ZXSDR BTS Configuration

Course Objectives:

- Grasp the networking principle and IP address planning of SDR.

- Grasp the data configuration flow of SDR.

- Grasp the operation of OMCB, OMCR.

- Grasp the meanings and configuration of the key parameters for SDR.

Contents

1 Overview

1.1 SDR Architecture

Separating baseband from RF helps to make full use of both the baseband and the RF part. The baseband can achieve the maximum integration, while the RF part focuses on realizing maximum power and efficiency, and thus providing more flexible networking modes. After the separation, the baseband part is called the base band unit (BBU), while the RF part is called the radio unit (RU). BBU and RU can be installed into the same cabinet to form a macro base station, such as BS8800 and BS8900. They can also be installed in the remote mode to form a remote radio unit (RRU).

BBU is responsible for processing and controlling digital baseband signals, while RU is responsible for converting digital baseband signals into analog signals between BBU and antenna. BBU is connected with RU via the BBU-RU interface using the optical fiber.

One BBU enables multiple RUs of different systems in the same frequency band or different frequency bands. RRU can support GU systems simultaneously in such common frequency bands as 850M, 900M, 1800M, and 1900M. It is based on two points mentioned above that SDR can support the dual-mode.

1.2 IP Abis/Iub Interface

Different from traditional base stations, SDR base stations adopt the all-IP architecture. Their Abis/Iub interfaces use the IP protocol and physical bearing medium is FE/GE or E1/T1 (IP over E1/T1) instead of traditional TDM over E1/T1. IP over E1/T1 takes advantage of the existing transmission equipment to save investment. FE/GE can obtain more bandwidth, which complies with the evolution trend of the IP-based telecommunications system.

1.3 OMCB Definition

Operate and Maintenance Center for Node B (OMCB) is the operation and maintenance unit that manages Node B in 3GPP. SDR also needs the management via OMCB.

Logically OMCB is independent from OMCR of GSM. Physically you need integrate OMCB and OMCR/OMM into the same network management system.

Figure 1.3 -1 shows the networking example in which OMCB is integrated with OMCR. Here OMCB manages SDR via the channel provided by BSC, which is indicated by the black lines in Figure 1.3 -1. However, BSC is not related to the communication between SDR and OMCB. Therefore, logically OMCB is directly connected with SDR, which is indicated by the red dotted line in Figure 1.3 -1.

Figure 1.3-1 Logical Position of OMCB

1.4 SDR-based Network Structure

SDR can support GSM single-mode, UMTS single-mode and GU dual-mode networkings, as shown in Figure 1.4 -2.

Figure 1.4-2 SDR Dual-mode Networking

1.5 Configuration Flow

The configuration flow of SDR is shown in Figure 1.5 -3.

Data planning is the kernel part process of the entire SDR data configuration. All the configuration data introduced in this manual are based on data planning.

Hardware Inspection checks the SDR rack, board, physical connection, antenna, and external alarms. It is performed on the construction site and is not introduced in this textbook.

LMT is a quick configuration tool for a single SDR base station. A maintenance engineer can connect the SDR and perform data configuration by LMT. SDR base stations provide the automatic link establishment function. Therefore, the LMT is not required for site opening.

After SDR is connected to OMCB, all the LMT functions can be performed from the remote OMCB so as to realize remote management.

Note:

The operator can send the data from the OMCB to the front end of SDR. The operator may also upload the data from the front end of SDR to the OMCB.

The configurations of interconnection with SDR are executed at the BSC side.

Figure 1.5-3 SDR Configuration Flow

2 Data Planning

⮾ **Note:**

All the parameters in this textbook are configured according to the data planning.

2.1 Racks and Boards Planning

1. Rack1: B8200 (BBU). shows the board layout of B8200.

Figure 2.1-4 B8200 Board Layout

2. Rack2: R8860 (RRU). The working frequency is GSM 900MHz.

BBUs and RRUs use star connection.

2.2 Transmission Resource Planning

The SDR base station connects to the iBSC via IP over E1 and IP over FE respectively. Figure 2.2 -5 shows the planning of transmission resources.

⮾ **Note:**

For GSM services, either IP over E1 or IP over FE is applicable. This textbook introduces both of the transmission configurations.

Figure 2.2-5 SDR Transmission Resource Planning

Table 2.2 -1 describes the planning of IP addresses.

Table 2.2-1 IP Address Planning

Name	Meaning	Planning Value
SDR IP	IP address of SDR in the GSM network	118.18.2.100/24
EUIP_SDR	IP address of network interface from iBSC to SDR (IPoE1)	118.18.2.254/24
IPBB_SDR	IP address of network interface from iBSC to SDR (IPoFE)	
OMCB IP	IP address of the OMCB server	139.1.1.200/24
IPBB_OMCB	IP address of network interface from iBSC to OMCB	139.1.1.254/24
IP Abis	The virtual address of the IP Abis interface on the RPU	118.18.1.1
OMCB Channel IP	IP created on RPU for OMCB connection (it usually shares the same IP with the IP Abis interface)	118.18.1.1

If the SDR uses IP over E1 transmission, the E1 lines and timeslots should be planned first, as shown in Table 2.2 -2.

Table 2.2-2 Timeslots Distribution of E1 Link

IP Port	E1 link ID	Time Slot	HDLC ID	HDLC ID in BSC/RNC Side	PPP ID	Connection Object
IP port1	E1 link0	TS1~TS31	HDLC ID0	HDLC ID1	PPP ID0	iBSC

Table 2.2 -3 shows the association parameters for SDR and iBSC.

Table 2.2-3 Association Parameters

Parameters	Meaning	Planning Value	Remarks
GSM Site No.	The local port ID for SCTP association configured on OMCB	2	-
iBSC Port ID	The remote port ID for SCTP association configured on OMCB	The CMP module number for the home iBSC of SDR is 3.	SCTP remote port ID= 14592 + home CMP module number

2.3 Radio Resource Planning

Table 2.3 -4 shows the planning of radio resources for GSM network.

Table 2.3-4 GSM Radio Resource Planning

RF module	R8860
Cell	S4
Power of each carrier	20W
Frequency	10, 12, 20, 22
BCCH Frequency point	10
MCC	216
MNC	1
LAC	30
CI	6
NCC	0
BCC	0

3 OMCB Configuration

3.1 Overview

OMCB serves as the background network management system of ZXSDR BTS. You can configure transmission data, physical data, and part of radio data via OMCB, which can implement the functions of LMT in a more flexible way. Using the automatic link establishment function, OMCB can open sites in a remote way, thus speed up site opening and reduces the cost. The configuration flow on OMCB is as shown in Figure 3.1 -6.

Figure 3.1-6 OMCB Configuration Flow

3.2 Add a Route

Since the IP addresses of the OMCB server and SDR are not in the same network segment. You need to add a route from the OMCB gateway to SDR.

In this example, the IP address of the OMCB server is 139.1.1.200. The IP address of the OMCB gateway IPBB_OMCB is 139.1.1.254. The SDR IP is 118.18.2.100.

[Steps]

1. The command used to add a route on OMCB (SBCX) is:

    #route add -net 118.18.2.0 gw 139.1.1.254 netmask 255.255.255.0 eth4

10

 Note:

In the LINUX system, the command used to add a route is:

#route add -net destination network address gw next-hop address netmask IP address of the network mask.

2.   After the operation, execute the netstat –nr command to view the route.

3.   Set a permanent route.

   After adding the route by using the "route add" command, to avoid route loss after restarting the SBCX, you can operate as the root user to add the line below into the /etc/rc.d /rc.local file:

   #route add -net 118.18.2.0 gw 139.1.1.254 netmask 255.255.255.0 eth4

3.3 Modify Server Configuration File

To ensure the successful link establishment between the OMCB server and the foreground SDR base station, it is necessary to check and modify some profiles on the OMCB server.

3.3.1 Check RB Separation Configuration File

[Steps]

1.   Log in to the OMCB server as user gomcb and navigate to the home\gomcb\ums-svr\deploy directory.

2.   Open the deploy-010muep.properties file and check whether muep-install-issplit is 1.

●   If muep-install-issplit is 0, the R and B are not separated.

●   If muep-install-issplit is 1, the R and B are separated.

3.   Open the deploy-030guomcb.properties file and check whether muep-common-sbcx-type is 1.

●   If muep-common-sbcx-type is 0, it indicates the OMCR in RB separation.

●   If muep-common-sbcx-type is 1, it indicates the OMCB in RB separation.

3.3.2 Modify deploy-020sdrmap.properties File

[Steps]

1. Log in to the server as user gomcb.

2. Navigate to the \ums-svr\deploy directory and open the deploy-020sdrmap.properties file.

3. Change the IP address in the red square to the OMCB IP.

userdefined-zxwomc-common-nodeb-api.omcb-ftpserver-ip=10.61.56.231

Figure 3.3-7 Modify deploy-020sdrmap.properties File

3.3.3 Modify deploy-default.properties File

1. Log in to the server as user gomcb.

2. Navigate to the \ums-svr\deploy directory and open the deploy-default.properties file.

3. Search for the userdefined-uep-psl-ftpserver.port filed in the file. Ensure that the value of the filed is the same as the configuration of the ftpserver port enabled by the OMCB, that is, 20021. If the value of the filed is not 20021, change it manually.

