yes => Secure the communication cable. The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Insert the DDRM into another slot. Check whether the DDRM is faulty.

- | Yes => Replace the damaged DDRM and check if the alarm is cleared.
- | No => Go to Step 5.

Step 5 Replace the faulty DDRM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 6.

Step 6 Replace the DMCM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.8 Clock Critical Alarm

Fault Symptoms

All the services of the DDRM are disrupted when the alarm is generated. The probable causes are:

- | The DMCM is faulty.
- | The DDRM is faulty.
- | The clock cable is faulty.
- | The cable connected with the backplane of the DDRM is loose or damaged.
- | The backplane or the signal conversion card is destroyed.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Replace the faulty DDRM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 Replace the DMCM and check if the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Plug out the device/equipment and plug into the socket again.

If the alarm is not cleared, replace the cables of the backplane or the DBMB. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => The DBMB may be damaged. Contact Huawei Customer Service Center.

----End

3.6.9 Repeat Download of DDRM Version

Fault Symptoms

The symptoms of the fault are as follows:

- | DDRM communication alarm is constantly generated on the remote maintenance terminal.
- | DDRM clock critical alarm.
- | Frame or TS Number alarm.
- | DDRM hardware alarm.
- | Processor alarm.
- | DDRM repeatedly resets on the terminal end.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Download the right DMCM and DDRM versions again and activate them.

Step 2 Power off and on the whole BTS again. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Check or replace the DMCM and the DDRM, and then check if the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.10 Hardware Faults

Fault Symptoms

All the services of the DDRM are disrupted when the alarm is generated. The possible reason is that the DDRM is faulty.

Handling Suggestions

Replace the DDRM and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

3.6.11 Abnormal Channel Status

Fault Symptoms

The channel status may be abnormal in a few channels, in a DDRM, or in a whole cell.

Handling Suggestions

To handle the fault, do as follows:

- | If the status of a few channels is abnormal, block and unblock the related cells on the maintenance terminal.
- | If the channel status of the whole cell is abnormal, perform the steps described in 3.5 "Handling Cell Service Disruption in Emergency Cases."
- | If the channel status of the whole DDRM is abnormal, check whether there are alarms related to the antenna system, such as VSWR alarm. Check the antenna system and reset the DDRM, the cell, and the BTS.

3.6.12 VSWR Alarm

Fault Symptoms

Radiated power of the antenna lowers and coverage reduces when the alarm is generated. The probable causes are as follows:

- | The connections of the antenna system transmit channel are faulty.
- | The DDPM hardware is faulty.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Reset the DDPM on the terminal or the remote maintenance terminal. The DDPM VSWR alarm may lead to the DDRM alarm. Check whether both alarms are cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 Check the connections of the jumper in the DDPM antenna port, the lightning arrester, feeder, Tower Mounted Amplifier (TMA), and the antenna. Check and secure the connector between the antenna port and the antenna. Then check whether the alarms of the DDPM and DDRM are cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Test the VSWR of the jumper on the DDPM antenna port, the lightning arrester, feeder,

TMA, and the antenna. If the VSWR is wrong, replace the faulty component. Then check whether the alarms of the DDPM and DDRM are cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Replace the DDPM and check whether the alarms of the DDPM and DDRM are cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.13 LNA Fault

Fault Symptoms

The DDPM receive path cannot run normally when the alarm is generated. The possible reason is that the DDPM is faulty.

Handling Suggestions

To handle the fault, do as follows:

Step 1 Reset the DDPM on the OMC and check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to step 2.

Step 2 Check whether the software version is correct.

- | Yes => Go to step 4.
- | No => Go to step 3.

Step 3 Reload the software version and activate it. Then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Replace the DDPM. Then check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.



NOTE

LNA refers to the low noise amplifier.

----End

3.6.14 Abnormal SFPA/SFPB Sending or Receiving Alarm

Fault Symptoms

The service deteriorates or is disrupted.

Handling Suggestions

To handle the abnormal SFP A/SFP B sending or receiving alarm, do as follows:

Step 1 Remove optical module A or B of the DMCM and install it again. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 2.

Step 2 Replace optical module A or B of the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.15 SFP A or SFP B Local Alarm

Fault Symptoms

The BTS service is disrupted temporarily and then recovered automatically, or the service is disrupted completely.

Handling Suggestions



NOTE

The handling of the SFP A local alarm is the same as that of the SFP B local alarm. This topic describes how to handle the SFP A local alarm.

To handle the SFP A local alarm, do as follows:

Step 1 Remove the optical input cable of optical module A. Check whether the cable has a bright spot projected to a white background.



CAUTION

Do not view the laser directly.

- | Yes => Go to Step 2.
- | No => Check the peer equipment or the optical cable. Refer to the handling suggestions of the remote alarm on the peer end.

Step 2 Install the optical input cable of optical module A. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 3.

Step 3 Perform loopback of the optical input line and the optical output cable for optical module A. Check whether the SFP-A indicator is off.

- | Yes => The peer equipment sending is faulty. Check the peer equipment.
- | No => Go to Step 4.

Step 4 Replace optical module A of the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 5.

Step 5 Replace the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.6.16 SFP A or SFP B Remote Alarm



NOTE

The handling of the SFP A remote alarm is the same as that of the SFP B remote alarm. This topic describes how to handle the SFP A remote alarm.

Fault Symptoms

The BTS service is disrupted temporarily and then recovered automatically, or the service is disrupted completely.

Handling Suggestions



CAUTION

If there is a local alarm, handle it first.

Step 1 Perform loopback of the optical input line and the optical output cable for optical module A. Check whether the SFP-A indicator is off.

- | Yes => Go to Step 2.
- | No => Go to Step 3.

Step 2 Check or replace the optical output cable of optical module A. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => The peer equipment receiving is faulty. Check the peer equipment.

Step 3 Replace optical module A of the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Go to Step 4.

Step 4 Replace the DMCM. Check whether the alarm is cleared.

- | Yes => The alarm handling is complete.
- | No => Contact Huawei Customer Service Center.

----End

3.7 Data Backup and Restoration

When handling emergency faults in a BTS, you need to back up the data of the BSC and the BTS. To recover the service quickly, you need to back up the data before modifying it.

If a fault persists after data modification, infer that the fault is not because a data error. In such a situation, restore the data and locate the fault further.

For details about backing up and restoring the data, refer to the BSS online help.

3.8 Maintenance Record

3.8.1 Emergency Maintenance Note

If you are unable to remove the faults, contact Huawei through the provided telephone number or fax number. To shorten the troubleshooting period, record your fault handling process in detail, notify Huawei of the types of modules replaced, and ask for spare modules depending on the warranty in the contract.

Use the *Emergency Maintenance Note* for fax as follows:

3.8.2 Troubleshooting Record Table

Name of the BTS: _____ Date of Maintenance: _____

Time of occurrence:	Time of solution:
Person on duty:	Operator:
Fault type: <input type="checkbox"/> Hardware fault <input type="checkbox"/> Clock fault <input type="checkbox"/> Transmission network fault <input type="checkbox"/> Other faults	
<input type="checkbox"/> Power fault <input type="checkbox"/> FE/E1 port fault <input type="checkbox"/> Configuration data error	
Fault source: <input type="checkbox"/> User complaint <input type="checkbox"/> Found during routine maintenance	
<input type="checkbox"/> Alarm system <input type="checkbox"/> Other sources	
Fault description: 	
Handling method and results: 	

4 Replacing Modules and Parts

About This Chapter

The following table lists the sections of this chapter.

Section	Description
4.1 Overview	Introduces the background for module and part replacement, and the classification of BTS3006C modules and parts.
4.2 Replacing Modules	Describes the procedure for replacing modules and provides the module replacement flowchart and guidelines.
4.3 Replacing Parts	Describes the procedure for replacing parts and provides the part replacement flowchart and guidelines.
4.4 Replacing Cables	Describes the procedure for replacing cables and provides cable replacement flowchart and guidelines.

4.1 Overview

4.1.1 Replacing Parts in Different Situations

This manual provides instructions on the procedure for replacing parts or modules in the following situations:

1 Troubleshooting

If a fault such as an optical cable broken cannot be rectified on a module or part, replace the module or part. For the method of replacing modules or parts, refer to sections 4.2 "Replacing Modules", 4.3 "Replacing Parts", and 4.4 "Replacing Cables."

1 Moving Equipment

When moving the equipment to another place, you probably have to replace some parts, for example, the previous Ethernet cable that fails to meet the requirement of the new environment.

1 Upgrading System

During system upgrade, the hardware and the software versions of a module may be inconsistent or the BTS configuration type may change. In this case, replace some modules or parts.

4.1.2 Classification of the BTS3006C Modules and Parts

Table 4-1 shows the classification of the BTS3006C modules and parts.

Table 4-1 Classification of the BTS3006C modules and parts

Content	Category	Refer to ...
Modules	DMCM	4.2 Replacing Modules
	DDRM	
	DDPM	
	DDCM	
	DSCM	
	DSEM	
	DPSM	
	DATM	
Parts	Fan box	4.3 Replacing Parts
	Antennas of the BTS	
	Tower mounted amplifier (TMA)	

Content	Category	Refer to ...
External cables	E1 trunk	4.4 Replacing Cables
	SDH external cables	
	DC/AC power cables	
	Power cables of the TMA	
	Radio interconnection cables	
	Combined-cabinet cables	
	Alarm cables	
	Antenna jumper	



NOTE

The flowcharts in the following text serve as guides when you replace modules or parts. Routine operations are not given in the flowcharts, such as wearing an antistatic wrist strap, taking off the wrist strap, confirmation after replacement, and handling faulty modules.

4.2 Replacing Modules

4.2.1 General Procedure

This section describes the general procedure for replacing the BTS3006C modules.

Table 4-2 lists the modules that can be replaced in the BTS3006C.

Table 4-2 List of the modules

Subsystem	Module	Full Name
Common subsystem	DMCM	Main Control Module for DDRM BTS
Dual-density frequency subsystem	DDRM	Double transceivers Digital and Radio frequency Module
Radio frequency front end subsystem	DDPM	Double Duplexer Module for DDRM BTS
	DDCM	Double Combining Module for DDRM BTS
	DSCM	Single Combining Module for DDRM BTS
	DATM	Antenna and TMA Control Module for DDRM BTS
Power subsystem	DPSM	Power Supply Module for DDRM BTS
	DSEM	DC SPD and EMI Module

Preparations

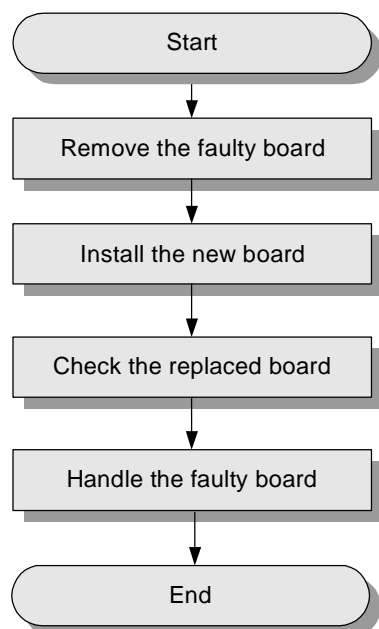
Before replacing a module, do as follows:

- 1 Check whether the replacement of the module will disrupt the services on the module and whether the service disruption is allowed.
- 1 Ensure that the fault information is retrieved before you replace or power off the module.
- 1 Specify the subrack or slot that has the module to be replaced.
- 1 Confirm the type and number of modules.
- 1 Analyze the *Release Notes* and check whether the hardware version of the new module is correct.
- 1 If the module has a DIP switch, ensure that the setting of the DIP switch on the new module is the same as that on the faulty module.
- 1 Arrange the key to the front cabinet door and other required tools, such as a hexagon spanner, cable strap, and label.
- 1 Deliver the prepared modules and tools to the installation site.

Flow Chart

Figure 4-1 shows the process of replacing the modules.

Figure 4-1 Replacing the modules



Removing a Faulty Module



CAUTION

- | Huawei recommends that the BTS3006C should be powered off before a module removal.
- | If you replace a faulty module when it is powered on, pull the faulty module out for 10 mm to power off the faulty module, and then disconnect the cables with the module.

