Table of Contents

1 Overview

cBTS3612-800 Routine Maintenance Instructions describes in details the contents and methods of cBTS3612-800 routine maintenance operations. It serves as a reference in determining the routine maintenance schedule of a particular site. cBTS3612-800 Routine Maintenance consists of:

1) Purpose of cBTS3612-800 routine maintenance;
2) Classification of cBTS3612-800 routine maintenance operations;
3) Logging of routine maintenance operations.

1.1 Purposes of cBTS3612-800 Routine Maintenance

Normal system operation of cBTS3612-800 in different running environment depends on effective routine maintenance. cBTS3612-800 routine maintenance is intended to detect and solve problems in due time to prevent trouble.

1.2 Classification of cBTS3612-800 Routine Maintenance Operations

1.2.1 Classification According to Implementing Methods

I. Conventional maintenance

To observe the operation of the system, and test and analyze equipment performance during system operation.

II. Unconventional maintenance

To test if the performance of system equipment has degraded by artificially creating some faults and observe system performance with these faults. For example, maintenance personnel may artificially create some faults and test if the alarm system reports alarm correctly.

1.2.2 Classification by Period Length

I. Unscheduled maintenance

Maintenance operations incurred by equipment fault or network adjustment. For example, maintenance tasks triggered by user complaint, damage of equipment and

line fault. Solving of problems left over by daily maintenance operations is also regarded as unscheduled maintenance operation.

II. Daily maintenance

Maintenance tasks conducted daily. cBTS3612-800 Daily maintenance helps maintenance personnel keep track of the operating conditions of the equipment at any moment so that problems can be solved in time. When a problem is detected in daily maintenance, record it in detail to help eliminate it in time.

III. Periodical maintenance

Maintenance tasks conducted regularly. Periodical maintenance helps maintenance personnel keep track of the long-term performance of the equipment.

Periodical maintenance includes: monthly maintenance, quarterly maintenance and yearly maintenance.

1.3 Guide to the Usage of cBTS3612-800 Routine Maintenance records and cBTS3612-800 Routine Maintenance Instructions

1) Note down in details the unexpected faults occurred in cBTS3612-800 daily maintenance operations in cBTS3612-800 Daily Unexpected Fault Handling Record for future reference. The user may modify the record according to the actual needs, or compile the records into manuals.
2) Note down in details the actual maintenance operations carried out during cBTS3612-800 monthly maintenance in cBTS3612-800 Monthly Maintenance Record. For details, see cBTS 3612 Monthly Maintenance Operation Instruction.
3) Note down in details the actual maintenance operations carried out during cBTS3612-800 quarterly maintenance in cBTS Quarterly Maintenance Record. For details, see cBTS 3612 Quarterly Maintenance Operation Instruction.
4) Note down in details the actual maintenance operations carried out during cBTS3612-800 yearly maintenance in cBTS3612-800 Yearly Maintenance Record. For details, see cBTS 3612 Yearly Maintenance Operation Instruction.

1.3.1 cBTS3612-800 Daily Unexpected Fault Handling Record

Site		Belong-to BSC	
Time when fault occurred:		Time when fault is solved:	
Person on duty:		Handled by:	

Classification of fault:

€ Primary power supply
€ Secondary power supply
€ Base Band Subrack
€ RF Subrack
€ CDU/DFU/RLDU Subrack
€ Antenna & Feeder System
€ Others

Fault detected:

? With user complaint
? In Daily maintenance
? From the alarm system
? From other sources

Description of fault:

Alarm Handling & Result:

1.3.2 cBTS3612-800 Monthly Maintenance Record

Site: _____

Time of maintenance:____(MM)_____(DD)_____(YY) ____(MM)____(DD)____(YY)	Maintainer:		
Items	**Status**	**Remarks**	**Maintenance personnel**
Environment	Normal, Abnormal		
Temperature	Normal, Abnormal		
Humidity	Normal, Abnormal		
Dust-proof performance	Normal, Abnormal		
Indoor air-conditioner	Normal, Abnormal		
Call test	Normal, Abnormal		
Battery group	Normal, Abnormal		
Grounding, lightening protection and power supply system	Normal, Abnormal		
RF antenna and feeder part	Normal, Abnormal		
Satellite antenna and feeder part	Normal, Abnormal		
Secondary power supply	Normal, Abnormal		

Description of fault and handling measures taken	
Problems remained	
Monitor check	

1.3.3 cBTS3612-800 Quarterly Maintenance Record

Site: _____

Time of maintenance:____(MM)_____(DD)_____(YY) ____(MM)____(DD)____(YY)	Maintainer:		
Items	Status	Remarks	Maintenance personnel
Primary power supply	Normal, Abnormal		
Fans	Normal, Abnormal		
Road test	Normal, Abnormal		
Alarm collection equipment	Normal, Abnormal	When available	
Description of fault and handling measures taken			
Problems remained			
Monitor check			

1.3.4 cBTS3612-800 Yearly Maintenance Record

Site: _____

Time of maintenance:____(MM)_____(DD)_____(YY) ____(MM)____(DD)____(YY)	Maintainer:		
Items	**Status**	**Remarks**	**Maintenance personnel**
Call test	Normal, Abnormal		
Cabinet sanitation	Normal, Abnormal		
BTS power output	Normal, Abnormal		
Grounding resistance and grounding wires	Normal, Abnormal		
Water-proof performance of antenna and feeder connector and lightening protection grounding clip	Normal, Abnormal		
Firmness and angle of antenna	Normal, Abnormal		
Description of fault and handling measures taken			
Problems remained			
Monitor check			

2 cBTS3612-800 Monthly Maintenance Instructions

Items	Instructions	Note
Call test	Make calls with an MS. Collect information at both the MS and the BSC to see if all calls are normal for all sector carriers.	There should be no noise, no call dropping, nor cross talking.
Grounding, lightening protection system (including E1 lightening protection board) and power supply system	1) Check the connections in the grounding system and the lightening protection system. 2) Check if the power supply system is normal. 3) Check if any part of the lightening protector is burnt.	Keep the lightening protector for the power supply system and the antenna and feeder system in good shape.
Antenna and feeder part	1) Check if there is any VSWR alarms; 2) Check if the support of the antenna is set to the correct direction; 3) Check if the water-proof performance of the feeder is normal.	Query at the maintenance console.
Secondary power supply	Check if there is any alarm on the fault of the secondary power supply module.	

3 Quarterly Maintenance Instructions

Items	Instructions	Note
Primary power supply	Measure the output voltage.	Range of normal output voltage: -40- 60V.
Fans	1) Check if the fans are working normally. 2) Check if there is any alarm reported on the fault of fans.	Alarm may be triggered when: 1) Some of the fans are unable to rotate; 2) Temperature of some of the fans is abnormal; 3) Fan rotational speed control is faulty.
Road test	Test on the handoff and coverage area of the cells with a test MS.	
VSWR	Check at the maintenance console if there is any VSWR alarms.	
Alarm collection equipment	Check if the alarm collection equipment (including that on humidity, temperature and fire) is normal.	
Equipment room environment	Check the temperature, humidity, dust-proof performance, and anti-static performance of the equipment room.	Temperature: -5®C~50®C. Relative humidity: 5%~90%.

4 cBTS3612-800 Yearly Maintenance Instructions

Items	Instructions	Note
Call test	Make calls with an MS. Collect information at both the MS and the BSC to see if all calls are normal for all sector carriers.	There should be no noise, no call dropping, nor cross talking.
Cabinet sanitation	Tools required: Vacuum cleaner, alcohol and towel.	Impose strict operation regulations to prevent mis- operation on power supply.
BTS power output	Test the output power of the RFs.	Check if the output is the same as recorded in the BSC.
Grounding resistance and grounding wires	1). Measure the grounding resistance with proper test instruments. 2). Check if the connector of the grounding wires are normal	
Water-proof performance of antenna and feeder connector and lightening protection grounding clip	1). Check the external parts; 2). Unwrap them and check.	Wrap up the checked parts with the same material used before the check.
Firmness and angle of antenna	1). Tighten the screw with the wrench. 2). Check if the angle are correctly set.	Do not apply too much force with the wrench.

5 Return Loss, VSWR and Reflection Coefficient

Return loss(dB)	VSWR	Reflection Coefficient (Γ)
4	4.41943	0.63096
5	3.56977	0.56234
6	3.00952	0.50119
7	2.61457	0.44668
8	2.32285	0.39811
9	2.09988	0.35481
10	1.92495	0.31623
11	1.78489	0.28184
12	1.6709	0.25119
13	1.57689	0.22387
14	1.49852	0.19953
15	1.43258	0.17783
16	1.37668	0.15849
17	1.32898	0.14125
18	1.28805	0.12589
19	1.25276	0.1122
20	1.22222	0.1
21	1.19569	0.08913
22	1.17257	0.07943
23	1.15238	0.07079
24	1.13469	0.0631
25	1.11917	0.05623
26	1.10553	0.05012
27	1.09351	0.04467
28	1.08292	0.03981
29	1.07357	0.03548
30	1.06531	0.03162
31	1.058	0.02818
32	1.05153	0.02512
33	1.0458	0.02239
34	1.04072	0.01995
35	1.03621	0.01778
36	1.03221	0.01585
37	1.02866	0.01413
38	1.0255	0.01259
39	1.0227	0.01122
40	1.0202	0.01
41	1.01799	0.00891
42	1.01601	0.00794
43	1.01426	0.00708
44	1.0127	0.00631
45	1.01131	0.00562
46	1.01007	0.00501
47	1.00897	0.00447
48	1.00799	0.00398
49	1.00712	0.00355
50	1.00634	0.00316

Formulas for calculating reflection coefficient Γ, return Loss RL, and VSWR is displayed in the following table:

Reflection Coefficient Γ	VSWR	Return loss(dB)
$\Gamma = \frac{Ureflected}{Uforward}$	$VSWR = \frac{Uforward + Ureflected}{Uforward - Ureflected}$	$RL = 20\lg\frac{Uforward}{Ureflected}$
$\Gamma = \frac{1}{alg(\frac{RL}{20})}$	$VSWR = \frac{1+\Gamma}{1-\Gamma}$	$RL = 20\lg\frac{1}{\Gamma}$
$\Gamma = \frac{VSWR-1}{VSWR+1}$	$VSWR = \frac{alg(\frac{RL}{20})+1}{alg(\frac{RL}{20})-1}$	$RL = 20\lg\frac{VSWR+1}{VSWR-1}$

Table of Contents

1 MS Unable to Access Network

1.1 About Mobile Station Network Access

Once powered on, an MS first enters the System Determination Substate and then selects an analog system or CDMA system based on the parameters predefined in the mobile station by the user. If the CDMA system is selected, the mobile station will attempt to capture it and enters the Pilot Channel Acquisition Substate.

In this substate, the mobile station will first search the primary frequency bands for all pilot channels (search all PN offsets), and captures the strongest pilot channel. If there are no pilot channels captured on the basic frequency bands, the mobile station will tune to an auxiliary frequency band and continue searching for a pilot channel. When the mobile station has captured a pilot channel, it enters the Sync Channel Acquisition Substate.