3.4 Configure Basic Properties

3.4.1 Create SDR Management NE

3.4.2 Create SDR Management Node

[Purpose]

This operation is conducted to create an SDR management NE and to generate the SDR node on the configuration resource tree.

[Steps]

1. Open the **Configuration Management** interface, right-click the root node of the configuration resource tree and select [Create→Subnetwork].

2. Figure 3.4 -8Enter the name and ID of a subnetwork, as shown in Figure 3.4 -8.
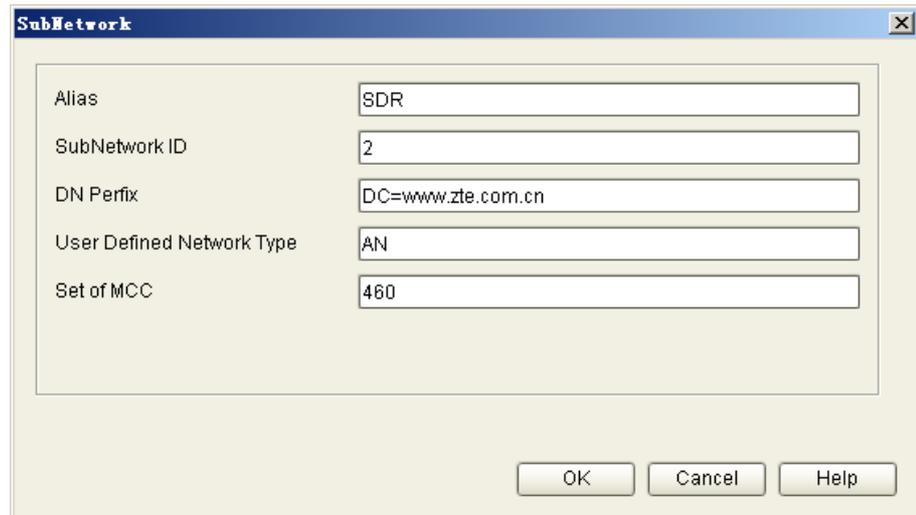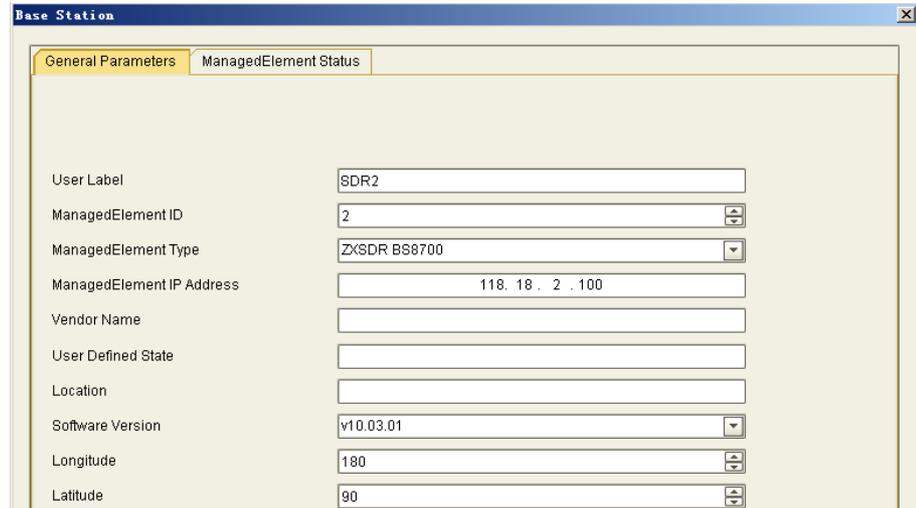
Figure 3.4-8 Create Subnetwork

2. On the configuration resource tree, select the created subnetwork node and right-click **Create→Base Station**.

3. On the displayed interface, enter configuration data, as shown in Figure 3.4 -9.

Figure 3.4-9 Create SDR Base Station

[Parameter Description]

(1) ManagedElement ID: Enter the GSM site number.

(2) ManagedElement Type: This instance is a distributed base station. Enter ZXSDR BS8700.

(3) ManagedElement IP Address: Enter the SDR address used for operation and maintenance, for example, the IP address of the SDR in this instance.

3.4.3 Apply Mutex Right

[Purpose]

After an SDR management NE is created, to perform the subsequent operations, you need to apply Mutex right first.

[Steps]

1. On the configuration resource tree, right-click the created SDR node, and select [Apply Mutex Right], as shown in Figure 3.4 -10.

Figure 3.4-10 Apply for Mutex Right

2. The green lock next to the SDR node indicates that the application is succeeded, as shown in Figure 3.4 -11.

Figure 3.4-11 Application Succeeded

3.5 Configuring SDR Physical Data

3.5.1 Create Base Station Equipment Resource

[Purpose]

This operation is conducted to create basic parameters of SDR ground resource.

[Steps]

1. On the configuration resource tree, double-click **Equipment Object**.

2. On the **Equipment Object** tab page, click   . Set configuration parameters on the displayed interface, as shown in Figure 3.5 -12.
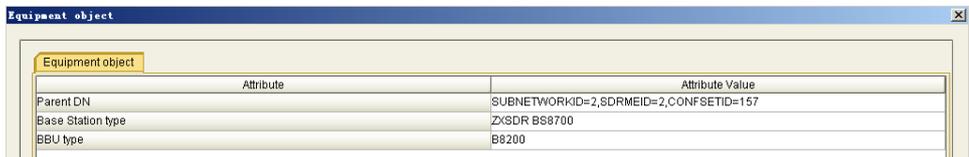
Figure 3.5-12 Create SDR Ground Resource

[Parameter Description]

(1) Parent DN: SUBNETWORKID, SDRMEID, and CONFSEID values automatically obtained by the system

(2) Base Station type: BS8700 by default.

(3) BBU Type: B8200

3.5.2 Create Rack

[Purpose]

When the SDR ground resource is created, the BBU rack that holds CC, SA, and PM boards is automatically created.This operation provides instructions for creating other boards and the RRU.

[Steps]

1. On the [Rack] tab page, click   . The BBU rack view is displayed.

2. According to the data planning, right-click the slots and create boards for the B8200, as shown in Figure 3.5 -13.
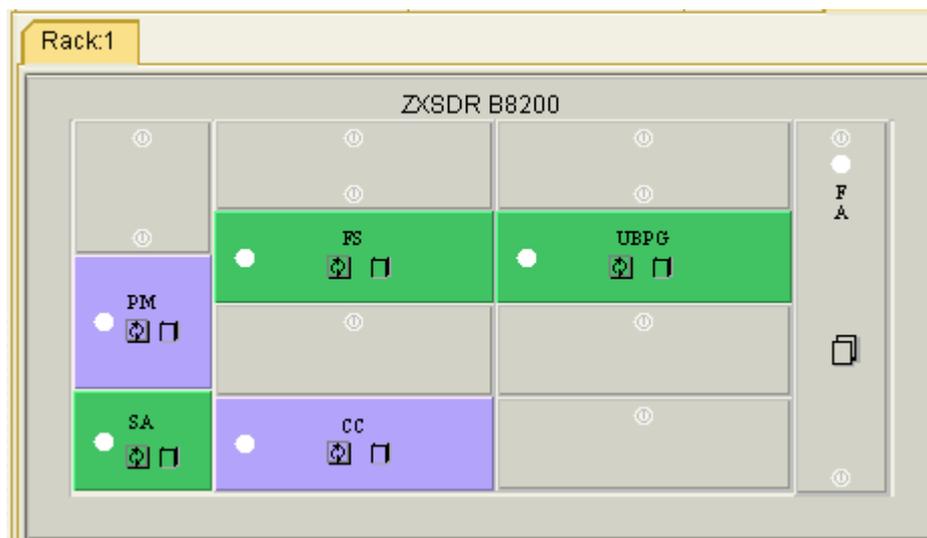
Figure 3.5-13 Create Boards for the B8200

3. Create the R8860.

On the [Rack] tab page, click   . Create the R8860 on the displayed interface, as shown in Figure 3.5 -14.

Figure 3.5-14 Create the R8860

 Note:

RRU racks are numbered from 51.