To remove a faulty module from the common subrack, perform the following steps:

- Step 1** Use a hexagon spanner to counterclockwise turn the four screws separately on the upside and downside of the module panel and to remove them from the slot.
- Step 2** Hold the top of the module with one hand and the bottom of the module with another hand, and then pull the module out of the slot.

----End

Installing a New Module



CAUTION

- | Place the module and the slot according to related module nameplate.
- | Push the module slowly at a moderate force to avoid damage on the pins on the backplane or parts on the module.
- | Tighten all the screws on the panel after installing the new module.

To install a new module, perform the following steps:

- Step 1** According to the configuration and layout methods, determine the position where the module should be installed.
- Step 2** Hold the handle of the panel and carry the module to place the module on the slideway.
- Step 3** Push the module along the slideway.
- Step 4** Tighten the four screws at the four corners of the panel.

----End

Checking the Replaced Module

To check the replaced module, perform the following steps:

- Step 1** Check whether the module is in full contact with its backplane.
 - | If module indicators are on and then off, infer that the module is not in full contact with its backplane. Reinstall the module.
 - | When the module is in full contact with the backplane, all the indicators will light up for three seconds. In this situation, go to Step 2.



NOTE

For details about module indicators, refer to the *iSite BTS3006C Hardware Description Manual*.

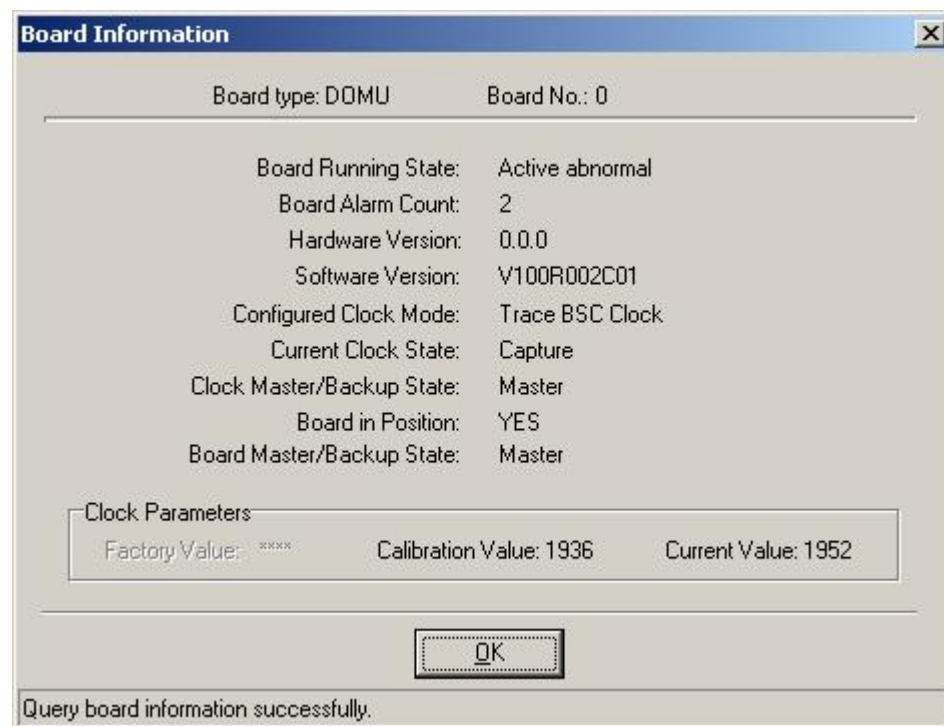
Step 2 Check whether the module software versions are correct.

CAUTION

When replacing the DMCM, DDRM, and DDPM, ensure that the software versions of all boards on the modules in the BTS3006C are correct.

1. Start the Site Maintenance Terminal System.
2. Click **Board** and then double-click **Board Management**.
The **Board Management** dialog box is displayed.
3. Right-click the module.
The shortcut menu is displayed.
4. Choose **Board Information** to check whether the software version is correct.
The Board Information dialog box is displayed, as shown in Figure 4-2.

Figure 4-2 Querying the board information



- If the software version is not correct, reload the software on the Site Maintenance Terminal System and activate it.
- If the software version is correct, go to Step 3.

Step 3 Check whether the relevant alarms are cleared.

Check whether there is any module related alarm through the alarm management system on the OMC. If yes, clear the alarm by following the related handling suggestions in the online help.

You can also right-click the module in the **Board Management** dialog box through the Site Maintenance Terminal System, and then choose **Board Alarm** from the shortcut menu to check the alarm.

- | If an alarm is generated, clear it by following related handling suggestions.
- | If no alarm is generated, go to Step 4.

Step 4 Check whether the module is operating normally.

Choose **Board > Board Management** in the Site Maintenance Terminal System to query the status of the module. The status information includes:

- | Availability
- | Operation
- | Administration

To provide services, the operation status of the module must be set to Normal.



NOTE

You can check the alarm and the module status through the indicators on the panel. For details about module status, refer to the *iSite BTS3006C Hardware Description Manual*.

If the module is operational, go to Step 5.

Step 5 Check whether the module can provide normal services.

Perform dialing tests after replacing the module. If the module supports packet service before replacement, you also have to perform the packet domain services such as browsing the internet to ensure that the module is in normal service.

----End

Handling the Faulty Module

To handle the faulty module, perform the following steps:

Step 1 Record the module name and the code.

Step 2 Check whether there are physical damages on the module. The damages include distorted connectors, bent or broken pins.

Step 3 Record the fault information if any, such as the fault type, fault cause, fault symptom, site name, and slot number.

Step 4 Put the module in a module box and store it properly.

Step 5 Contact the local Huawei office to handle the faulty module.

----End

4.2.2 Replacing the DMCM

This section describes the procedure for replacing the DMCM.

**CAUTION**

The BTS is configured with only one DMCM. The replacement of the DMCM may disrupt the BTS services.

Preparations

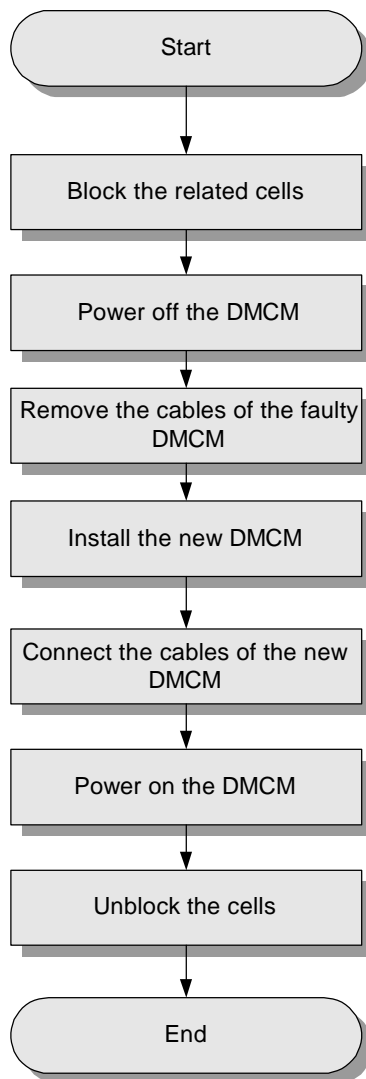
Before replacing the DMCM, do as follows:

- 1 Confirm the position and version of the DMCM. For details, refer to the "Preparations" in section 4.2.1 "General Procedure."
- 1 Mark the installation positions of the cables to the DMCM.

Flow Chart

Figure 4-3 shows the process of replacing the DMCM.

Figure 4-3 Replacing the DMCM



Procedure

To replace the DMCM, do as follows:

Step 1 Block the related cells.

1. Start the Site Maintenance Terminal System.
2. Click **Cell** and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED** to block the cells under the faulty DMCM.

4. Click **OK**.

Step 2 Power off the DMCM.

Set the power switch of the DPSM or DSEM to **OFF**.

Step 3 Remove the panel and cables of the faulty DMCM.



NOTE

If the cabinet is installed in floor standing mode, you need to remove the panel from the base of the DMCM before removing the cables.

Step 4 Remove the faulty DMCM.

For details, refer to section 4.2.1 "General Procedure."

Step 5 Install the new DMCM in the previous slot.

For details, refer to "Installing a New Module" in section 4.2.1 "General Procedure."

Step 6 Connect the cables of the new DMCM according to the previous cable connection positions.

Step 7 Power on the DMCM.

Set the power switch of the DPSM or DSEM to **ON**.

Step 8 Unblock the cells.

1. In the **Change Cell Management State** dialog box, select **UNLOCKED** to unblock the cell.
2. Click **OK**.

----End

Checking the Replaced DMCM

Refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DMCM

Refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.3 Replacing the DDRM

This section describes the procedure for replacing the DDRM.



CAUTION

- | Replace the DDRM at a suitable time so that the services are not disrupted in the cell carried on the module.
 - | Do not touch the running DDRM as its surface temperature is rather high.
 - | The DDRM is heavy, so you need to carry it with both hands.
 - | Connect cables to the DDRM tightly to avoid RF signal leakage.
-

Preparations

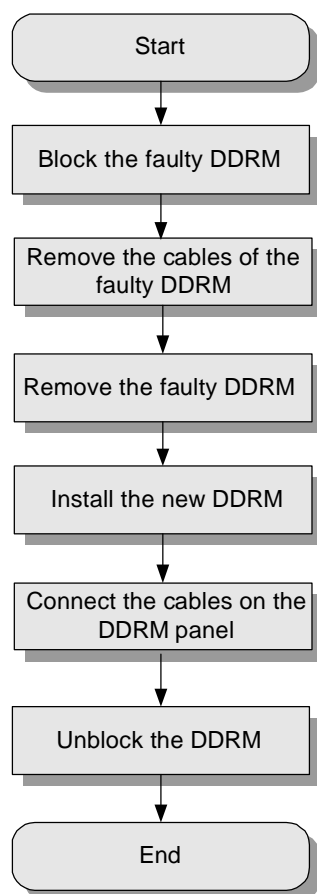
Before replacing the DDRM, do as follows:

- | Confirm the position and version of the DDRM.
For details, refer to "Preparations" in section 4.2.1 "General Procedure."
- | Mark the installation positions of the cables to the DDRM.

Flow Chart

Figure 4-4 shows the process of replacing the DDRM.

Figure 4-4 Replacing the DDRM



Procedure

To replace the DDRM, do as follows:

Step 1 Block the faulty DDRM.

1. Start the Site Maintenance Terminal System.
2. Click **Board** and then double-click **Board Management**.
The **Board Management** dialog box is displayed.
3. Right-click the faulty TRX to display the shortcut menu.
4. Choose **Management State** and then select **Locked** to lock the faulty DDRM.

Step 2 Remove the cables of the faulty DDRM from the panel.

The cables of the DDRM consist of radio transmit cables, radio receive cables, and fan cables.

Step 3 Remove the faulty DDRM.

1. Use a hexagon spanner to remove the four screws at the four corners of the DDRM panel.
2. Hold the handle of the DDRM panel with one hand, and the bottom of the DDRM with the other hand, and then remove the DDRM.
3. Place the DDRM in the package box.

Step 4 Install the new DDRM.

1. Hold the handle on the new DDRM panel with one hand, and the DDRM with the other hand to place the module on the guide rails of the slot.
2. Push the new DDRM along the guide rails until it is tightly against the rack.
3. Fasten the DDRM to the subrack with captive screws.

Step 5 Connect the cables on the DDRM panel.

Step 6 Unblock the DDRM.

1. In the **Board Management** dialog box, right-click the locked DDRM to display the shortcut menu.
2. Choose **Management State** and then select **Unlocked** to unblock the DDRM.

----End

Checking the Replaced DDRM

Refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DDRM

Refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.4 Replacing the DDPM

This section describes the procedure for replacing the DDPM.