In this substate, the mobile station will attempt to obtain a sync channel and receive synchronization messages. And by means of these messages, the mobile station can obtain the pilot PN offset, network system identity, long code status, system time, paging channel rate, frequency bands on which basic paging channels are, etc. Once this information is obtained, the mobile station will enter the Timing Change Substate.

In this substate, the mobile station will use the pilot PN offset, long code status received in the sync channel messages and synchronizes the long code status and system timing with the CDMA system timing. After that, the mobile station will enter the Mobile Station Idle State.

In the idle status, the mobile station needs to receive the overhead messages on the paging channels. The mobile station cannot work normally unless it has received correct Overhead Messages within the specified period of time.

If all the above conditions are satisfied, the mobile station will normally gain access to a network.

1.2 Disabled Mobile Station Network Access

1.2.1 Description of Fault

When started, the mobile station cannot access the CDMA network.

1.2.2 Fault Analysis and Location

Before locating any base station fault, make sure that the parameters for a mobile station are correctly set, such as the basic frequency band, auxiliary frequency band, SID, NID, etc.

I. Base station not in service

The base station is not in service and the mobile station cannot gain access to a network. The causes for the base station not to be in service include:

1) The base station equipment in a faulty status makes the base station fail to be in service.
2) The base station has not obtained correct configuration data, which leads to the base station not being in service.

For the troubleshooting details, please refer to "4 Base Station Initialization Failure Fault".

II. Abis signaling link fault

Abis signaling link fault will disable the network access of a mobile station.

1) If any fault occurs to the Abis signaling link after a base station has been in service, BSC cannot implement any logical configuration for the base station and accordingly the mobile station cannot gain access to a network.
2) If a base station has obtained its logic configuration, when any fault occurs to the Abis signaling link, the base station will cut off the transmission signals of BTRM corresponding to all sector carriers and this makes a mobile station unable to gain access to a network.

At an OMC or near-end maintenance console of a base station, query the current alarm of the base station to make sure whether there exists any "Abis signaling link fault" alarm.

For the troubleshooting details, please refer to "5.2 Abis signaling link fault".

III. A cell has not obtained the logic configuration of BSC

1) If a cell has no logical configuration, that is to say, such common channels as pilot, synchronization, paging, etc. have not been established or overhead messages not updated, the mobile station naturally cannot gain access to a network.

View the confiuguration process report of a cell at the OMC maintenance console. If the cell does not report the process of "Common channel successfully established" and "Overhead message successfully updated", it shows that the cell has no logic configuration.

2) Unavailable physical equipment or operation & maintenanace (for example, deletion of the equipment) results in the deletion of a logic cell, therefore the mobile station cannot gain access to a network.

View the configuration process report of a cell at an OMC maintenance console. If the cell reports the process report of "Cell deleted", it shows that the cell has been deleted.

In addition, you may query whether a cell has its logic configuration via the "Cell Status Query" command at the OMC maintenance console.

If a cell has not obtained its logic configuration, then check point by point:

- Whether the BTRM used in this cell works normally.
- Whether the BCPM used in this cell works normally.
- Whether the corresponding BRDM works normally.
- Whether the optical fiber of BTRM and that of BRDM are correctly connected.
- Whether BCIM works normally.
- Whether the Abis signaling link is in connected status.
- Whether BSC works normally.
- Check the configuration parameters of BTS and BSC and make sure that they are in accordance.

If any problem is found at some step, handle it according to the corresponding chapter or section. For example, a BTRM module fault should be handled as described in "6.5 BTS Transceiver Module (BTRM)".

IV. This cell is in blocked status

If you see at the OMC maintenance console that the logic configuration of a cell has been completed, but the mobile station still cannot gain access to a network, then you can check whether this cell is in blocked status.

When a cell is in blocked status, the base station will cut off the transmission signals of BTRM corresponding to this cell carrier and this makes the mobile station unable to gain access to a network.

You may query BTRM status at the OMC maintenance console to see whether the BTRM corresponding to this cell has been blocked.

If the cell is in blocked status, the mobile station cannot gain access to a network until the user has unblocked it.

V. Abnormal receiving channel

If you see at the OMC maintenance console that the logic configuration of a cell has been completed, but the mobile station still cannot gain access to a network, then you can check whether the receiving channel of a base station is abnormal.

An abnormal BS receiving channel will lead to excessive receiving error codes and frequent mobile station dropouts. The mobile station, when started, will send a power-on registration message to the system. However, the base station cannot receive this registration message because of a faulty receiving channel. Thus, the base station will not send any base station answer instruction to this mobile station, which leads to failed registration of this mobile station. Because of failed registration, the mobile station enters the system defining sub-status and recaptures the system. When the system is captured, the mobile station will start again the power-on registration. Such things happen repeatedly, so that the mobile station cannot gain access to a network.

You may test the mobile station via CDMA and trace air interface messages. If the mobile station sends "Registration message" but does not receive any "Base station answer instruction" message, it shows that some fault has occurred to the reverse receiving channel of the base station.

If there exists any receiving channel abnormality, you may check point by point as follows and make judgements by viewing related indicators, querying the board status and alarm information, etc.

- Whether the CDU, RLDU and BTRM module are well installed and the panel screws are correctly fastened.
- Whether the antenna feeder connection is correct.
- Whether the CDU works normally.
- Whether the RLDU works normally.
- Whether the configuration selection switch "S/W" on the RLDU panel is set correctly. For the description of RLDU panel switch, please refer to "Board Indicator and DIP Switch" of "Base Station Maintenance" part in the user manual.
- Whether the BTRM works normally.
- Whether the BCPM works normally.
- Whether the blind plugs of various modules of the receiving channel are normally connected and there is any loosening.
- Whether the physical configuration data of the base station are correct, including the cell parameter, backward search parameters, etc.

If any problem is found at some step, handle it according to the corresponding chapter or section. For example, a BTRM module fault should be handled as described in "6.5 Transceiver Module (BTRM)".

VI. Abnormal transmission channel

Transmission activation (BTRM), BHPA, CDU and antenna feeder form the transmission channel. But an abnormal transmission channel will lead to no output signal from the base station or abnormal output signals. In this case, you may see at the OMC maintenance console that the logic configuration of a cell has been completed, but the mobile station still cannot gain access to a network. Then, you may check point by point as follows:

- Whether the CDU, BHPA module and BTRM module are well installed and the panel screws correctly fastened.
- Whether BTRM transmission activation part works normally.
- Whether the CDU works normally.
- Whether BTRM and BHPA are normally connected.
- Whether the BHPA works normally.
- Whether BHPA and CDU are connected.
- Whether the feeder connection between CDU and the cabinet top is normal.
- Whether the feeder connection between the cabinet top and the antenna is normal.
- Whether the blind plugs of various modules of the receiving channel are normal and whether there is any loosening.
- Whether the antenna is correctly installed.
- Whether there is any standing wave ratio alarm.

If any problem is found at some step, handle it according to the corresponding chapter or section. For example, a BTRM module fault should be handled as described in "6.5 Transceiver Module (BTRM)".

VII. The cell gain and common channel gain are not correctly set

You may see at the OMC maintenance console that the logic configuration of a cell has been completed, but the mobile station still cannot gain access to a network. In this case, you may check whether various gain parameters during the cell configuration are correctly set.

When the cell is logically configured, such parameters as the sector gain, carrier gain, pilot channel gain, synchronization channel gain, paging channel gain, etc. must be configured. If these parameters are improperly set (for example, excessively small), the mobile station will not be able to capture the corresponding common channel and this makes the mobile station unable to gain access to a network.

Make sure whether the gain parameters contained in Abis-Cell Setup message are reasonable via the Abis interface message tracing tool. If unreasonable, the data configuration table of BSC must be modified and the gain parameters be configured again.

VIII. The overhead message content is not correct

You may see at the OMC maintenance console that the logic configuration of a cell has been completed, but the mobile station still cannot gain access to a network. In this case, you may check whether the overhead message content is correct.

Upon entering the idle status, the mobile station must receive all overhead messages (including at least the following four: the access parameter message, system parameter message, CDMA channel list message and adjacent area list message.

Other overhead messages depend on the setting of network parameters) configured in the whole system within the specified period of time. Otherwise, the mobile station cannot gain access to a network.

In addition, the value of the parameters in each overhead message will also make the mobile station unable to gain access to a network and needs confirming carefully.

With the air interface message signaling analyzer, you may check whether the mobile station has received the overhead messages configured in the whole system. In addition, you should check whether the parameter value of each overhead message is correct. If not, you may modify the data configuration table of BSC and update the overhead message again.

2 Conversation Fault

For the content in this chapter, please refer to related parts in BSC Maintenance Manual.

3 Software Downloading Failure Fault

3.1 Description of Fault

I. FTP client login failure

OMC sends a command to an OMU (a base station operation & maintenance unit running on BCKM) to start downloading files from BAM. The OMU receives the command, but cannot log on to the FTP server of BAM. In this case, OMC background receives the abnormal halt message of OMU and FTP client login fails.

II. Abnormal halt of file loading by the board

When some board software is downloaded and activated by means of OMC, it is found that the whole stage from the starting of downloading and activating to the waiting for the activation report is normal. Then, OMC receives the abnormal halt message of OMU and file loading is abnormally halted by the board.

3.2 Fault Analysis and Location

I. FTP client login failure

1) Check whether the FTP server on BAM is in Stop status or correctly set.

First view whether the FTP server is in Stop status. If it runs normally, then check whether the FTP server is set correctly. FTP server settings include the following four: user name, user password, user accessible path and access authority. Any setting error will lead to failed login or failed board software loading.

When a base station loads software, the above four items are set as follows:

User name:	OMU
Password:	OMU
Access path:	Required to include the file path specified in the software uploading/downloading command.
Access authority:	The directory to be uploaded must be set as readable and writable.

2) Check whether OMU BOOTP is normal

OMU obtains the IP address of a base station by means of BOOTP request. If this process fails, OMU will not be able to obtain the IP address of the base station and naturally cannot log on to the FTP server of BAM. Usually, a disconnected link, wrong route or configuration data error may lead to the failed BOOTP process. These should be eliminated one by one. For details, please refer to "5.1 OML Signaling Fault".

II. Abnormal halt of file loading by the board

All load files must have the file headers in stipulated format, in which the file ID and file version must be consistent with the corresponding field in the activation command sent by OMC. Otherwise, the board will consider the software actually downloaded as inconsistent with that to be loaded and reports abnormality error.

4 Base Station Initialization Failure Fault

4.1 Description of fault

The base station, when powered on, fails to be initialized, which makes it unable to be in normal service. Once such a fault occurs, the ACT indicators on some boards flashes quickly.

4.2 Fault Analysis and Location

There are quite a lot of factors leading to failed initialization of a base station, but in summary, the following aspects can be taken into consideration to locate and solve those problems.

I. Link fault

The prerequisite for successful initialization of a base station is that an ATM link should be successfully established between the BCIM of the base station and XIE board of BSC. And the BCIM board of the base station is required to successfully intercept the link configuration of the XIE board of BSC and establish the corresponding IMA/UNI link. If the BSC configuration data are wrong (or no corresponding physical link configured), then BCIM cannot make a successful interception and this leads to failed link establishment.

