

2009-02

Security Level: Internal Use

HUAWEI DBS3900 Dual-Mode Base Station Hardware Structure

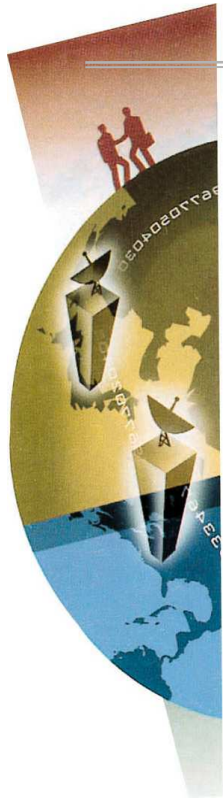
ISSUE1.0

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- ◆ **DBS3900 Dual-Mode Base Station is the fourth generation base station developed by Huawei. It features a multi-mode modular design and supports three working modes: GSM mode, GSM+UMTS dual mode, and UMTS mode through configuration of different software. In addition, the DBS3900 supports smooth evolution to the Long-Term Evolution (LTE).**

Purpose

- ◆ Know the functions and features of DBS3900
- ◆ Master the Hardware structure and function of DBS3900
- ◆ Master the typical configuration and RF Cable Connections
- ◆ Master the Network topologies of DBS3900



Reference

- ◆ DBS3900 Product Description (V100R001_01)
- ◆ BBU3900 User Guide (V100R001_01)
- ◆ RRU3908 User Guide (V100R001_01)



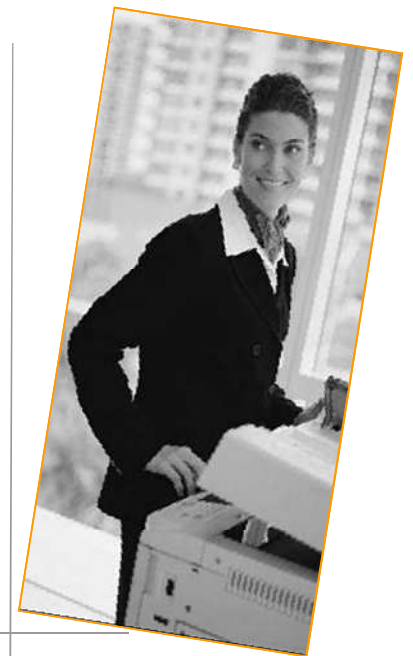
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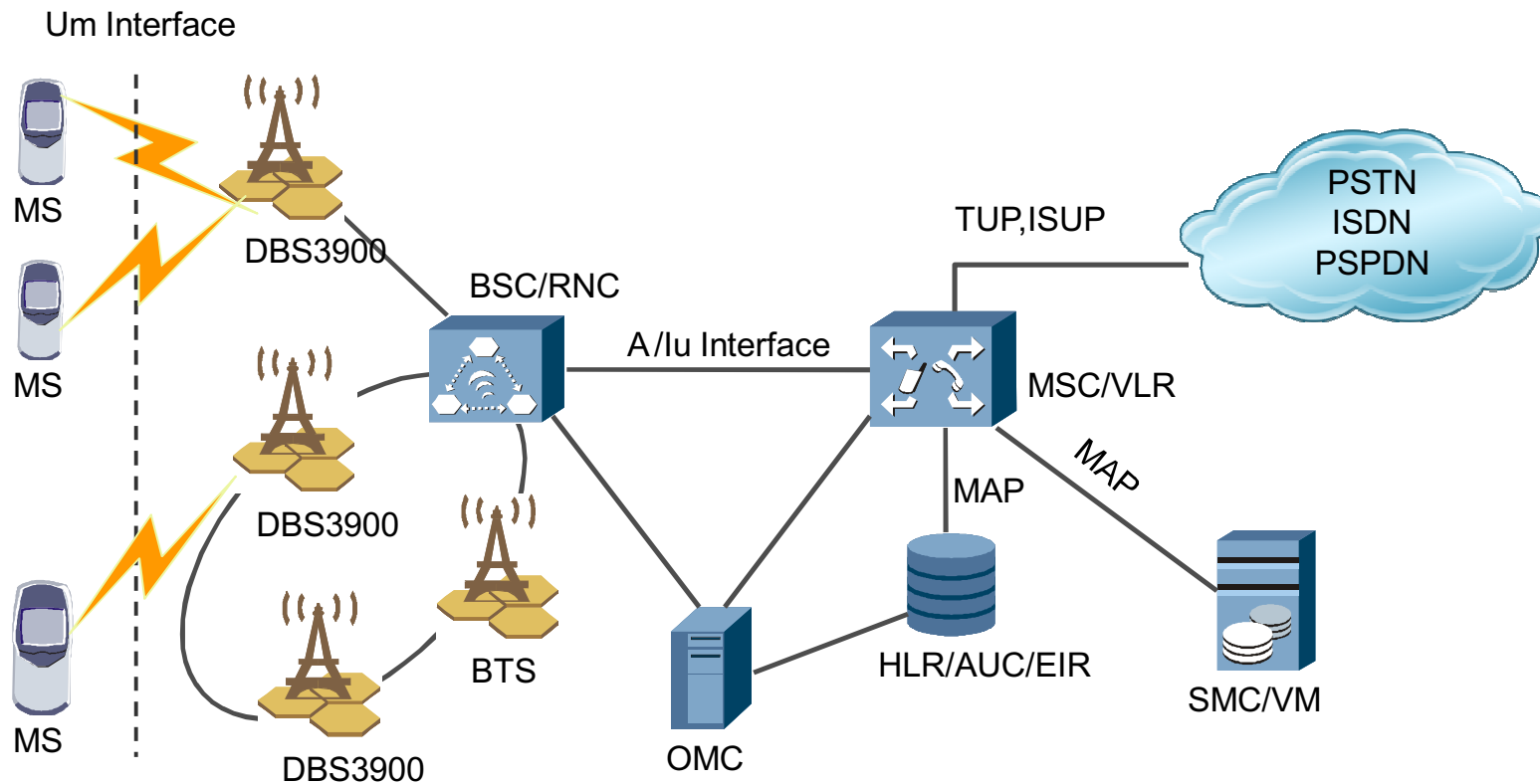
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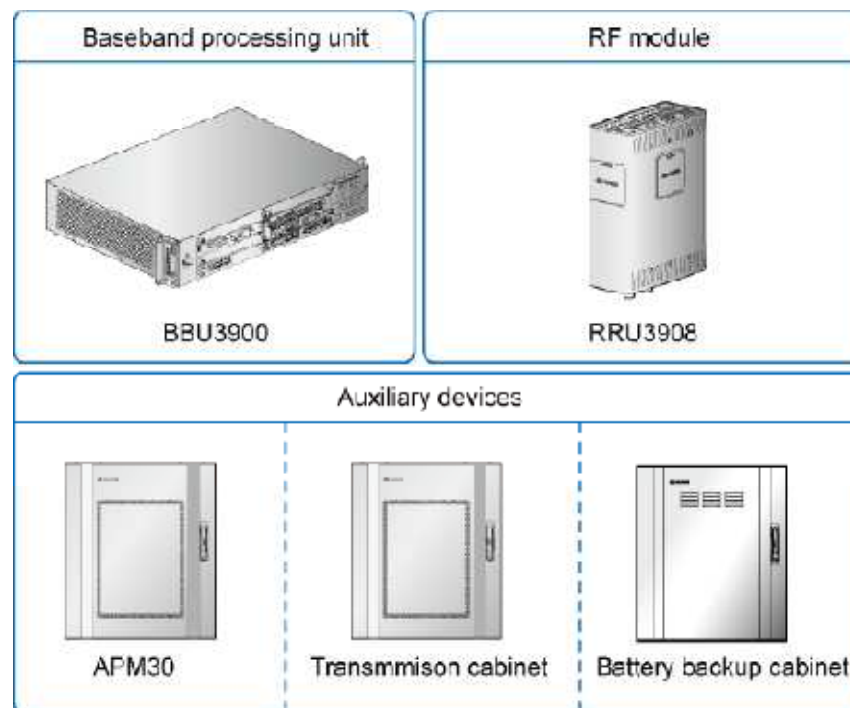
Location



MS: Mobile Station	BTS: Base Transceiver Station	BSC: Base Station Controller
HLR: Home Location Register	AUC: Authentication Center	EIR: Equipment Identity Register
MSC: Mobile Switching Center	VLR: Visitor Location Register	SMC: Short Message Center
VM: Voice Mailbox	OMC: Operation and Maintenance Center	DBS : Distributed Base Station

DBS3900 Product Description

- ◆ The DBS3900 consists of two basic modules: BBU3900 (baseband processing unit) and RRU3908 (outdoor remote radio unit). Flexible combinations of the two basic modules and auxiliary devices can provide comprehensive solutions that apply to different scenarios of operators. For the distributed installation scenario, the RRU3908 can be installed close to the antenna to decrease feeder loss and enhance base station performance.



Features of DBS3900

◆ Advanced Platform-Based Architecture

- ◀ Based on the unified hardware platform, the DBS3900 supports three working modes: GSM mode, GSM+UMTS dual mode, and UMTS mode through configuration of different software. In addition, the DBS3900 supports smooth evolution to the Long-Term Evolution (LTE).
- ◀ The RF module integrates the duplexer and the Transceiver Unit (TRU), thus enhancing integrity of RF parts and meeting future requirements for a compact, high-efficiency, and low-cost base station.
- ◀ Support 900M PGSM and 850M. Support High 40M band and low 40M band of 1900M.

◆ Transmission Sharing

- ◀ Share the CPRI port. The CPRI data of the GSM and UMTS networks can be multiplexed on the same optical cable, which reduces the quantity of CPRI ports.
- ◀ Share transmission resources between the Abis and the Iub interfaces.

Features of the DBS3900

◆ High Capacity

- ◀ When the DBS3900 works in GSM mode, a BBU3900 supports the maximum cell configuration of S24/24/24, and RRU3908 supports a maximum of six GSM carriers.
- ◀ When the DBS3900 works in GSM+UMTS dual mode, a BBU3900 supports the maximum cell configuration of GSM S24/24/24 or UMTS S8/8/8, Capacity of the RRU3908 can be expanded through cascading of RRU3908s, and three cascaded RRU3908s can support the cell configuration of GSM S4/4/4 + UMTS S2/2/2 or GSM S5/5/5 + UMTS S1/1/1.
- ◀ When the DBS3900 works in UMTS mode, a BBU3900 supports 24 cells, the maximum configuration of 3 x 8, 1,536 CEs in the uplink, 1,536 CEs in the downlink. In addition, the BBU3900 supports the HSDPA and HSUPA. An RRU3908 supports a maximum of four UMTS carriers.

◆ Low Power Consumption

- ◀ The DBS3900 can control the power-on/off of boards through software, disabling of RF channels through software, voltage adjustment of PA power supply, and the rotation speed of the fan. This enable adjustment of power requirements based on the actual traffic load, thus reducing power consumption.

Features of the DBS3900

◆ Coverage

- ◀ The transmission distance of a single-mode optical cable at one level (that is, from the BBU to an RRU or from one RRU to another RRU) is 40 km. The RRU supports a maximum of three levels of cascading, which enables the longest distance between RRUs and a BBU to be 100 km.
- ◀ When the DBS3900 works in UMTS mode, one RRU3908 can support open loops in both Space Time Transmit Diversity (STTD) and Time Switched Transmit Diversity (TSTD) modes and closed loops in TX diversity mode, which enhances the performance in DL coverage and capacity.
- ◀ The DBS3900 supports the 2-way RX diversity and 4-way RX diversity, which enhances the performance in UL demodulation and receiver sensitivity.

Features of the DBS3900

◆ Networking Capability

- ◀ The DBS3900 supports multiple network topologies, such as star, tree, chain, and ring topologies.
- ◀ The DBS3900 supports Flex Abis networking.
- ◀ The DBS3900 supports co-transmission between the GSM and the UMTS.
- ◀ When working in UMTS mode, the DBS3900 supports ATM and IP dual stack to protect operators' early investment in ATM transport.
- ◀ The DBS3900 supports optimized transmission on the Abis interface.

◆ Flexible Clock Synchronization Modes

- ◀ When the GSM network uses E1/T1 transport and UMTS uses IP transport, the clock of the UMTS can be directly extracted from the GSM, thus implementing clock resource sharing without additional investment in the Global Positioning System (GPS) or clock server.
- ◀ Synchronization with the IP clock, a highly cost-effective clock solution, which can be obtained through software upgrade without additional hardware.
- ◀ The dynamic transmission bandwidth sharing is supported in GSM+UMTS dual-mode IP networking.
- ◀ Clock phase lock, tracing, and memory functions and free-run synchronization mode. When the clock operates in free-run mode, the system can keep operational for at least 90 days at normal temperature.

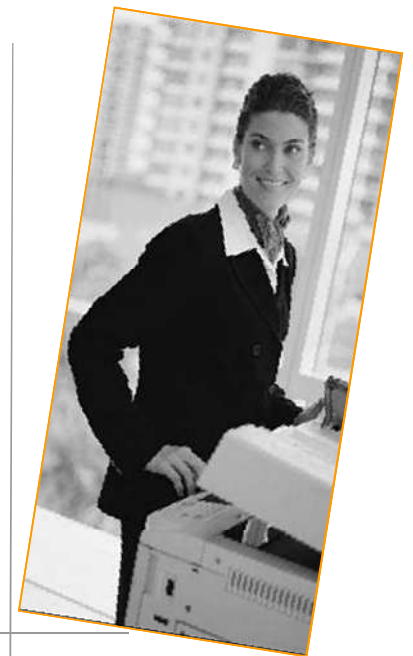
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Abbreviation

Abbreviation	Description
GTMU	Transmission& Timing& Management Unit for BBU
WMPT	WCDMA Main Processing and Transmission Unit
WBBPa	WCDMA Baseband Process unit Type A
UTRP	Universal Transmission Processing Unit
UPEA	Universal power and Environment interface unit Type A (-48v)
BSBC	Universal BBU Subrack Backplane Type C (2U)
UBFA	Universal BBU Fan Unit Type A (2U)
UEIU	Universal Environment Interface unit
UELP	Universal E1/T1 Lighting Protection unit
UFLP	Universal FE/GE Lighting Protection unit
CPRI	Common Protocol Radio Interface
APM	Advanced Power Module
IBBS	Integrated Backup Battery System
OFB	Outdoor Facility Box

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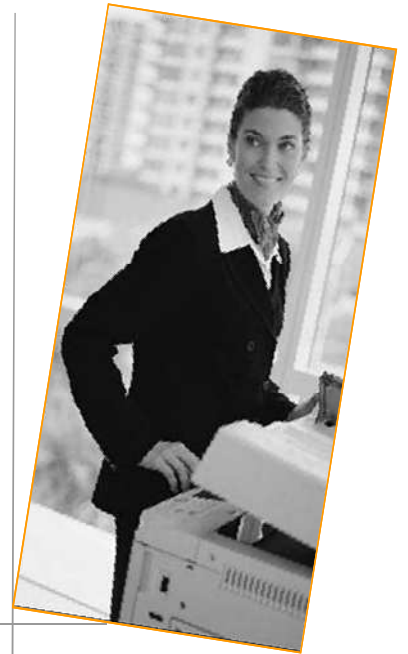
Sector 1 DBS3900 Hardware Components