4. Select the R8860 rack and click   . The R8860 rack view is displayed.

5. Right-click the R8860 rack and select [Create Board]. Select boards of the R8860 on the displayed interface, as shown in Figure 3.5 -15.
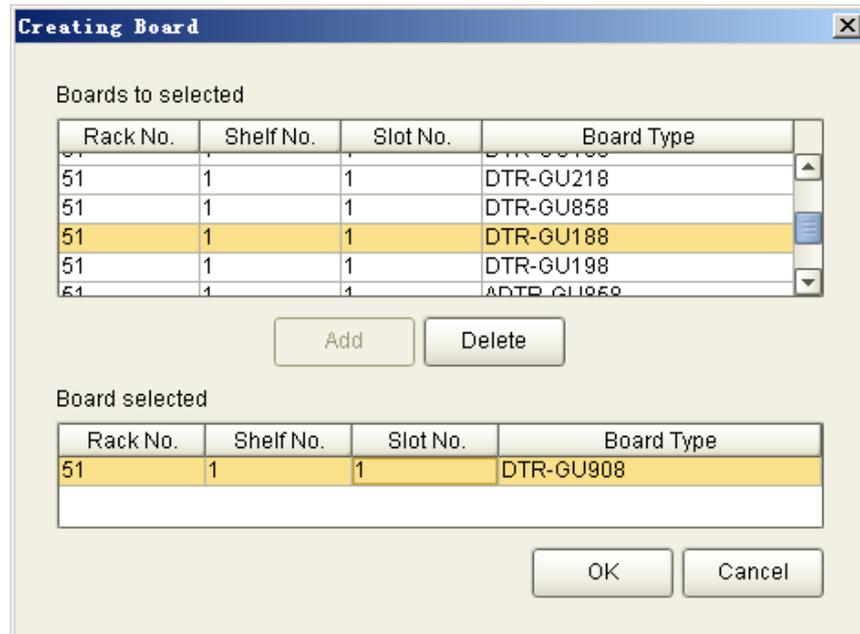
Figure 3.5-15 Create Boards for the R8860

[Parameter Description]

   (1) DTR-GU908: Dual mode carrier board; 900 Mhz; TOC: 80 W.

3.5.3 Create Fiber

[Purpose]

This operation is conducted to identify ports on FS boards used by each RRU to connect to the BBU.

[Context]

ZXSDR BTS uses FS interface boards on the main rack for topology connection. An FS interface board provides a maximum of six ports, which are used for connecting RRUs.

[Steps]

   1. On the [Fiber cable object] tab page, click   . Set configuration parameters on the displayed interface, as shown in Figure 3.5 -16.

Figure 3.5-16 Create Rack Topology

[Parameter Description]

1. Optical port of previous hop in topology structure: port number of the FS board

2. Optical port of previous hop in topology structure: port number of the RRU

⚠ **Caution:**

Upper level and lower level: the board or rack close to the BBU is of the upper level, while the board or rack far away from the BBU is of the lower level.

Each FS board in the BBU provides 6 optical fiber interfaces used to connect RRUs. From the front of the FS board, you can see that the interface numbers are 0, 1, 2, 3, 4, 5 from right to left. The RRU provides two optical fiber interfaces via the DTR board. One is used to connect the BBU with the interface number of LC0; the other is used to connect the lower-level RRU with the optical interface number of LC1. Select star or link for the topology type. RRU cascade can be realized only when the topology type is link.
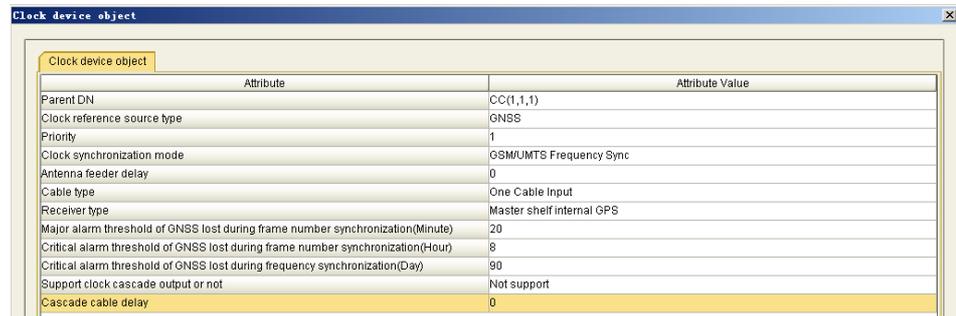
3.5.4 Create Clock Source Priority

[Purpose]

This operation provides instructions for creating priorities for clock sources of the SDR.

[Context]

If an SDR base station has the GPS clock source. It is recommended that you use the GPS clock source in priority.

[Steps]

1. On the [Clock device object] tab page, click   . Set configuration parameters on the displayed interface, as shown in Figure 3.5 -17.

Figure 3.5-17 Create Clock Source Priority

[Parameter Description]

(1) Priority: The smaller the value is, the higher the priority.

2.   Create line clock priority by using the same method and set the line clock priority value to be greater than the clock source priority value.
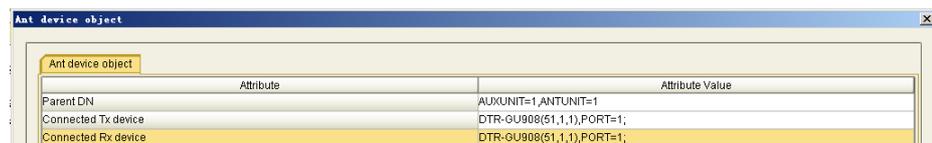
3.5.5 Create Antenna

[Purpose]

This operation provides instructions for creating antennas for RRUs. Each RRU requires two antennas. One is used for both receiving and sending signals, and the other is used for receiving signals with diversity.

 Note:

Antennas are classified into the following two types: ANT (common antennas) and RET (adjustable antennas).

[Steps]

1.   Choose [Auxiliary peripheral device→Object of ant device set→Ant device object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.5 -18.

Figure 3.5-18 Create Antenna

[Parameter Description]

(1) Connected Tx device: Select the R8860 rack number.

(2) Connected Rx device: Two antennas need to be created. 1 indicates the first one.

2. According to step 1, create the other diversity reception antenna for the R8860, as shown in Figure 3.5 -19.
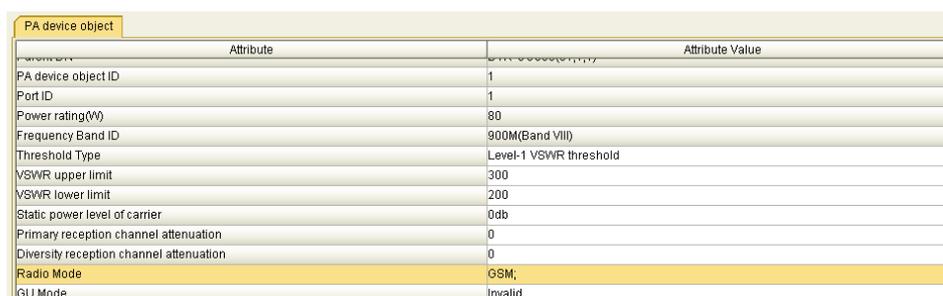

Figure 3.5-19 Create Antenna

3.5.6 Adjust PA Property

[Purpose]

After you create the RRUs and boards, related PA objects and operating parameters are automatically generated in the system. This operation provides instructions for modifying related property parameters based on actual applications of the RRUs.

[Steps]

1. On the [Pa device object] tab page, click   . Set configuration parameters on the displayed interface, as shown in Figure 3.5 -20.

Figure 3.5-20 Adjust PA Property

[Parameter Description]

1. Radio Mode: It is set to GSM and UMTS dual modes by default. You can modify it based on actual applications of RRUs.

2. GU Mode: It is used to configure dual-mode resources for RRUs and is invalid

in single mode.

3.5.7 Create Dry Contact

[Purpose]

This operation is conducted to configure the port for receiving dry contact alarm signals and the constant status of the circuit.

[Prerequisite]

The board (for example, the SA board on the main rack) for leading in dry contact signals has been configured.

[Context]

Dry contact alarm signals of external devices can be led in to a base station and displayed in the network management system of the base station. Dry contact signals are passive electric signals. If the constant status of the circuit is "open", an alarm will be generated when a short circuit occurs. If the constant status of the circuit is "short circuit", an alarm will be generated when the circuit is open.

[Steps]

1. On the [Dry contact device object] tab page, click . Set configuration parameters on the displayed interface, as shown in Figure 3.5 -21.

Figure 3.5-21 Create Dry Contact

[Parameter Description]

1. Parent DN: It is used to select a dry contact input/output device.

2. Dry contact No.: It indicates the dry contact number of the SA board. An SA board provides six input dry contact interfaces and two input/output dry contact interfaces.

3. Dry contact type: It can be set to the input dry contact or output dry contact.

4. Alarm Status: It is used to set the status of the dry contact when an alarm is generated.

3.6 Configuring SDR Transmission Resource

3.6.1 Transmission Resource Configuration Flow

Figure 3.6 -22 shows the configuration flow in IP over E1 and IP over FE modes.

Figure 3.6-22 Transmission Resource Configuration Flow

3.6.2 Configuration in IP over E1 Mode

3.6.2.1 Create IP Port

[Purpose]

This operation provides instructions for creating the IP port described in Table 2.2 -2.

[Context]

When the transmission medium is E1/T1, a B8200 (with one SA board) can be equipped with a maximum of eight E1s.

[Steps]

1. Choose [Transport network object→Physical Capacity→IP Port]. Then click and set configuration parameters on the displayed interface, as shown in Figure

3.6 -23.

Figure 3.6-23 Create IP Port

[Parameter Description]

1. Working mode: It is set only when bearing over Ethernet is used and is invalid when bearing over E1 is used.

2. Used E1: It indicates the E1 port selected on the SA board. This instance uses the first pair of E1s.

 Note:

An SA board provides 8 pairs of E1s, which respectively correspond to link IDs from 0 to 7. 0 indicates the first pair of E1s, which are physically numbered 1 and 2. The port ID will be cited in the subsequent operation for creating an HDLC channel.

3.6.2.2 Create HDLC Channel

[Purpose]

This operation provides instructions for creating the HDLC link described in Table 2.2 -2.