In addition, the base station BOOTP failure and failed establishment of an OML may lead to unsuccessful initialization of the base station. For such a case, please refer to "5.1 OML Fault".

II. Clock fault

After a base station has successfully established an OML, BSC will send corresponding configuration data. In this case, some boards of the base station must have correct clock signals before they are in normal service. Thererfore, check is necessary when a base station fails to be initialized after the configuration is sent.

1) Whether the clock signals of a base station are correct.
2) Whether the clock output of BCKM is normal.
3) Whether BCKM and GPS or GLONASS antenna are well connected.
4) Whether the captured GPS or GLONASS satellites are more than 4.

For the above (1) and (2), please refer to "6.2 BTS Control & Clock Module (BCKM)". As for (3), please refer to "7.2 Satellite Antenna Feeder Part". (4) may be caused by geographical position. If it is found that the captured GPS or GLONASS satellites are not more than 4, the base station may not be able to obtain reliable clock signals.

III. BCPM Configuration Data Error

If the BCPM board configuration data sent by a base station are wrong, the base station may fail to be initialized. Please locate such a fault as follows:

1) Whether BCPM board No. and its physical slot form one-to-one correspondence.
2) Whether the cell parameters of a channel board are correctly configured.

3) Whether the chip parameters of a channel board are correctly configured.
4) Whether the daisy chain of a channel board is correct.
5) Whether the traffic link of a channel board is correctly configured.

Confirm the above and configure correct data again.

IV. BTRM configuration data error

BTRM configuration data error may also lead to failed initialization of a base station, therefore various parameters must be carefully checked, such as the board No., cell No., cell resource pool No., optical interface No., ect. Of BTRM. Please confirm them and configure correct data again.

V. Board physical connection error

That a base station fails to be initialized as a result of physical connection error may be caused by the following:

1) Various boards or modules have not been correctly installed and need installing well.
2) The optical fiber connection between BRDM and BTRM is faulty. Please refer to "6.2 Processing of Common Board Faults".

5 Signaling Link Fault

5.1 OML Signaling Link Fault

5.1.1 Description of Fault

After a base station is powered on, such faults occurred, for example, failed BOOTP, failed establishment of the OML with OMC or OML broken link alarm during the normal operation of a base station. In this case, you may observe at the near-end and OMC far end maintenance consoles of a base station that the "OML Signaling Link Fault" alarm occurs.

5.1.2 Fault Analysis and Location

The OML connection of a base station begins with the BCKM of the base station, passes BCIM of the base station, the XIE and MUX of BSC, LPU and MPU of the switching frame, and ends with the background (BAM). Therefore, any chain fault in this route may lead to an OML fault in the base station.

I. Communication link fault between the BCKM board and BCIM board

For details, please refer to the board communication link fault in "6.2 Processing of Common Board Faults".

II. Abnormal IMA group or UNI link status

If the physical layer of an OML is connected by means of E1, it can be configured as IMA mode or UNI mode as required. If there is incorrect IMA group status or UNI link status, OML fault may occur.

At the far end OMC client or near-end maintenance console, you may query the special status of a board to obtain the IMA group status or UNI link status.

If there is abnormal IMA group status or UNI link status, please check point by point:

- Whether E1 link is normal. This can be done by means of loopback test.
- In the case of IMA, it is necessary to make sure whether the N pair of E1s in the BSC IMA group corresponds to that in the base station IMA group (N=1~8).
- Check whether the IMA group configuration of BSC and that of the base station are consistent.

III. VCI configuration error of CMUX board of BSC

The prerequisite for an OML to be established in a base station is that there should be a successful BOOTP request, which demands a unique MAC address field. If there are repeated data when BSC configures MUX with VCI information, the MAC field in the BOOTP request packet may be made not unique. Thus, the base station BOOTP fails and the OML cannot be established.

Processing method: check the configuration data of BSC to ensure the correctness and uniqueness of the configuration data.

IV. Route information configuration error

The OML in a base station bridges two IP gateways, one being MPU of BSC switching frame and the other being MUX of BSC BM frame. And the uplink and downlink route table information are different from each other. If any gateway is configured with wrong information, the OML will fail to be established in a base station. What is typical is that TCP connection of an OML cannot be established after the base station BOOTP request has succeeded. For such a case, please check in turn the route information of the above-mentioned chains. First check the route information of BAM to see whether it can correctly connect with the MPU of a switching frame. Then, check the route inforamtion of MUX to see whether it can connect downward with a base station and upward with a BAM. If the route configuration is wrong, then modify the route configuration of the switching frame and the MUX route data of BSC.

V. Related data configuration error of a far end OMC

During the OML establishment in a base station, the far end OMC acts as both BOOTP Server and TCP Server. During the base station BOOTP, the OMC is required to configure local BOOTP related information based on the data configured in BSC. And this group of BOOTP information is required to be unique and consistent with the data configured in BSC.

If an OMC is configured with wrong BOOTP information, the MAC field contained in BOOTP request packet of a base station will not correspond to the BOOTP information configured in OMC. And this results in failed BOOTP request of a base station and an OML cannot be established.

Solution: Query the BOOTP information of this base station at the far end OMC, compare it with the data configured in BSC and modify those inconsistent ones.

VI. Far end OMC fault

During the OML establishment in a base station, the far end OMC acts as both BOOTP Server and TCP Server. Therefore, any far end OMC fault may lead to the OML fautl of the base station. Possible OMC faults include:

1) BAM halts or BAM process is not started. In this case, it is necessary to restart BAM or start a BAM process.
2) The loading process of BAM is abnormal. In this case, it is necessary to restart the loading process of BAM.
3) The low layer communication process (Exchange Server) of BAM is abnormal. In this case, it is necessary to restart it.

5.2 Abis Signaling Link Fault

5.2.1 Description of Fault

When a base station is in service, the Abis signaling link between the base station and BSC cannot be established or broken link occurs to the running base station. And you can observe at the OMC alarm console that the "Abis signaling link fault" alarm occurs.

5.2.2 Fault Analysis and Location

I. Abnormal IMA group or UNI link status

For details, please refer to "5.1 OML Signaling Fault".

II. Abis signaling link configuration parameters are incorrect

If the IMA group status or UNI link status is normal and the base station has obtained the configuration data, you may check whether the Abis signaling link configuration parameters are normal.

Abis signaling link is in the mode of IPOA and needs configuring with the following parameters: PVC parameters (VPI and VCI) of and TCP/IP address (IP address, subnet mask and TCP port No.) of the Abis signaling link. In addition, it is necessary to make sure that the PVC used in the Abis signaling link is different from that used in Abis services.

III. BSC abnormality

When any fault occurs to BSC, the base station will generate the "Abis Signaling Link Fault" alarm.

6 Part Module Fault

6.1 Description of Part Fault

6.1.1 Finding of Part Fault

This section describes how to find a part fault and how to deal with specific part fault will be given in the following sections.

The parts described here include the base band frame board, radio frequency module, PSU, antenna feeder equipment, etc. If any fault occurs to them, the fault information can be obtained by means of the corresponding alarm box, maintenance console and part indicator.

6.1.2 Common Processing Flow to deal with Part Fault

The common processing flow to deal with part faults observes the principle of "From the outside to the inside". The transmission link check and GPS or GLONASS receiving signal check belong to outside check while the check of various boards or modules belong to cabinet inside check. This division aims to achieve a clear presentation and the outside check is actually integrated in the cabinet part check.

I. External check

1) Power check

Mainly check whether the –48 DC input at the top of the equipment is normal. For details, please refer to "2.2 Maintenance Guide".

2) Transmission link check

Check whether the transmission link between the BCIM in a base station and the XIE board in a BSC is normal. For details, please refer to "4.3 BTS Control & Interface Module (BCIM)".

3) Check of GPS or GLONASS receiving signal

GPS or GLONASS signals are received through the GPS or GLONASS antenna feeder system and sent to the BCKM board, whose clock unit will process them. For details, please refer to "4.4 BTS Control & Clock Module (BCKM)".

II. Check of cabinet parts

First check the PSU module of the power frame, then the boards (including BCIM, BCKM, BCPM, BRDM and BTRM) and at last various radio frequency parts (including BHPA, CDU, RLDU and antenna feeder system) which form a radio frequency channel.

1) Check of power supply

Mainly check the PSU module of the power frame. If the PSU module is found faulty, handle it as described in "4.12 Power Supply Unit (PSU)" and check whether the -48V DC input at the top of the equipment is normal.

2) Board check

Check the BCIM board and transmission link. Only when the two parts are normal can the base station establish a normal connection with BSC.

Check the BCKM board and GPS or GLONASS receiving signals. Only when the two parts are normal can the other boards in a base station work normally.

Check whether the BCPM board works normally.

Check whether the BRDM board works normally. Only BRDM works normally can BTRM works normally.

Note:

Various boards in a base station have something in common, therefore their possible faults will be similar . When locating a board fault, please first refer to "4.2 Processing of Common Board Faults". If the problem still cannot be solved, please refer to the other parts in this chapter based on different kinds of board.

---

3) Check radio frequency parts

Transmission channel: the signals of the BTRM are amplified by the BHPA module and sent to the CDU to combine. Then, they are output to the antenna feeder and transmitted.

Receiving channel: the radio frequency signals are received through the antenna feeder system and sent to the CDU. Then, the RLDU receives and splits them, and sends them to the corresponding BTRM for processing.

Check the BHPA, CDU, RLDU and the antenna feeder system according to the above describtion of transmission/receiving channels. If any fault occurs to some part, handle it as described in corresponding part in this chapter based on the part name.

6.2 Processing of Common Board Faults

6.2.1 Description of Fault

Common board faults mainly include:

- Wrong configuration of board parameters.
- Faulty board communication link.
- Abnormal board temperature.
- Excessively high CPU occupation rate.
- Interrupted escape serial port.
- Failed initialization of minor board components.
- No signals at the optical interface.
- CELL BUS clock lost.
- Excessively high CELL BUS frame error rate.
- Faulty CELL BUS driving components.
- Board reset.

The above-mentioned faults will all have corresponding fault alarms.

6.2.2 Fault Locating & Eliminating

I. Automatic configuration of base station failure

After the base station succeeds in the BOOTP request and establishes the OML with the OMC, check whether the base station locally has its configuration file. If it has, the configurations will be sent locally. If it has not or local configuration data are wrong, the BCKM board will download the base station configuration file from a far end OMC.

If the base station configuration file fails to be downloaded, the board cannot obtain correct parameter configuration and the base station cannot be in service. Possible causes are as follows:

1) OMC is not configured with the correct configuration file loading information or the configuration file is incorrect.
2) There is no corresponding base station configuration file in the loading file directory configured in OMC.
3) The FTP Server of OMC is not started or does not run normally.
4) Such data as the file path, attribute information, user informatioon corresponding to the FTP Server on OMC are not correctly configured.

In this case, it is necessary to eliminate the above possible causes one by one (perform related operations via the OMC maintenance console). For other possible fault causes and solutions, please refer to "3.2 Software Downloading Failure Fault".