CAUTION

- 1 Replace the DDPM at a suitable time so that the services are not disrupted in the cell carried on the module.
 - 1 Connect cables to the DDPM tightly to avoid RF signal leakage.
 - 1 The removed DDPM cable connectors must be installed with protective caps to avoid damages due to the contact between the inner conductor of the cable connector and the sharp edges.
-

Preparations

Before replacing the DDPM, do as follows:

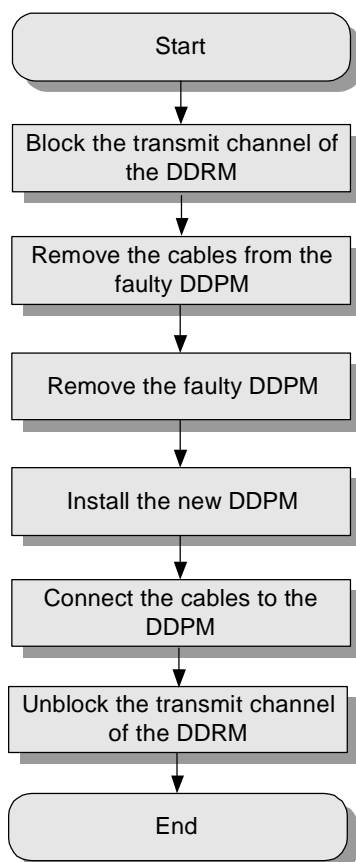
- 1 Confirm the position and version of the DDPM.
For details, refer to the "Preparations" in section 4.2.1 "General Procedure."

- 1 Mark the installation positions of the cables to the DDPM.

Flow Chart

Figure 4-5 shows the process of replacing the DDPM.

Figure 4-5 Replacing the DDPM



Procedure



WARNING

Do not touch the running DDPM as its surface temperature is rather high.

To replace the DDPM, perform the following steps:

Step 1 Block the transmission channel of the related DDRM.

1. Start the Site Maintenance Terminal System.
2. Click **RC** and then double-click **Change RC Management State**.

The **Change RC Management State** dialog box is displayed.

3. Select the RC from the **Select RC** box.
4. Select **LOCKED** from the **Management State** box.
5. Click **OK**.

Step 2 Remove the cables from the faulty DDPM and install protective caps onto the cable connectors.

Step 3 Remove the faulty DDPM.

1. Use a hexagon spanner to loosen the screws on the DDPM panel.
2. Hold the handle with one hand and the DDPM with the other hand to pull out the DDPM from the slot.
3. Put the DDPM in a packaging box.

Step 4 Install the new DDPM.

1. Hold the handle on the new DDPM panel with one hand, and the DDPM with the other hand to place the module on the guide rails of the slot.
2. Push the new DDPM along the guide rails until it is tightly against the rack.
3. Use a hexagon spanner to fasten the DDPM to the subrack.

Step 5 Install the cables to the DDPM panel.

Remove the protective caps and insert the cables into the corresponding cable sockets on the panel according to the installation positions of the cables.

Step 6 Unblock the transmission channel of the related DDRM.

1. In the **Management State** box of the **Change RC Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced DDPM

Refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DDPM

Refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.5 Replacing the DDCM



CAUTION

- 1 The replacement of the DDCM may disrupt the services on the DDRM. Replace the DDCM when the traffic is low (usually early in the morning).
 - 1 Connect cables to the DDCM tightly to avoid RF signal leakage.
-

Preparations

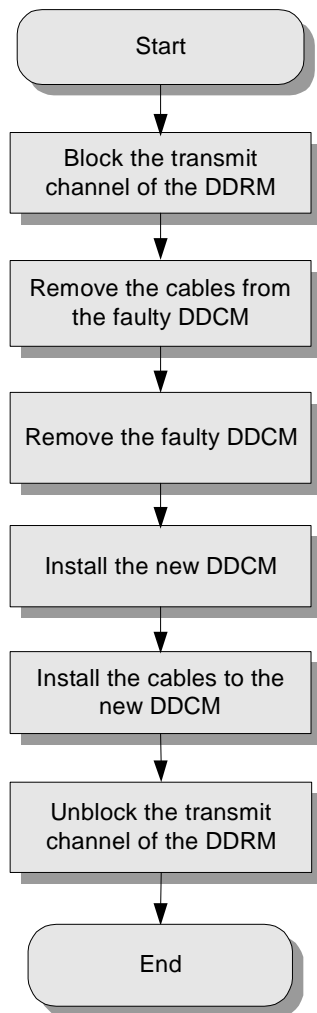
Before replacing the DDCM, do as follows:

- 1 Confirm the position and version of the DDPM.
For details, refer to the "Preparations" in section 4.2.1 "General Procedure."
- 1 Mark the installation positions of the cables to the DDPM.

Flow Chart

Figure 4-6 shows the process of replacing the DDCM.

Figure 4-6 Replacing the DDCM



Procedure



Do not touch a running DDCM as its surface temperature is rather high.

To replace the DDCM, perform the following steps:

Step 1 Block the transmission channel of the related DDRM.

1. Start the Site Maintenance Terminal System.
2. Click **RC** and then double-click **Change RC Management State**.
The **Change RC Management State** dialog box is displayed.
3. Select the RC from the **Select RC** box.
4. Select **LOCKED** from the **Management State** box.
5. Click **OK**.

Step 2 Remove the cables from the faulty DDCM.

Step 3 Remove the faulty DDCM.

1. Use a hexagon spanner to loosen the screws on the DDCM panel.
2. Hold the handle with one hand and the DDCM with the other hand to pull out the DDCM from the slot.
3. Put the DDCM in a packaging box.

Step 4 Install the new DDCM.

1. Hold the handle on the new DDCM panel with one hand, and the DDCM with the other hand to place the module on the guide rails of the slot.
2. Push the new DDCM along the guide rails until it is tightly against the rack.
3. Use a hexagon spanner to fasten the screws on the DDCM to the subrack.

Step 5 Install the cables on the panel of the new DDCM.

Insert the cables into the corresponding cable sockets on the panel according to the installation positions of the cables.

Step 6 Unblock the transmission channel of the related DDRM.

1. In the **Management State** box of the **Change RC Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced DDCM

For details, refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DDCM

For details, refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.6 Replacing the DSCM



CAUTION

- | The replacement of the DSCM may disrupt the related DDRM services. Replace the DDCM when the traffic is low (usually early in the morning).
 - | Connect cables to the DSCM tightly to avoid RF signal leakage.
-

Preparations

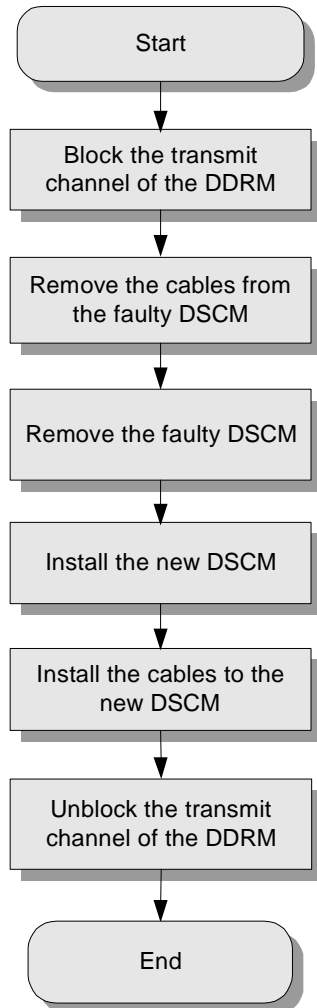
Before replacing the DSCM, do as follows:

- | Confirm the position and version of the DSCM.
For details, refer to the "Preparations" in section 4.2.1 "General Procedure."
- | Mark the installation positions of the cables to the DSCM.

Flow Chart

Figure 4-7 shows the process of replacing the DSCM.

Figure 4-7 Replacing the DSCM



Procedure



Do not touch the running DSCM as its surface temperature is rather high.

To replace the DSCM, perform the following steps:

Step 1 Block the transmission channel of the related DDRM.

1. Start the Site Maintenance Terminal System.

2. Click **RC** and then double-click **Change RC Management State**.
The **Change RC Management State** dialog box is displayed.
3. Select the RC from the **Select RC** box.
4. Select **LOCKED** from the **Management State** box.
5. Click **OK**.

Step 2 Remove the cables from the faulty DSCM.

Step 3 Remove the faulty DSCM.

1. Use a hexagon spanner to loosen the screws on the DSCM panel.
2. Hold the handle with one hand and the DSCM with the other hand to pull out the DSCM from the slot.
3. Put the DSCM in a packaging box.

Step 4 Install the new DSCM.

1. Hold the handle on the new DSCM panel with one hand, and the DSCM with the other hand to place the module on the guide rails of the slot.
2. Push the new DSCM along the guide rails until it is tightly against the rack.
3. Use a hexagon spanner to fasten the screws on the DSCM to the subrack.

Step 5 Install the cables on the DSCM panel.

Insert the cables into the corresponding cable sockets on the panel according to the installation positions of the cables.

Step 6 Unblock the transmission channel of the related DDRM.

1. In the **Management State** box of the **Change RC Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced DSCM

For details, refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DSCM

For details, refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.7 Replacing the DPSM



CAUTION

The replacement of the DPSM may disrupt the power supply for the BTS.

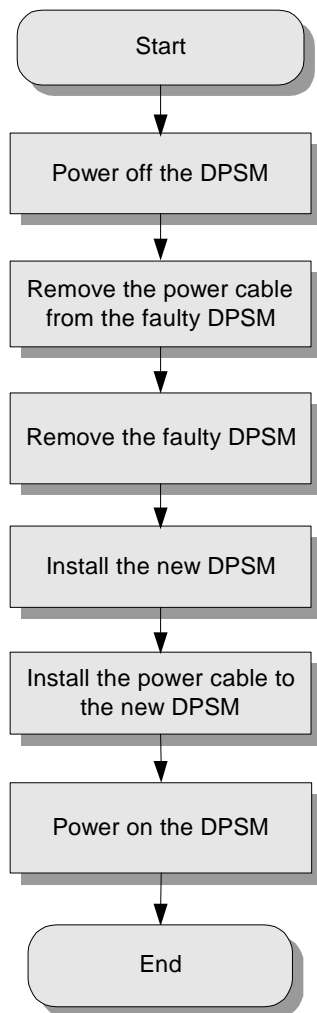
Preparations

Before replacing the DPSM, prepare a new DPSM and required tools and carry them to the site.

Flow Chart

Figure 4-8 shows the process of replacing the DPSM.

Figure 4-8 Replacing the DPSM



Procedure

To replace the DPSM, perform the following steps:

- Step 1** Switch off the external power of the DPSM.
- Step 2** Power off the DPSM.
- Step 3** Remove the AC power cables from the power input socket of the faulty DPSM.

Step 4 Remove the faulty DPSM.

1. Remove the screws on the four corners of the DPSM panel.
2. Hold the handle with one hand and the DPSM with the other hand to pull out the DPSM from the slot.
3. Put the DPSM in a packaging box.

Step 5 Install the new DPSM.

1. Hold the handle on the new DPSM panel with one hand, and the DPSM with the other hand to place the module on the guide rails of the slot.
2. Push the new DPSM along the guide rails until it is tightly against the rack.
3. Fasten the screws on the four corners of the DSCM.

Step 6 Insert the cylindrical waterproof connector into the power input socket of the new DPSM.**Step 7** Power on the DPSM.**Step 8** Switch on the external power of the DPSM.

----End

Checking the Replaced DPSM

Check whether the relevant alarms that occur to the LMT, OMC, or peer equipment are cleared. If the alarms are cleared, the replacement is successful.

Handling the Faulty DPSM

For details, refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.8 Replacing the DSEM



CAUTION

The replacement of the DSEM may disrupt the power supply for the BTS.