[Steps]

1. Choose [Transport network object→IP Transport→HDLC channel object]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.6 -24.

Figure 3.6-24 Create HDLC Channel

[Parameter Description]

1. TS-bit mapping relation: It indicates the E1 timeslot used by HDLC.

2. Used IP port: It indicates the IP port used by the HDLC channel.

Note:

An HDLC channel usually cites all the 31 timeslots of an E1 link. One E1 link can be assigned to multiple HDLC channels based on the site requirements.

3.6.2.3 Create PPP Link

[Purpose]

Table 2.2 -2This operation provides instructions for creating the PPP link described in Table 2.2 -2.

[Steps]

1. Choose [Transport network object→IP Transport→PPP]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.6 -25.
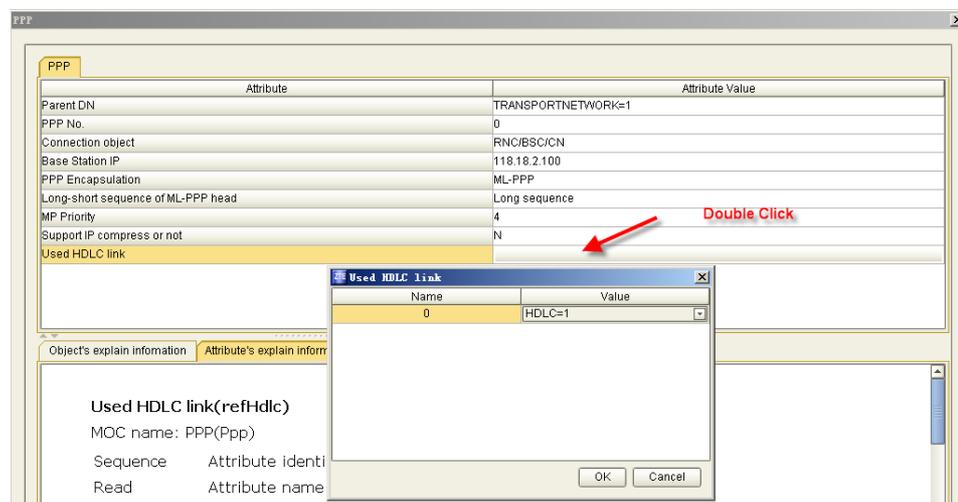

Figure 3.6-25 Create PPP Link

[Parameter Description]

1. Base Station IP: Enter the SDR IP.

2. PPP Encapsulation: Select ML-PPP.

 Note:

If the Abis/Iub interface uses only one HDLC channel, select PPP encapsulation; if the Abis/Iub interface uses multiple HDLC channels, select ML-PPP encapsulation.

If the SDR supports the automatic link establishment function, ML-PPP encapsulation is selected by default even if only one HDLC channel is used.

3. Used HDLC link: Double-click this item and select the HDLC link ID in the displayed dialog box.

3.6.2.4 Create IP Parameter

[Purpose]

This operation is conducted to create the SDR IP.

[Steps]

1. Choose [Transport network object→IP Transport→IP Parameter]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.6 -26.
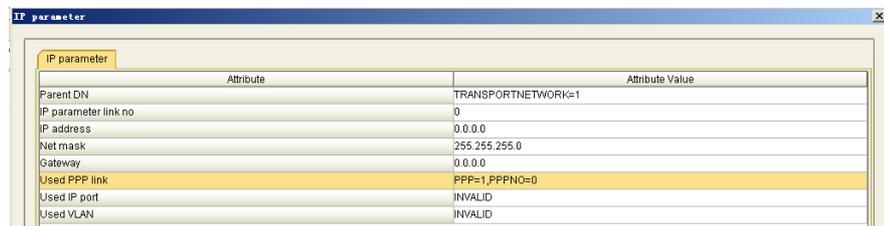
Attribute	Attribute Value
Parent DN	TRANSPORTNETWORK=1
IP parameter link no	0
IP address	0.0.0.0
Net mask	255.255.255.0
Gateway	0.0.0.0
Used PPP link	PPP=1,PPPNO=0
Used IP port	INVALID
Used VLAN	INVALID

Figure 3.6-26 Create IP Parameter

[Parameter Description]

1. Used PPP Link: Select the PPP link used by the SDR IP.

2. IP address/Net mask/Gateway: Set this parameter based on the data planning in IP over FE mode and retain the default values in IP over E1 mode.

3. Used IP Port: Set this parameter based on the data planning in IP over FE mode and select **INVALID** in IP over E1 mode.
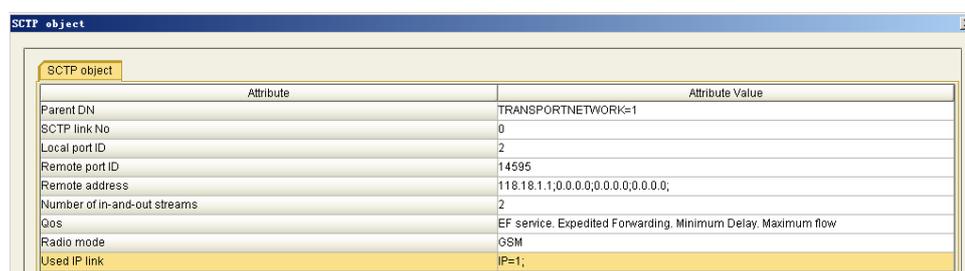
3.6.2.5 Create SCTP Association

[Purpose]

Transmission can be performed only after the association is created. This operation provides instructions for creating GSM association.

Before create the association, you need to create GSM radio network objects, as shown in 3.7.1 Create GSM Radio Network Object.

[Steps]

1. Choose [Transport network object→IP Transport→SCTP object]. On the [SCTP object] tab page, set configuration parameters, as shown in Figure 3.6 -27.

Figure 3.6-27 Create SCTP Association

[Parameter Description]

1. Local port ID: In GSM radio mode, the value of this parameter must be the same as the GSM site number.

2. Remote port ID: The value of this parameter equals to 14592 plus the number of the home CMP module of the SDR. According to the data planning, SDR belongs to the CMP with a module number of 3. Therefore, this parameter is set to **14595**.

3. Remote address: Enter the IP Abis address.

4. Radio mode: Select **GSM**.

5. Used IP link: Select SDR IP1.

3.6.2.6 Create OMCB Link

[Purpose]

To operate and maintain the SDR by using the OMCB, you need to create an OMC-B link between the SDR and OMCB.

[Steps]

1. Choose [Transport network object→Interface object→OMC channel object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.6 -28.

Figure 3.6-28 Create OMCB Link

[Parameter Description]

1. Used IP link: It indicates the base station IP address used for operation and maintenance. Select the SDR IP.

2. OMC gateway IP: According to the data planning, enter the OMCB channel IP.

 Note:

For GSM services, the service generally shares the same link with the operation & maintenance. You can also independently assign timeslot, create the HDLCand PPP, configure the IP ID for the operation & maintennace channel, and create independent OMCB Channel IP at the iBSC side, so as to separate the service from the operation & maintenance.

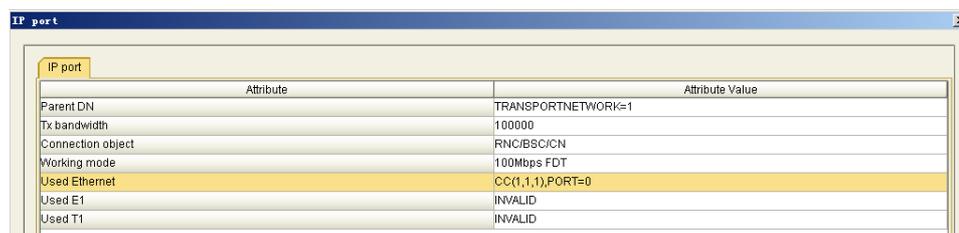## 3.6.3 Configuration in IP over FE Mode

3.6.3.1 Create IP Port

[Purpose]

This operation is conducted to create an IP port for transmission over FE.

[Steps]

1. Choose [Transport network object→Physical Capacity→IP Port]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.6 -29.

Figure 3.6-29 Configure Ethernet

[Parameter Description]

1. Used Ethernet: Select the CC board.

2. Working mode: Based on actual Ethernet connection, it is usually set to 100 Mbps. You can also set it to self-adaptation.

3.6.3.2 Create IP Parameter

[Purpose]

This operation is to create the SDR IP, defined as IP ID 1.

[Steps]

1. Choose [Transport network object→IP Transport→IP Parameter]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.6 -30.
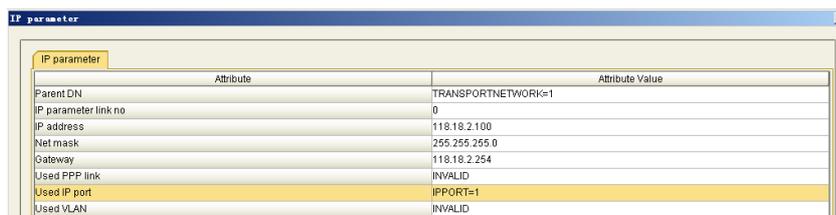
Figure 3.6-30 Create IP Parameter

[Parameter Description]

1. IP address/Net mask/Gateway: Set these parameters based on the data planning in IP over FE mode and retain the default values in IP over E1 mode.