Sector 2 BBU3900 System Structure

Sector 3 RRU3908 System Structure

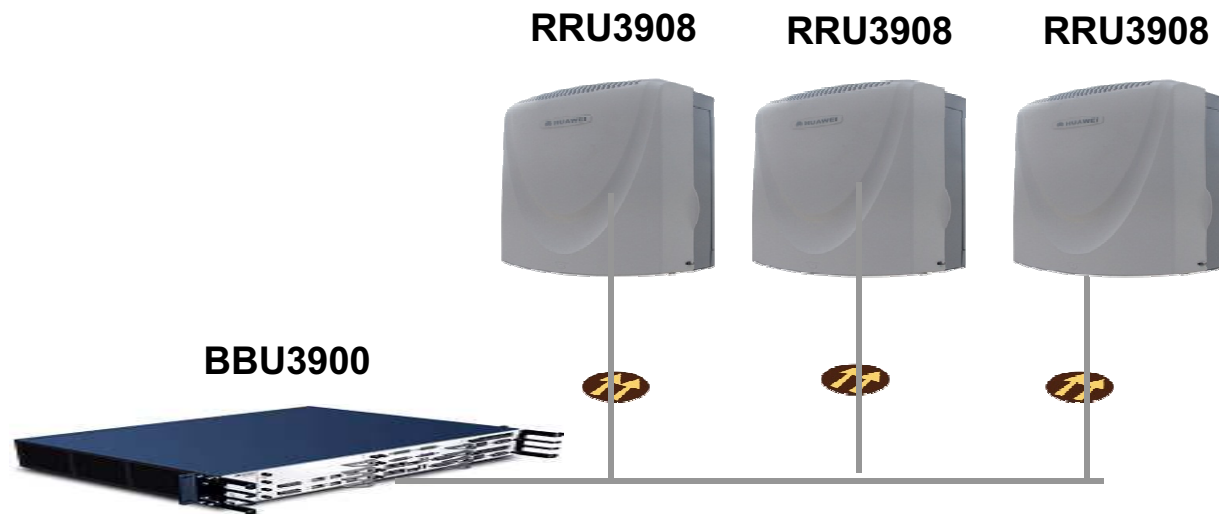
Sector 4 DBS3900 auxiliary equipment

Sector 5 DBS3900 Typical Application Scenarios



DBS3900 Hardware Components

- ◆ The DBS3900 consists of the BBU3900 and the RRU3908 which are connected with fiber.
- ◆ The BBU3900 is an indoor baseband unit. It provides physical interfaces for connection with the BSC/RNC and RRU. It performs centralized management (OM and signaling processing) of the entire base station system and provides reference clock for the system.
- ◆ The RRU3908 is an outdoor remote RF unit. It processes baseband signals and RF signals.
- ◆ The Local Maintenance Terminal (LMT) and Site Maintenance Terminal System (SMT) can implement the maintenance of the DBS3900 through the BBU3900.



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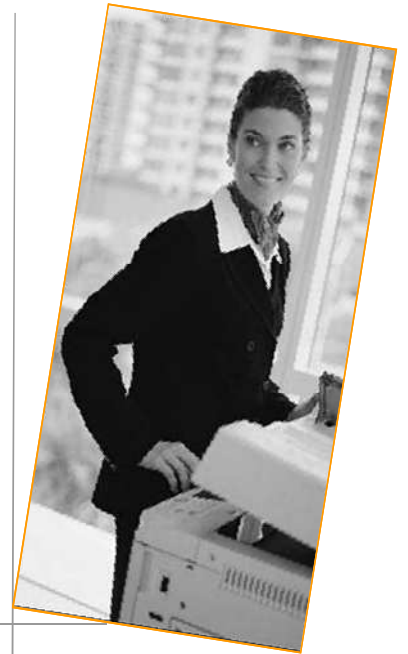
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Sector 4 DBS3900 auxiliary equipment

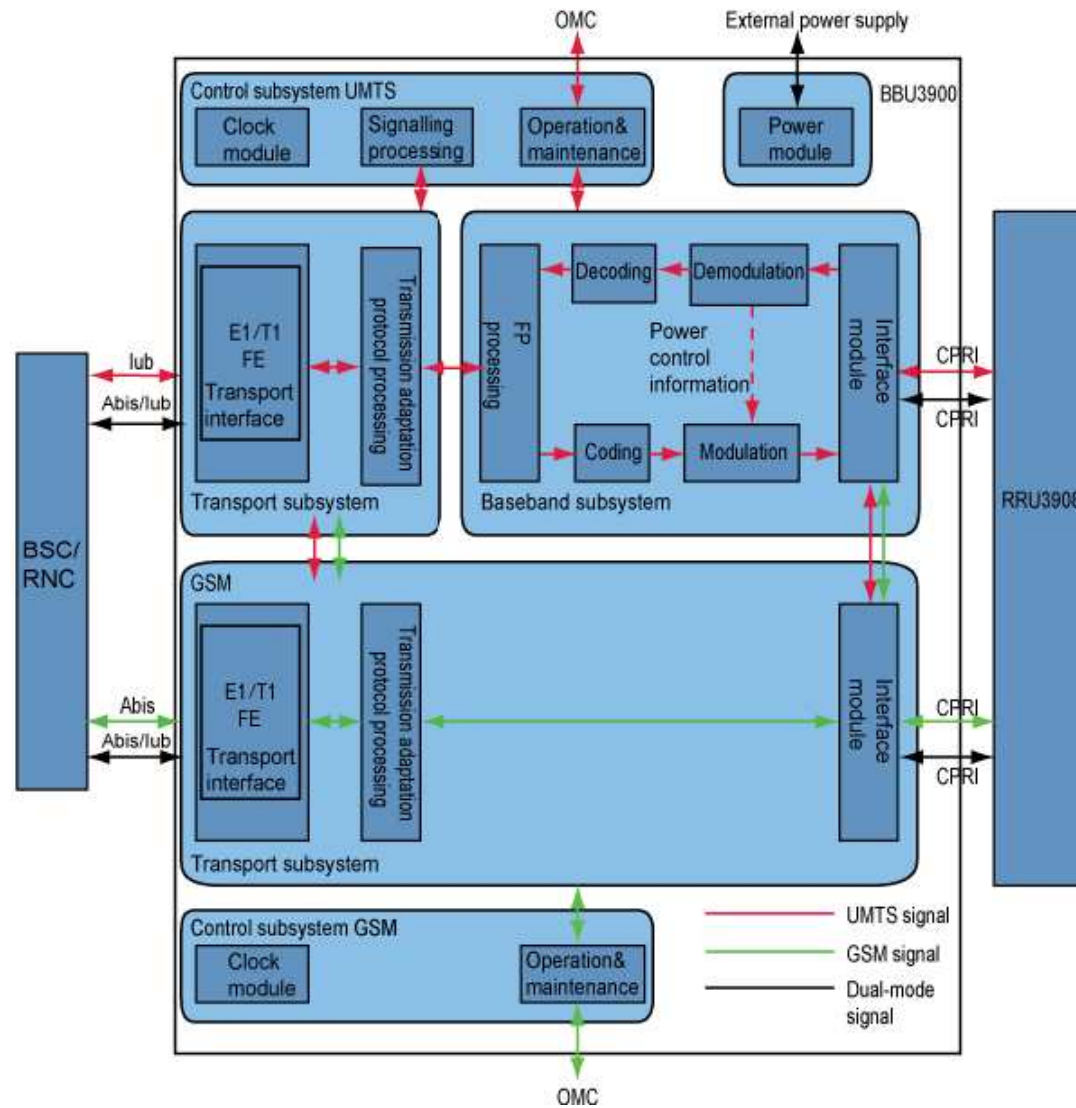
Sector 5 DBS3900 Typical Application Scenarios



BBU3900

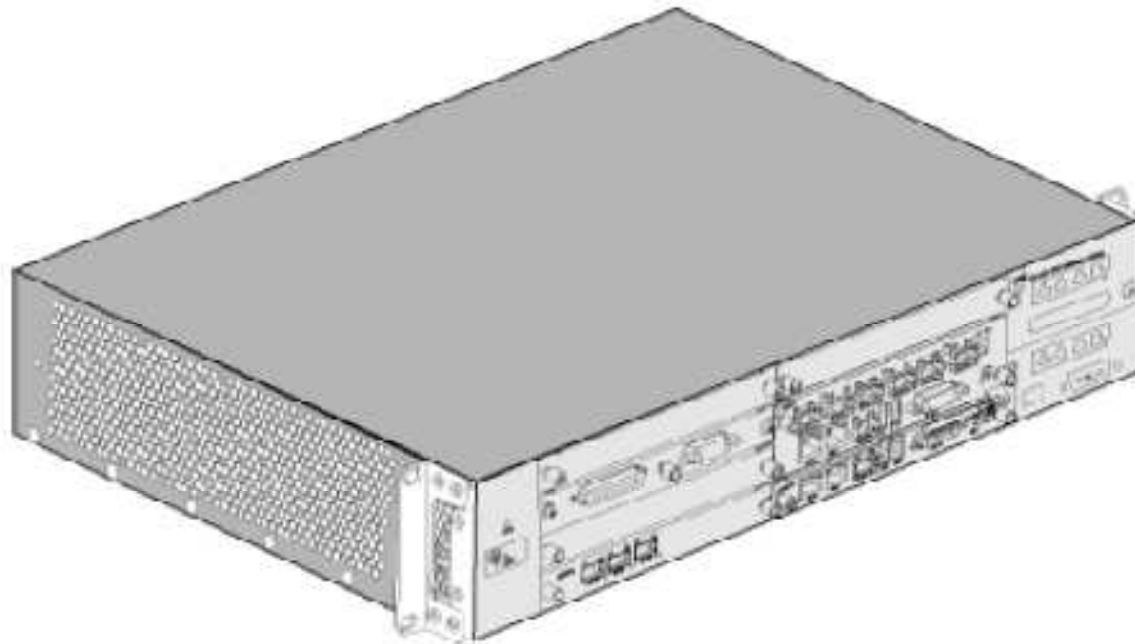
- ◆ **The BBU3900 is a baseband processing unit. It provides physical ports for connection to the BSC/RNC and the RRU3908, performs centralized management of the entire DBS3900 system in terms of Operation and Maintenance (OM) and signaling processing, and provides the system clock.**
- ◆ **Functions of the BBU3900:**
 - ◀ Provides ports between the BBU3900 and the BSC/RNC for data communication.
 - ◀ Provides the CPRI ports for communication with the RRU.
 - ◀ Provides USB ports, one of which facilitates automatic NodeB upgrade when a USB disk is inserted during software installation and data configuration.
 - ◀ Provides the OM channel for connection to the LMT (or M2000).
 - ◀ Processes uplink and downlink data.
 - ◀ Manages the entire DBS3900 in terms of OM and signaling processing.
 - ◀ Provides the system clock.

Logical Structure of the BBU3900



Hardware Components of BBU3900

- ◆ The BBU3900 has a case structure. It can be installed in a 19-inch-wide and 2 U-high indoor space or outdoor protective cabinet.
- ◆ The dimensions of the BBU3900 in GSM+UMTS dual mode are 442 mm (width) x 310 mm (depth) x 86 mm (height).



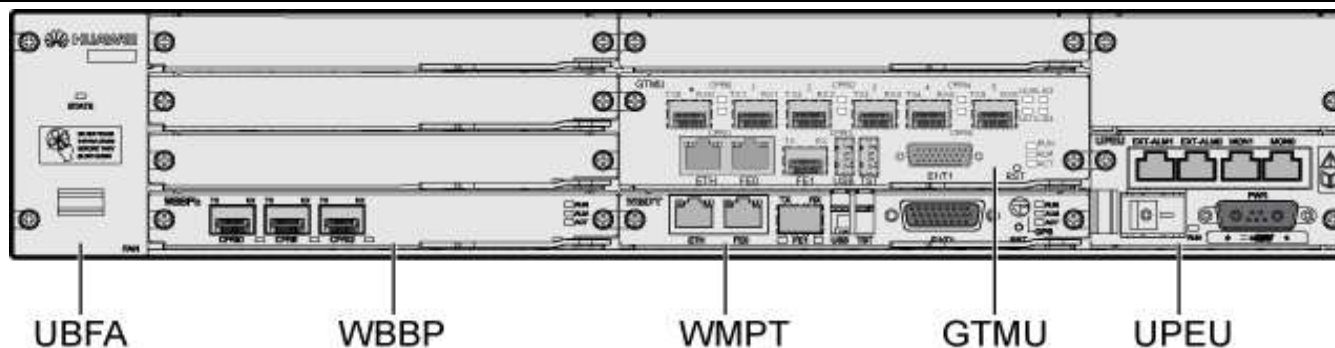
Slots of the BBU3900

- ◆ The BBU3900 can be configured with the boards such as the GSM Timing and Main control Unit (GTMU), WCDMA Main Processing Transmission unit (WMPT), WCDMA Baseband Processing unit (WBBP), Universal Transmission Processing unit (UTRP), Universal Power and Environment Interface Unit (UPEU), Universal Environment Interface Unit (UEIU), Universal E1/T1 Lightning Protection (UELP), Universal FE Lightning Protection (UFLP), and UBFA.

UBFA	Slot 0 WBBP/UTRP/UELP/UFLP	Slot 4 WBBP/UTRP/UELP/UFLP	PWR1 UPEU/UEIU
	Slot 1 WBBP/UTRP	Slot 5 GTMU	
	Slot 2 WBBP/UTRP	Slot 6	PWR2 UPEU/UEIU
	Slot 3 WBBP/UTRP	Slot 7 WMPT	

Board configuration principles of the BBU3900

Board Name	Optional/ Mandatory	Maximum Number	Slot	Configuration Limitations
WMPT	Mandatory	1	Slot 7	Only configured in slot 7
GTMU	Mandatory	1	Slot 5 and Slot 6	Only configured in slot 5 and slot6
WBBP	Mandatory	4	Slot 0 - Slot 3	Only configured in slot 2 and slot 3 in the case of the WBBP that transmits CPRI signals
UBFA	Mandatory	1	UBFA	Only configured in the FAN slot
UPEU	Mandatory	2	PWR1 or PWR2	Preferentially configured at the PWR2 slot in the case of a single UPEU
UEIU	Optional	1	PWR1 or PWR2	Preferentially configured in the PWR1 slot
UELP	Optional	2	Slot 0 or Slot 4	Configured in slot 0 in GSM mode. Configured in slot 4 in UMTS mode.
UFLP	Optional	1	Slot4	Preferentially configured in slot 4 in the case of a single UFLP
UTRP	Optional	4	Slot0 - Slot4	—

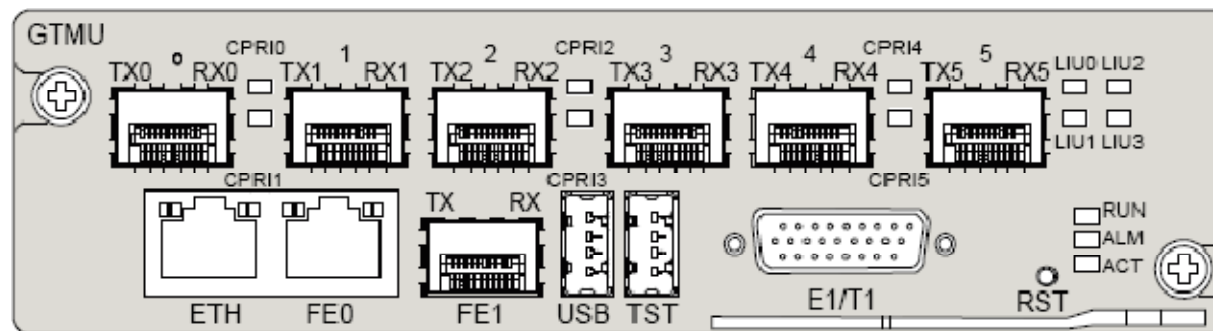


GTMU Board

◆ **Transmission, Timing, and Management Unit for BBU (GTMU) controls and manages the entire BTS in GSM mode. It provides interfaces related to the reference clock, power supply, OM, and external alarm collection.**

◆ **Functions:**

- ✦ Provides OM management for the GSM network including fault management, configuration management, performance management, and security management. Monitoring the fan module and the power supply module
- ✦ Provides four E1s/T1s, one FE electrical port, and one FE optical port.
- ✦ Provides the six-channel CPRI ports for connection to the RF modules and supports convergence of dual-mode signals in dual-mode application.
- ✦ Processes clock signals and provides a unified clock for service boards in GSM mode.
- ✦ Providing the Ethernet port for local maintenance
- ✦ Providing clock input for testing



GTMU Board

◆ Ports on the GTMU panel:

Board	Port	Connector Type	Cable	Description
GTMU	CPRI0~CPRI5	SPF connector	CPRI optical cable between the BBU and the RRU	Ports for the communication between the BBU and the RF module; support input and output of the optical and electrical signal .
	ETH	RJ45 connector	Crossover cable (delivered with the equipment)	Ports for the communication between the BBU and the RF module; support input and output of the optical and electrical signal .
	FE0	RJ45 connector	—	A reserved port that Connects the BBU to a routing device in the equipment room through the Ethernet cable to transmit network information.
	FE1	DLC connector	—	A reserved port that Connects the BBU to a routing device in the equipment room through the optical cable to transmit network information.
	USB	USB connector	—	A reserved port that enables the automatic software
	TST	USB connector	—	Tests the output clock signals using a tester.
	E1/T1	DB26 male connector	E1/T1 cable of the BBU	Provides the input and output of the four E1/T1 signals between the GTMU and the UELP or between the GTMU and the BSC.