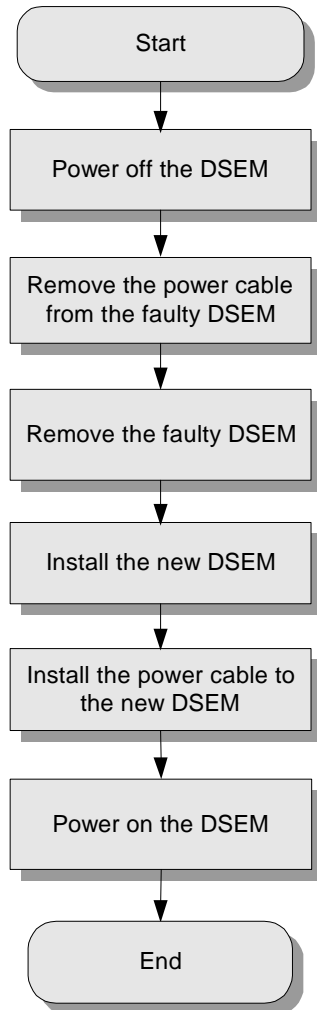
Preparations

Before replacing the DSEM, prepare a new DSEM and required tools and carry them to the site.

Flow Chart

Figure 4-9 shows the process of replacing the DSEM.

Figure 4-9 Replacing the DSEM



Procedure

To replace the DSEM, perform the following steps:

- Step 1** Switch off the external power of the DSEM.
- Step 2** Power off the DSEM.
- Step 3** Remove the DC power cables from the power input socket of the faulty DSEM.
- Step 4** Remove the faulty DSEM.
 1. Remove the screws on the four corners of the DSEM panel.
 2. Hold the handle with one hand and the DSEM with the other hand to pull out the DSEM from the slot.

3. Put the DSEM in a packaging box.

Step 5 Install the new DSEM.

1. Hold the handle on the new DSEM panel with one hand, and the DSEM with the other hand to place the module on the guide rails of the slot.
2. Push the new DSEM along the guide rails until it is tightly against the rack.
3. Fasten the screws on the four corners of the DSEM.

Step 6 Insert the OT terminal into the power input socket of the new DSEM.

----End

Checking the Replaced DSEM

Check whether the relevant alarms that occur to the LMT, OMC, or peer equipment are cleared. If the alarms are cleared, the replacement is successful.

Handling the Faulty DSEM

For details, refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.2.9 Replacing the DATM

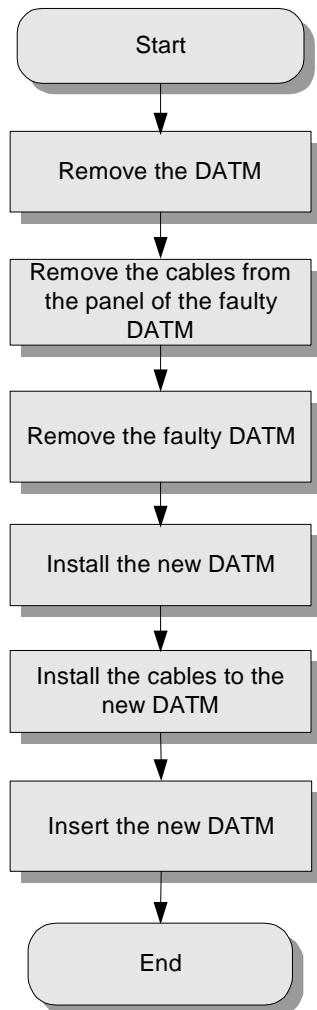
Before replacing the DATM, make the following preparations:

1. Confirm the position and version of the DATM.
For details, refer to "Preparations" in section 4.2.1 "General Procedure."
1. Record the position of the cable installation.

Flow Chart

Figure 4-10 shows the process of replacing the DATM.

Figure 4-10 Replacing the DATM



Procedure

To replace the DATM, perform the following steps:

Step 1 Remove the DATM Module about 10 mm from the cabinet.

Step 2 Remove the cables from the panel of the faulty DATM.

Step 3 Remove the faulty DATM.

1. Hold the handle on the panel of the DATM with one hand and the DATM with the other hand to remove it.
2. Put the removed DATM in the packing box.

Step 4 Install the new DATM in the previous slot.

Hold the handle on the panel of the DATM with one hand and the DATM with the other hand to put it on the guide rails.

Step 5 Install the cables on the new DATM.

According to the recorded installation positions, insert the cables into the ports on the panel.

Step 6 Install the new DATM.

1. Push the new DATM along the guide rails until it is tightly against the subrack.
2. Fasten the DATM to the subrack with captive screws.

----End

Checking the Replaced DATM

For details, refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty DATM

For details, refer to "Removing a Faulty Module" in section 4.2.1 "General Procedure."

4.3 Replacing Parts

4.3.1 Replacing the Fan Box

This section describes the procedure for replacing the fan box.



CAUTION

When the fan box is removed, the temperature inside the BTS may rise. The system may report an over temperature alarm.

Preparations

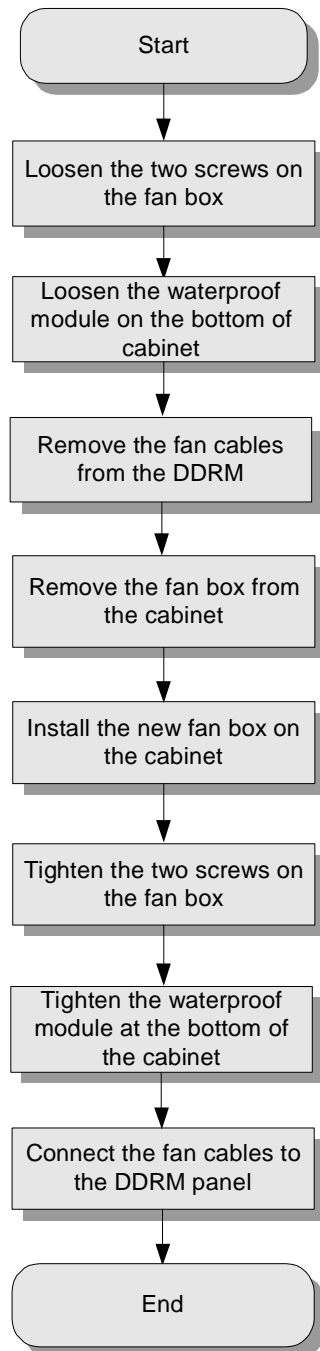
Before replacing the fan box, do as follows:

1. Confirm the position and version of the fan box.
For details, refer to the "Preparations" in section 4.2.1 "General Procedure."
1. Mark the installation positions of the cables to the fan box.

Flow Chart

Figure 4-11 shows the process of replacing the fan box.

Figure 4-11 Replacing the fan box



Procedure



WARNING

- 1 When the fan box is removed, the temperature inside the BTS may rise. The system may report an over temperature alarm.
 - 1 The fan box can be replaced only after it stops running. You must remove the cable of the fan box before replacing the fan box.
-

To replace the fan box, do as follows:

Step 1 Open the front door of the BTS3006C cabinet.

Step 2 Remove the cable of the fan box from the corresponding DDRM.



NOTE

Each DDRM module of the BTS3006C is configured with a fan box. The DDRM module supplies power to fan boxes through cables.

Step 3 Use a cross screwdriver to loosen the two screws on the fan box.

Step 4 Remove the fan box from the cabinet.

1. Press the spring piece in the front of the fan box.
The front part of the fan box is disconnected from the bottom of the cabinet.
2. Hold the fan box with one hand and remove the pothook of the fan box from the hanging pole of the cabinet with the other hand.

Step 5 Install the new fan box on the cabinet.

1. Determine the position where the fan box should be installed on the DDRM.
2. Hold the notch of the fan and hook the sheet metal at the rear of the fan up to the beam under the installed DDRM.
3. Rotate the fan clockwise until the leaf spring on the front side of the fan is securely fixed to the sheet metal at the bottom of the cabinet.

Step 6 Use a cross screwdriver to tighten the two screws on the fan box.

Step 7 Connect the cable of the fan box on the DDRM panel.

----End

Checking the Replaced Fan Box

For details, refer to "Checking the Replaced Module" in section 4.2.1 "General Procedure."

Handling the Faulty Fan Box

For details, refer to "Handling the Faulty Module" in section 4.2.1 "General Procedure."

4.3.2 Replacing BTS3006C Antennas

This section describes the procedure for replacing BTS3006C antennas.



CAUTION

Before BTS3006C antennas are replaced, the corresponding power amplifier must be switched off. The replacement of the BTS3006C antennas may disrupt the services on the cells covered by the antennas. Therefore, replace the BTS3006C antennas at a suitable time.

Preparations

Before replacing BTS3006C antennas, do as follows:

1 Prepare the antennas.

Before replacing the antenna, do as follows:

- Confirm the types, models, and number of faulty antennas.
- Deliver the new antennas and relevant tools to the installation site.

1 Assign the task of replacing the antenna to qualified engineers.

Replacing antennas is a dangerous job. The engineers must:

- Have attended relevant operation trainings and got the qualifications.
- Be healthy.
- Have bought health insurance for themselves.
- Have known the safety requirements of device usage and wear a safety belt.

The engineers who are to replace the antennas mounted on a steel tower on site should:

- Wear helmets.
- Drink no alcohol.
- Prepare a first-aid kit.
- Fasten the safety belts securely.
- Never wear loose clothes or slippery shoes.

The engineers working under the tower must:

- Keep those persons irrespective of the job, especially children, away from the site.
- Look after the installation parts, tools, and instruments.

1 Check the new antennas.

After unpacking the antennas, check whether there are cracks on the antenna surface and the connectors are bent.

- If there is any damage, do not use the antenna but report the damage to the corresponding person who supplies the antenna.
- If there is no visible damage on the antenna, connect the corresponding jumpers to it. Use a radio analyzer to test the VSWR of the antenna.
- As the position and direction of the antenna affect its VSWR, try different positions and directions during the test.

- If the VSWR is greater than 1.5 in any position or direction, infer that the antenna or the connector is faulty.
- If the VSWR is greater than 1.5 only in some positions or directions, the antenna may be faulty or not. Install the antenna and then test its VSWR again. If its value is still over 1.5, the antenna must be faulty.

1 Replace the antenna.

To replace a directional antenna, do as follows:

- Measure the pitch angle and azimuth first.
- Compare the measured values with the earlier data to ensure that the engineering parameters required for the antenna installation are correct.
- Update the data if the engineering parameter records are not updated.
- Check whether the labels attached to 1/2-inch jumper is legible or not.

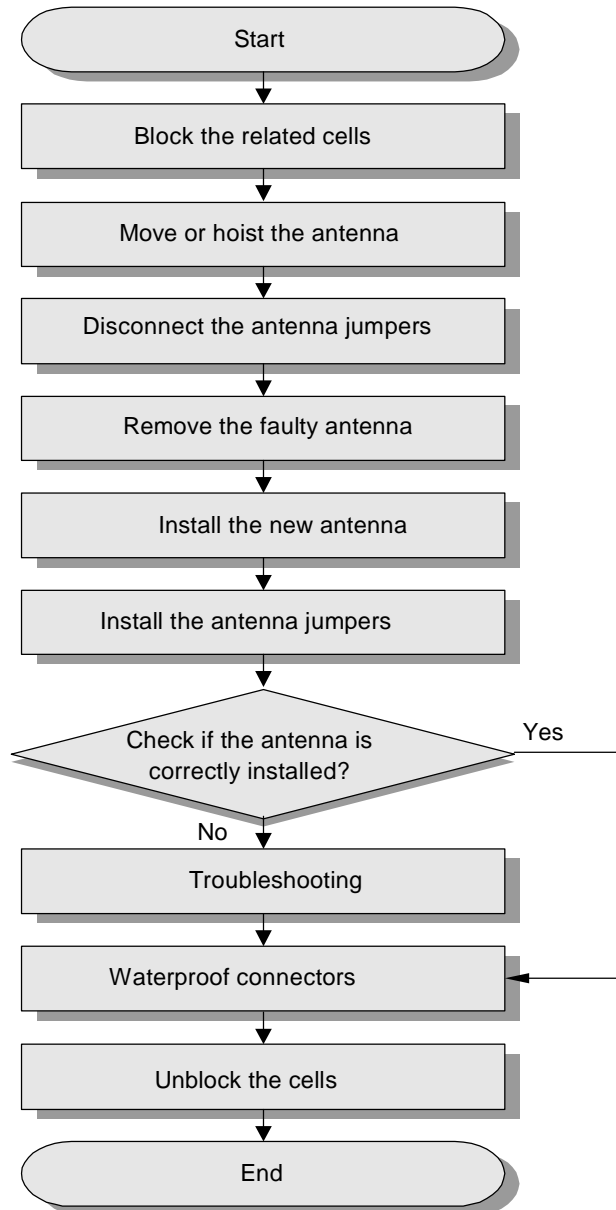
If not, reattach the labels to avoid mistakes in connecting the cables after the antenna replacement.