2. Used IP port: Set this parameter based on the data planning in IP over FE mode and set it to **INVALID** in IP over E1 mode.

3.6.3.3 Create SCTP Association

[Purpose]

Transmission can be performed only after the association is created. This operation provides instructions for creating GSM association.

Before create the association, you need to create GSM radio network objects, as shown in 3.7.1 Create GSM Radio Network Object.

[Steps]

1. Choose [Transport network object→IP Transport→SCTP object]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.6 -31.
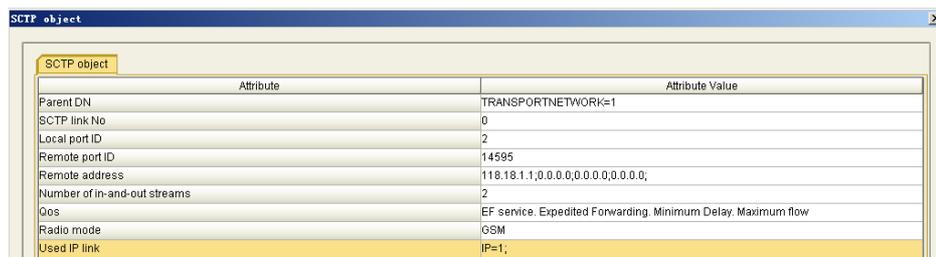
SCTP object	
Attribute	**Attribute Value**
Parent DN	TRANSPORTNETWORK=1
SCTP link No	0
Local port ID	2
Remote port ID	14595
Remote address	118.18.1.1;0.0.0.0;0.0.0.0;0.0.0.0;
Number of in-and-out streams	2
Qos	EF service. Expedited Forwarding. Minimum Delay. Maximum flow
Radio mode	GSM
Used IP link	IP=1;

Figure 3.6-31 Create SCTP Association

[Parameter Description]

1. Local port ID: In GSM radio mode, the value of this parameter must be the same as the GSM site number.

2. Remote port ID: The value of this parameter equals to 14592 plus the number of the home CMP module of the SDR. According to the data planning, the SDR belongs to the CMP with a module number of 3. Therefore, this parameter is set to **14595**.

3. Remote address: Enter the IP Abis address.

4. Radio mode: Select **GSM**.

5. Used IP link: Select SDR IP1.

3.6.3.4 Create OMCB Link

[Purpose]

To operate and maintain the SDR by using the OMCB, you need to create an OMC-B

link between the SDR and OMCB

[Steps]

1. Choose [Transport network object→Interface object→OMC channel object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.6 -32.
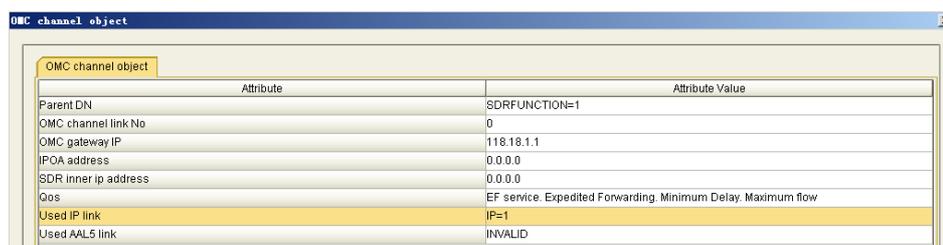

Figure 3.6-32 Create OMCB Link

[Parameter Description]

(1) Used IP link: It indicates the base station IP address used for operation and maintenance. Select the SDR IP.

(2) OMC gateway IP: According to the data planning, enter the OMCB channel IP

3.7 Create SDR Radio Resource

3.7.1 Create GSM Radio Network Object

[Purpose]

This operation provide instructions for creating GSM radio network objects.

[Steps]

1. Figure 3.7 -33Choose [SdrFunction object→GSM radio network object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.7 -33.
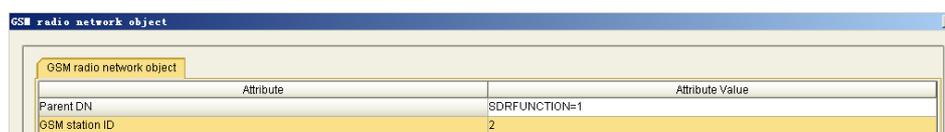

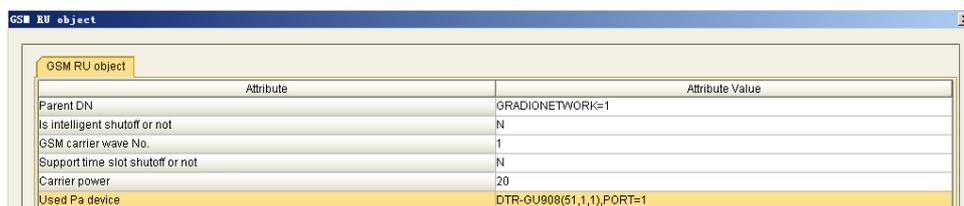Figure 3.7-33 Create GSM Radio Network Object

3.7.2 Create GSM RU

[Purpose]

This operation provides instructions for creating the mapping between the RU and carrier waves.

[Steps]

1. Choose [SdrFunction object→GSM radio network object→GSM RU object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.7 -34.

Figure 3.7-34 Create GSM RU

2. Repeat step 1 to create the other three GSM RUs.

[Parameter Description]

(1) GSM carrier wave No.: The value of this parameter is unique in one PA.

(2) Carrier power: According to the data planning, set it to 20 W.

(3) Used Pa device: The R8860 has only one PA. Select the only PA.

3.7.3 Create GSM Sector

[Purpose]

This operation provides instructions for creating GSM sectors.

[Steps]

1. Choose [SdrFunction object→GSM radio network object→GSM sector object]. Then click   and set configuration parameters on the displayed interface, as shown in Figure 3.7 -35.

Figure 3.7-35 Create GSM Sector

[Parameter Description]

(1) Sector No.: Sectors are usually numbered from 1.

(2) Used PA device: Select the PA on the RRU used by this sector.

(3) Number of used carriers: Set the number of carrier waves in the PA.

3.7.4 Create GSM Carrier Frequency

[Purpose]

This operation provides instructions for creating properties for each carrier frequency on the RRU.

[Steps]

1. Choose [SdrFunction object→GSM radio network object→GSM carrier frequency object]. Then click and set configuration parameters on the displayed interface, as shown in Figure 3.7 -36.

Figure 3.7-36 Create GSM Carrier Frequency

2. Repeat step 1 to create the other three carrier frequency parameters for sector 1.

[Parameter Description]

1. Logic carrier frequency No.: The number of each carrier is unique within a sector.

2. Parent frequency: The value of this parameter is consistent with the model of the PA device. It is set to **900M(Band VIII)** in this instance.

3. Quoted GSM sector object: Select the home GSM sector of the created carrier frequency.

3.8 Data Synchronization

[Purpose]

Perform this operation to synchronize the data configured in the OMCB to the SDR.

[Prerequisite]

After properly configuring the transmission resources and establishing the link between the OMCB and SDR, you need to perform data synchronization.

[Steps]

1. Right-click the SDR root node and choose **Synchronize All Tables** in the shortcut menu, as shown in Figure 3.8 -37. The **Synchronize All Tables** dialog box is displayed. Click **OK**.

Figure 3.8-37 Synchronize All Tables

[Parameter Description]

(1) Synchronize All Tables: Synchronize all data under the SDR node to the SDR.

(2) Synchronize Modified Tables: Synchronize the modified data under the SDR node to the SDR.

3.9 Upload Data to OMCB

[Context]

The configuration data has existed in the SDR, for example, the SDR data has been configured by using the LMT. For this scenario, you need to upload the SDR data to the OMCB.

[Steps]

1. Right-click the SDR root node and choose **Base Station Configuration Wizard(SDR)** in the shortcut menu. The **Configuration Wizard** dialog box is displayed as shown in Figure 3.9 -38.
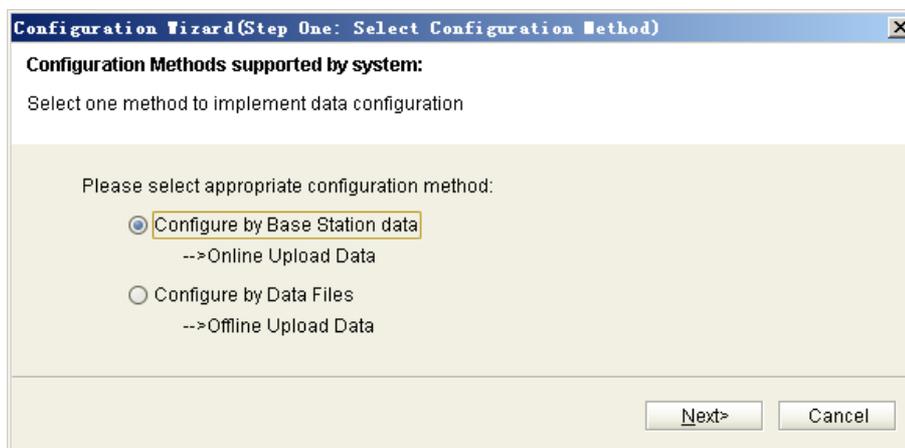

Figure 3.9-38 Base Station Configuration Wizard(SDR)

[Parameter Description]

(1) Online Upload Data: Read the data from the link-established SDR and configure it to the OMCB.