GTMU Board

◆ LEDs on the GTMU:

LED	Color	Status	Description
RUN	Green	ON	The board is faulty.
		OFF	No power supply is available or the board is faulty.
		ON for 1s and OFF for 1s	The board is operational.
		ON for 2s and OFF for 2s	The OML link is abnormal.
		ON for 0.125s and OFF for 0.125s	The board is loading software.
ALM	Red	ON	A fault occurs in the running board.
		OFF	No alarm is generated.
ACT	Green	ON	The board is operational.
		OFF	The board is faulty.
LIU0~LIU3	Green	ON	This link is not used.
		ON for 0.125s and OFF for 0.125s	A remote E1/T1 alarm is generated.
		OFF	This link is operational.
CPRI0~CPRI5	Green	ON	The CPRI link is normal.
	Red	The reception of the optical	The reception of the optical

GTMU Board

◆ DIP Switches on the GTMU:

DIP Switch	DIP Status		Description
	1	2	
SW1	ON	ON	The E1 impedance is set to 75 ohms.
	OFF	ON	The E1 impedance is set to 120 ohms.
	ON	OFF	The T1 impedance is set to 100 ohms.

DIP Switch	DIP Status				Description
	1	2	3	4	
SW2	ON	ON	ON	ON	E1/T1 grounded (unbalanced mode)
	OFF	OFF	OFF	OFF	E1/T1 not grounded (balanced mode)

DIP Switch	DIP Status				Description
	1	2	3	4	
SW4	ON	ON	ON	ON	The E1 link can be bypassed.
	OFF	OFF	OFF	OFF	The E1 link cannot be bypassed.

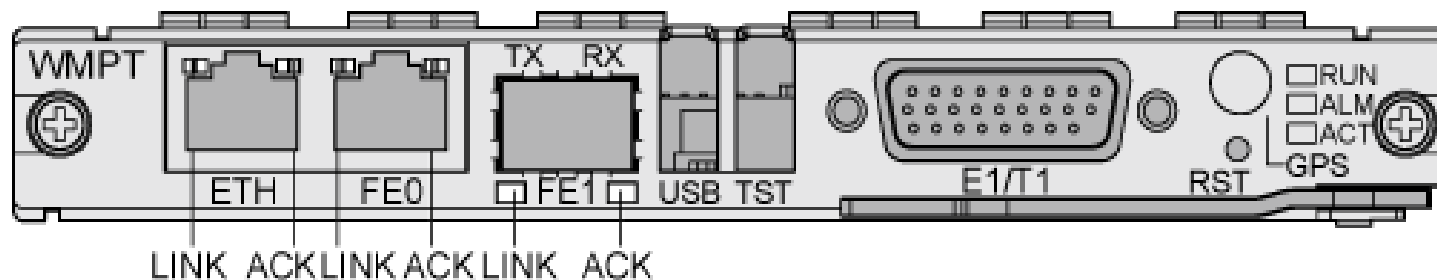
DIP Switch	DIP Status				Description
	1	2	3	4	
SW5	ON	ON	ON	ON	The E1 link cannot be bypassed.
	OFF	ON	ON	OFF	The E1 link of the Level 1 cascaded BTS can be bypassed.
	ON	OFF	ON	OFF	The E1 link of the Level 2 cascaded BTS can be bypassed.
	OFF	OFF	ON	OFF	The E1 link of the Level 3 cascaded BTS can be bypassed.
	ON	ON	OFF	OFF	The E1 link of the Level 4 cascaded BTS can be bypassed.
	OFF	ON	OFF	OFF	The E1 link of the Level 5 cascaded BTS can be bypassed.

WMPT Board

◆ This describes the WCDMA Main Processing and Transmission unit (WMPT). It is the BBU3900 main control and transmission board that processes the signals and manages the resources for other boards.

◆ **Functions:**

- ✦ Providing Operation and Maintenance (OM) functions such as configuration management, equipment management, performance monitoring, signaling processing, and active/standby switchover and providing OM channels connected to the OMC (LMT or M2000).
- ✦ Processes clock signals and provides a unified clock and reference clock source for service boards in UMTS mode.
- ✦ Processing signaling and managing resources for other boards in the BBU.
- ✦ Provides one USB port to download and activate the host software by using a USB disk.
- ✦ Provides four E1s/T1s, one FE electrical port, and one FE optical port.
- ✦ Supporting cold backup.



WMPT Board

◆ Ports on the WMPT:

Board	Port	Type	Description
WMPT	E1/T1	DB26 connector	E1
	FE0	RJ45 connector	FE electrical port
	FE1	SFP connector	FE optical port
	GPS	SMA connector	GPS antenna
	ETH	RJ45 connector	Commissioning Ethernet port
	USB	USB connector	USB loading port
	TEST	USB connector	testing port
	RST	—	Resetting the BBU

WMPT Board

◆ LEDs on the WMPT:

LED	Color	Status	Description
RUN	Green	ON	The power input is available, but the board is faulty.
		OFF	The power supply is available.
		ON for 1s and OFF for 1s	The board in normal configuration is running properly.
		ON for 0.125s and OFF for 0.125s	The software is being loaded to the board, or the board is not in use.
ALM	Red	ON	The board has alarms on hardware.
		OFF	No alarm is generated.
ACT	Green	ON	The board is in active mode.
		OFF	The board is in standby mode.

WMPT Board

◆ LEDs beside the three ports on the WMPT:

LED	Color	Status	Description
LEDs beside the FE1 optical port	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Green (ACK)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.
LEDs beside the FE0 electrical port	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Yellow (ACK)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.
ETH	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Yellow (ACK)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.

WMPT Board

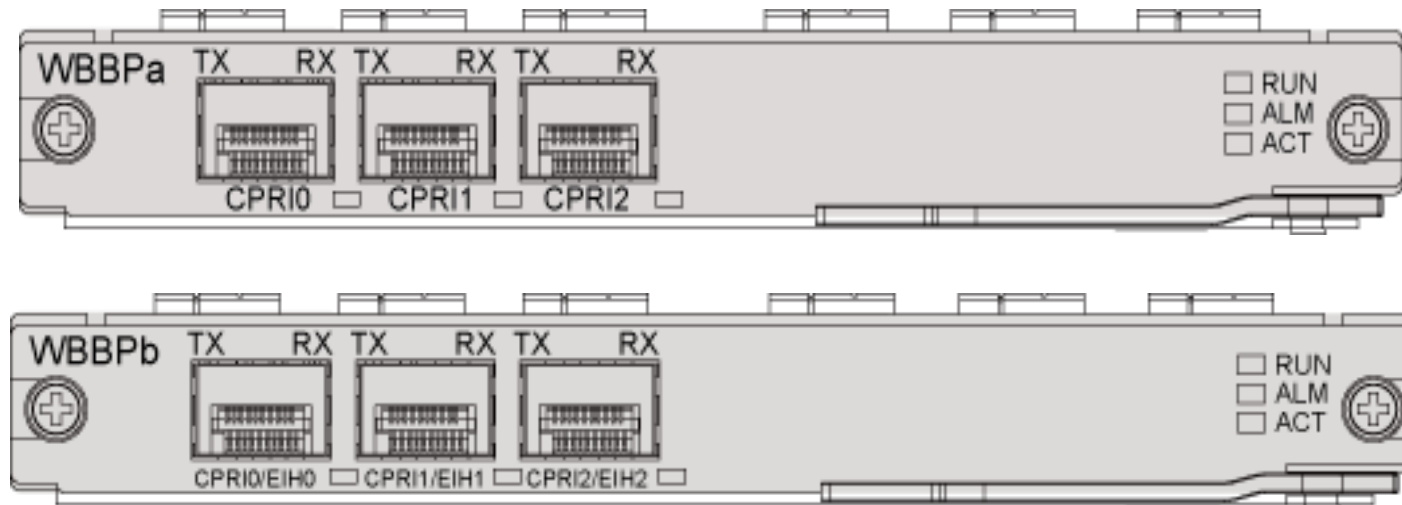
◆ DIP Switches on the WMPT:

DIP Switch	DIP Bit	T1 Mode	120-ohm E1 Mode	75-ohm E1 Mode
SW1	1	ON	OFF	ON
	2	ON	OFF	ON
	3	OFF	ON	ON
	4	OFF	ON	ON

DIP Switch	DIP Bit	Balanced Mode	Unbalanced Mode
SW2	1	OFF	ON
	2	OFF	ON
	3	OFF	ON
	4	OFF	ON

WBBP Board

- ◆ This describes the WCDMA Baseband Process Unit (WBBP) board of the BBU3900. The WBBP processes baseband signals.
- ◆ **Function:**
 - ◀ Providing the CPRI interface for communication between the BBU and the RRU, and supporting the CPRI interface in 1+1 backup mode.
 - ◀ Processing uplink and downlink baseband signals.
- ◆ **Two types WBBP panels: WBBPa and WBBPb**



WBBP Board

◆ Specifications of the WBBP:

Number	Number of Cells	UL CE Number	DL CE Number	Maximum HSDPA Traffic	Maximum HSUPA Traffic
WBBPa	3	128	256	15Mbps	6Mbps
WBBPb1	3	64	64	15Mbps	6Mbps
WBBPb2	3	128	128	15Mbps	6Mbps
WBBPb3	6	256	256	30Mbps	12Mbps
WBBPb4	6	384	384	40Mbps	12Mbps

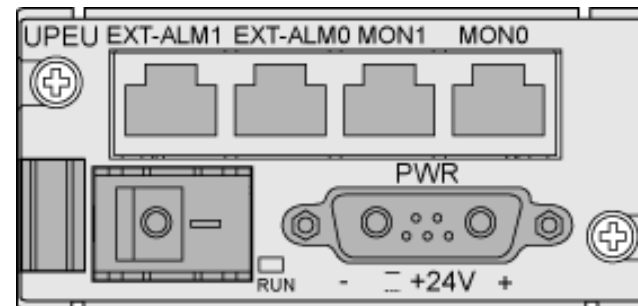
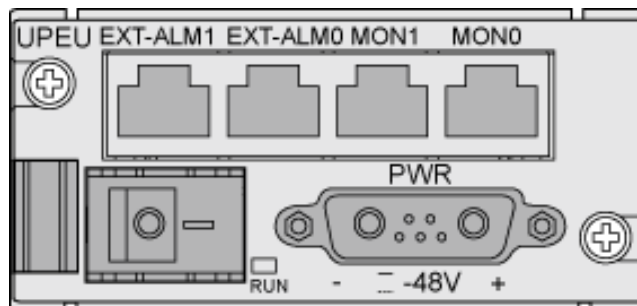
WBBP Board

◆ LEDs on the WBBP:

LED	Color	Status	Description
RUN	Green	ON	The board has power input, yet the board is faulty.
		OFF	The power supply or the board is faulty.
		ON for 1s and OFF for 1s	The board is running properly.
		ON for 0.125s and OFF for 0.125s	Software is being loaded to the board.
ALM	Red	ON	The board has alarms on hardware.
		OFF	The board is running properly.
ACT	Green	ON	The board is running properly.
		OFF	The WBBP is not in use.
CPRI0/ CPRI1/ CPRI2	Red/ green	OFF	The optical module is not configured with CPRI ports or the module is powered off.
		ON (green)	The CPRI link is operational, and the RRU hardware is functional.
		ON (red)	The optical module is not in position or the CPRI link is faulty.
		Blinking at 4 Hz (red, 0.125s ON, 0.125s OFF)	The hardware of the RRU connected to the CPRI link is faulty and needs to be replaced.
		Blinking at 0.5 Hz (red, 1s ON, 1s OFF)	The VSWR alarm, antenna alarm, or RRU external alarm occurs on the RRU connected to the CPRI link.

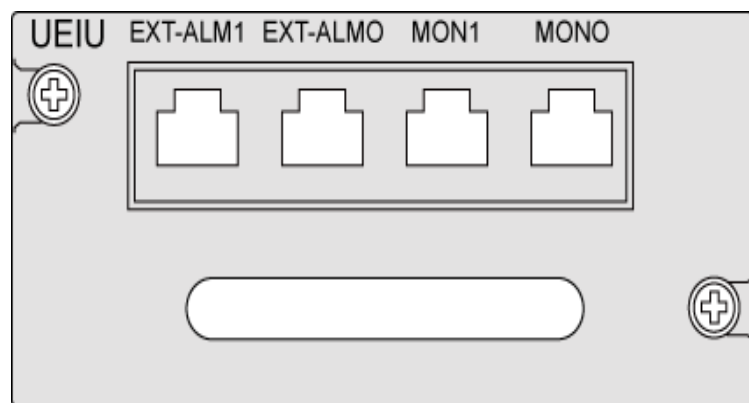
UPEU Board

- ◆ This describes the **Universal Power and Environment Interface Unit (UPEU)** board. It is a mandatory board of the BBU3900 that converts **-48V DC or +24V DC to +12V DC**.
- ◆ **Function:**
 - ◀ Convert -48V or +24V DC to +12V DC that is applicable to the boards.
 - ◀ Provide two ports with each transmitting one RS485 signal and another two ports with each transmitting four dry contact signals.
 - ◀ Provide reverse connection protection for power cable connectors.
- ◆ **The UPEU is classified into the Universal Power and Environment Interface Unit Type A (UPEA) and the Universal Power and Environment Interface Unit Type B (UPEB). The UPEA converts -48V DC to +12V DC and the UPEB converts 24V DC to 12V DC.**



UEIU Board

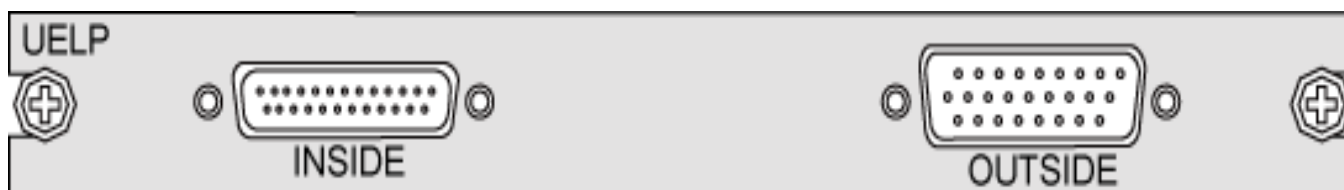
- ◆ This describes the Universal Environment Interface Unit (UEIU) board of the BBU3900. The UEIU transmits monitoring signals and alarm signals from external devices to the main control board. Providing two ports with each transmitting one RS485 signal and two ports with each transmitting four dry contact signals.