II. Faulty board communication link

When powered on, the boards will be initialized. After that, they (excluding the BCKM) will requrest the OMU on the BCKM for its configuration. After receiving correct configurations, the board begins to work normally. If the ALM and ACT indicators flash on the frequency of 4Hz, there is some fault occurring to the communcation link between the board and the OMU.

1) If an alarm occurs to some board (for example, the BCIM board) alone, while other boards works normally .a fault may occur to this board. Then, it is necessary to check whether the board is well plugged. If the TRX module is faulty, it is necessary to check whether the optical fiber connection is good, then, please reset this board. If the problem still cannot be solved, the faulty board needs replacing.
2) If such an alarm also occurs to other boards, it may be a BCKM fault, which will be handled as described in "4.4 BTS Control & Clock Module (BCKM)".
3) If the problem still cannot be solved, after the above two steps the fault can be located to a base band frame backplane and this backplane needs replacing.

III. Abnormal board temperature

If the temperature of the base band frame board becomes abnormal, it is necessary to make sure whether the fan module used for cooling the base band frame works normally and whether the duct is blocked. If the temperature of a BTRM becomes abnormal, it is necessary to make sure whether the corresponding BTS Radio Frequency Fan Module (BRFM) works normally.

If the fault remains the same after the above reasons have been eliminated, it can be located to the corresponding board, which needs resetting. If the fault still exists, the corresponding board needs replacing.

IV. No signal at the optical interface

No signal at the optical interface. Mostly means there are something wrong between the BRDM board and the BTRM board.First check related optical interfaces to see whether any optical interface has been configured without any optical fiber inserted, whether the boards or modules on bothl sides of the optical fiber is normal and the optical fiber is damaged or broken. If there is any of such cases hanppened, please refer to the corresponding part in this chapter and handle it. After other possible reasons have been eliminated, it can be located to the corresponding board or module, which should be reset. If the fault still exists, the corresponding board or module needs replacing.

V. Other faults

Other possible common faults include:

Board resetting, excessively high CPU occupation rate, link to escape serial port damaged, initialization of minor board components failure, CELL BUS clock lost, excessively high CELL BUS frame error rate and CELL BUS driving components malfunction.

If the above faults seldom occur or are recovered very soon, then make a further observation. If they occur frequently (or have been occurring continuously) and have seriously affected the function of a base station, then please observe whether there is any other fault occurring at the same time and locate it. Otherwise, reset the corresponding board. If the fault still exists, the corresponding board should be replaced.

6.3 BTS Control Interface Module (BCIM)

6.3.1 Description of Fault

1) The base station, when powered on, cannot establish the OML with the OMC and BOOTP request fails.
2) During the running of the base station, the communication links operation & maintenance, signaling or service are interrupted. In this case, you may observe the E1, IMA group or IMA/UNI link alarms. at the near-end maintenance console .

6.3.2 Fault Analysis and Location

I. The BCIM does not work normally

When the BCIM is powered on and, is initializing, the RUN, ALM and ACT indicators are lighted. If the initialization fails, the watchdog will reset the board. After the board has been initialized, it sends a reset report to the OMU to request for configurations. In this case, the RUN indicator flashes on the frequency of 4Hz. After the board receives the configuration and is in service, the RUN indicator will flash on the frequency of 0.5Hz.If the ALM and ACT indicators flash on the frequency of 4Hz after initialization, there must be some fault occurred to the communication link between the board and the OMU. If the fault only occurs to the communication link between the board and the OMU, the cause may lie in the board. Then, please check whether the board is well plugged. If faults occur to the communication link between other board and the OMU at the same time, there may be some faults in BCKM or base

band frame backplane Then, please check whether the BCKM is well plugged and runs the correct software.

II. E1 trunk cable fault or connection error

The operation & maintenance, signaling and traffic link between the base station and OMC/BSC are all transmitted via the E1 trunk cable through the BCIM. E1 trunk cable works in the mode of IMA or UNI. The E1 trunk cables between the base station and BSC must be correctly connected. When there are multiple routes of E1 to be configured, the connections order between the base station and BSC must be in the same as the routes.

E1 trunk cable fault and connection order error can be checked by means of the E1 loopback test.

The configuration and status of IMA/UNI can be obtained by querying the specific status of the boards in a base station.

III. BSC interface board (XIE) fault

If it can be confirmed that E1 trunk cable is good and the connection order is correct after E1 loopback test, but the BCIM cannot intercept the configuration, it may be a BSC interface board (XIE) that is faulty. And this fault can be eliminated by resetting or replacing the XIE.

IV. BSC and OMC fault or configuration error

If the IMA group and link status of the BCIM are found normal by means of querying the specific status of a base station board, but the OMU BOOTP request fails, or the BOOTP request succeeds but the TCP connection fails to be established, it may be BSC and OMC faults or data configuration error. For details, please refer to the locating of "5.1 OML Signaling Link Fault" and "5.2 Abis Signaling Link Fault".

6.4 BTS Control & Clock Module (BCKM)

6.4.1 Description of Fault

- The OML fails to be established between the base station and the OMC.
- The Abis signaling link cannot be established between the base station and BSC.
- The base station clock does not work normally.
- Other possible BCKM faults.

6.4.2 Fault Analysis and Location

I. The OML fails to be established between the base station and the OMC

If the base station BOOTP request succeeds, but the OML of the base station cannot be correctly established, the BCKM board of the base station will keep on performing BOOTP request operations. To locate the reason that the base station OML cannot be established, please refer to "5.1 OML Fault".

II. The Abis signaling link cannot be established between the base station and BSC

The Main Control (MC) unit on the BCKM is responsible for establishing the Abis signaling link with the BSC. If this link fails to be established, please refer to "3.5 Abis Signaling Link Fault".

III. The base station clock does not work normally

The clock unit (CLK) on the BCKM is responsible for receiving and processing the GPS or GLONASS clock signals. Possible clock unit faults are as follows: clock module hardware faults, satellite antenna feeder system fault, reference clock source driving fault, clock reference driver source error and main clock lose lock.

When the above-mentioned clock faults occur, first check the satellite antenna feeder system and then check the configurations of the clock reference source. If it does not work, please reset the BCKM. If the fault still exists, this BCKM needs replacing.

IV. Other faults of the BCKM board

The main cabinet PSU fault and base band frame fan module fault are also reported to the BCKM and listed with other faults. If it is the base band frame fan module fault, it is necessary to replace the fan module. If it is the main cabinet PSU fault, handle it as described in "6.10 Power Supply Unit (PSU)".

6.5 BTS Channel Processing Module (BCPM)

6.5.1 Description of Fault

- System clock error.
- Reverse data error of the Gigabit Ethernet link.
- FPGA status error.
- Internal error of the channel processing chip.
- Clock error of the channel processing chip.
- Board hardware module error.

6.5.2 Fault Analysis and Location

I. System clock error

To any system clock error, please handle it as described in "6.4 BTS Control & Clock Module (BCKM)".

II. Gigabit Ethernet link reverse data error

To any Gigabit Ethernet link reverse data error, it is necessary to check whether the BRDM connected via the backplane with this BCPM works normally. Please handle it as described in "6.6 BTS Resource Distribution Module (BRDM)".

III. FPGA status error

To any FPGA status error, it is necessary to reload the software of FPGA. If the fault still exists, it is the related board hardware being faulty and the board needs replacing.

IV. Other faults

To other faults and those which cannot be eliminated after the above procedures, please first reset the corresponding BCPM. If the equipment still cannot work normally, the fault may be located to this BCPM and this board needs replacing.

6.6 BTS Resource Distribution Module (BRDM)

6.6.1 Description of Fault

- FPGA status fault.
- The low layer communication link between BRDM and BTRM is faulty.
- Abnormal clock signal.
- Board hardware fault.

6.6.2 Fault Analysis and Location

I. FPGA status fault

To the FPGA status error, it is necessary to reload the software of FPGA firstly. If the fault still exists, it is a board hardware fault and the board needs replacing.

II. The low layer communication link between BRDM and BTRM is faulty

The low layer communication link fault between BRDM and BTRM is usually caused by an excessively high communication link error code rate or abnormal running of the board. You may plug/unplug the optical fiber or replace the BTRM. If this fault exists for a long time, please reset or replace this BRDM.

III. Abnormal clock signal

The clock used for the switching of BRDM control services comes from the BCKM. If the BCKM works normally(abnormally), this fault may be occurred. First check whether BCKM board phase-lock is normal. If it is normally, try to load FPGA logic. If the fault still exists after the above, procedures, it means that some faults may occur to the hardware and this BRDM needs replacing.

IV. BRDM boad hardware fault

The BRDM board hardware fault usually is due to components being damaged or wrong logic being loaded and the board needs replacing.

6.7 BTS Transceiver Module (BTRM)

6.7.1 Description of Fault

- Overexcited receiving channel
- Software phase-lock lost
- Abnormal forward link power
- Abnormal reverse signal strength indication
- RS485 link fault alarm

- Other BTRM faults

These include the transmission channel clock lost, hardware phase-lock loop lost, abnormal I_0 value and digital general inverter fault.

- RF fan module faults

These include the fan monitor board failure to read the temperature sensor, fan running abnormally, fan monitor board temperature alarm, invalid speed control of the fan monitor board. And BTRM becomes less sensitive.

6.7.2 Fault Analysis and Location

I. Overexcited receiving channel fault

The processing procedures are as follows. If the problem still cannot be solved in a certain step, please handle it as described in the next one.

1) If any interference leads to the overexcited receiving channel fault, it is necessary to reduce the interference from outside as much as possible instead of processing the base station.
2) If it is the FPGA logic fault that leads to overexcited receiving channel, it is necessary to reset the BTRM.
3) Replace the BTRM.

II. Software phase-lock losing lock

The software phase-lock lost, if not caused by hardware, usually can be recovered automatically within 5 minutes. If this fault exists for a long time, handle it as follows. If this problem still cannot be solved in a certain step, please handle it as described in the next one.

1) Eliminate the corresponding BRDM fault.
2) Replace the corresponding optical fiber.
3) Replace this BTRM.

III. Abnormal forward link power fault

Abnormal forward link power fault may lead to adjacent area interference, which should be handled as follows. If the problem still cannot be solved in a certain step, please handle it as described in the next one.

1) Check whether the BRDM, BCPM or BCKM are plugged/unplugged well. If this fault is caused by any of these reasons, no additonal processing is necessary.
2) Replace the corresponding optical fiber.
3) Eliminate the faults of the BRDM, BCPM and BCKM.
4) Replace this BTRM.

IV. Abnormal reverse signal strength indication

Abnormal reverse signal strength may lead to reverse traffic link disconnecting and it is necessary to check the antenna feeder system.

V. RS485 link fault

RS485 link fault may make the alarm information of a fan monitor board unable to be reported to the BTRM and closed loop power control invalid. The processing procedures are as follows. If the problem still cannot be solved in a certain step, please handle it as described in the next one.

1) Power off and reinstall the corresponding BHPA module. Then, power it on again.
2) Replace the fan monitor board (or the corresponding BRFM).
3) Replace the BTRM.
4) Replace the radio frequency backplane.