(2) Offline Upload Data: Read the existing data file from the disk

4 OMCR Configuration

4.1 Overview

 Note:

Before starting this chapter, please make sure the iBSC has finished commissioning and debugging, and all functions are normal.

This chapter only describes the operation of connection between the iBSC and SDR.

The configuration flow on the OMCR is as shown in Figure 4.1 -39.

Figure 4.1-39 Configuration Flow

4.2 IP Interface Configuration

4.2.1 IP over E1 Interface Configuration

4.2.1.1 Create Interface Board

[Purpose]

This operation is conducted to create the DTB and EUIP interface boards for connecting the SDR and the IPBB interface board for connecting the OMCB.

[Steps]

1. On the configuration resource tree, select **[BSC Global Resource→BSC Device Configuration→BSC Rack]**. Double click [**BSC Rack**] to open the BSC rack map.

2. Create the DTB board.

   Right-click the slot for the DTB, select **[Create Board]** and select **DTB** as the function type.

3. Configure the PCM information for the DTB.

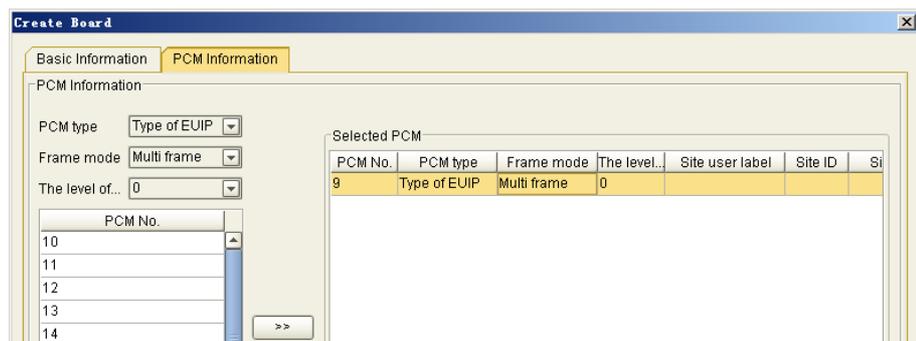   Click [PCM Configuration Information] and type in the configuration data, as shown in Figure 4.2 -40.

Figure 4.2-40 Configure the PCM information for the DTB

[Parameter Description]

(1) PCM Type: Select "Type of EUIP" for the IP over E1 mode.

(2) PCM No.: The selected PCM No. must be consistent with the physical connection, "9" refers to the first PCM.

(3) Frame Mode: Select "Multiple Frames" for SDR base station.

4.   Create the EUIP board, configure the HDLC channel of EUIP, as shown in Figure 4.2 -41.
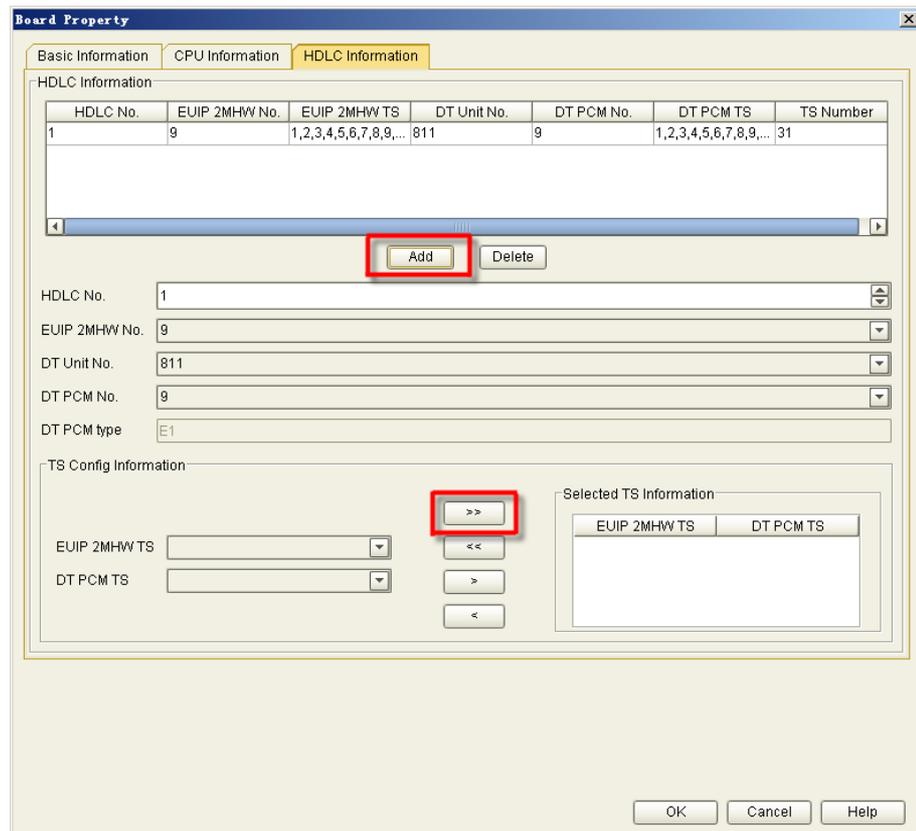

Figure 4.2-41 Configure the HDLC Channel of EUIP

[Parameter Description]

(1) EUIP 2MHW No.: EUIP has 64 2MHW channels, which can support the HDLC channel connection of 2 DTB boards. "9" refers to the first 2MHW.

(2) DT Unit No.: Locates on the DTB boards, "311" refers to the Slot3 on Shelf1 of Rack1.

(3) DT PCM No.: Select the PCM number created in Step3.

(4) Press the ⬚ button to connect all the 31 timeslots at one 2MHW of the EUIP and one PCM of the DTB.

(5) Press the ⬚ button, a HDLC channel is generated and shown in [HDLC Configurtion Information] column.

5. Create the OMCB interface board IPBB, as shown in Figure 5.2-3.

Figure 4.2-42 Create OMCB Interface Board IPBB

[Parameter Description

(1) IPBB Channel Mode defines whether to provide 1 GE or 4 FEs as the external interfaces. The configuration of 4 FE interfaces is generally used.

(2) OMCB is connected to the iBSC via IPBB, as shown in Figure 2.2 -5.

4.2.1.2 Create IP over E1 Configuration

[Purpose]

This operation is conducted to create the HDLC channels used by the IP over E1 mode.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [IP over E1 Configuration] tab in the pop-up configuration dialog box on the right side.

2. Click the ⊞ button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -43.
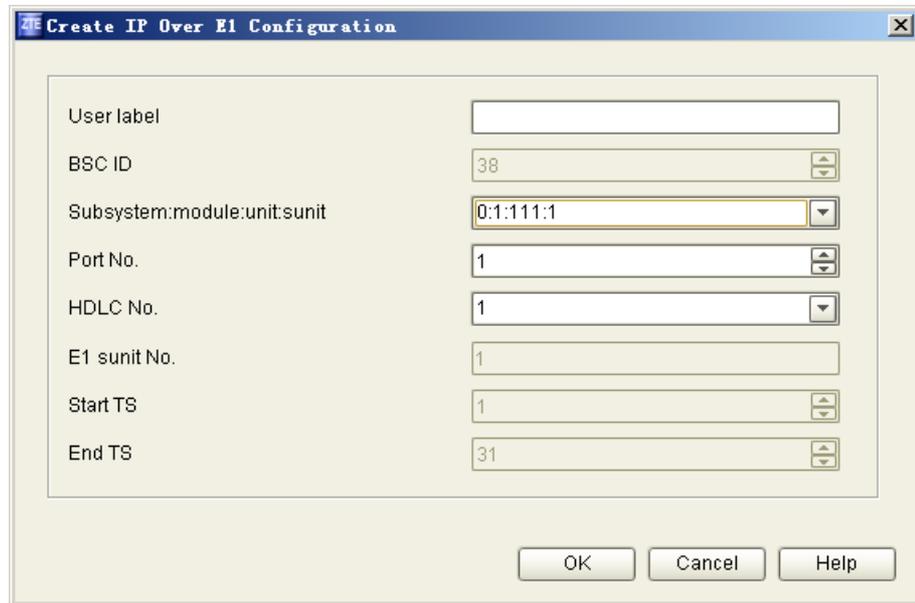

Figure 4.2-43 Create IP Over E1 Configuration

[Parameter Description]

(1) Port No.: Indicates the port of one IP over E1 on the EUIP board. When the bearer protocol is PPP, the port No. is set to the same value in the corresponding EUIP interface configuration. When the bearer protocol is ML-PPP, the port No. is irrelevant with the EUIP setting. But multiple ports in one MP-PPP cannot be repeated and these ports are normally set as 1, 2, 3 and 4.

(2) HDLC No.: Select the HDLC No. configured in EUIP Board Properties.

(3) Start TS/End TS: By default, the timeslot configured in HDLC channel is used. In this example, HDLC 1 uses the timeslots from 1 to 31.

4.2.1.3 Create PPP Configuration

[Purpose]

This operation is conducted to create the PPP configuration at the BSC side, which corresponds to the PPP configuration on the SDR side.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC

Device Configuration→IP Related Configuration]. Select the [PPP Configuration] tab in the pop-up configuration dialog box on the right side.