Label	Connector Type	Description
MON0	RJ45	One RS485 signal
MON1	RJ45	One RS485 signal
EXT-ALM0	RJ45	Four dry contact signals
EXT-ALM1	RJ45	Four dry contact signals

UELP Board

- ◆ The Universal E1/T1 Lightning Protection (UELP) is a universal E1/T1 surge protection unit. The UELP is optionally installed in the SLPU (Signal Lightning Protection Unit) or BBU. Each UELP provides surge protection for four E1s/T1s.



Label	Connector Type	Description
INSIDE	DB25	E1 transfer transmission port
OUTSIDE	DB26	E1 transmission port

- ◆ The UELP has one DIP switch, which is used to select whether the receive terminal is grounded.

DIP Switch	DIP Status				Description
	1	2	3	4	
S1	ON	ON	ON	ON	Used for the 75-ohm unbalanced mode
	OFF	OFF	OFF	OFF	Used for other modes except the 75-ohm unbalanced mode

UFLP Board

- ◆ The universal FE lightning protection (UFLP) board is optionally installed in the SLPU or BBU3900. Each UFLP supports 2-way FE surge protection.



Port Location	Port	Quantity	Connector Type
INSIDE	FE0、FE1	2	RJ45
OUTSIDE	FE0、FE1	2	RJ45

UTRP Board

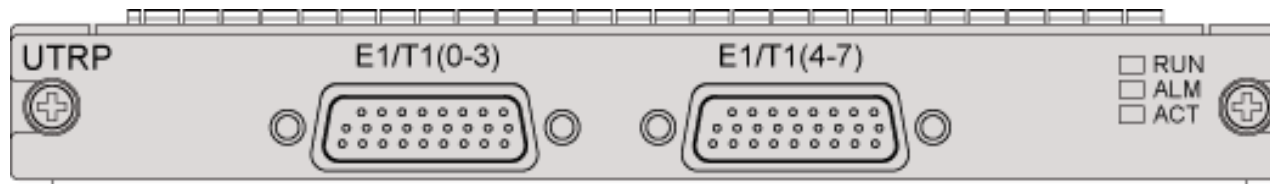
- ◆ **This describes the Universal Transmission Processing unit (UTRP) board. It is a transmission extension board of the BBU3900 and provides eight E1s/T1s and one unchannelized STM-1/OC-3.**
- ◆ **Function:**
 - ◀ Provide extension lub transmission ports which support eight E1s/T1s and one unchannelized STM-1/OC-3.
 - ◀ Support ATM and IP transport.
 - ◀ Support cold backup.

UTRP Board

- ◆ The UTRP can be configured with different sub-boards to support different ports.

Sub-Board	Port
UAEU (Universal ATM over E1/T1 Interface and Processing Unit)	Ports for eight ATM over E1s/T1s
UIEU (Universal IP Packet over E1/T1 Interface and Processing Unit)	Ports for eight IP over E1s/T1s
UUAS (Universal Unchannelized ATM over SDH/SONET Card)	Port for one unchannelized STM -1/OC-3

- ◆ The panel of the UTRP configured with the UAEU or UIEU is different from that of the UTRP configured with the UUAS.



Panel of the UTRP (with eight E1s/T1s)



Panel of the UTRP (with one 1STM-1)

UTRP Board

◆ LEDs on the UTRP:

LED	Color	Status	Description
RUN	Green	ON	The board has power input, yet the board is faulty.
		OFF	The power supply or the board is faulty.
		1s ON, 1s OFF	The board is running properly.
		0.125s ON, 0.125s OFF	Software is being loaded to the board.
		2s ON, 2s OFF	The board is under test.
ALM	Red	ON	The board is reporting alarms and is faulty.
		OFF	The board is running properly.
ACT	Green	ON	The board is in active mode.
		OFF	The board is in standby mode.

UTRP Board

- ◆ The UTRP has three DIP switches: SW1 and SW2 for setting the protection grounding for the RX end of the E1 cable and SW3 for selecting the impedance mode for the E1 signal cable.

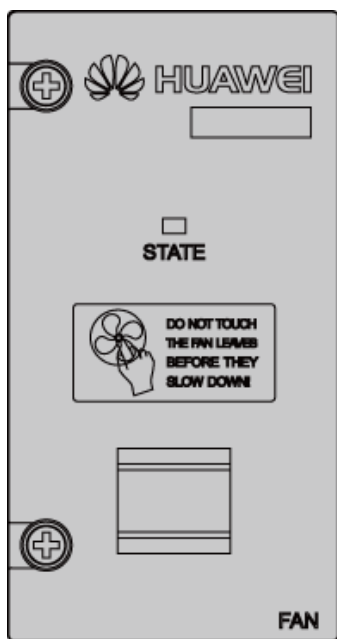
DIP Switch	Bit	Balanced Mode	Unbalanced Mode
SW1	1	OFF	ON
	2	OFF	ON
	3	OFF	ON
	4	OFF	ON

DIP Switch	Bit	Balanced Mode	Unbalanced Mode
SW2	1	OFF	ON
	2	OFF	ON
	3	OFF	ON
	4	OFF	ON

DIP Switch	Bit	75-Ohm E1 Mode	120-Ohm E1 Mode	T1 Mode
SW3	1	ON	ON	OFF
	2	ON	ON	OFF
	3	ON	OFF	ON
	4	ON	OFF	ON

UBFA Board

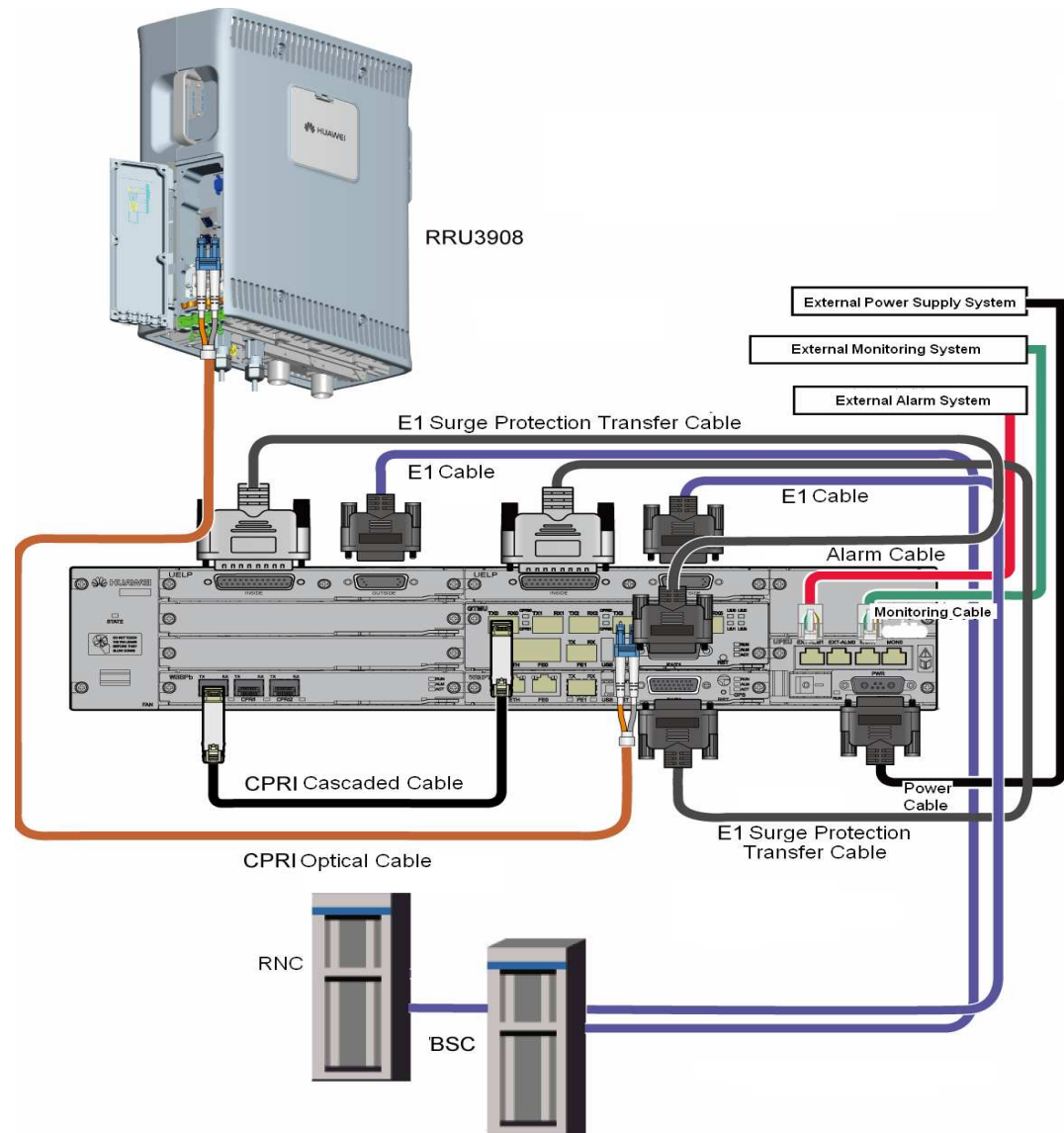
- ◆ This describes the Universal BBU Fan Unit Type A (UBFA) module of the BBU3900. The UBFA controls the fan speed and detects the temperature of the fan board.



LED	Color	Status	Description
STATE	Green	0.125s ON, 0.125s OFF	The module is not registered, and no alarm is reported.
		1s ON, 1s OFF	The module is running properly.
	Red	OFF	No alarm is reported.
		1s ON, 1s OFF	The module is reporting alarms.

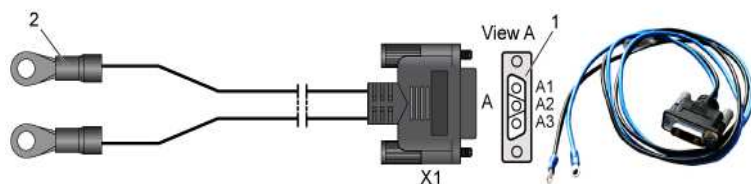
BBU3900 Cable Connection

- ◆ This describes the BBU3900 cables. The BBU3900 cables are the BBU PGND cable, BBU power cable, E1 cable, E1 surge protection transfer cable, CPRI optical cable, inter-CPRI signal cable, BBU alarm cable, monitoring signal cable between the APMI and the BBU, FE cable, FE surge protection transfer cable, monitoring signal cable for the EMUA, and GPS clock signal cable.

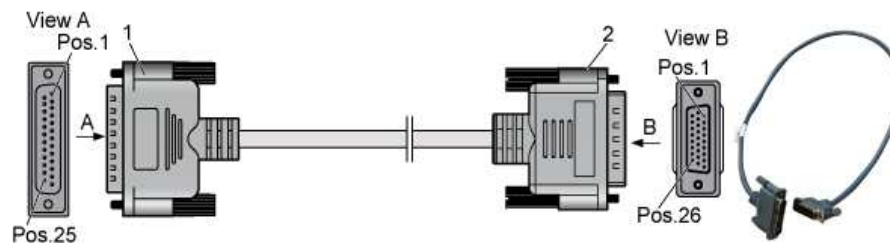


BBU3900 Cable

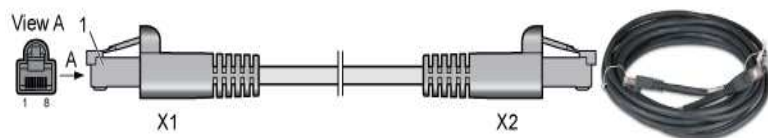
◆ BBU3900 Cable List:



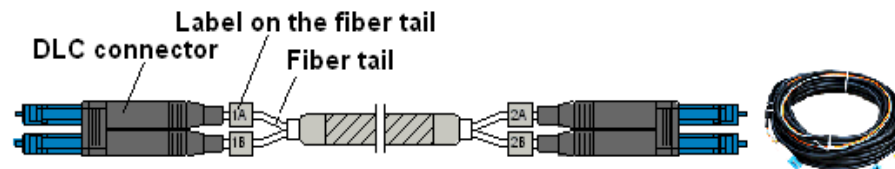
Power Cable



E1 Surge Protection Transfer Cable



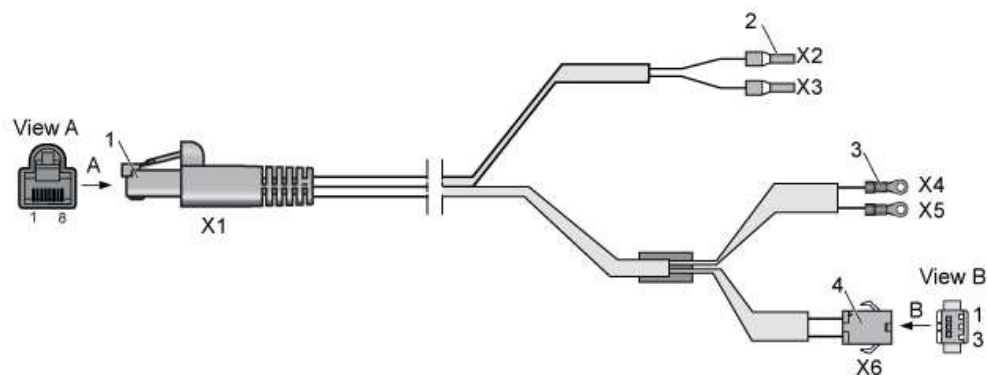
FE Cable



CPRI Optical Cable

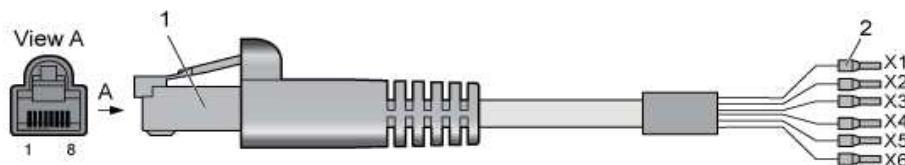
BBU Cable

◆ BBU3900 Cable List:



(1) RJ45 connector	(2) cold-pressed terminal
(3) ring terminal	(4) 3PIN connector

Monitoring Signal Cable Between the OFB and the BBU



(1) RJ45 connector	(2) cold-pressed terminal
--------------------	---------------------------