VI. Other BTRM faults

Other BTRM faults mainly include:

Transmission channel clock lost, hardware phase-lock lost, abnormal I_0 value and digital general inverter fault.

If these faults occur and cannot be recovered after resetting the BTRM, please replace the corresponding BTRM.

VII. BRFM fault

The BRFM faults mainly include:

The fan monitor board failed to read the temperature sensor, fan running abnormally, fan monitor board temperature alarm and invalid speed control of fan monitor board.

The processing procedures are as follows. If the problem still cannot be solved in a certain step, please handle it as described in the next one.

1) Check whether the fan face shield connection is correct and reliable.
2) Replace the fan monitor board or the corresponding BRFM.

6.8 BTS High Power Amplification (BHPA) Module

6.8.1 Description of Fault

- No radio frequency signals output.
- Abnormal radio frequency signals, including low output power and output spectrum out of standard range.

6.8.2 Fault Analysis and Location

I. No radio frequency signals output

No radio frequency signals output from the BHPA module are mainly caused by self-shield shutdown, self damage or abnormal cable/connector connection.

1) Self-shield shutdown

For the sake of self-shield, the BHPA module will shut down automatically when there is a power amplification alarm or an excess temperature alarm.

a) Power amplification overexcitation alarm

Power amplification overexcitation alarm reflects the levels of the input BHPA radio frequency signals. When the levels of the input radio frequency signals are between +0.5dBm and +1.5dBm, the BHPA will generate an overexcitation alarm but will not shut down automatically. When they are more than +2.5dBm, the BHPA will generate an overexcitation alarm and shut down automatically. If the external alarm conditions no longer exist, the BHPA will resume to normal.

b) Excess temperature alarm of power amplification

Excess temperature alarm of power amplification reflects the temperature rise of a power amplification base plate. When a excess temperature alarm of power amplification occurs, the BHPA will shut down automatically. When the temperature of the power amplification base plate is 95°C ± 5°C, an excess temperature alarm will occur to the BHPA and the BHPA shuts down automatically. The restoration threshold of the excess temperature alarm is 80°C ± 5°C.

At the OMC or the near-end maintenance console of a base station, query the current alarm of the base station to confirm whether there exists a "Power amplification overexcitation or excess temperature" alarm.

The troubleshooting process is gradually completed. If the fault cannot be eliminated in a certain step, please handle it as described in the next one.

- Check whether the radio frequency output power of the BTRM is excessively high. If it is, please reduce it.
- Check whether the fan corresponding to BHPA works normally.
- Check whether the cables between the power amplification module inside BHPA and the radio frequency fan monitor board are normally connected.

2) Abnormal cable/connector connection

BHPA uses blind plug/connector, which is connected via the backplane with the BTRM, CDU and power supply. And abnormal input/output connection will lead to no radio frequency signals output from BHPA.

The troubleshooting process is gradually completed. If the fault cannot be eliminated in a certain step, please handle it as described in the next one.

- Plug/unplug the BHPA again to ensure that it is blindly plugged well and normally connected with the backplane.
- Check whether the cables between BTRM and BHPA, between BHPA and CDU and between the power supply and BHPA on the backplane. connected well.

3) Self damaged

If the BHPA is normally powered, the cables/connectors are connected normally and input signals are normal, but no radio frequency signal is output from BHPA, the BHPA is considered damaged and needs replacing.

II. Abnormal radio frequency output signals

Abnormal BHPA radio frequency output signals means that the output power is smaller than the rated one and the Adjacent Channel Power Ration (ACPR) of the output signals is. out of function range. The fault are mainly caused by decrease in power amplification gain, certain power amplification components being damaged or excessively high output power. Decrease in gain will generate a power amplification gain decrease alarm. Excessively high input/output power will lead to diffused power amplification output spectrum and ACPR indices out of function range.

Power amplification gain decrease alarm reflects how a BHPA amplification channel works. The alarm threshold range is decrease in gain by 3~6dB. If the BHPA gain decreases over 6dB, a gain decrease alarm will occur. If the BHPA gain decreases less than 3dB, no gain decrease alarm will occur. If the BHPA gain decreases by 3~6dB, it is normal that a gain decrease alarm occurs or not.

At the OMC or the near-end maintenance console of a base station, query the current alarm of the base station to confirm whether there exists a "Power amplification gain decrease" alarm.

The troubleshooting process is gradually completed. If the fault cannot be eliminated in a certain step, please handle it as described in the next one.

- Check whether the output power of the BHPA is excessively high. If it is high, please reduce it.
- Replace the BHPA.

6.9 Receiving Line Division Unit (RLDU)

6.9.1 Description of Fault

- Antenna standing wave alarm.
- RLDU fault.

6.9.2 Fault Analysis and Location

I. Antenna standing wave alarm

The antenna standing wave alarm in a sector means the mismatch of an antenna feeder system. If an antenna fault leads to higher antenna standing wave or the antenna and feeder are not normally connected, an antenna standing wave alarm in the sector will occur.

The troubleshooting process is gradually completed. If the fault cannot be eliminated in a certain step, please handle it as described in the next one.

- Check whether the antenna feeder connection and antenna are normal.
- Check whether CDU works normally.
- Check whether the connection cable between CDU and RLDU is normal.
- Check whether the power indicator on the RLDU panel works correctly.
- Replace the RLDU.

II. RLDU fault

If the RLDU fault alarm occurs, the faulty RLDU needs replacing.

6.10 Power Supply Unit (PSU)

6.10.1 Description of Fault

- The PSU does not work or work abnormally
- PSU fan fault.
- PSU output over-voltage fault.
- PSU input under-voltage fault.
- PSU overheat fault.

6.10.2 Fault Analysis and Location

I. The PSU does not work or not work normally

If the 3 indicators on the PSU panel are all off or flash, it shows that the PSU is not in normal status and an unknown fault occurs. In this case, the PSU needs replacing.

II. PSU fan fault

If the PSU fan runs abnormally, the red alarm indicator (Alm) on the PSU panel will be on and the fan fault alarm will be reported at the same time. In this case, the PSU fan needs replacing.

III. PSU output over-voltage fault

If the PSU output is more than 30.5±0.5V, the PSU will automatically stop working. And the red alarm indicator (Alm) on the PSU panel will be on with the output over-voltage fault alarm reported at the same time. This fault status cannot be recovered automatically and the PSU needs replacing.

IV. PSU input under-voltage fault

If the PSU input voltage is smaller than 36.5±1V, the PSU will stop outputting any power and the red alarm indicator (Alm) on the PSU panel will be on. Meantime, the output over-voltage fault alarm will be reported. When the input voltage is higher than 38.5±1V, the PSU will automatically resume to normal.

V. PSU overheat fault

If the PSU runs at an excessively high ambient temperature or the heat dissipation system does not work normally, there will also cause an excessively high temperature inside the PSU. And the PSU will stop its output power and the red alarm indicator (Alm) on the panel will be on. Meantime, the overheat fault alarm will be reported. When the internal temperature decreases to certain degree, the PSU will automatically resume to normal.

If the working ambient temperature is normal, the PSU fan will run normally. But if the PSU is continuously overheated, this module can be considered as faulty and needs replacing.

7 Antenna Feeder Fault

7.1 Radio Frequency Antenna Feeder Part

7.1.1 Description of Fault

- Standing wave alarm.
- At the antenna port, there is no or too low transmission power.

7.1.2 Fault Analysis and Location

If this fault occurs, check the standing waves and transmission powers (including the testing of the power from the CDU coupled output interface) from the CDU antenna port to the antenna terminal of the base station step by step . Meantime, check whether the connectors are installed correctly and fastened well, and whether the sealing gum gets loosen or even fallen off. The specific treatment procedures are as follows:

1) Check whether the antenna feeder system is penetrated by water.
2) Check whether the antenna, feeder and jumper are damaged (such as short circuit or open circuit).
3) Check whether the base station antenna and jumper connection are open or in poor contact.
4) Check whether the jumper and feeder connection are open or in poor contact.
5) Check whether the jumper and connector connection at the top of the equipment are open or in poor contact.
6) Check whether the jumper inside a cabinet and the CDU connection are open or in poor contact.
7) Check whether the feeder or jumper connector is not correctly installed on site.

7.2 Satellite Antenna Feeder Part

7.2.1 Description of Fault

- Antenna open circuit alarm.
- Antenna short circuit alarm.

7.2.2 Fault Analysis and Location

When this fault occurs, it is necessary to check whether the connectors are installed correctly and fastened well, and whether the sealing gum gets loosen or even fallen off .The specific treatment procedures are as follows:

1) Check whether the satellite antenna feeder system is penetrated by water.
2) Check whether the satellite antenna, feeder and jumper are damaged (such as the short circuit or open circuit).
3) Check whether the satellite antenna feeder lightning protector is damaged.
4) Check whether the satellite antenna and jumper connection are open or in poor contact.

5) Check whether the jumper and feeder connection are open or in poor contact.
6) Check whether the jumper and connector connection at the top of the equipment are open or in poor contact.
7) Check whether the jumper inside a cabinet and the SMA connector connection on the BCKM panel are open or in poor contact.
8) Check whether the connection between the SMA connector on the BCKM panel and GPS/GLONASS receiving card is open or in poor contact.

Table of Contents

1 General Replacement Procedure

1.1 General Replacement Procedure of Boards

1.1.1 Preparation

1) Query Alarm

Before the replacement of a board, check the alarm information in BCKM at the local end maintenance console. After replacement check again and see if recovery alarms are generated.

2) Check version

Before the replacement of a board, check the versions of the board and its software. After the replacement, check again to make sure the versions are the desired ones.

3) Security precautions

Some of the boards or modules are vulnerable to static electricity. Please take anti-static measurements while operating on these boards and modules, e.g., put on well-grounded anti-static wrist strip and gloves.

4) Power off

Shut off the power supply for the related boards to be replaced and turn it on after the replacement.

The power supply of all boards in a base band subrack is controlled by the switch in the subrack. When replacing a board in the base band subrack:

- Turn off the base band subrack switch while replacing boards such as BCIM or BCKM (when only one BCKM is configured for the BTS).
- Do not turn off the base band subrack switch while replacing boards such as BRDM, BCPM or BCKM (when 2 BCKMs are configured in active/standby mode for the BTS).

5) Block sector carrier

Block the BTRMs that may be affected by the replacement of a board of the base band subrack.

No blocking/unblocking is necessary when switching on/off the power supply of a BTRM.

6) Commonly-used Tools

For the replacement of a board or module: a cross screwdriver that matches the M3 screw is required.

1.1.2 Taking out the Board

1) Turn anti-clockwise the fastening screws at the upper and lower ends of the board panel until they go off the cabinet.
2) Hold the handle bar of the board. Quickly and simultaneously pull it out and rotate for 45
3) Pull out the board along the slot and put it into the anti-static packing (keep bear hands off the printed circuit board).

1.1.3 Installation Preparations

1) Wear the anti-static wrist strap and gloves and make the grounding terminal well grounded.
2) Before a board is installed, take the board out of the anti-static packing box (do not touch the surface of the printed circuit board) and check whether there is any damage or deciduous element.