2. Click the ⊞ button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -44.
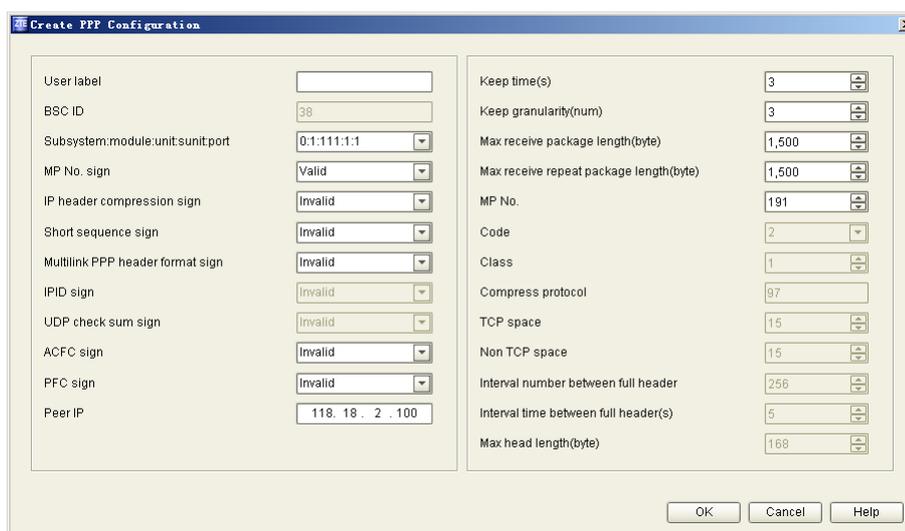

Figure 4.2-44 Create PPP Configuration

[Parameter Description]

(1) Peer IP: Type in the SDR IP.

(2) Subsystem/module/unit/subnit/port: Locates the port of the IP over E1 on the EUIP board. That is, select the same value of IP over E1 configuration set in section 4.2.1.2 Create IP over E1 Configuration.

(3) MP No. Sign: When the bearer protocol is PPP, this parameter is set to "Invalid"; when the bearer protocol is ML-PPP, it is set to "Valid", and the MP No. on the right side is the Port No. of the corresponding EUIP. See 4.2.1.4 Create SDR Real Interface.

(4) IP Header Compression Sign: Select "Valid" when the PPP is configured with compression transmission.

(5) Keep time (s)/Keep granularity (num): For example, when keep time is 3s and keep granularity is 3, it indicates 3 times of message transmission within 3s. If no response message is received for 3 times, it indicates that the PPP link is broken.

 Knowledge Points:

If it is required to add the 2nd IP over E1 to the PPP configuration, execute the following steps:

1. Recreate one PPP configuration.

2. For the "Subsystem:module:unit:sub-unit field, select one IP over E1 that needs to add the PPP configuration.

3. The configuration of other parameters is consistent with the 1st PPP configuration.

4.2.1.4 Create SDR Real Interface

[Purpose]

This operation is conducted to create the SDR real interface IP for connecting to the iBSC, that is, the EUIP_SDR address.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [Interface] tab in the pop-up configuration dialog box on the right side.

2. Click the button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -45.

Figure 4.2-45 Create SDR Real Interface IP

[Parameter Description]

(1) Board Function Type: Select "EUIP".

(2) Port No.: Assign one port No. to the real address of each EUIP and use this port No. to be associated with the port No. of IPOverE1. When the PPP protocol is used, the valid port No. ranges from 1 to 190. When the ML-PPP protocol is used, the valid port No. ranges from 191 to 254.

(3) The Number of IP: Configure one IP on the 191 Port of the EUIP. Select "1" in this example.

(4) IP address: The SDR gateway address. Under the same iBSC, the links of various EUIPs cannot be set in the same network segment. The IP address must be in the same network segment with the SDR. Type in the IP address of EUIP_SDR in this example.

(5) Subnet mask: According to the data planning, type 255.255.255.0. In the existing network, based on the number of actual SDR sites, increase or decrease the mask.

4.2.1.5 Create OMCB IP Interface

[Purpose]

This operation is conducted to create the OMCB real interface IP for connecting to the iBSC, that is, the IPBB_OMCB address.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→**IP Related Configuration**]. Select the [Interface] tab in the pop-up configuration dialog box on the right side.

2. Click the 🔲 button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -46.

Figure 4.2-46 Create OMCB Real Interface IP

[Parameter Description]

(1) Board Function Type: Select "IPBB".

(2) Port No.: According to the data planning, the FE1 port of IPBB is connected to the OMCB.

(3) MAC address: The range of the MAC address is [00-D0-D0-A0-00-00 □00-D0-D0-A0-9F-FF] or [00-19-C6-3E-30-10□00-19-C6-4E-30-0F].

(4) IP Address/Subnet Mask: The OMCB gateway address. The IP address must be in the same network segment with the OMCB IP. Type in the IP address of IPBB_OMCB in this example.

4.2.1.6 Create IP Abis Interface

[Purpose]

This operation is conducted to create the IP Abis interface IP, which is used as the OMCB channel IP.

[Context]

The IP Abis is created on the RPU. All the addresses on the RPU are virtual addresses.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [Interface] tab in

the pop-up configuration dialog box on the right side.

2. Click the ⊞ button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -47.

Figure 4.2-47 Create IP Abis Interface IP

[Parameter Description]

(1) Board Function Type: Select "RPU".

(2) Port No.: The port numbers on the RPU should be different from each other. Select "1" in this example.

(3) The Number of IP: Configure 1 IP for the port1 of the RPU. You can also bind multiple IPs to this port.

(4) IP Address: Type in the address of IP Abis according to the data planning.

(5) Subnet Mask:: The subnet mask for virtual address must be 255.255.255.255.

4.2.2 IP over FE Interface Configuration

4.2.2.1 Create Interface Board

[Purpose]

This operation is conducted to create the interface board IPBB for connecting the SDR and the OMCB server.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→BSC Rack] to open the BSC rack map.

2. Create the interface board IPBB for the SDR and OMCB, as shown in Figure 4.2 -48.

Figure 4.2-48 Create the Interface board IPBB for the SDR and OMCB

[Parameter Description]

(1) IPBB Channel Mode defines whether to provide 1 GE or 4 FEs as the external interfaces. The configuration of 4 FE interfaces is commonly used. FE1 connects to OMCB, and FE2 connects to SDR, as shown in Figure 2.2 -5.

4.2.2.2 Create SDR Real Interface IP

[Purpose]

This operation is conducted to create the SDR real interface IP for connecting to the iBSC, that is, the IPBB_SDR address.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [Interface] tab in the pop-up configuration dialog box on the right side.

2. Click the ⊞ button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -49.

Figure 4.2-49 Create SDR Real Interface IP

[Parameter Description]

(1) Board Function Type: Select "IPBB".

(2) Port No.: According to the data planning, the FE2 port of IPBB is connected to the OMCB.

(3) MAC Address:: The range of the MAC address is [00-D0-D0-A0-00-00～00-D0-D0-A0-9F-FF] or [00-19-C6-3E-30-10～00-19-C6-4E-30-0F].

(4) IP Address/Subnet Mask: The SDR gateway address. The IP address must be in the same network segment with the OMCB IP. Type in the IP address of IPBB_SDR in this example.

4.2.2.3 Create OMCB Real Interface IP

[Purpose]

This operation is conducted to create the OMCB real interface IP for connecting to the

iBSC, that is, the IPBB_OMCB address.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [Interface] tab in the pop-up configuration dialog box on the right side.

2. Click the [image] button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -50.

Figure 4.2-50 Create OMCB Real Interface IP

[Parameter Description]

(1) Board Function Type: Select "IPBB".

(2) Port No.: According to the data planning, the FE1 port of IPBB is connected to the OMCB.

(3) MAC address: The range of the MAC address is [00-D0-D0-A0-00-00～00-D0-D0-A0-9F-FF] or [00-19-C6-3E-30-10～00-19-C6-4E-30-0F]

(4) IP Address/Subnet Mask: The OMCB gateway address. The IP address must be in the same network segment with the OMCB IP. Type in the IP address of IPBB_OMCB in this example.

4.2.2.4 Create IP Abis Interface IP

[Purpose]

This operation is conducted to create the IP Abis interface IP, which is used as the OMCB channel IP.

[Context]

The IP Abis is created on the RPU. All the addresses on the RPU are virtual addresses.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource→BSC Device Configuration→IP Related Configuration]. Select the [Interface] tab in the pop-up configuration dialog box on the right side.

2. Click the ▣ button, and configure the data in the pop-up dialog box, as shown in Figure 4.2 -51.

Figure 4.2-51 Create IP Abis Interface IP

[Parameter Description]

(1) Board Function Type: Select "RPU".

(2) Port No.: The port numbers on the RPU should be different from each other. Select "1" in this example.

(3) The Number of IP: Configure 1 IP for the port1 of the RPU. You can also bind

multiple IPs to this port.

(4) IP address: Type in the address of IP Abis according to the data planning.

(5) Subnet mask: The subnet mask for virtual address must be 255.255.255.255.