Monitoring Signal Cable Between the APMI and the BBU

Contents

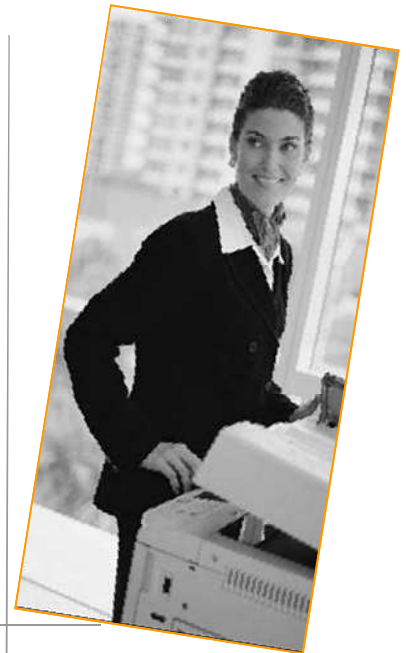
Sector 1 DBS3900 Hardware Components

Sector 2 BBU3900 System Structure

Sector 3 RRU3908 System Structure

Sector 4 DBS3900 Typical Application Scenarios

Sector 5 DBS3900 auxiliary equipment



RRU3908

- ◆ **The RRU3908 is an outdoor remote radio unit that processes the baseband signals and the RF signals of the GSM, and processes the RF signals of the UMTS.**
- ◆ **The functions of the RRU3908:**
 - ◀ The RRU3908 provides the CPRI port for data communication with the BBU3900.
 - ◀ When working in GSM mode, the RRU3908 adopts the direct frequency conversion technique, which is directly implemented in the transmit channel. The RRU3908 modulates the baseband signals into GSM RF signals. After being filtered and amplified, the RF signals are sent to the antenna for transmission, through the duplexer in the RF front-end unit.
 - ◀ When working in UMTS mode, the RRU3908 directly sends the baseband signal to the antenna for transmission, through the duplexer in the RF front-end unit.
 - ◀ The RRU3908 processes the uplink RF signals received from the antenna through down conversion, amplification, analog-to-digital conversion, digital down-conversion, matched filtering, Automatic Gain Control (AGC), and then transmits the signals to the BBU3900 for further processing.
 - ◀ The RRU3908 supports power control and Voltage Standing Wave Ratio (VSWR) detection.
 - ◀ The RRU3908 supports frequency synthesis.
 - ◀ The RRU3908 supports the generation and recovery of the clock circuitry, and alarm detection on the CPRI port.

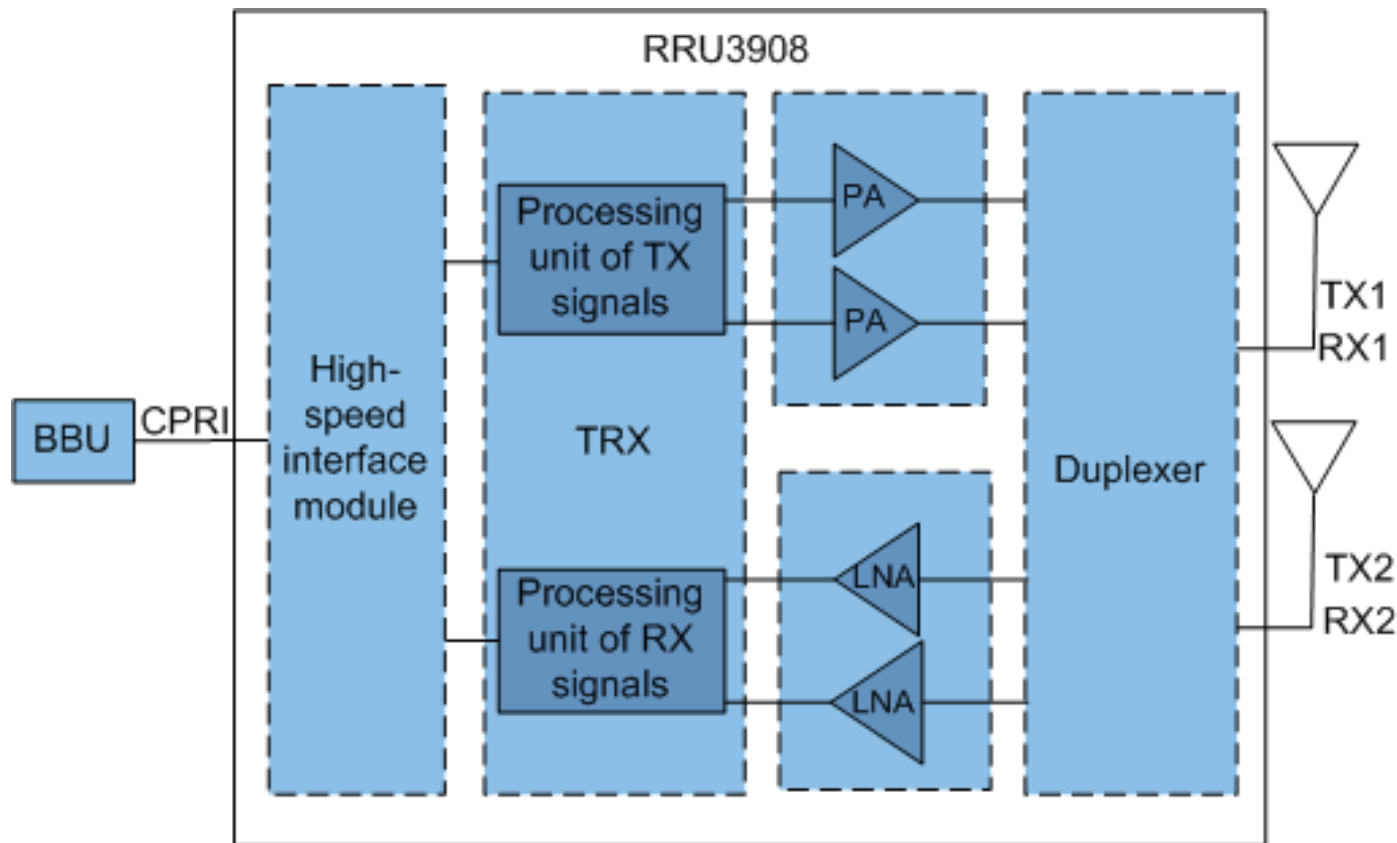
RRU3908

◆ Main features of RRU3908:

- ◀ The single RRU3908 module supports six carriers when working in GSM mode and GSM+UMTS dual mode, and four carries in UMTS mode.
- ◀ RRU3908 supports power sharing among carriers of the same mode. An RRU3908 has large output power which can reach 80 W and supports power sharing among carriers of the same mode on the same TX channel, which raises power utilization.
- ◀ Instantaneous frequency bands of 1-way TX is 12.5MHz, Instantaneous frequency bands of 2-way RX:25MHz.

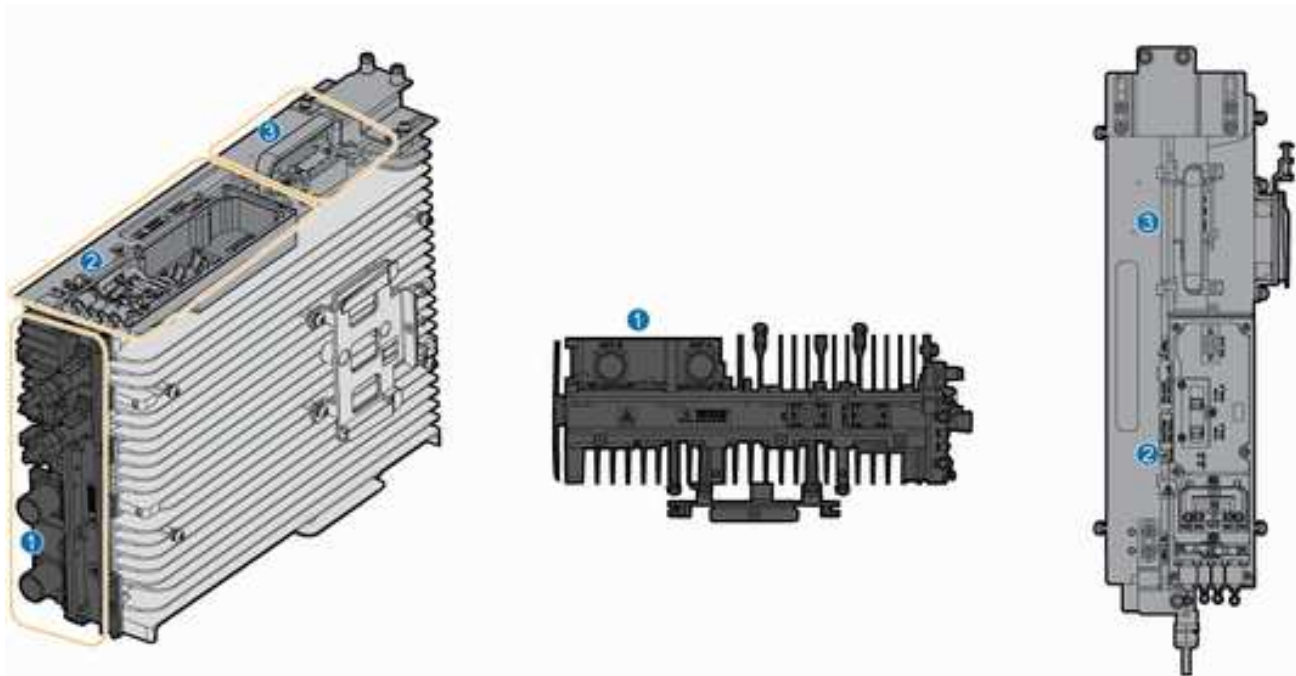
Logical Structure of the RRU3908

- ◆ The RRU3908, which features a modular design, consists of the high-speed interface unit, TRX, Power Amplifier (PA), duplexer, and Low Noise Amplifier (LNA).



RRU3908 Board

- ◆ The RRU module has a bottom panel, a cabling cavity panel, and an area attached with LEDs.



1	Bottom panel
2	Cabling cavity panel
3	LEDs

RRU3908 Board

◆ Panels of the RRU3908:

Item	Label	Description
Bottom panel	RX_IN/OUT	RF interconnection port
	RET	RET antenna port
	ANT_TX/RXA	RF TX/RX port A
	ANT_TX/RXB	RF TX/RX port B
Cabling cavity panel	RTN+	Power wiring post
	NEG-	
	TX RX CPRI_E	Eastward optical/electrical port
	TX RX CPRI_W	Westward optical/electrical port
	EXT_ALM	Alarm port
	RST	Hardware reset button
	TST VSWR	Test button for VSWR alarms
	TST CPRI	CPRI test port button

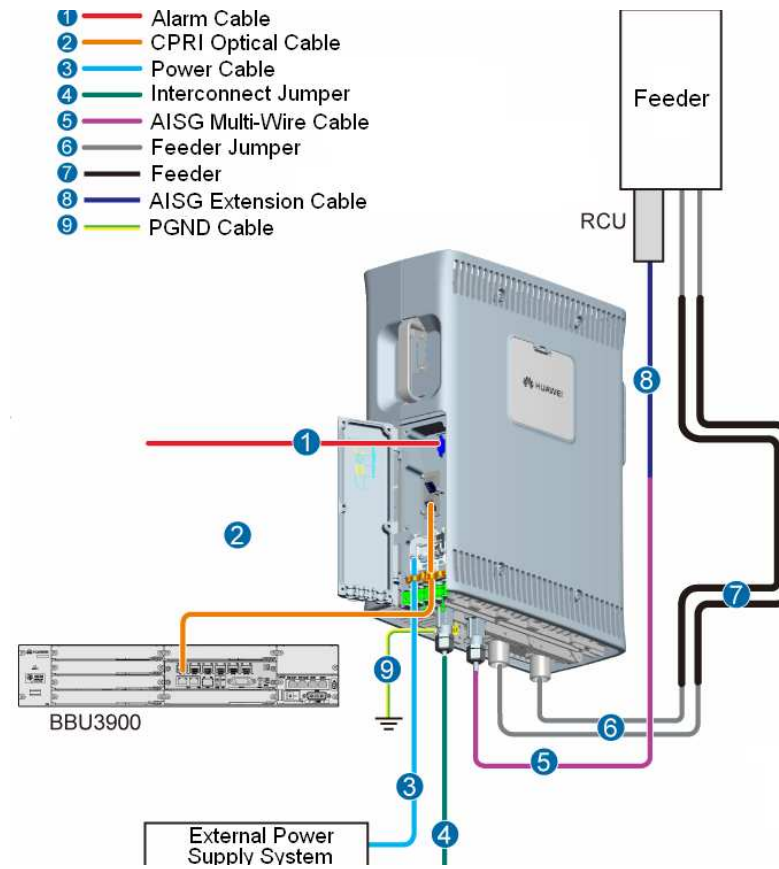
RRU3908 Board

◆ LEDs on the RRU3908:

LED	Color	Status	Meaning
RUN	Green	ON	The board is faulty or undergoing version verification.
		OFF	The board is faulty or no power input is available.
		Blinking (ON for 1s and OFF for 1s)	The board is operational.
		Blinking (ON for 0.5s and OFF for 0.5s)	The software is being loaded.
ALM	Red	ON	The alarms (excluding VSWR related alarms) are reported.
		OFF	No alarms (excluding VSWR related alarms) are reported.
TX_ACT	Red/green	Blinking (ON for 1s and OFF for 1s) (green)	The power amplifier is not functional. The board is functional.
		ON (red)	The power amplifier is operational. VSWR alarms are reported from the ANT_TX/RX port.
		Blinking (red)	The power amplifier is not operational. VSWR alarms reported from the ANT_TX/RX port are being held.
VSWR	Green	ON (green)	The power amplifier is functional. There are no VSWR alarms.
		OFF	No specific meaning
OPT(West ward/eastward CPRI LED)	Red/green	ON (green)	The CPRI link is functional.
		ON (red)	The reception of the optical module is abnormal and an alarm is generated.
		Blinking (ON for 1s and OFF for 1s) (red)	The CPRI link has a loss-of-lock error.
		OFF	The SFP is out-of-position or the optical module is powered off.

RRU3908 Cable Connection

- ◆ The RRU3908 cables are the PGND cable, power cable, CPRI optical cable, RF jumper, interconnect jumper, alarm cable, signal cable between the CPRI ports on the cascaded RRUs, AISG multi-wire cable, and AISG extension cable.