1.1.4 Installing a Board

1) Locate the slot that the board is to be inserted by name on the board name plate of a frame.
2) Hold the front panel with one hand and plug it into the board bottom along the guide slot. The panel and the frame surface should be kept aligned. Then, press inward the upper and lower front panels.
3) Turn clock-wise the fastening screws on the panel until they are tightened.
4) After the replacement, turn on the power (in case of a blocked BTRM, unblock it) and view the indicator of a corresponding board to judge whether the board is running normally.

1.1.5 Replacement Completed

After the replacement, the following three factors can help us judge whether it is successful:

1) View whether related indicator status is normal. For details, refer to the sub-module “Board Indicator and DIP Switch” of the “Base Station Maintenance” module in this manual.
2) View a local-end maintenance console or OMC far end maintenance console to see whether corresponding base station alarms have disappeared and any recovery alarm has occurred.
3) Conduct a dialing test with a mobile station to judge whether the base station works normally.

1.2 General Backplane Replacement Process

1.2.1 Preparation

1) Security precautions

Power supply board supports hot plugging. However, please follow every instruction when replacing a power supply board. Prevent the board from being damaged by static electricity. A backplane must be replaced with the power off and strictly based on the operation procedures. Put on wrist strap and gloves and connect reliably the grounding ends of them with the ground (the switch housing).

2) Power off

Power off the whole BTS cabinet before the replacement.

3) Commonly-used Tools

Before the replacement of a backplane, a cross screwdriver must be prepared to match the M3 screw.

1.2.2 Replacing the Backplane

I. Dismount the BTS cabinet door

- Unscrew the fastening screws on the related cabinet door.
- Dismount the related cabinet door with two hands.
- Put gently the dismounted cabinet door at a reliable location.

II. Remove the board or module on a backplane

Unplug all boards or modules on a backplane.

III. Unplug the backplane cable

Unplug the cables on the back of the backplane, such as the data line, alarm cable, power cable, etc. and record the cable connection modes in detail.

IV. Removing a board

1) Unscrew the fastening screws on the backplane and cabinet. Do put the screws where they should be to prevent them falling into the cabinet and leading to short circuit.
2) Dismount the backplane gently with two hands.

Caution:

1) To dismount a base band frame backplane, first take off the metal shielding can over the backplane. To install a base band frame backplane, install first the backplane and then a metal shiedling can.
2) Because the backplane is very big and heavier than a common board, there must be some help in dismounting or installing the backplane lest any accident should occur.

V. Preparations for backplane installation

Before a backplane is installed, take the backplane out of the anti-static packing box (do not touch the surface of the printed circuit board) and check whether there is any damage, such as broken line and short circuit.

VI. Installation & fixation of a backplane

Put the backplane close to the corresponding plug-in frame and align the screws. Then, take out of the screws when the backplane is dismounted and fix the backplane on the frame.

VII. Backplane distribution

Connect various cables together in strict recorded cable connection order.

VIII. Backplane switch setting

If there are switches and jumpers on a backplane, set the switches and jumpers on the new backplane according to the original one.

IX. Stick the board name plate of the backplane

X. Power on the new backplane

Power on the backplane by means of a corresponding switch on the switch box and observe whether the power-on is normal.

XI. Power off and insert a board

If a backplane is normally powered on, turn off the power and insert carefully all the dismounted boards or modules into the backplane slot.

XII. Power on and observe the working statuses of various boards or modules

XIII. Conduct a conversation test with a mobile station and view whether the conversation is normal

2 Board and Part Replacement

2.1 Overview

This chapter details the precautions and procedures when various boards and parts of cBTS3612-800 are replaced. For the common parts of the replacement, please refer to “Chapter 1 Universal Replacement Process”. This chapter will not describe again any content in “Chapter 1 Universal Replacement Process” unless it is worthy of special note.

Before various boards and parts are dismounted, usually unscrew the screws fastening the boards or parts with a cross screwdriver and tighten them when new boards or parts are installed. This procedure will not be specially described in later sections.

2.2 Replacement of BTS E1 Surge Protector (BESP)

I. Note

1) The replacement of a BESP will interrupt all services transmitted via this BESP.
2) BESP board should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the board.

II. Replacement Details

1) Shut off the base station power

Shut off first all the switches on the switch box of the base station and then -48V DC output of AC/DC power.

2) Dismount the BESP

Unplug the E1 trunk cables of two 25-pin interfaces on the BESP and unscrew the screws at the four corners of BESP to dismount the BESP at the top of the equipment. And unplug from the 37-pin interface the E1 trunk cable connected with BCIM.

3) Install a new BESP

Connect the trunk cables between BCIM and the new BESP, install the new BESP at the top of the equipment and connect the trunk cables at the 25-pin interface.

4) Re-power on

Start the -48V DC output of AC/DC power and turn on the switches on the switch box corresponding to the configured board or module.

5) Test

Observe the starting and running status of the base station and conduct a conversation test.

6) After replacement

If the new BESP has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BESP is completed.

2.3 Replacement of BTS Control Interface Module (BCIM)

I. Note

1) The replacement of a BCIM will interrupt all services transmitted via the BCIM.
2) BCIM should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the board.

II. Replacement Details

1) View the BCIM alarm and block corresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type and software/hardware versions of BCIM.

For a BTRM which will interrupt services, execute the command of sector carrier blocking or shut off its power.

2) Unplug BCIM

Pull the BCIM out of the slot.

3) Plug a new BCIM

Check and find that the impedance of BCIM matches DIP switch jumper J6 and S2~S9. Then, plug the new BCIM into a corresponding slot and wait to successfully reestablish links with BSC.

4) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

5) Test

Conduct a conversation test with a mobile station and view whether BCIM software version is the one to run normally.

6) After replacement

If the new BCIM has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BCIM is completed.

2.4 Replacement of BTS Channel Process Module (BCPM)

I. Note

1) The replacement of a BCPM will interrupt the current service processed by the BCPM.
2) BCPM should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the board.

II. Replacement Details

1) View the BCPM alarm

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type and software/hardware versions of BCPM.

2) Unplug the BCPM

Pull the BCPM out of the slot.

3) Plug a new BCPM

Plug a new BCPM into a corresponding slot.

4) Test

Conduct a conversation test with a mobile station and view whether BCPM software version is the one to run normally.

5) After replacement

If the new BCPM has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BCIM is completed.

2.5 Replacement of BTS Control & Clock Module (BCKM)

I. Note

1) cBTS3612-800 is generally configured with two BCKMs, one set as active and the other set as standby. When the active BCKM is faulty, it will automatically switch over to the standby BCKM. In this case, the active BCKM should be replaced. If one BCKM alone is configured in the base station, the replacement of BCKM will interrupt all services in this base station.
2) BCKM should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the board.

II. Replacement Details

1) View the BCKM alarm and block a corresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of this BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type and software/hardware versions of BCKM.

For a BTRM which will interrupt services, execute the command of sector carrier blocking or shut off its power.

📖 **Note:**

1. When a base station is configured with two BCKMs and the active/standby changeover is completed, skip this step.
2. If the local-end login is unsuccessful, it is unnecessary to view the fault type of BCKM.

---

2) Unplug the BCKM

Remove the GPS clock line and pull the BCKM out of the slot.

3) Plug a new BCKM

Plug the new BCKM into a corresponding slot and install the GPS clock line. If only one BCKM is configured, then you have to wait for the reinitialization of this site until it succeeds.

4) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

5) Test

Conduct a conversation test with a mobile station and view whether BCKM software version is the one to run normally.

6) After replacement

If the new BCKM has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BCKM is completed.

2.6 Replacement of BTS Resource Distribution Module (BRDM)

I. Note

1) The replacement of a BRDM will interrupt the current service processed by the BRDM.
2) BRDM should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the board.

II. Replacement Details

1) View the BRDM alarm and block a corresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type and software/hardware versions of BRDM.

For a BTRM whose services will be interrupted, execute the command of "BLK BTSCELL" with right parameters or shut off its power.

2) Unplug the BRDM

Remove the optical fiber and record its optical interface location. Then, pull the BRDM out of the slot.

3) Plug a new BRDM

Plug a new BRDM into a corresponding slot and the optical fiber into the corresponding optical interface location.

4) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

5) Test

Conduct a conversation test with a mobile station and view whether BRDM software version is the one to run normally.

6) After replacement

If the new BRDM has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BRDM is completed.

2.7 Replacement of BTS Fan Module (BFAN)

I. Note

The replacement of a BFAN will have some influence on the heat dissipation of a base band frame.

II. Replacement Details

1) Dismount the fan module and gently pull the fan frame out of the slot.
2) Take apart the damaged fan, but take care to put the screws away for later use.
3) Install a new fan and bind the distributions well again.
4) Gently push the fan frame into the slot until the fan frame panel and the rack fit well and fasten it.
5) If the BFAN is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

2.8 Replacement of Power Supply Unit (PSU)

I. Note

1) The power system made up of this power module has n+1 redundancy configuration. This achieves more reliable operation and one damaged module will not influence the normal operation of the system. Therefore, the damaged power module can be replaced without affecting the normal operation of the system. If any fault occurs to two or more modules at the same time, the normal operation of the whole base station may be affected as a result of the load.
2) When there is any fault indication or alarm on a module (unless there is special burning), do not replace it at once but make a preliminary judgement of the module fault based on the display status of the indicator on the module panel. Then, make a decision about the replacement. The specific operations are as follows:

a) Display description of the indicator: green indicator on (Vin): means that there is input voltage on the module. Red indicator on (Alm): any fault occurs to the module. Green indicator on (Vo): means that there is output on the module.

b) In normal cases, the two green indicators on the power module are on while the red indicator is off.

- When there is light load output from the system, some module may not work (namely, Vo indicator being off) as a result of flow equalization, but this cannot be considered as faulty.
- If the power module input green indicator (Vin) is on, but the output green indicator (VO) is off or flashes, check whether the faulty module is well installed and the upper and lower fastening parts on the panel are fastened clockwise. If not, reinstall them according to module fixture procedures. If the output green indicator (Vo) is still off, this module is faulty.

c) If the three indicators on the module panel are all off, check as follows:

- Check the indicator display statuses of other power modules in the same system. If all power module indicators are off, then check whether the input bus-bar (or connector) of the power system is powered on and the connection gets loose. If any problem exists, connect again and input.
- If there is any module indicator on or the power system input bus-bar is confirmed powered on, check whether the module is well installed and the upper

and lower fastening parts on the panel are fastened clockwise. If not, reinstall them according to module fixture procedures.

- If the indicator is still off after the above procedures, then this module is faulty.

d) If the input green indicator (Vin) and red indicator (Alm) on the module panel are off, but the output green indicator (Vo) is on, it shows that the module itself can normally output the power. If there are any spare parts, please replace. If no, this module still can be used without affecting normal powering performance.

e) If the red alarm indicator (Alm) on the module panel is on, but the output green indicator (Vo) is off, check in the following order:

- Check whether any input over-/under-voltage alarm occurs to the system monitor. If there is, the power module red indicator (Alm) normally will be on. Once the input voltage resumes to normal, the module will work normally.
- If the input voltage is normal, then check whether the fan on the PSU has stopped running. When the fan has not run for a long time, the module has excess temperature protection. In this case, this PSU fan must be replaced. If there is still any alarm after the replacement, it shows that this module has been damaged and needs replacing.