Mark the installation positions of each cable.

Flow Chart

Figure 4-12 shows the process of replacing the BTS3006C antenna.

Figure 4-12 Replacing the BTS3006C antenna



Procedure



DANGER

Replacing BTS3006C antennas is a dangerous job. Ensure that all the preparations are made before the replacement.

To replace the BTS3006C antenna, do as follows:

Step 1 Block the related cells.

1. Start the Site Maintenance Terminal System.
2. Click **Cell** and then double-click **Change Cell Management State** in the right pane. The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED** to block the cell under the antenna.
4. Click **OK**.

Step 2 Hoist the antenna.

For details about moving or lifting the antenna, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 3 Remove the 1/2-inch jumper.

1. Cut a few rifts on the waterproof clay near the contact between the antenna and the jumper with a paper knife.
2. Scratch off the clay with fingers or a paper knife.
3. Remove the 1/2-inch jumper.

Step 4 Remove the faulty antenna.

- ┆ If it is an omni-directional antenna, loosen the antenna-fixing clip and bring down the antenna.
- ┆ If it is a directional antenna, remove the antenna with the antenna-fixing clip. Remove the fixing clip and install it onto the new antenna. For details, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 5 Install a new antenna.

- ┆ If it is an omni-directional antenna, plug it to the antenna-fixing clip and tighten the clip.
- ┆ If it is a directional antenna, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 6 Install the 1/2-inch jumper.

Connect the jumper to the antenna according to the marked cable connections.

Step 7 Check whether the antenna is installed correctly. If all the items listed as follows are confirmed, go to Step 9. If any one of the following items mentioned is not confirmed, go to Step 8.

- ┆ The omni-directional antenna is vertical and the error of perpendicularity is less than $\pm 2^\circ$.

- l The top of the omni-directional antenna jacket is equal to or slightly higher than that of the antenna bracket.
- l The azimuth angle error of the directional antenna is less than $\pm 5^\circ$ and the pitch angle error is not greater than $\pm 0.5^\circ$.
- l A waterproof curve is made on the jumper.
- l The VSWR measured with the radio analyzer at the jumper port to the antenna is lower than 1.5.

Step 8 Find the reasons for the faults by checking the items listed in step 7 and handle the problems. If the value of the VSWR is greater than 1.5, use a Site Master to locate the problem.

Step 9 Waterproof the connectors.

Ensure that the point where the antenna and the jumper meet is waterproof. For details, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 10 Unblock the related cells.

1. In the **Change Cell Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced BTS3006C Antenna

Check whether the related alarms in the Site Maintenance Terminal System or the OMC are cleared. If yes, replacing the BTS3006C antenna is successful.

Handling the Faulty BTS3006C Antenna

Contact local Huawei office to handle the faulty antenna.

4.3.3 Replacing the TMA

This section describes the procedure for replacing the TMA.



Replace the TMA at a suitable time, because the replacement may disrupt the services of the cells related to the antenna to which the TMA is connected.

Preparations

Before replacing the TMA, do as follows:

- l Prepare the required articles.
 - Confirm the types, models, and quantity of the faulty TMAs.
 - Deliver the new TMAs, relevant tools, and two 50-ohm match load of N-type connectors to the installation site.
- l Assign the task of replacing the TMA to qualified engineers.

For details, refer to section 4.2.1 "General Procedure."

- I Check the TMA.
 - Check for damages on the TMA.
 - Measure the VSWR on the two ports on the TMA.

Before measuring the VSWR on one port, connect the other port to a 50-ohm match load. If you do not connect the unused port to the match load, the BER of the VSWR may be high. This test is called power-off test. If the tested VSWR greatly differs from the reference VSWR, replace the TMA.

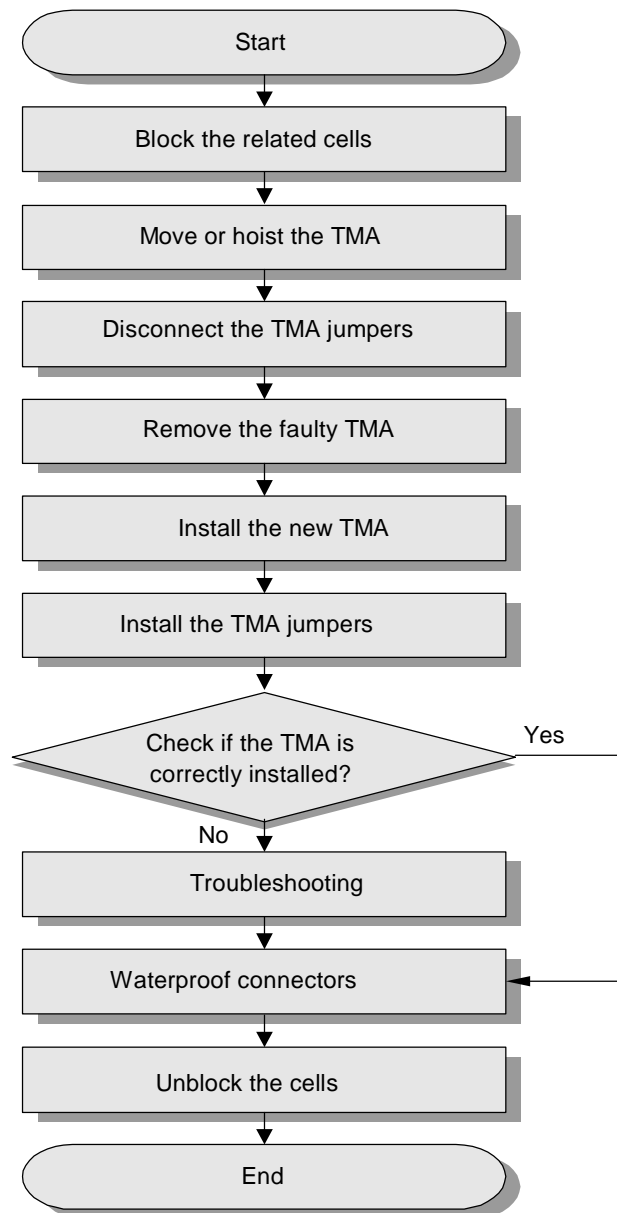
**NOTE**

Power on the TMA and test its current. If the TMA current runs within the range of 50–175 mA, the VSWR is normal.

Flow Chart

Figure 4-13 shows the process of replacing the TMA.

Figure 4-13 Replacing the TMA



Procedure

 **NOTE**

Removing and installing a TMA requires the cooperation of two persons to avoid dropping of the TMA. Select the procedure that has minimum influence on the services, as described in the following section.

To replace the TMA, do as follows:

Step 1 Block the related cells.

1. Start the Site Maintenance Terminal System.
2. Click **Cell** and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED**.
4. Click **OK**.

Step 2 Hoist the TMA.

For details about hoisting the TMA, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 3 Remove the TMA jumpers.

1. Cut a few rifts on the waterproof clay near the point of contact between the antenna and the jumper with a paper knife.
2. Scratch off the clay with fingers or a paper knife.
3. Remove the TMA jumpers.

Step 4 Remove the faulty TMA.

1. If the TMA is fixed on a steel tower or pole by a steel fastening bracket, loosen the bolts at one end of the fastening bracket. Then pull out the other end from the gap under the bolt to free the TMA.
1. If the TMA is fixed on the wall surface with expansion bolts, unscrew the bolts and remove the spring washers, flat washers, and TMA.

Step 5 Install a new TMA.

Install the new TMA at or near the original position and ensure that it is well grounded. For details, refer to the *iSite BTS3006C Hardware Installation Manual*.

**NOTE**

After the expansion bolt is removed, it cannot be used again. You need to use a new expansion bolt to install the TMA.

Step 6 Install the jumpers to the new TMA.

For details, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 7 Check whether the TMA is installed correctly.

1. The connectors to the TMA are correct.
1. The VSWR measured with the radio analyzer at the related jumper port is less than 1.5.

If all the items listed as follows are confirmed, go to Step 8.

If any one is not confirmed, go to Step 9.

Step 8 Find the reasons for the faults by checking the items listed in Step 7 and handle the problems.

If the value of the VSWR is greater than 1.5, use a Site Master to locate the problem.

Step 9 Waterproof the connectors.

Ensure that the point of contact between the antenna and the jumpers is waterproof. For details, refer to the *iSite BTS3006C Hardware Installation Manual*.

Step 10 Unblock the related cells.

1. In the **Change Cell Management State** dialog box, click **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced TMA

Check whether the related alarms in the Site Maintenance Terminal System or the OMC (such as TMA related alarm and transmission channel related alarm) are cleared. If yes, replacing the TMA is successful.

Handling the Faulty TMA

Contact local Huawei office to handle the faulty TMA.

4.4 Replacing Cables

Preparations

Before replacing the cables, do as follows:

- 1 Confirm the type and number of cables. Deliver the prepared cables and tools to the installation site.
- 1 Mark the installation positions of the faulty cables and the connection to the peer end equipment.
- 1 Check whether there is any visible damage on the new cables.
 - If yes, replace the damaged cables with normal ones.
 - If no, go to next step.
- 1 Attach a temporary label to each new cable to distinguish the cable from the others.



NOTE

Ensure that the content on the temporary label is consistent with that on the label of the replaced cable.

4.4.1 Replacing an E1 Trunk Cable

This section describes the procedure for replacing the trunk cable.



CAUTION

- 1 Replace the trunk cable at a suitable time, because the replacement may disrupt the services on the cable.
 - 1 For the BTS that provides normal services before the cable is replaced, block the cells related to the trunk cable in the BTS.
 - 1 For the cascade site, the services of its lower sites are disrupted after the trunk cable is replaced. Therefore, you also have to block the cells of the cascade site.
-

Table 4-3 lists the E1 trunk cables used for the BTS3006C.

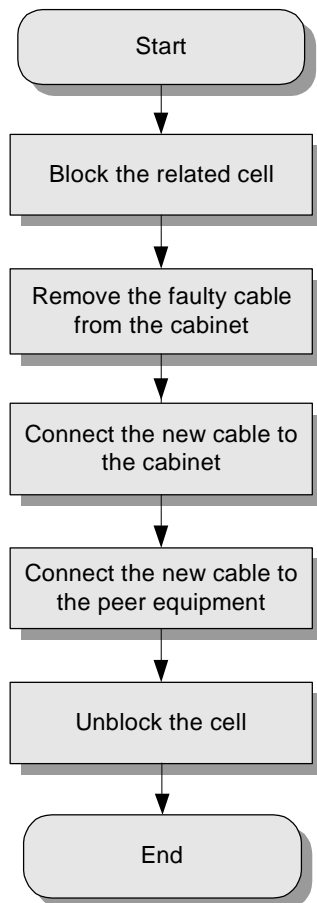
Table 4-3 E1 trunk cables

Type	Connector Type	Installation Position
75-ohm E1 cable	One end is a cylindrical waterproof connector. The other end is an SMB terminal.	One end connects the E1_0/1 port or E1_2/3 port at the bottom of the DMCM. The other end connects transmission equipment.
120-ohm E1 cable	One end is a cylindrical waterproof connector. The other end is a bare terminal.	One end connects the E1_0/1 port or E1_2/3 port at the bottom of the DMCM. The other end connects transmission equipment.

Flow Chart

Figure 4-14 shows the process of replacing an E1 trunk cable.

Figure 4-14 Replacing an E1 trunk cable



Procedure

To replace an E1 trunk cable, do as follows:

Step 1 Block the related cell.

1. Start the Site Maintenance Terminal System.
2. Click the target cell and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED**.
4. Click **OK**.

Step 2 Route the new trunk cable.

Lay out the new trunk cable from the cabinet to the peer end equipment along the route used to lay the previous one.