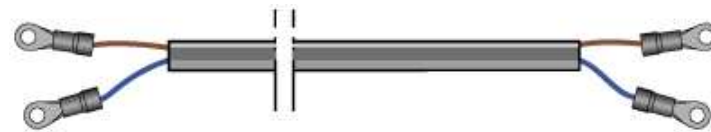


RRU3908 Cable

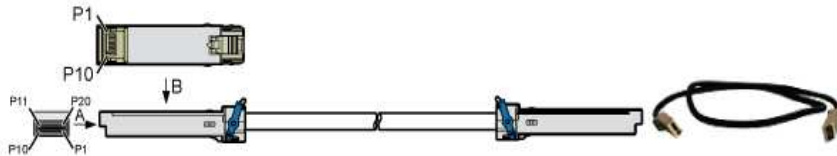
◆ RRU3908 Cable List



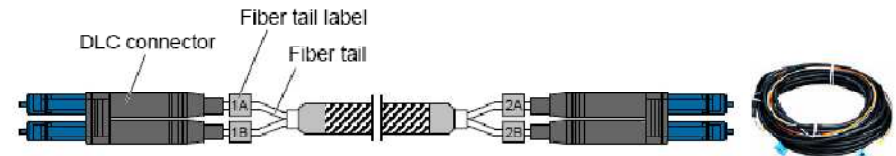
RRU3908 – 48V external input power cable



RRU3908 – 48V power cable for cascaded RRU modules



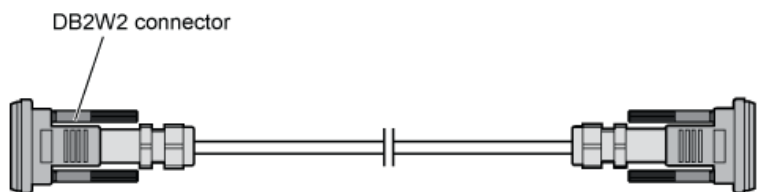
RRU3908 CPRI interconnect jumper



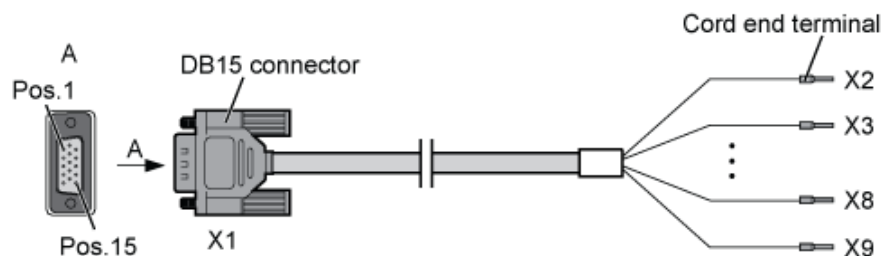
The CPRI optical cable connects the BBU and the RRU3908

RRU3908 Cable

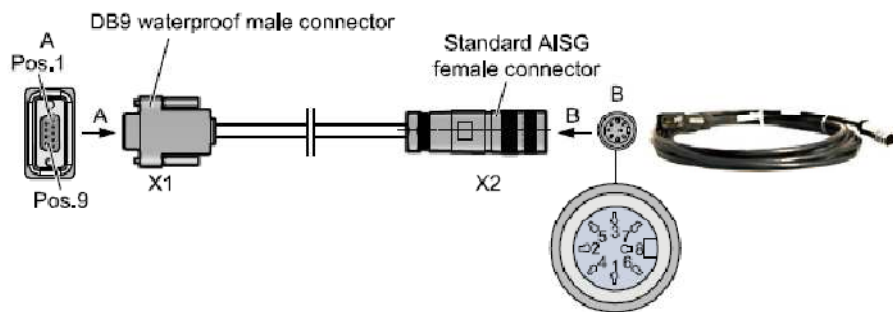
◆ RRU3908 Cable List



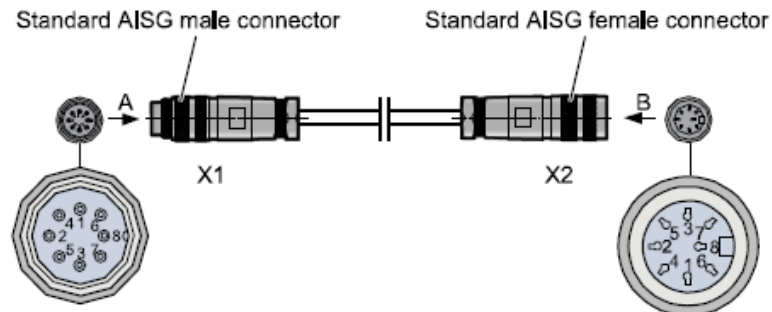
RF Cable Connections of the RRU3908



Alarm cable of RRU3908



AISG Multi-Wire
Cable of the RRU3908



AISG Extension
Cable of the RRU3908

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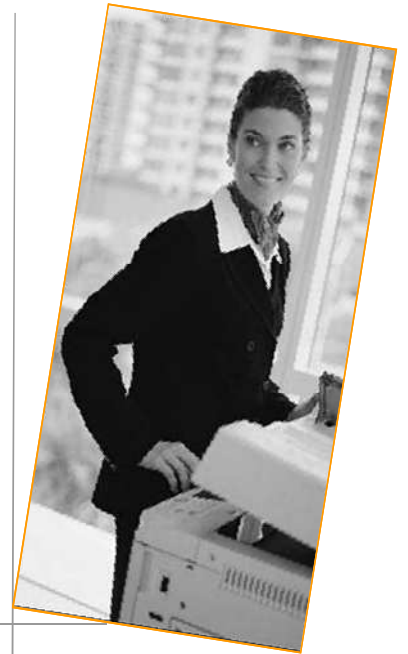
Sector 1 DBS3900 Hardware Components

Sector 2 BBU3900 System Structure

Sector 3 RRU3908 System Structure

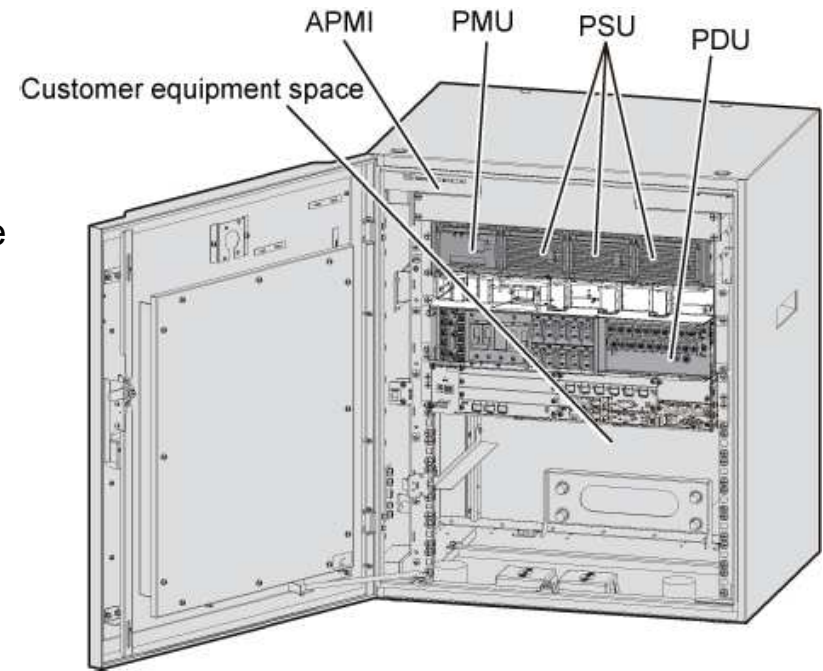
Sector 4 DBS3900 auxiliary equipment

Sector 5 DBS3900 Typical Application Scenarios

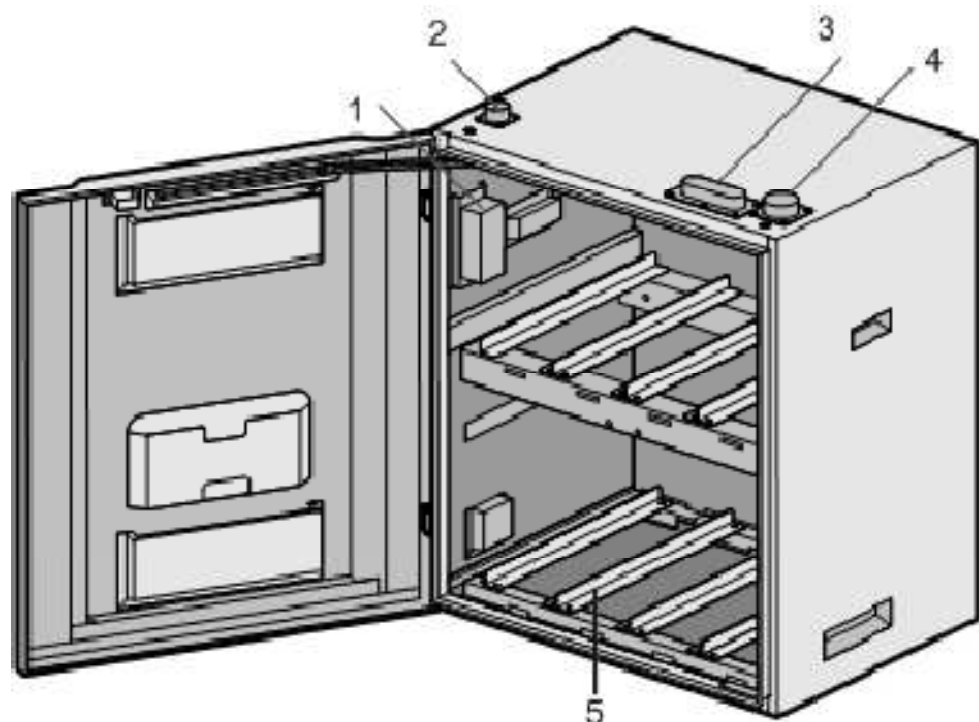


Auxiliary Devices of the DBS3900 – APM30

- ◆ **The APM30 has the following features:**
 - ◀ Small size and light weight
 - ◀ Installation space for user devices
 - ◀ DC power supply
 - ◀ Battery management, and monitoring and communication of the power supply system
 - ◀ Power distribution, surge protection, temperature control, and power backup
 - ◀ Installation on a pole or on the ground
- ◆ **The APM30 has the following components:**
 - ◀ Power Supply Unit (PSU)
 - ◀ Power Distribution Unit (PDU)
 - ◀ APM Power Monitor unit Interface Board (APMI)
 - ◀ Temperature control unit



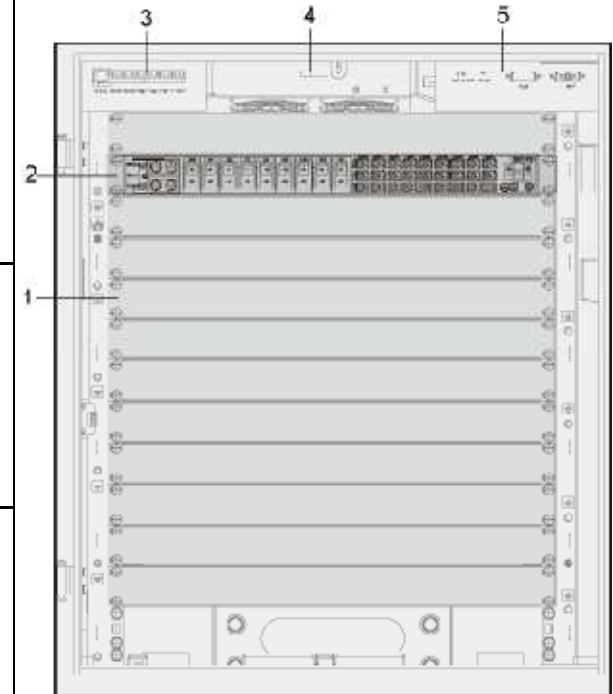
Auxiliary Devices of the DBS3900 – Battery Cabinet



1	Protecting hood for the copper busbar	2	Cable hole for the AC power cable
3	Cable hole for the signal cable	4	Cable hole for the DC power cable
5	Guide rail		

Auxiliary Devices of the DBS3900 — Transmission Cabinet

Function	Description
-48 V DC power supply	<p>The -48 V DC-BOX in the APM30 has the following functions:</p> <ul style="list-style-type: none"> ● Supports the -48 V DC power input. ● Surge protection. ● Provides nine -48 V DC outputs from LOAD0 to LOAD8. And one of the outputs is 12A, providing the power for the fan.
Installation space for User devices	<ul style="list-style-type: none"> ● Provides the standard 19-inch-wide and 11 U-high installation space ● If an AC heater needs to be installed in the 1 U space at the bottom of the cabinet, the APM30 transmission cabinet provides 10 U space for installing the user equipment.
Alarm function	<p>Provides three dry contact alarm ports for remote and attendance-free monitoring:</p> <ul style="list-style-type: none"> ● Dry contact port 1: connects to the door status sensor. An open circuit means that the connection is faulty while a closed circuit means that the connection is normal. ● Dry contact port 2: connects to the DC-BOX surge protector. An open circuit means that the connection is faulty while a closed circuit means that the connection is normal. ● Dry contact port 3: connects to the extended monitoring board.



1	Filler panel	2	DCDU-03
3	APMI board	4	Fan
5	AFMU board		

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Sector 1 DBS3900 Hardware Components

Sector 2 BBU3900 System Structure

Sector 3 RRU3908 System Structure

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Sector 5 DBS3900 Typical Application Scenarios

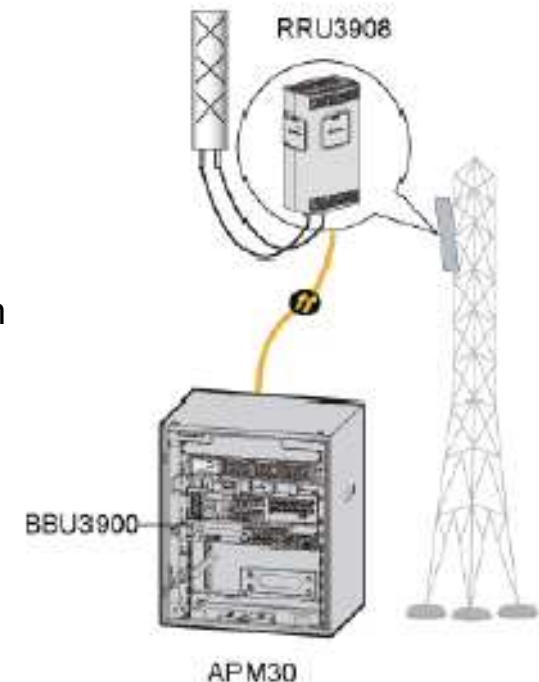


Application Scenarios of the DBS3900

◆ Integrated Application with BBU3900+RRU3908+APM30

For a new site,

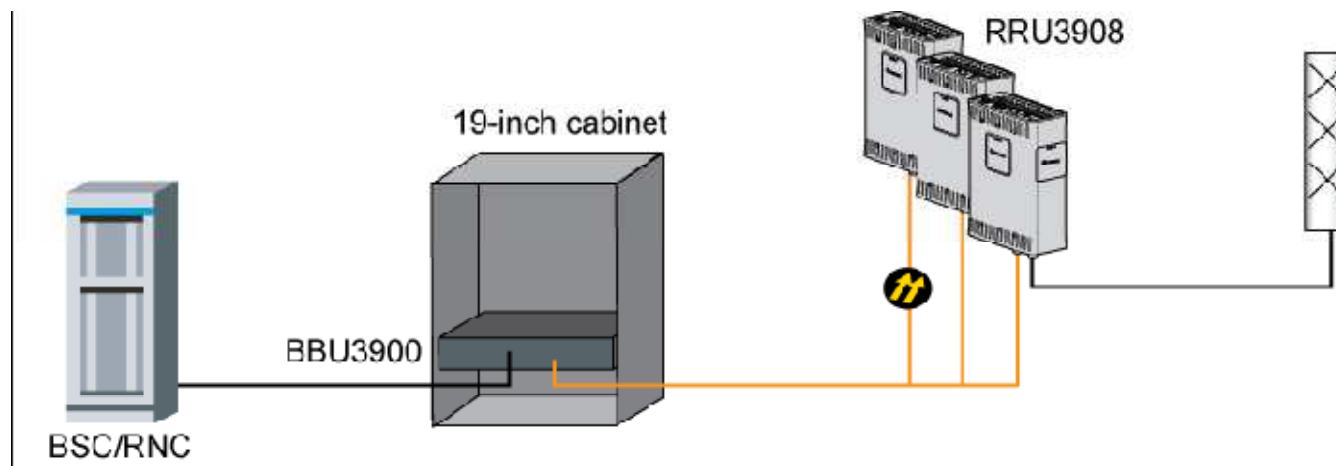
- ◀ If the site supplies the AC power and the APM30 does not have enough space for the transmission equipment, use the installation mode of BBU3900+RRU3908+APM30+transmission cabinet.
- ◀ If the APM30 requires backup power but does not have enough space, use the installation mode of BBU3900+RRU3908+APM30+battery cabinet.
- ◀ If the site requires backup power and enough space for the transmission equipment, use the installation mode of BBU3900+RRU3908+APM30+battery cabinet+transm cabinet.