II. Replacement Details

1) View the PSU alarm

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type of PSU.

2) Unscrew the fastening screws of the PSU and unplug the faulty module from the power frame
3) Smoothly push a new module along the guide slot into the location of the faulty module until the module panel and the edge of the power plug-in frame are roughly aligned

If the input is normal, the module will start and communicate with BCKM within about half a minute after being plugged, and both the input green indicator (Vin) and output green indicator (Vo) on the panel are on.

4) Make sure that the new module works normally and fasten it.
5) After replacement

If the PSU is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

2.9 Replacement of BTS Radio Frequency Fan Module (BRFM)

I. Note

1) Turn off the power switch in the switch box corresponding to this BRFM. Note that a group of BHPA, BTRM and BRFM share one power switch.
2) When a new BRFM is installed, note to put the optical fiber into the gap at the right lower corner lest the optical fiber be damaged.

II. Replacement Details

1) Dismount the BRFM and unplug the cables connected with it.
2) Take apart the damaged fan, but take care to put the screws away for later use.
3) Install a new fan or a new BBFM and BBFL, and bind the distributions well again.

4) Assemble and fasten the BRFM.
5) If the BRFM is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

2.10 Replacement of BTS High Power Amplification Module (BHPA)

I. Note

1) The replacement of a BHPA will interrupt the service of the adjacent BTRM.
2) Turn off the power switch in the switch box corresponding to this BHPA. Note that a group of BHPA, BTRM and BRFM share one power switch.
3) Before the replacement of a BHPA, take apart the corollary BRFM. When this BRFM is installed again, note to put the optical fiber into the gap at the right lower corner lest the optical fiber should be damaged.
4) The power amplification module should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the module.

II. Replacement Details

1) View the BHPA alarm and block the corresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type of BHPA.

For a BTRM which will interrupt services, execute the command of sector carrier blocking or shut off its power.

2) Remove the corollary BRFM of the faulty BHPA
3) Unplug the faulty BHPA
4) Plug and fasten the new BHPA and then bend its handle ring so as to install the BRFM.
5) Install and fasten the BRFM.
6) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

7) After replacement

If the BHPA is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

2.11 Replacement of BTS Transceiver Module (BTRM)

I. Note

1) The replacement of a BTRM will interrupt any service it processes.
2) Turn off the power switch in the switch box corresponding to this BTRM. Note that a group of BHPA, BTRM and BRFM share one power switch.

3) Before the replacement of a BTRM, take apart the corollary BRFM. When this BRFM is installed again, note to put the optical fiber into the gap at the right lower corner lest the optical fiber should be damaged.
4) BTRM should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the module.

II. Replacement Details

1) View the BTRM alarm

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type and software/hardware versions of BTRM.

2) Remove the corollary BRFM of the faulty BTRM.
3) Unplug the optical fiber and record the corresponding optical interface location. Then, take apart the faulty BTRM.
4) Plug and fasten a new BTRM, and plug the optical fiber into the corresponding optical interface.
5) Install and fasten the BRFM.
6) Test

Conduct a conversation test with a mobile station and view whether BTRM software version is the one to run normally.

7) After replacement

If the new BTRM has passed all tests, related alarms disappeared and corresponding recovered alarms occurred, it shows that the replacement of a BRDM is completed.

2.12 Replacement of Receive LNA Distribution Unit (RLDU)

I. Note

1) The replacement of an RLDU will interrupt any service it processes.
2) Turn off the power switch in the switch box corresponding to this RLDU.
3) RLDU should be anti-static, therefore operations should be made strictly based on operation procedures. That is to say, wear an anti-static wrist strap and gloves and make the grounding terminal well grounded to prevent any static electricity damaging the unit.

II. Replacement Details

1) View the RLDU alarm and block the corrresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type of RLDU.

For a BTRM which will interrupt services, execute the command of sector carrier blocking or shut off its power.

2) Unplug the power cables and data cables on the faulty RLDU panel.
3) Unscrew the screws on the RLDU panel and take out the faulty RLDU along the slot
4) Plug and fasten the new RLDU along the slot, and set its S/W switch the same as that of the original RLDU.
5) Connect the power cables and data cables and bind them well.

6) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

7) After replacement

If the RLDU is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

Caution:

If the RLDU has not been plugged well and the screws not tightened, the transmitting/receiving indices of the base station may be made to decrease.

2.13 Replacement of Combining Duplex Unit (CDU)

I. Note

1) Before the operation, block the BTRMs connected with CDU at the maintenance console.
2) When dismounting/mounting the radio frequency transceiving cable on the CDU panel, take care not to damage any cable connector. When installing cables, fasten the connectors of various cables and keep them in good contact. Do not damage any connector.

II. Replacement Details

1) View the CDU alarm and block the corresponding BTRM

Connect a portable computer with the local-end maintenance software with the Ethernet interface of a base station BCKM and switch on Telnet to log on to the base station. Then, view and record the fault type of CDU.

For a BTRM which will interrupt services, execute the command of sector carrier blocking or shut off its power.

2) Check the location of the CDU to be replaced in thecabinet and the working status and type of CDU so as to avoid any mistake.
3) Dismount the cable connectors connected with the CDU module to be replaced and panel fastening screws.
4) Pull out the CDU and install a new one.

After the connectors and screws on the CDU panel to be replaced have been dismounted, unplug this CDU. If the CDU to be replaced can be replaced with the new one, install this new CDU.

5) Plug the new CDU along the slot and fasten it.
6) Connect in turn the radio frequency cables on the CDU panel and note that the main diversity cables should be connected correctly as numbered.
7) Change the management state of the blocked BTRM

Unblock the blocked BTRM.

If you turn off the power switch of a corresponding BTRM in advance instead of blocking the BTRM, then turn on the corresponding switch in this step.

8) After replacement

If the CDU is found working normally, related alarms have disappeared and corresponding recovered alarms occurred, it shows that the replacement is completed.

Caution:

1. CDU is very heavy, therefore its bottom must be held with one hand when dismounted/mounted.
2. If the CDU has not been plugged well and the screws not tightened, the transmitting/receiving indices of the base station may be made to decrease. The same attention should be paid when other radio frequency modules are installed.

Table of Contents

1 BTS Control Interface Module (BCIM)

1.1 BCIM Indicators

BCIM indicators are shown in Figure 1-1.

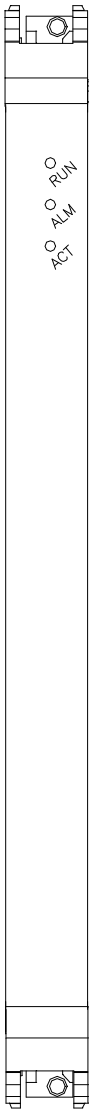

Figure 1-1 BCIM panel

See Table 1-1 for the description of BCIM indicators.

Table 1-1 BCIM indicators

Indicator	Color	Function	Details	Normal status
RUN	Green	Status Indicator	Quick flash (4Hz): BCIM is being powered on and initialized or is downloading software. Slow flash (0.5Hz): BCIM is running normally. Others: BCIM is faulty.	Slow flash (0.5Hz)
ALM	Red	Alarm indicator	Quick flash (4Hz): Critical alarm. Slow flash (0.5Hz): Major alarm. Slow flash (0.25Hz): Minor alarm. Off: No alarm.	Off
ACT	Green	Operation indicator	On: BCIM is running normally. Quick flash (4Hz): Operation & maintenance link is faulty. Slow flash (0.5Hz): IMA group is interrupted. Slow flash (0.25Hz): IMA link is broken.	On

1.2 BCIM DIP Switches and Jumpers

BCIM DIP switches and jumpers are shown in Figure 1-2.

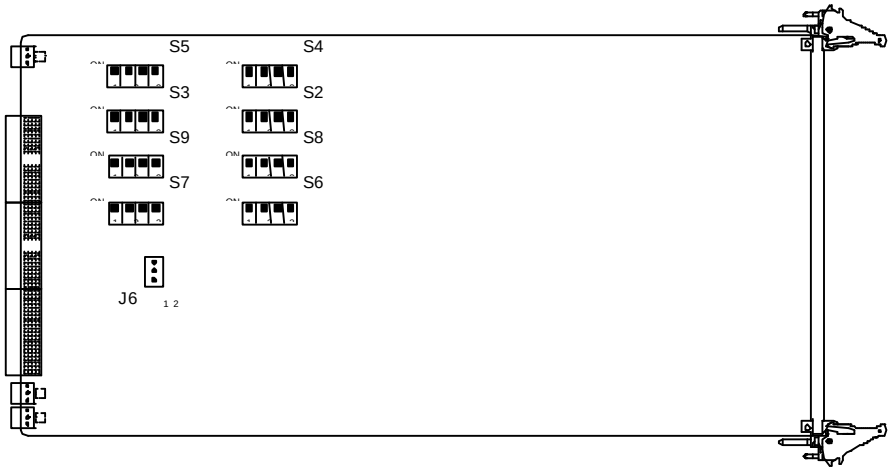

Figure 1-2 BCIM DIP switches and jumpers

See Table 1-2 for the description of BCIM DIP switches and jumpers.

Table 1-2 BCIM DIP switches and jumpers

Sequence number	Function	Description
S2~S9	Selection of: 1) E1 interface matching impedance (75Ω/120Ω); 2) E1 interface unbalanced/unbalanced mode.	All four digits set to OFF: 120Ω twisted pairs. All four digits set to ON: 75Ω co-axial cable, with sheath connected with PGND. Digits 1 and 2 set to ON, and digits 3 and 4 set to OFF: 75Ω co-axial cable, with sheath not connected with PGND. Other settings: Undefined.
J6	Feedback of E1 interface matching impedance (75Ω120Ω) mode. The program initializes E1 driving chip based on the status of this jumper.	Connect jumpers 2 and 3: 120Ω configuration mode. Connect the others or no connection at all: 75Ω configuration mode

2 BTS Channel Processing Module (BCPM)

2.1 BCPM Indicators

BCPM indicators are shown in Figure 2-1.

Figure 2-1 BCPM panel

See Table 2-1 for the description of BCPM indicators.

Table 2-1 BCPM indicators

Indicator	Color	Function	Details	Normal status
RUN	Green	Status Indicator	Quick flash (4Hz): BCPM is being powered on and initialized or is downloading software. Slow flash (0.5Hz): BCPM is running normally. Others: BCPM is faulty.	Slow flash (0.5Hz)
ALM	Red	Alarm indicator	Quick flash (4Hz): Critical alarm. Slow flash (0.5Hz): Major alarm. Slow flash (0.25Hz): Minor alarm. Off: No alarm.	Off
ACT	Green	Operation indicator	On: BCPM is running normally. Quick flash (4Hz): T8206 alarm. Slow flash (0.5Hz): Signaling Link disconnected. Slow flash (0.25Hz): CSM5000 alarm.	On

3 BTS ClocK Module (BCKM)

3.1 BCKM Indicators

BCKM indicators are shown in Figure 3-2.