4.3 Apply IP Property

[Purpose]

Generally, the IP properties that the BSC needs to configure are as follows:

● OMCB IP

● OMCB Channel IP

● IP Abis Address

This operation is conducted to create these 3 IP properties.

[Steps]

1. On the configuration resource tree, double click [BSC Global Resource] and select the [Basic Property] tab.

2. Type in the OMCB IP, as shown in Figure 4.3 -52.

OMP IP(OMP_IP)	129. 0 . 98 . 1
OMP MAC(OMP_MAC)	00- 00- 00- 00- 00- 00
OMC subnet mask(Info4)	255. 255. 255. 0
OMC gateway(Info5)	0 . 0 . 0 . 0
OMC server IP(Info6)	129. 0 . 98 . 10
OMCB IP(OMCB)	139. 1 . 1 . 200

Figure 4.3-52 Configure OMCB IP

[Parameter Description]

(1) OMCB IP: Type in the OMCB IP.

3. Select the [IP Information] tab, type in the IP Abis and OMCB channel IP, as shown in Figure 4.3 -53.

Virtual IP(VirtualIP)

| IPABIS(VirtualIP_1) | 118. 18 . 1 . 1 |
| OMCB channel IP(VirtualIP_3) | 118. 18 . 1 . 1 |

Figure 4.3-53 Configure IP Abis and OMCB channel IP

[Parameter Description]

(1) IPABIS: The address used by the iBSC to transmit the service to the SDR. Type in the IP Abis address here.

(2) OMCB channel IP: The address used by the iBSC to transmit the operation and maintenance command to the SDR. Type in the OMCB channel IP here.

4.4 Create IP Abis Bandwidth Resource Pool

[Purpose]

This procedure describes how to create an Abis pool.

[Context]

When creating a site, you should select a resource pool as a standard for other resources.

[Steps]

1. In the **IP Related Config** window, click the **IP Abis Bandwidth Resource Pool** tab. Click to open the **Create IP Abis Bandwidth Resource Pool** dialog box. Set the configuration data as shown in Figure 4.4 -54.

Figure 4.4-54 Create PPP Configuration

[Parameter Description]

(1) IP ABIS pool ID: Created ID to be used in creating a site

(2) Module No.: Homed CMP module number

(3) Attribute: According to the real transmission mode, select IP or IP over E1.

(4) Working mode: Indicating the service type of this resource pool; Generally select Mixed indicating that both CS and PS are supported.

(5) Uplink/Downlink config bandwidth: Uplink/downlink bandwidth of the resource pool; Matching the real physical bandwidth of a site

4.5 Create SDR Logic Site

[Purpose]

The actual SDR site is created on the OMCB. This operation is conducted to create the logical site for the SDR on the OMCR.

[Steps]

1. On the configuration resource tree, right-click [BSC Global Resource→Base

Station Config] to select [Create→Base Station], and configure the data in the pop-up dialog box, as shown in Figure 4.5 -55.

Figure 4.5-55 Create SDR Logical Site

[Parameter Description]

(1) Base Station Type: Select **SDR**.

(2) BTS ID: Type in the GSM site number.

(3) Module number: According to the data planning, the home CMP module number of the SDR is 3.

(4) Support IPOverE1 or not: Select "Yes" for IP over E1; select "No" for IP over FE.

(5) CS/PS Bandwidth pool: Select an IP Abis Bandwidth pool ID created for this site.

(6) Site IP Address: Type the GSM IP of SDR.

4.6 Create Cell

[Purpose]

This operation is conducted to create the logical information of the cell on the OMCR after the physical information of the cell is created on the OMCB.

[Steps]

1. On the configuration resource tree, right click [BSC Global Resource→Base Station Config →SDR2] to select [Create→Cell], and configure the data in the pop-up dialog box, as shown in Figure 4.6 -56.

Figure 4.6-56 Create Cell

[Parameter Description]

(1) BTS Id: Type in the ID of the cell, which is consistent to the cell ID configured on the OMCB.

(2) Type in the other radio parameters according to the data planning.

4.7 Create TRX

[Purpose]

This operation is conducted to create the logical information of the TRX on the OMCR after the physical information of the TRX is created on the OMCB.

[Steps]

1. On the configuration resource tree, right click [BSC Global Resource→Base Station Config→SDR2→Cell1] to select [Create→TRX], and configure the data in the pop-up dialog box, as shown in Figure 4.7 -57.

Figure 4.7-57 Create TRX

[Parameter Description]

(1) Trx ID: Type in the TRX ID of Cell1, which is consistent to the carrier ID configured on the OMCB.

(2) BCCH carrier frequency (BcchMark): According to the data planning, frequecy10 is the BCCH carrier frequency. Select **Yes**.

(3) Priority (TrxPriority): It indicates the priority of the service. "1" means the highest priority. The system automatically select "1" for the BCCH carrier frequency, which means the service will occupy the BCCH carrier frequency first.

(4) Support FHS: This parameter is to be configured in the network optimization stage. Select **No** in the commissioning stage.

(5) Frequency: According to the data planning, type in "10" to represent the frequency (ARFCN) used by the TRX.

2. Select the [Channel Information] tab, and type in the configuration data, as shown in Figure 4.7 -58.
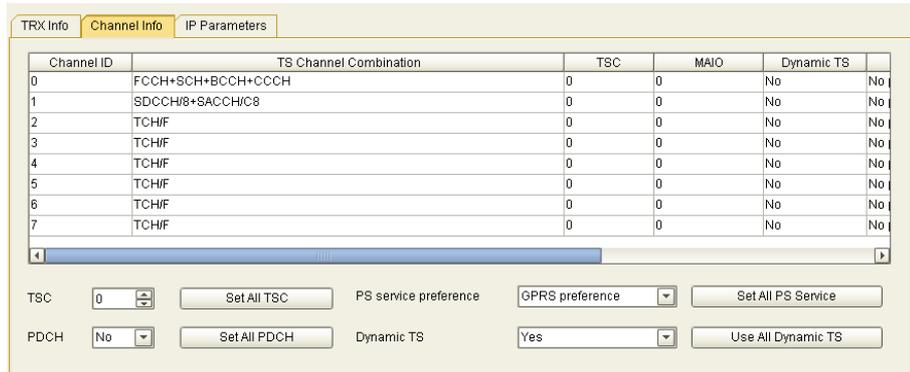
Figure 4.7-58 Set TS Channel Property

Note:

This textbook will not give detailed description for the configuration of channels, since it is closely related with the radio network optimization.

3.   Select the [IP Information] tab, and type in the configuration data, as shown in Figure 4.7 -59.
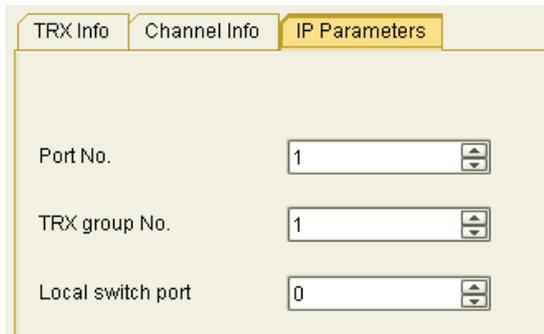

Figure 4.7-59 Set TRX IP Parameters

[Parameter Description]

(1) Port No.: Port No. of the TRX, unique in the same iBSC.

(2) TRX group No.: Indicating the group number of TRX; In one group by default

(3) Local switch port: Set a local switching port. The default value is 0 when the local switching port is not used.

4.   Continue to configure the other 3 TRXs of cell1, i.e TRX2, TRX3 and TRX4.

4.8 Data Synchronization

[Purpose]

This operation is conducted to send the data configured on the OMCB to the iBSC.

[Prerequisite]

In order to send the data to the iBSC, the link between the SBCX and OMP should be established first.

[Steps]

1. Right-click the root node of BSC managed elements and select [Synchronize All Data], as shown in Figure 4.8 -60.
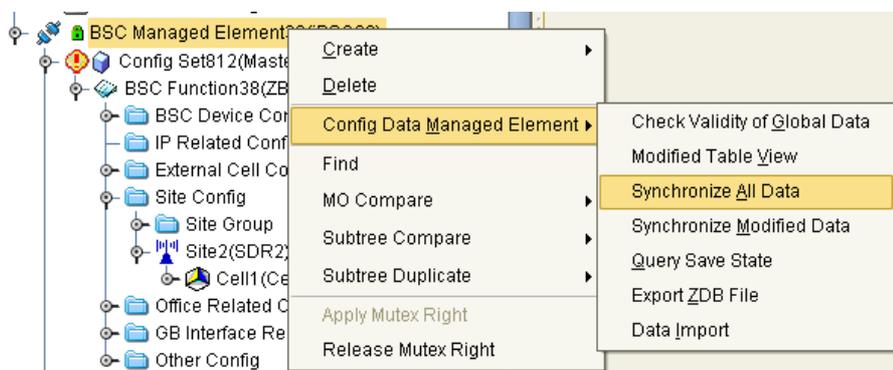

Figure 4.8-60 Data Synchronization

[Parameter Description]

(1) Synchronizing All Data: Send all data under the master configuration set to the iBSC.

(2) Incremental Synchronization: Send the modified data under the master configuration set to the iBSC.