Application Scenarios of the DBS3900

◆ Embedded Application with Existing Site Equipment

◀ For a site which is shared with the 2G network, the BBU3900 can be installed in any standard 19-inch-wide and 2 U-high cabinet, and the RRU3908 can be installed on a metal pole close to the antenna. Additionally, the BBU3900 and the RRU3908 can share the power backup system and transmission system of the existing network. In this way, a new network can be deployed on the running network at a very low cost.



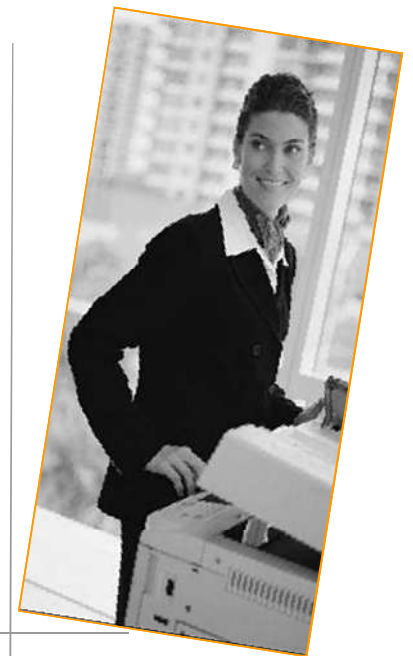
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Chapter 2 DBS3900 Hardware Structure

Chapter 3 DBS3900 typical configuration

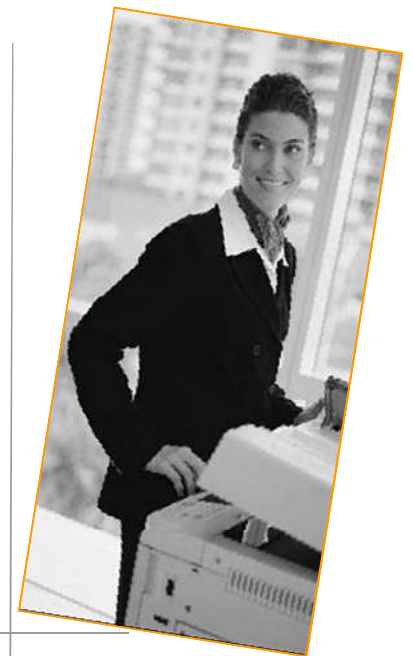
Chapter 4 DBS3900 Network Topologies



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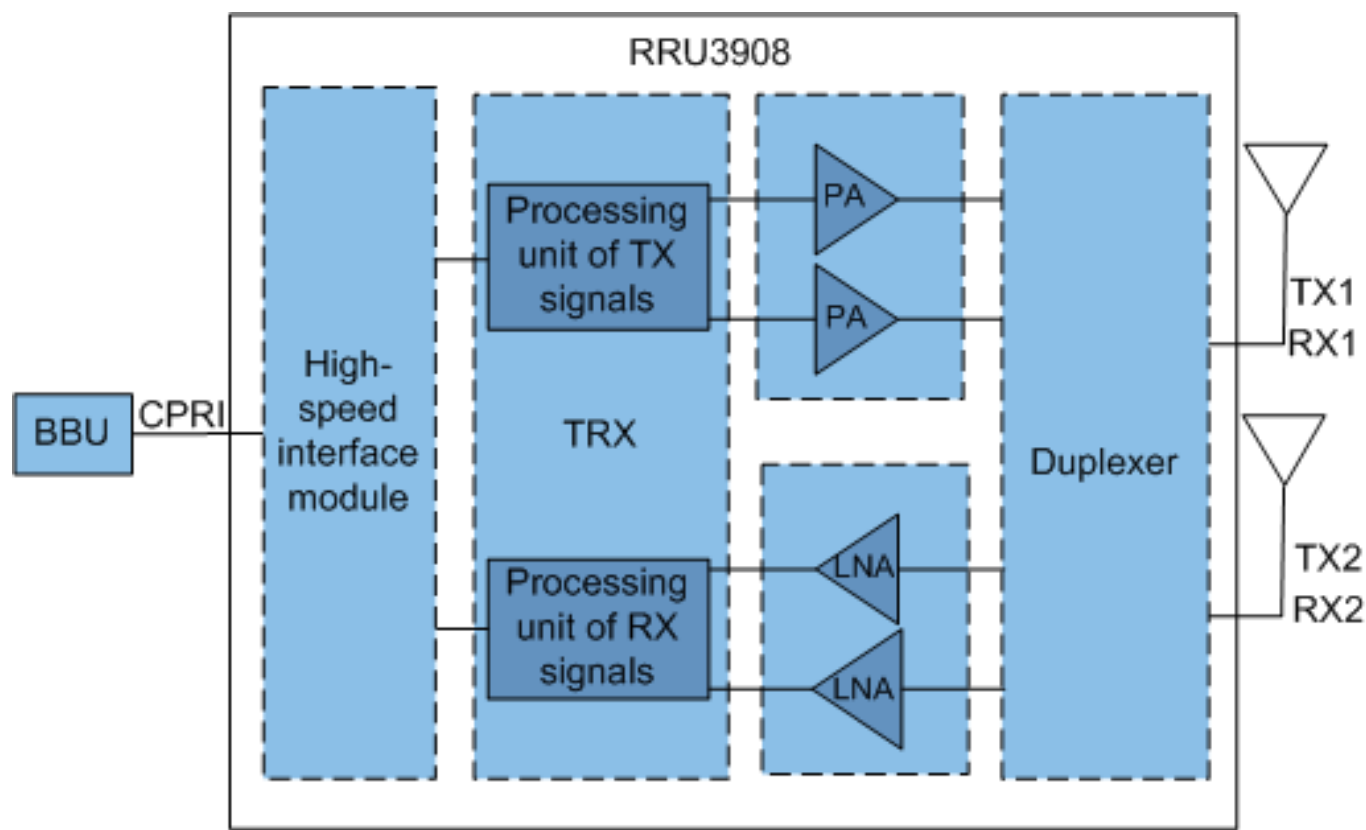
Section 1 RRU3908 Working Mode

Section 2 RRU3908 Typical Configuration



Logical Structure of the RRU3908

- ◆ RRU3908 provides two RX channels and two TX channels for RF signals. Single RRU3908 can support transmit diversity and receive diversity.
- ◆ Instantaneous frequency bands of 1-way TX is 12.5MHz, Instantaneous frequency bands of 2-way RX:25MHz.



Corresponding Relationship between RRU3908 Capacity and working modes

RRU3908 Capacity when 2TX and 2RX

RRU3908 working mode	Maximum number of TRX
GSM Mode	6
GSM+UMTS Dual Mode	6 (Total TRX number of GSM+ Total TRX number of UMTS)
UMTS Mode	4

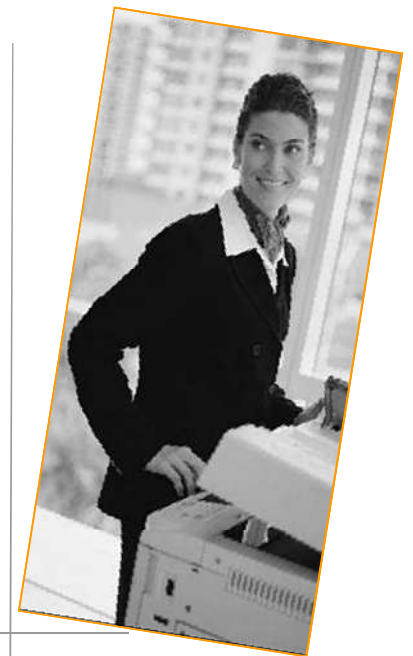
RRU3908 Capacity when 1TX and 2RX

RRU3908 working mode	Maximum number of TRX
GSM Mode	4
GSM+UMTS Dual Mode	4 (Total TRX number of GSM+ Total TRX number of UMTS)
UMTS Mode	2

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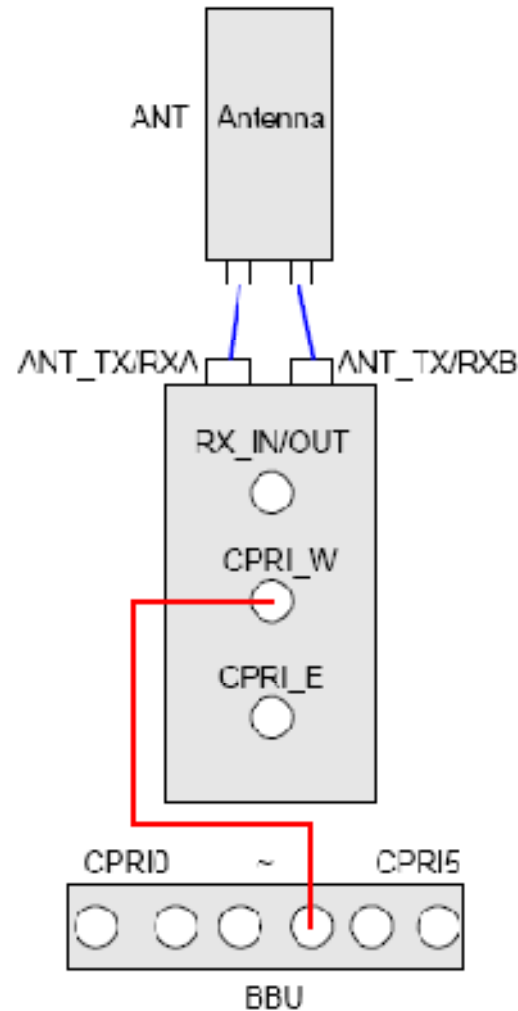
Section 1 RRU3908 Working Mode

Section 2 RRU3908 Typical Configuration



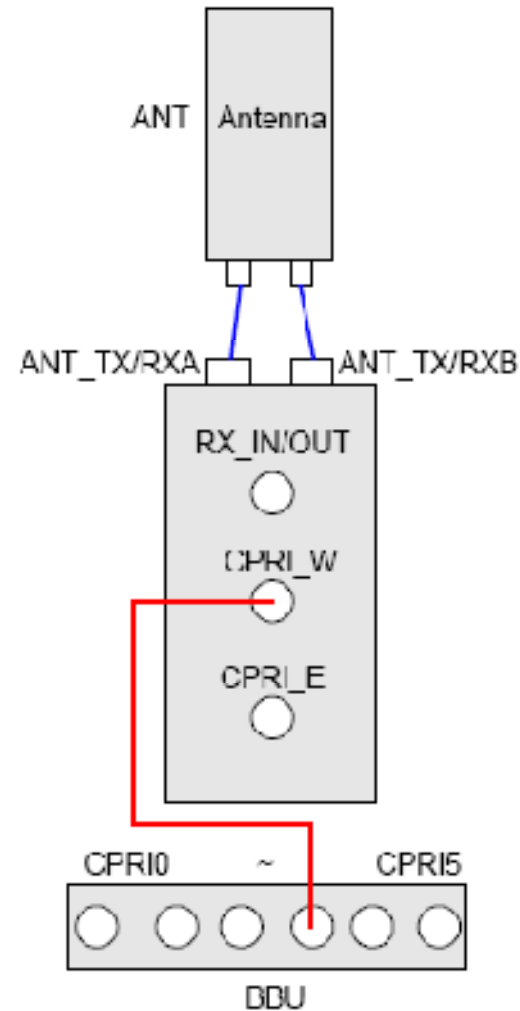
Typical Configuration — GSM Only

- ◆ **Typical Configuration : S1 ~ S6**
- ◆ **Hardware Configuration**
 - ◀ One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Independency
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



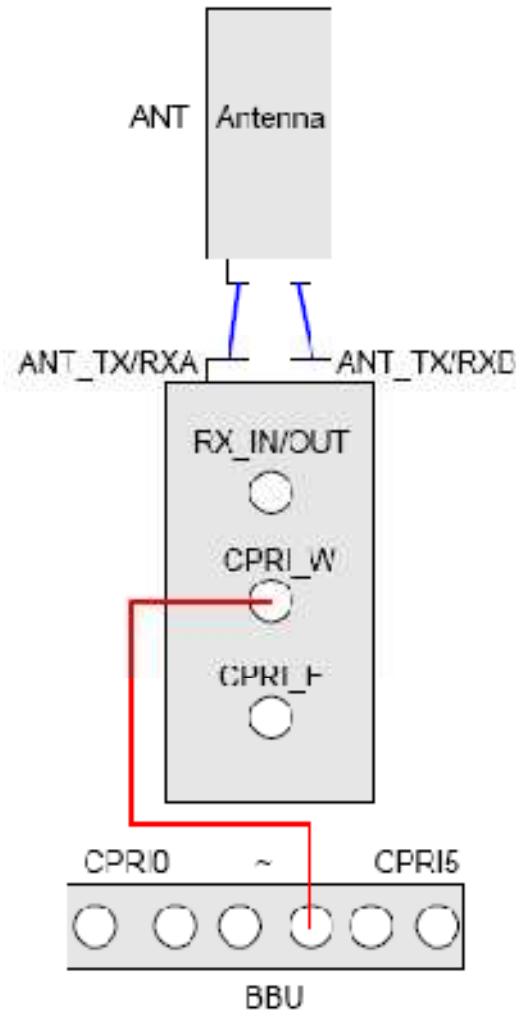
Typical Configuration — GSM Only

- ◆ **Typical Configuration : S1 ~ S3**
- ◆ **Hardware Configuration**
 - ◀ One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Diversity
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



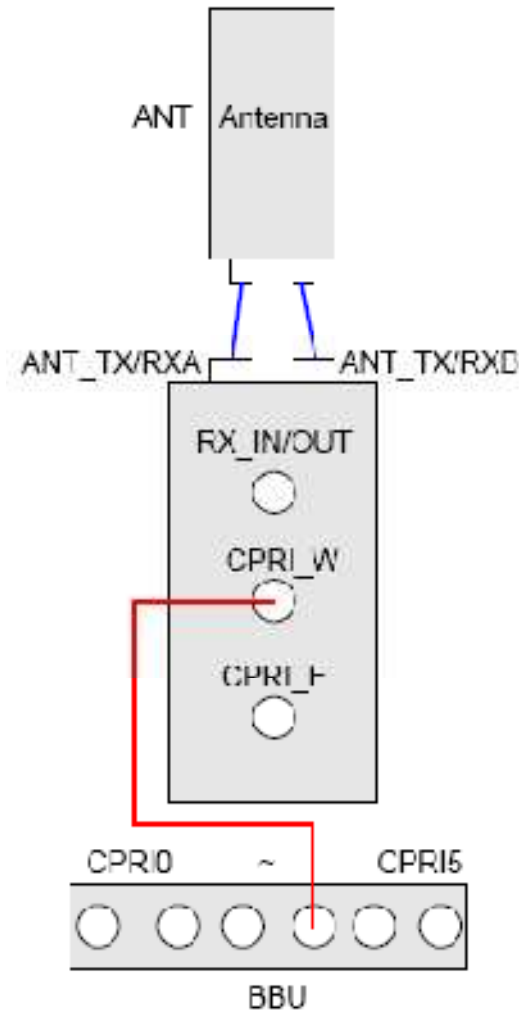
Typical Configuration— UMTS Only

- ◆ **Typical Configuration : S1 ~ S4**
- ◆ **Hardware Configuration**
 - ◀ One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Independency
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