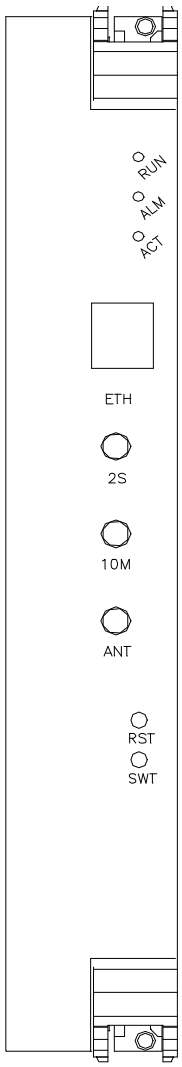

Figure 3-2 BCKM panel

See Table 3-1 for the description of BCKM indicators.

Table 3-1 BCKM indicators

Indicator	Color	Function	Details	Normal status
RUN	Green	Status Indicator	Quick flash (4Hz): BCKM is being powered on and initialized or is downloading software. Slow flash (0.5Hz): BCKM is running normally. Others: BCKM is faulty.	Slow flash (0.5Hz)
ALM	Red	Alarm indicator	Quick flash (4Hz): Critical alarm. Slow flash (0.5Hz): Major alarm. Slow flash (0.25Hz): Minor alarm. Off: No alarm.	Off
ACT	Green	Operation indicator	On BCKM is running normally. Quick flash (4Hz): Operation & maintenance link is faulty. Slow flash (0.5Hz): BSC link is interrupted. Slow flash (0.25Hz): 1) Satellite signal has been lost for 24 hours, 2) No satellite is detected when the BCKM is powered on for the first time.	On

4 BTS Resource Distribution Module (BRDM)

4.1 BRDM Indicators

BRDM indicators are shown in Figure 4-1.

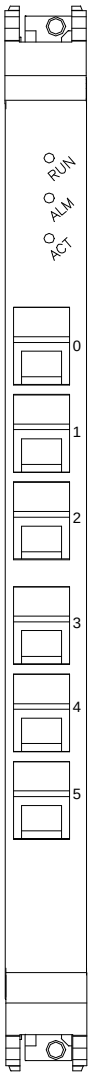

Figure 4-1 BRDM panel

See Table 4-1 for the description of BRDM indicators.

Table 4-1 BRDM indicators

Indicator	Color	Function	Details	Normal status
RUN	Green	Status Indicator	Quick flash (4Hz): BRDM is being powered on and initialized or is downloading software. Slow flash (0.5Hz): BRDM runs normally. Others: BRDM fault.	Slow flash (0.5Hz)
ALM	Red	Alarm indicator	Quick flash (4Hz): Critical alarm. Slow flash (0.5Hz): Major alarm. Slow flash (0.25Hz): Minor alarm. Off: No alarm.	Off
ACT	Green	Operation indicator	On: BRDM is running normally. Quick flash (4Hz): T8206 alarm. Slow flash (0.5Hz): FPGA alarm. Slow flash (0.25Hz): QMC trunk alarm.	On

5 BTS TransceiveR Module (BTRM)

5.1 Board Indicators

BTRM indicators are shown in Figure 5-1.

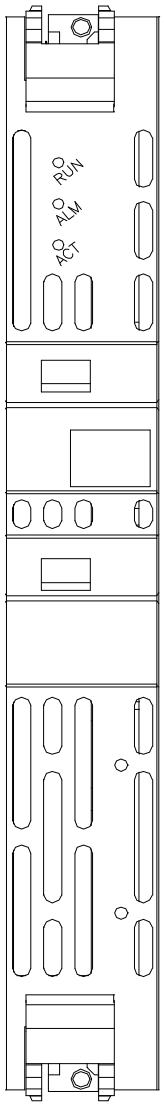

Figure 5-1 BTRM panel

See Table 5-1 for the description of BTRM indicators.

Table 5-1 BTRM indicators

Indicator	Color	Function	Details	Normal status
RUN	Green	Status Indicator	Quick flash (4Hz): BTRM is being powered on and initialized or is downloading software. Slow flash (0.5Hz): BTRM is running normally. Others: BTRM is faulty.	Slow flash (0.5Hz)
ALM	Red	Alarm indicator	Quick flash (4Hz): Critical alarm. Slow flash (0.5Hz): Major alarm. Slow flash (0.25Hz): Minor alarm. Off: No alarm.	Off
ACT	Green	Operation indicator	On: BTRM is running normally, and the clock has been locked. Slow flash (0.5Hz): 1) The clock has not been locked; 2) The clock cannot be locked.	On

6 BTS RF Fan Module (BRFM)

6.1 BRFM Indicators

BRFM indicators are shown in Figure 6-1.

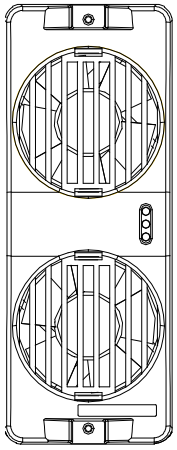

Figure 6-1 BTS RF Fan Module

See Table 6-1for the description of BRFM indicators.

Table 6-1 BRFM indicators

Indicator	Color	Function	Details	Normal status
TRX	Green	BTRM alarm indicator	On: BTRM is in running normally. Quick flash (4Hz): BTRM is not in service or with critical alarm. Slow flash (0.5Hz): BTRM is in service, but with major alarm. Slow flash (0.25Hz): BTRM is in service, but with minor alarm. Off: the communication between BTRM and the fan monitor board is interrupted.	On
HPA	Green	HPA Status indicator	On: HPA is running normally. Quick flash (4Hz): HPA alarm.	On
FAN	Green	Fan Status indicator	On: The fan is running normally. Quick flash (4Hz): The fan is unable to rotate.	On

7 Receiving Line Division Unit (RLDU)

7.1 RLDU Indicators and DIP Switches

RLDU indicators and DIP switches are shown in Table 7-1.

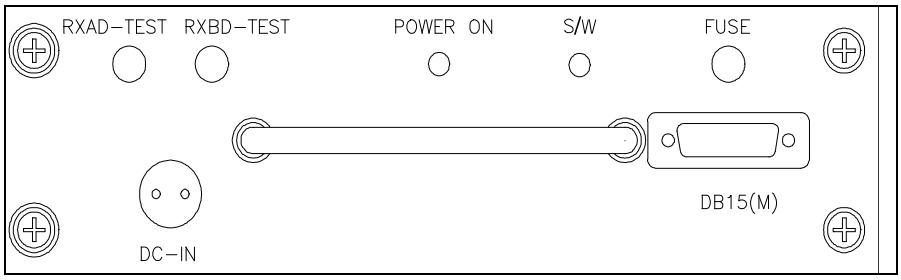

Table 7-1 RLDU panel

See Table 7-1 and Table 7-2 for the descriptions of RLDU indicators and RLDU DIP switch settings.

Table 7-1 RLDU indicator description

Indicator	Color	Function	Details	Normal status
POWER	Green	Power indicator	On: normal. Off: abnormal.	On

Table 7-2 RLDU DIP switches

DIP Switch	Details	Description
S/W	Number of sector carriers corresponding to RLDU	S/W set as 0: 1) Number of sectors of the BTS 3, 2 number of carriers for each sector 4. 2) There are 2 carriers in each sector and the interval between carriers in each sector is not equal to CDU S/W set as 1: the carriers in each sector are =2 and each sector is configured with one CDU.

8 Power Supply Unit (PSU)

8.1 PSU Indicators

PSU indicators are shown in Figure 8-1.

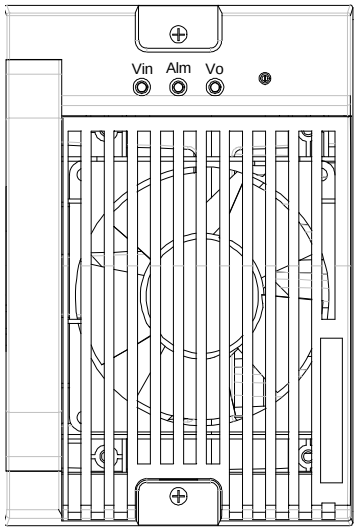

Figure 8-1 PSU panel

See Table 8-1 for the description of PSU indicators.

Table 8-1 PSU indicators

Indicator	Color	Function	Details	Normal status
Vin	Green	Power input status indicator	On: normal. Off: abnormal.	On
Alm	Red	Module fault indicator	On: alarm. Off: normal.	Off
Vo	Green	Power output indicator	On: normal. Off: abnormal.	On

Caution:

Possible cause to module fault alarm: Input power under/over voltage, over-heated or the power supply unit is not well plugged in.

9 BTS Lightning Protection Indicator Board (BPLI)

9.1 BPLI Indicator

BPLI indicators are shown in .Figure 9-1

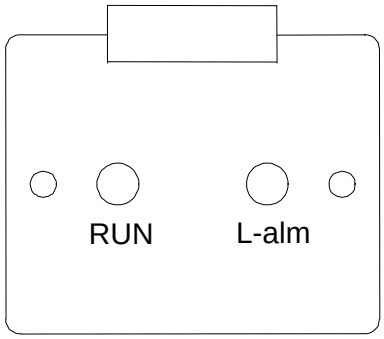

Figure 9-1 BPLI panel

See Table 9-1for the description of BPLI indicators.

Table 9-1 BPLI indicators

Indicator	Color	Meaning	Details	Normal status
RUN	Green	-48V Power indicator	On: -48V power input is normal. On: -48V power input is abnormal.	On
L-alm	Red	Lightening protector indicator	On: Lightning protector abnormal. Off: Lightning protector normal.	Off

10 BTS Fan Monitor Module (BFMM)

10.1 BFMM Indicators

BFMM indicators are shown in Figure 10-1.

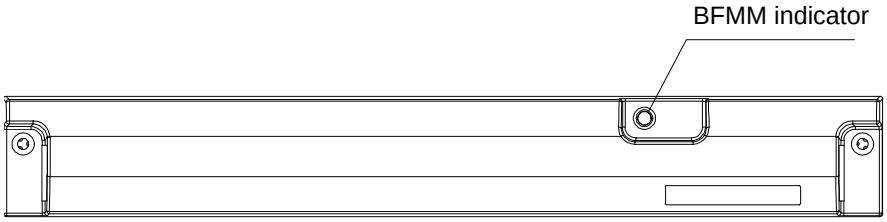

Figure 10-1 Fan box panel

See Table 10-1 for the description of BFMM indicators.

Table 10-1 BFMM indicator

Indicator	Color	Meaning	Details	Normal status
BFMM Indicators	Green	Operational status indicator	Fast flashing (4Hz): fault has occurred to the monitored objects, such as: 1) fan unable to rotate; 2) port communication abnormal; 3) mono-stable circuit fault. Slow flashing (0.5Hz): the fan monitoring circuits and the monitored object are working normally. On or Off: The controlling chip on the fan monitoring board is down.	Slow flash (0.5Hz)