Step 3 Remove the faulty trunk cable from the E1_0/1 port or E1_2/3 port of the DMCM.



NOTE

If the cabinet is installed in floor standing mode, you need to remove the panel from the base of the DMCM before removing the cables.

Step 4 Install a new trunk cable on the cabinet.

According to the recorded installation positions, insert the new trunk cable into the E1_0/1 port or E1_2/3 port of the DMCM.

Step 5 Connect the new trunk cable to the peer end equipment.

1. According to the connections of the replaced trunk cables, connect the new trunk cable to the peer end equipment.
2. Remove and install one trunk cable at a time.

Step 6 Unblock the cell.

1. In the **Change Cell Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

Step 7 Attach the engineering labels on the new trunk cable.

1. Ensure that the content on the labels of the new trunk cable is the same as that on the previous one. For labeling standards, refer to the *iSite BTS3006C Hardware Installation Manual*.
1. Remove the temporary labels after attaching the engineering labels.

Step 8 Bundle the trunk cable.

----End

Checking the Replaced E1 Trunk Cable

After replacing the trunk cable, check that:

1. The connections are correct.
1. Alarms related to trunk links in the Site Maintenance Terminal System or OMC are cleared.

If these conditions are met, infer that the trunk cable replacement is successful.

Handling the Faulty E1 Trunk Cable

Contact Local Huawei office or installation engineers to handle the faulty trunk cable.

4.4.2 Replacing an SDH External Optical Cables

The trunk cables configured in the BTS3006C are SDH external optical cables, as listed in Table 4-4.

Table 4-4 Trunk cable

Category	Sub-Category	Connector Type	Installation Position
Trunk cable	SDH external optical cable	One end is a cylindrical waterproof connector. The other end consists of four FC optical connectors.	One end connects to the OPT port of the DMCM. The other end connects to the transmission equipment.



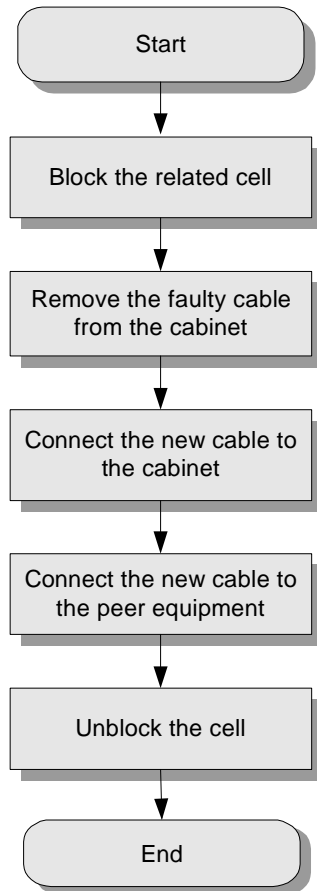
CAUTION

The replacement of SDH external optical cables may disrupt the services on the optical cables. Replace the SDH external optical cable when the traffic is low (usually in early mornings).

Flow Chart

Figure 4-15 shows the process of replacing an SDH external optical cable.

Figure 4-15 Replacing an SDH external optical cable



Procedure

To replace an SDH external optical cable, do as follows:

Step 1 Block the related cell.

1. Start the Site Maintenance Terminal System.
2. Click the target cell and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED**.
4. Click **OK**.

Step 2 Remove the faulty cable from the OPT port of the DMCM.

Step 3 Install the new cable on the cabinet.

1. Lead the SDH external optical cable along the right cabling trough to the bottom of the cabinet.
2. Insert the cylindrical waterproof connector of the cable into the OPT port of the DMCM and tighten the connection.
3. Connect the other end of the cable to the optical transmission equipment.

Step 4 Unblock the cell.

1. In the **Change Cell Management State** dialog box, select **UNLOCKED**.
2. Click **OK**.

----End

Checking the Replaced SDH External Optical Cable

After replacing the SDH external optical cable, check that:

- l The cable connection is tight.
- l The cable connection is correct.
- l The related alarms are cleared on the LMT and OMC.

If yes, replacing the SDH external optical cable is successful.

Handling the Faulty SDH External Optical Cable

The faulty optical cable can be handled at random.

4.4.3 Replacing the AC/DC Power Cables

This section describes the procedure for replacing power cables.



CAUTION

Replace the power cable at a suitable time, because the replacement may disrupt the services of the BTS.

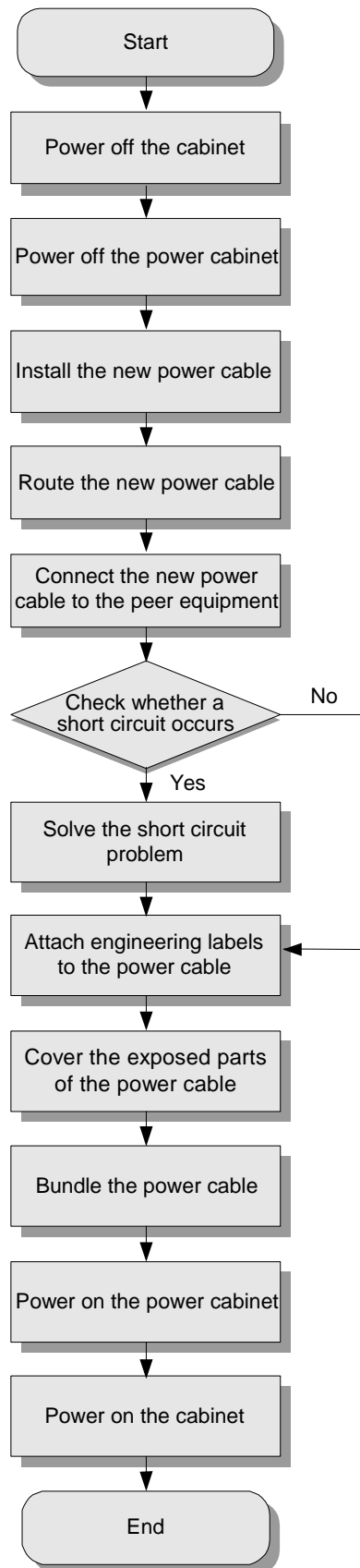
Table 4-5 lists the AC/DC power cables configured in the BTS3006C.

Table 4-5 AC/DC power cables

Category	Sub-Category	Connector Type	Installation Position
Power cable	DPSM AC power cable	One end is a cylindrical waterproof connector. The other end is a bare cable.	One end connects the input power socket on the DPSM. The other end connects the output power socket of the external power system.
	DSEM DC power cables (one blue cable and one black cable)	One end is an OT terminal configured with M6. The other end is an OT terminal configured with M8. The OT terminal with M8 should be cut on site.	Connect the M6 OT terminal of the blue cable with the NEG (-) terminal, and connect the M6 OT terminal of the black cable with the RTN (+) terminal. The other end connects the output power socket of the external power system.

Flow Chart

Figure 4-16 shows the process of replacing the power cable.

Figure 4-16 Replacing the power cable

Procedure



WARNING

Ensure that all the switches are set to OFF before you replace the power cable.

To replace the power cable, do as follows:

Step 1 Power off the cabinet.

Switch off the power of the DSEM or DPSM.

Step 2 Power off the power cabinet.

Step 3 Remove the faulty power cable.

1. Remove the faulty power cable from the socket of the power cabinet.
2. Remove the faulty power cable from the socket of the DESM or DPSM.

Step 4 Install the new power cable.

- | If the installation is in floor standing mode, go to Step 5.
- | If the BTS3006C cabinet is installed in against-pole mode, go to Step 6.

Step 5 Lead the power cable along the right cabling trough to the bottom of the cabinet.

Step 6 Lead the power cable from the waterproof module at the bottom of the cabinet to the internal cabinet.

Insert the power cable into the input power socket of the DSEM or DPSM.

Step 7 Lay the new power cable.

Lay the new power cable to the peer end equipment along the route of the previous one.

Step 8 Connect the new power cable to the peer end equipment.

Connect the other end of the new power cable to the same socket of the peer end equipment.

Step 9 Use a multimeter to check whether a short circuit occurs.

- | If yes, go to Step 10.
- | If no, go to Step 11.

Step 10 Check all connections that may lead to a short circuit, and then solve the problem.

Step 11 Attach engineering labels on the power cable.

- | Ensure that the content on the labels of the new power cable is the same as that on the previous one.
For labeling standards, refer to the *iSite BTS3006C Hardware Installation Manual*.
- | Remove the temporary label after sticking the engineering labels.
- | Handle the exposed part of the power cable.

Step 12 Use heat-shrink tubes or electrical adhesive tapes to cover the exposed parts of the power cable.

Step 13 Bundle the power cable.

Step 14 Power on the power cabinet.

Step 15 Power on the cabinet.

Strictly follow the procedure to power on the equipment.

----End

Checking the Replaced Power Cable

After replacing the power cable, check that:

- l The connections are secure and correct.
- l The related alarms in the Site Maintenance Terminal System or the OMC are cleared.

If these conditions are met, infer that the power cable replacement is successful.

Handling the Faulty Power Cable

Contact local Huawei office or installation engineers to handle the faulty power cable.

4.4.4 Replacing the Power Cable of the TMA

Table 4-6 describes the power cable of the TMA configured in the BTS3006C.

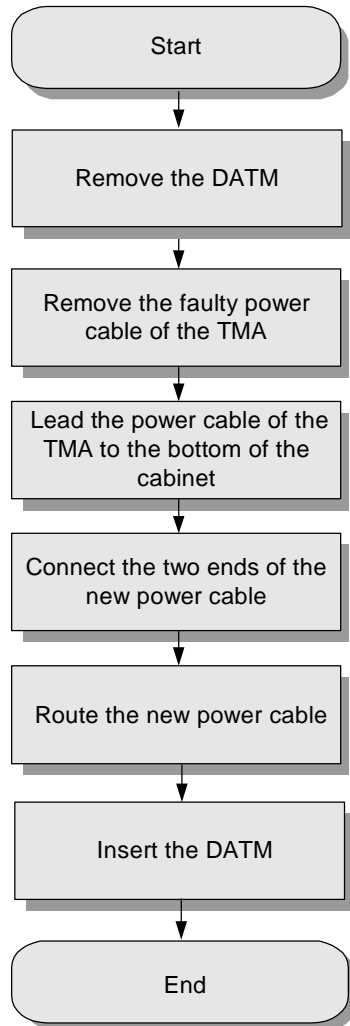
Table 4-6 Power cable of the TMA

Category	Sub-Category	Connector Type	Installation Position
Power cable	Power cable of the TMA	One end is an SMA elbow male connector and the other end is an SMA male connector.	One end connects any ANT port on the DATM panel. The other end connects the SMA connector of the Bias Tee.

Flow Chart

Figure 4-17 shows the process of replacing the power cable of the TMA.

Figure 4-17 Replacing the power cable of the TMA



Procedure

To replace the power cable of the TMA, do as follows:

Step 1 Remove the DATM Module about 10 mm from the cabinet.

Step 2 Remove the faulty power cable of the TMA.

1. Remove the faulty power cable from the socket of the DATM panel.
2. Remove the faulty power cable from the SMA connector of the Bias Tee.

Step 3 Install the new power cable.

1. If the BTS3006C cabinet is installed in floor standing mode, go to Step 4.
1. If the BTS3006C cabinet is installed in against-pole mode, go to Step 5.

- Step 4** Lead the power cable of the TMA along the right cabling trough to the bottom of the cabinet.
- Step 5** Lead the power cable of the TMA from the waterproof module at the bottom of the cabinet to the internal cabinet.
- Step 6** Insert the SMA elbow male connector into the ANTA or ANTB port on the DATM panel and tighten the connection.
- Step 7** Insert the SMA male connector into the SMA connector of the Bias Tee and tighten the connection.
- Step 8** Lay the new power cable according to the previous layout.
For the layout method, refer to the *iSite BTS3006C Hardware Installation Manual*.
- Step 9** Install the new DATM.
1. Push the new DATM along the guide rails until it is tightly against the subrack.
 2. Fasten the DATM to the subrack with captive screws.
- End

Checking the Replaced Power Cable of the TMA

After replacing the power cable of the TMA, check that:

- l The connections are secure and correct.
- l The related alarms in the Site Maintenance Terminal System or the OMC are cleared.