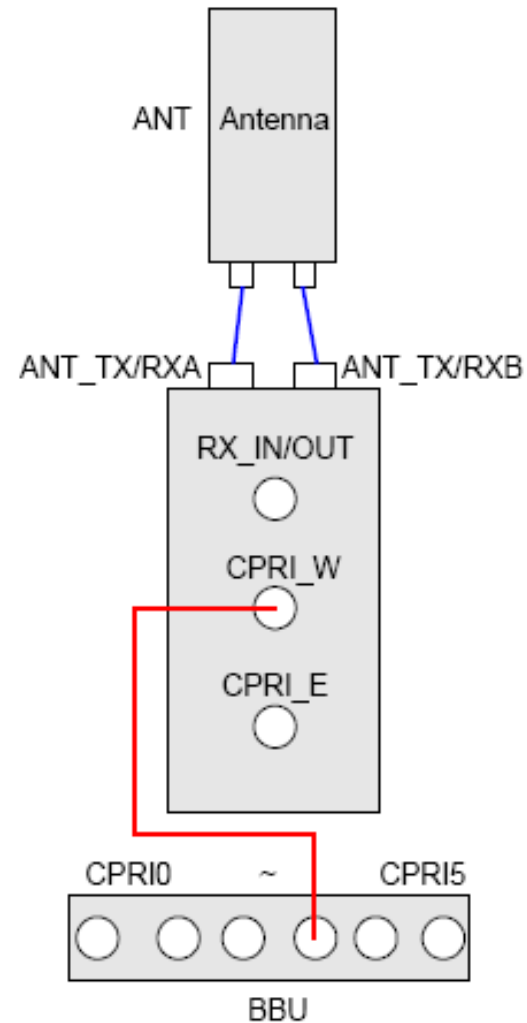
Typical Configuration— UMTS Only

- ◆ **Typical Configuration : S1 ~ S2**
- ◆ **Hardware Configuration**
 - ◀ One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Diversity
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



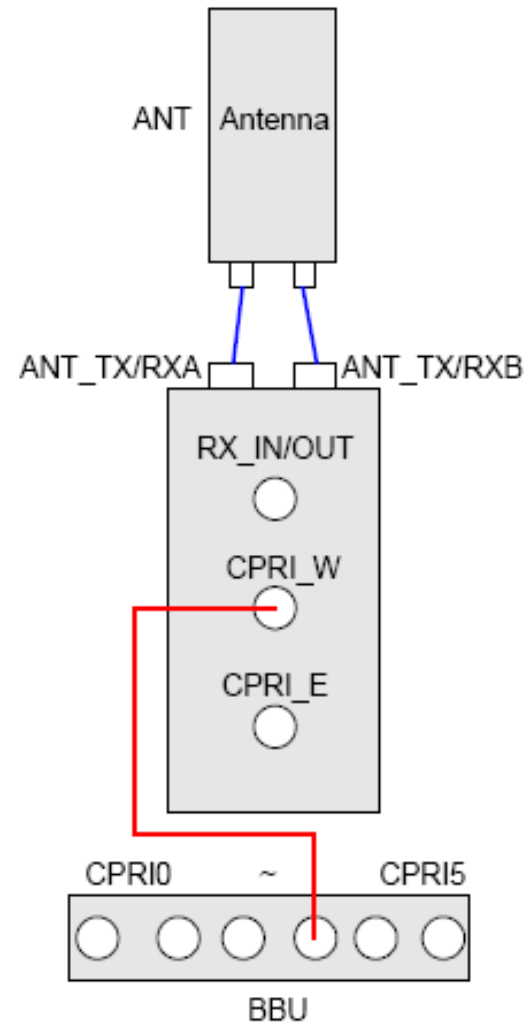
Typical Configuration— GSM/UMTS

- ◆ **Typical Configuration : S2 ~ S6**
- ◆ **Hardware Configuration**
 - ◀ One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Independency
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



Typical Configuration— GSM/UMTS

- ◆ **Typical Configuration : S2 ~ S3**
- ◆ **Hardware Configuration**
 - ◀ 1 One RRU3908
 - ◀ One dual-polarized antenna
- ◆ **TRX attributes and antenna mode on the BSC side:**
 - ◀ Transmit mode: Transmit Diversity
 - ◀ Receive mode: Receive Diversity
 - ◀ Antenna mode: Double Antennas



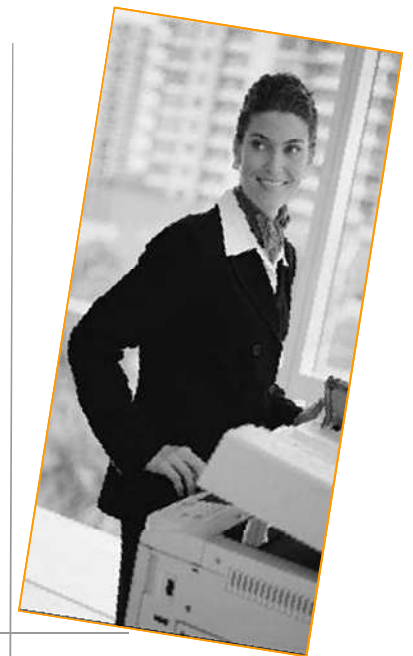
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Chapter 4 DBS3900 Network Topologies



Network Topologies of the DBS3900

◆ Network Topologies of the BBU3900

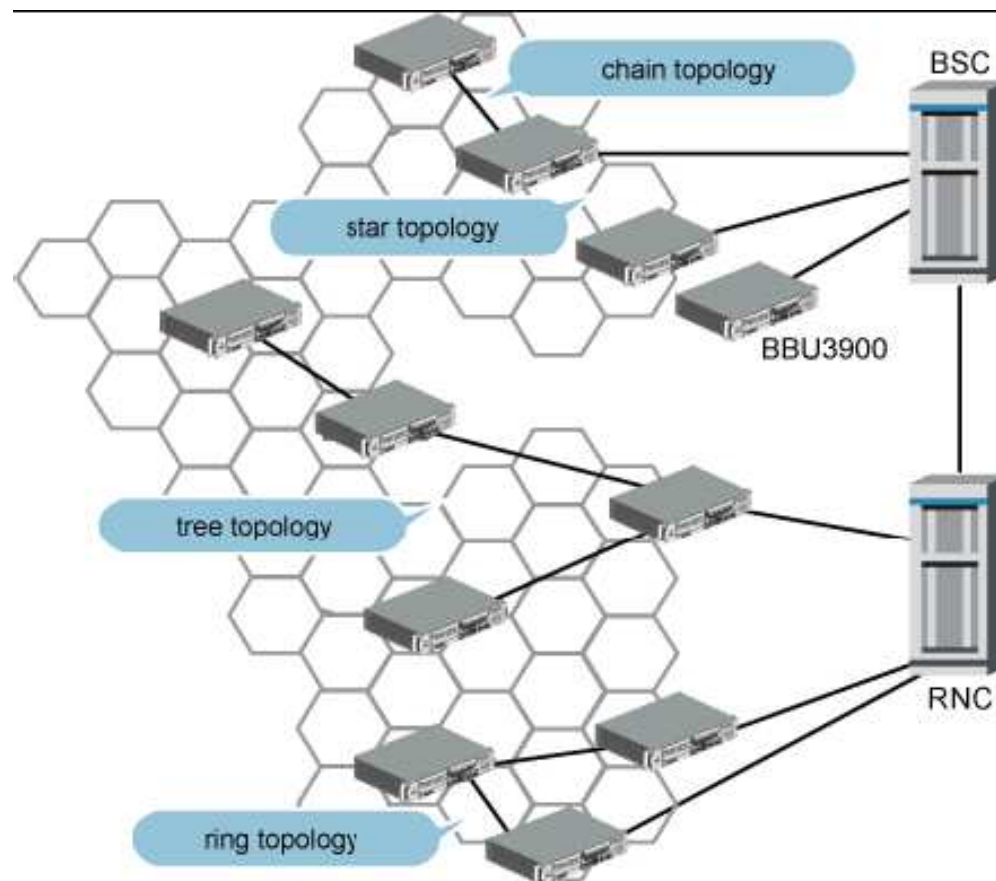
- ◀ The BSC/RNC and BBU3900s support multiple network topologies such as star, chain, tree, and ring.
- ◀ The DBS3900 supports two transmission modes: co-transmission and non co-transmission.

◆ Network Topologies of the RRU3908

- ◀ The BBU3900 and RRU3908s support multiple network topologies such as star, chain, and ring topologies.
- ◀ The RRU3908s support a maximum of three levels of cascading to form the star, chain, or ring network topologies. For the chain and ring topologies, the bandwidth of the transmission data should be taken into account due to the restriction on the bandwidth of the CPRI interface between the BBU3900 and the RRU3908s.

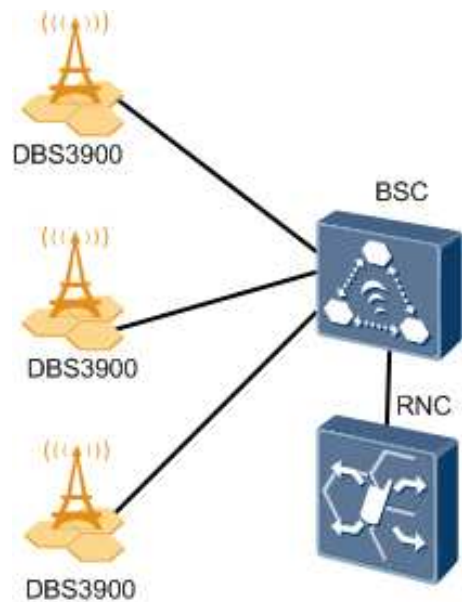
Network Topologies of the BBU3900

- ◆ The BSC/RNC and BBU3900s support multiple network topologies such as star, chain, tree, and ring.

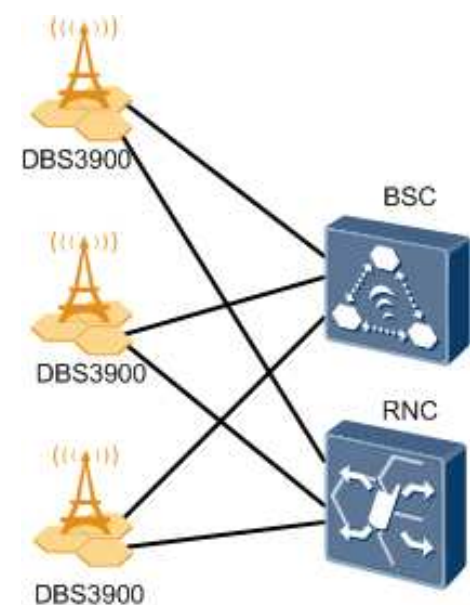
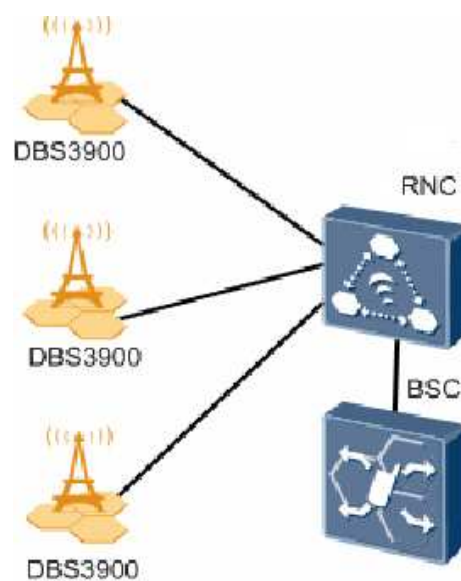


Network Topologies of the BBU3900

- ◆ The DBS3900 supports two transmission modes: co-transmission and non co-transmission. The co-transmission mode is used when the BSC is not far from the RNC or the BSC and RNC are in the same equipment room. In this mode, data of UMTS mode and GSM mode are transmit over one link, thus saving transmission lines and reducing network construction cost. The non co-transmission mode is more applicable when the BSC is far from the RNC.



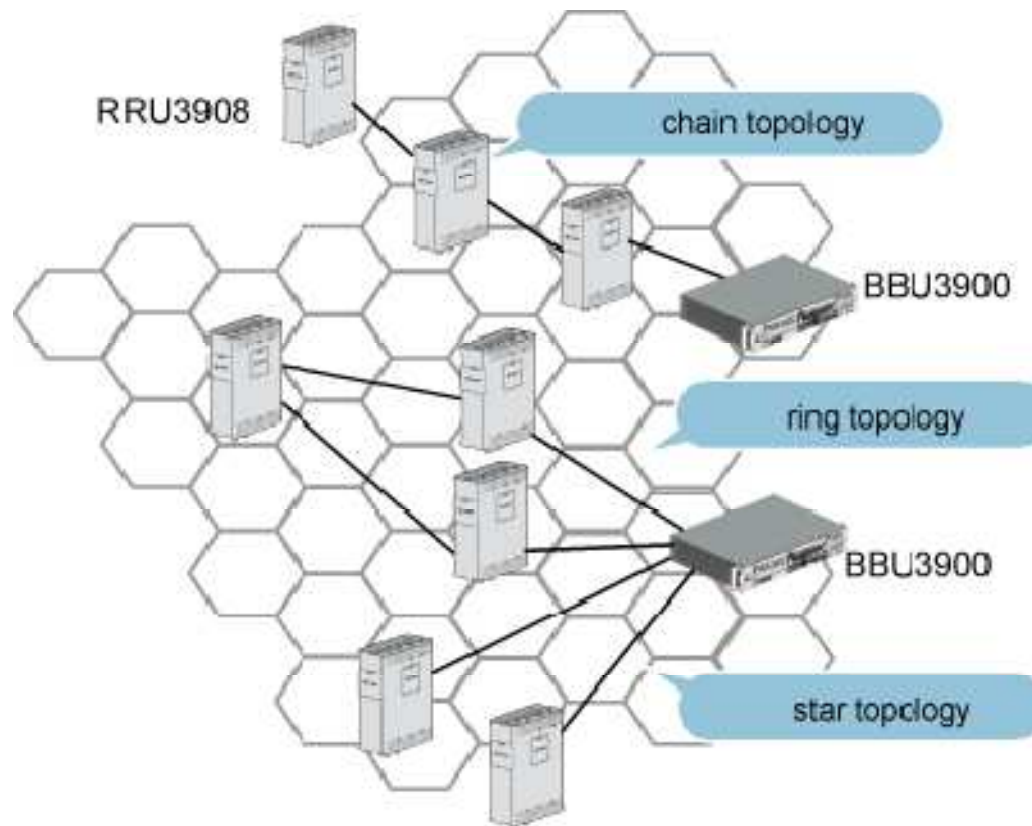
Co-transmission mode



Non co-transmission mode

Network Topologies of the RRU3908

- ◆ The BBU3900 and RRU3908s support multiple network topologies such as star, chain, and ring topologies.



Thank you

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