If these conditions are met, infer that the power cable replacement is successful.

Handling the Faulty Power Cable of the TMA

Contact local Huawei office or installation engineers to handle the faulty power cable of the TMA.

4.4.5 Replacing the RF Interconnection Cable

Table 4-7 describes the RF interconnection cables configured in the BTS3006C.

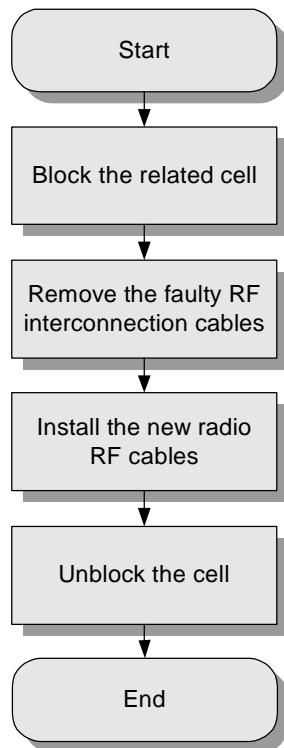
Table 4-7 RF interconnection cables between modules

Cable	One End	The Other End
RF receive cable	Connects to the RX port on the DDRM	Connects to the RX port on the DDPM
RF transmit cable	Connects to the TX port on the DDRM	Connects to the TX port on the DDPM
		Connects to the TX port on the DDCM
	Connects to the TX port on the DDPM	Connects to the TX port on the DDCM or DSCM
	Connects to the TX port on the DDCM	Connects to the TX port on the DSCM

Flow Chart

Figure 4-18 shows the process of replacing RF interconnection cables.

Figure 4-18 Replacing RF interconnection cables



Procedure

To replace the RF interconnection cables, do as follows:

Step 1 Block the related cell.

1. Start the Site Maintenance Terminal System.
2. Select a cell from the left pane, and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
3. Select **LOCKED**.
4. Click **OK**.

Step 2 Remove the faulty RF interconnection cables.

Loosen the SMA elbow male connector and N elbow male connector of the RF interconnection cables on the modules.

Step 3 Install the new RF interconnection cables on the cabinet.

1. Insert the SMA elbow male connectors of the receive signal cable into the corresponding RX ports and tighten the connection.

2. Insert the N elbow male connectors of the transmit signal cable into the corresponding TX ports and tighten the connection.

Step 4 Unblock the cell.

1. In the **Change Cell Management State** dialog box, select **UNLOCKED** to unblock the cell.
2. Click **OK**.

----End

4.4.6 Replacing the Combined Optical Cable

Table 4-8 describes the combined optical cable configured in the BTS3006C.

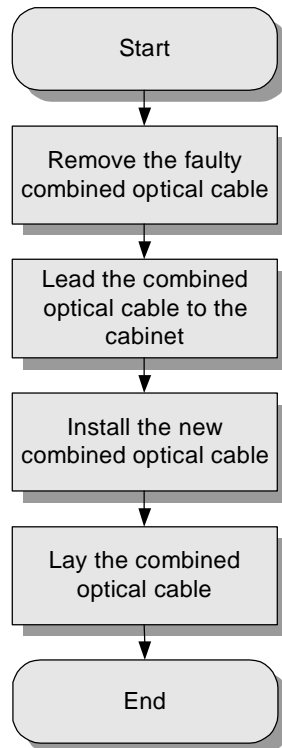
Table 4-8 Combined optical cable

Category	Sub-Category	Connector Type	Installation Position
Combined cable	Combined optical cable	LC optical connector	One end connects to the SFP-A or SFP-B port on the DMCM in the main cabinet. The other end connects to the SFP-A or SFP-B port on the DMCM in the extension cabinet.

Flow Chart

Figure 4-19 shows the process of replacing the combined optical cable.

Figure 4-19 Replacing the combined optical cable



Procedure

To replace the combined optical cable, do as follows:

Step 1 Remove the faulty combined optical cable.

Remove the faulty combined optical cable from the SFP-A and SFP-B ports on the DMCM in the main cabinet.

Step 2 Lead the combined optical cable to the cabinet.

- ┆ If the BTS3006C cabinet is installed in floor standing mode, go to Step 3.
- ┆ If the BTS3006C cabinet is installed in against-pole mode, go to Step 4.

Step 3 Lead the power cable along the right cabling trough to the bottom of the cabinet.

Step 4 Lead the power cable from the waterproof module at the bottom of the cabinet to the internal cabinet.

Step 5 Install the new combined optical cable.

One end connects to one port (SFP-A or SFP-B) on the DMCM of the main cabinet.

The other end connects to the other port (SFP-A or SFP-B) on the DMCM of the extension cabinet.

Step 6 Lay the combined optical cable.

----End

Checking the Replaced Combined Optical Cable

After replacing the combined optical cable, check that:

- 1 The connections are secure and correct.
- 1 The related alarms in the Site Maintenance Terminal System or the OMC are cleared.

If these conditions are met, infer that the cable replacement is successful.

Handling the Faulty Combined Optical Cable

Contact local Huawei office or installation engineers to handle the faulty combined optical cable.

4.4.7 Replacing the Alarm Cables

Table 4-9 describes the alarm cables configured in the BTS3006C.

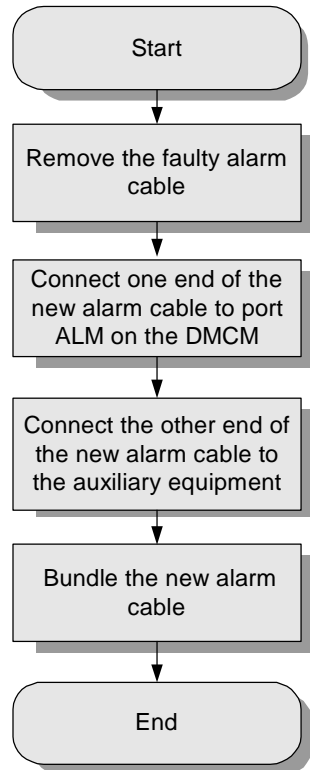
Table 4-9 Alarm cables

Category	Sub-Category	Connector Type	Installation Position
Alarm cables	Access control cable of the cabinet	One end is a 3-pin ordinary connector. The other end has two parallel terminals.	One end connects the DOOR port on the DMCM of the main cabinet. The other end connects the access control switch at the bottom of the cabinet.
	External alarm cable	One end is a cylindrical waterproof connector. The other end is a bare terminal.	One end connects the ALM port on the DMCM. The other end connects the external alarm equipment and the power distribution cabinet.

Flow Chart

Figure 4-20 shows the procedure for replacing an alarm cable.

Figure 4-20 Replacing an alarm cable



Procedure

To replace an alarm cable, do as follows:

- Step 1** Remove the faulty alarm cable from the cabinet.
- Step 2** Connect one end of the new alarm cable to port ALM on the DMCM.
- Step 3** Connect the other end of the new alarm cable to the auxiliary equipment.
- Step 4** Bundle the new alarm cable.

----End

Checking the Replaced Alarm Cable

After replacing the alarm cable, check that:

- l The connections are secure and correct.
- l The related alarms in the Site Maintenance Terminal System or in the OMC are cleared.

If these conditions are met, infer that the cable replacement is successful.

Handling the Faulty Alarm Cable

Contact local Huawei office or installation engineers to handle the faulty alarm cable.

4.4.8 Replacing the RF Jumper



CAUTION

If there are transmit signals on the RF jumper, replacing the jumper may disrupt all services in the cell. Replace the RF jumper at a suitable time.

Table 4-10 describes the RF jumper configured in the BTS3006C.

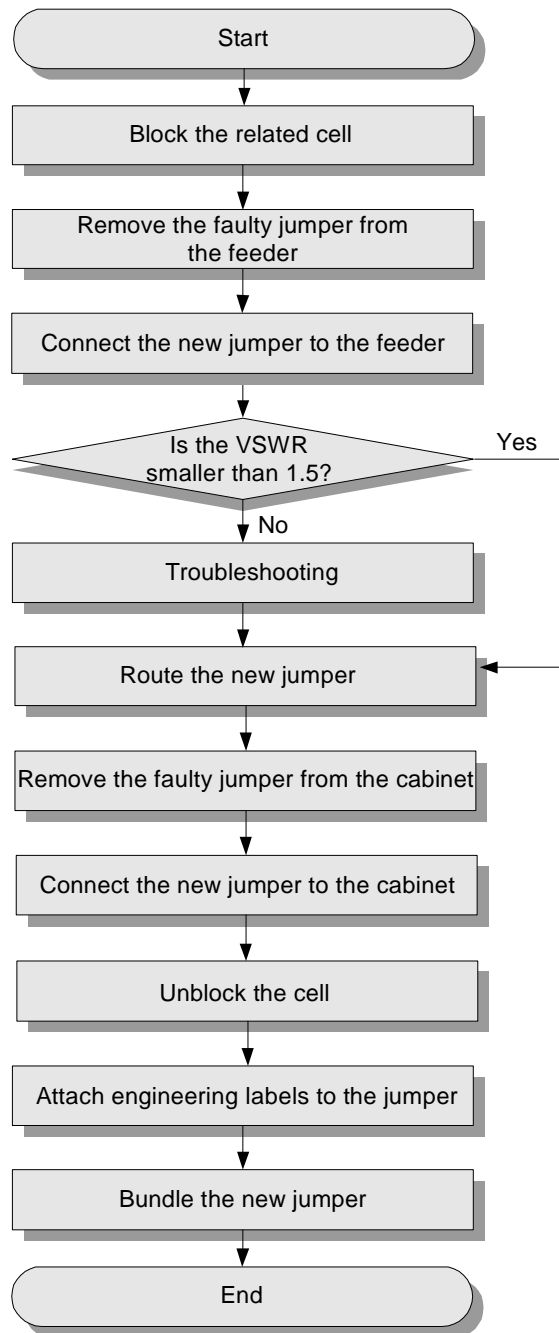
Table 4-10 RF jumper

Category	Sub-Category	Connector Type	Installation Position
Jumper	RF jumper	One end is an N elbow male connector. The other end is a DIN male connector.	One end connects the ANTA or ANTB port of the DDPM. The other end connects the Bias-Tee, which then connects the feeder.

Flow Chart

Figure 4-21 shows the process of replacing the RF jumper.

Figure 4-21 Replacing the RF jumper



Procedure

To replace the RF jumper, do as follows:

- Step 1** Block the related cell.
1. Start the Site Maintenance Terminal System.
 2. Select a cell from the left pane, and then double-click **Change Cell Management State** in the right pane.
The **Change Cell Management State** dialog box is displayed.
 3. Select **LOCKED**.
 4. Click **OK**.
- Step 2** Wear an antistatic wrist strap.
- Step 3** Remove the faulty jumper from the feeder.
- Step 4** Connect the new jumper to the feeder.
- Step 5** Use a RF analyzer to measure the VSWR at the jumper port. Check whether the tested VSWR is smaller than 1.5.
1. If yes, go to step 7.
 1. If no, go to step 6.
- Step 6** Find the cause and clear the faults.
- Step 7** Route the new jumper to the cabinet along the path of the previous jumper.
- Step 8** Remove the faulty jumper from the cabinet.
- Step 9** Install the new jumper to the cabinet.
- Step 10** Unblock the related cells.
- In the **Change Cell Management State** dialog box, select **UNLOCKED**, and click **OK**.
- Step 11** Stick engineering labels to the new jumper.
1. Ensure that the content on the labels of the new jumper is the same as that on the labels of the previous jumper. For labeling standards, refer to the *iSite BTS3006C Hardware Installation Manual*.
 1. Remove the temporary labels after sticking the engineering labels.
- Step 12** Bundle the new jumper.
- Step 13** Take off the antistatic wrist strap and keep it for future use.
- End

Checking the Replaced RF Jumper

After replacing the RF jumper, check that:

1. The connections are secure and correct.
1. The related alarms in the Site Maintenance Terminal System or the OMC are cleared.

If these conditions are met, infer that the RF jumper replacement is successful.

Handling the Faulty RF Jumper

Contact local Huawei office or installation engineers to handle the faulty RF jumper.

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A Requirements for Antenna Spacing

About This Chapter

The following table lists the contents of this chapter.

Section	Describes
A.1 Omni-Directional Antenna	This section introduces the requirements for omni-directional antenna spacing.
A.2 Directional Antennas	This section introduces the requirements for directional antenna spacing.

A.1 Omni-Directional Antenna



CAUTION

- 1 For the convenience of the future expansion, the antenna spacing should be strictly up to the requirements.
- 1 When TX and RX antennas share one antenna stand, the horizontal spacing requirements can be ignored. However, the vertical spacing has to be guaranteed. The TX and RX antennas cannot be at the same level.
- 1 The angle of the highest-radiation-intensity directions of antennas should be greater than the half of the vertical plane half-power angle of an antenna. The vertical plane half-power angle of an antenna normally is from 4° to 12°. Therefore, the angle of the highest-radiation-intensity directions of antennas should be greater than 7°. The higher the antenna gain is, the smaller the angle is.
- 1 Normally, the longer the antenna is, that is, the higher the antenna gain is, the larger the antenna spacing should be.

As the isolation of the omni-directional antenna should be 30 dB, the omni-directional antenna spacing should satisfy the requirements listed in Table A-1.

Table A-1 Requirements for omni-directional antenna spacing

Antennas	Vertical spacing	Horizontal spacing	Remarks
GSM900: TX-TX, TX-RX	> 0.5 m	> 4 m (when the antenna gain is less than 10 dBi) > 5 m (when the antenna gain is larger than 10 dBi)	Antennas are 2 m away from the tower. RX antenna is normally higher than TX antenna.
GSM1800: TX-TX, TX-RX	> 0.3 m	> 2 m (when the antenna gain is less than 10 dBi) > 2.5 m (when the antenna gain is larger than 10 dBi)	Antennas are 2 m away from the tower. RX antenna is normally higher than TX antenna.
GSM900+G SM1800: TX-TX, TX-RX	> 0.2 m	> 2 m (when the antenna gain is less than 10 dBi) > 2 m (when the antenna gain is larger than 10 dBi)	Antennas are 2 m away from the tower. Rx antenna is normally higher than TX antenna.
Requirements for diversity receiving:			
GSM900: RX-RX	-	> 4 m (6 m recommended)	Antennas are 2 m away from the tower.
GSM1800: RX-RX	-	> 2 m (3 m recommended)	Antennas are 2 m away from the tower.

A.2 Directional Antennas



CAUTION

- 1 For the convenience of the future expansion, the antenna spacing should be strictly up to the above requirements.
- 1 Directional antennas cannot be installed face to face. They can be arranged back to back or side by side.
- 1 Normally, the longer the antenna is (that is, the higher the antenna gain is), the larger the antenna spacing should be.

As the isolation of the 120° directional antenna should be larger than 30 dB, the directional antenna spacing should satisfy the requirements listed in Table A-2.

Table A-2 Requirements for directional antenna spacing

	Antennas	Vertical spacing	Horizontal spacing	Remarks
Antennas in the same sector	GSM900: TX-TX, TX-RX	⌋ 0.2 m	⌋ 2 m	No interference from the tower structure should exist in the forward direction of the antenna.
	GSM1800: TX-TX, TX-RX	⌋ 0.2 m	⌋ 1 m	No interference from the tower structure should exist in the forward direction of the antenna.
Antennas in adjacent sectors on the same platform	GSM900: TX-TX, TX-RX	-	⌋ 1 m	The more cells there are under one site, the larger horizontal spacing is required.
	GSM1800: TX-TX, TX-RX	-	⌋ 1 m	The more cells there are under one site, the larger horizontal spacing is required.
Requirements for diversity receiving	GSM900: RX-RX	-	⌋ 4 m (6 m recommended)	No interference from the tower structure should exist in the forward direction of the antenna.
	GSM1800: RX-RX	-	⌋ 2 m (3 m recommended)	No interference from the tower structure should exist in the forward direction of the antenna.

B Engineering Labels for Antenna System

About This Chapter

The following table lists the contents of this chapter.

Section	Describes
B.1 Engineering Labels for Feeders	Describes the engineering labels for the feeders.
B.2 Explanation of the Jumper Engineering Label	Describes the engineering labels for the jumper.

B.1 Engineering Labels for Feeders

The feeder is identified with metal tags. The white tags marked with black letters are fixed to the feeder with cable ties.

Metal labels should be bound to the feeders using black ties at the following recommended places:

- l 200 mm away from the feeder connectors
- l 200–300 mm down the tower platform
- l Turning of the feeder

Paper labels should be stuck 200 mm away from the feeder connectors.

Be sure to turn the labels bound to the feeder outside. Keep the tags nice and neat. Lay both the tags and the cables ties in the same direction.

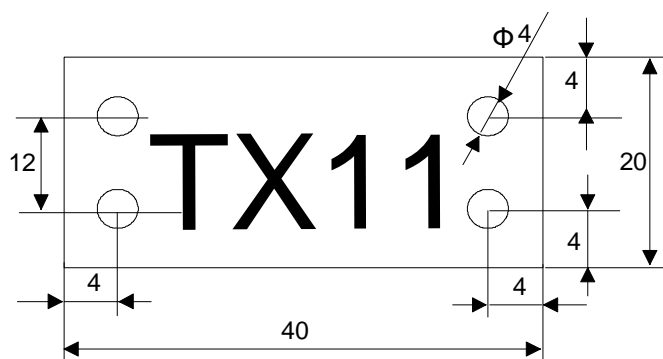
Feeders are identified with metal tags, which are called engineering labels. The engineering labels are described as Table B-1.

Table B-1 Description of the feeder engineering labels

Identifier	Meaning
TX	Transmit end
RX	Receive end
RXD	Receive diversity
TRX	Transmit & receive end
Numeral (tow digit)	For omnidirectional cells, there is only one digit following the letter, indicating the tributary No.; and for directional cells, there are 2 digits following the letter, indicating the cell ID and tributary No. respectively.

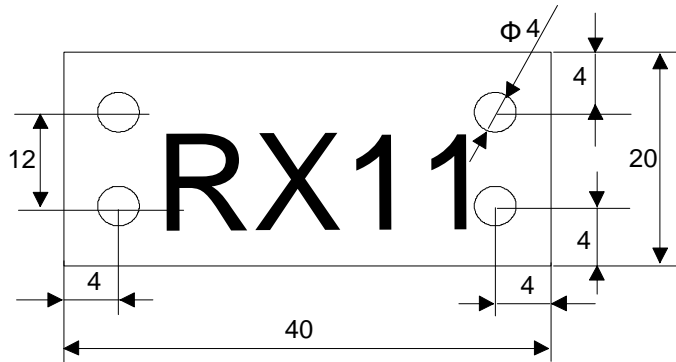
Figure B-1 and Figure B-2 illustrate the tags for feeders.

Figure B-1 Feeder tag (for the transmit end)



"TX11" in Figure B-1 indicates the transmit end of the feeder from Tributary 1, Cell1(directional).

Figure B-2 Feeder tag (for the receive end)



"RX11" in Figure B-2 indicates the receive end of the feeder from Tributary 1, Cell1(directional).

B.2 Explanation of the Jumper Engineering Label

All the jumpers should be stuck with labels at the places 200 mm away from one jumper connectors. One jumper needs one label.

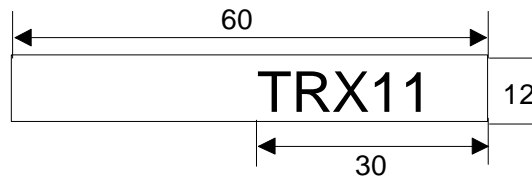
The description of the jumper engineering labels is given in Table B-2.

Table B-2 Description of the jumper engineering labels

Identifier	Meaning
TX	Transmit end
RX	Receive end
RXD	Receive diversity
TRX	Transmit & receive end
Numeral (two digits)	For omnidirectional cells, there is only one digit following the letter, indicating the tributary No.; and for directional cells, there are 2digits following the letter, indicating the cell ID and tributary No. respectively.

Figure B-3 illustrates a specific jumper engineering tag.

Figure B-3 Jumper tag (for the transmit & receive end)



"TRX11" in Figure B-3 indicates the transmit & receive end of the jumper from Tributary 1, Cell1(directional).

C Glossary

A	
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Antenna A device which radiates and/or receives radio signals. When working as a transmitter, it converts high frequency current to electromagnetic waves; when working as a receiver, it converts electromagnetic waves to high frequency current.

B

Baseband Baseband is a form of modulation in which the information is applied directly onto the physical transmission medium.

BSS In GSM the Base Station System is a term given to a BSC (Base Station Controller) and the BTS (Base Transceiver Station) associated with it. The number of BTS associated with a BSC is dependent on the manufacturer. Although not mandatory, through interpretation of the Abis interface standard BTS and BSC employed within a BSS will always be supplied by the same manufacturer.

The BSS is the physical equipment used to give radio coverage to a determined geographical zone called a cell. Functionally, a BSS is subdivided into BSC and BTS.

C

Cell Radio network object that can be uniquely identified by a User Equipment from a (cell) identification that is broadcasted over a geographical area from one UTRAN Access Point. A Cell is either FDD or TDD mode.

G

GSM The Global System for Mobile communications is a second generation digital cellular telecommunication system which was first planned in the early 1980s.

H

Handover The transfer of a user's connection from one radio channel to another (can be the same or different cell).

O

omnidirectional antenna An antenna having an essentially non-directional radiation intensity in a given plane, usually horizontal, referred to a specified polarization.

R

Receive diversity The most common type of diversity, where a mobile device uses two physically separate antennas to combine signals from the two antennas to reduce the impact of spatial variations in signal strength and thus increase the average data rate available - sometimes dramatically.

T

TMA A Tower Mounted Amplifier (TMA) is a lower noise amplifier installed close to the antenna, for example, on a tower. It amplifies weak signals from the antenna, thus improving UMTS coverage, enhancing receiver sensitivity and reducing the transmit power of the UE.

TRX A transmitter and receiver housed together in a single unit and having some circuits in common, often for portable or mobile use.

D Acronyms and Abbreviations

A

AC	Alternating Current
ALM	Alarm Board

B

BAM	Back Administration Module
BER	Bit Error Rate
BIE	Base Station Interface Equipment
BSC	Base Station Controller
BSS	Base Station Subsystem

C

CGI	Cell Global Identification
CIC	Call Instance Code

D

DATM	Antenna and TMA Control Module for DDRM BTS
DC	Direct Current
DDCM	Double Combining Module for DDRM BTS
DDPM	Dual Duplexer Module for DDRM BTS
DDRM	Double transceivers Digital and Radio frequency Module
DIP	Dual-In-line Package
DMCM	Main Control Module for DDRM BTS
DPSM	Power Supply Module for DDRM BTS

DSCM Single Combining Module for DDRM BTS
DSEM DC SPD and EMI Module

F

FPGA Field Programmable Gate Array

G

GPRS General Packet Radio Service

GSM Global System for Mobile communications

GUI Graphic User Interface

H

HLR Home Location Register

HO Handoff

I

ID Identity

L

LAPD Link Access Procedure on the D channel

LC Lucent Connector

LMT Local Maintenance Terminal

LNA Low Noise Amplifier

M

MMS Multimedia Messaging Service

MS Mobile Station

MSC Mobile Switching Center

O

OMC Operation and Maintenance Center

OML Operation and Maintenance Link

R

RACH	Random Access CHannel
RF	Radio Frequency
RSL	Radio Signaling Link
RX	Receiver/Reception

S

SDH	Synchronous Digital Hierarchy
SIM	Subscriber Identity Module
SMB	System Management Board
SMS	Short Message Service
SPD	Security Policy Database

T

TMA	Tower Mounted Amplifier
TS	Total Slack

V

VDC	Variable Dispersion Compensator
VLR	Visitor Location Register
VSWR	Voltage Standing Wave Ratio

W

WAP	Wireless Application Protocol
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iSite BTS3006C

Maintenance Manual

15.7 cm

10 cm

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