

Band Selective Repeater



User Manual

2012 February

Information in this manual is subject to change without notice

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Important Notice:

Don't connect electrical power line to repeater before donor and service antenna connects to repeater.

1. How to Use this Manual

1.1 Introduction

It is recommended that you read this manual prior to installing the Outdoor Band Selective Repeater. This manual gives you a complete guide for how to install, operate and maintain the product.

1.2 Structure

This manual describes the basic diagram and features, and provides overall and detailed functional descriptions of the repeater. Also, this manual describes how to survey, install and operate the equipment. The manual is divided into 4 chapters. The overall contents of this manual are as follows:

- **Chapter 1 - How to Use This Manual**
- **Chapter 2 - Technical Specification**
- **Chapter 3 - Product Introduction**
- **Chapter 4 - Operation and Software**

1.3 Prior to Installation

A thorough study of the site conditions and transmission path requirements should be undertaken prior to installing the repeater system. The location of antennas, repeater and cable lengths are all important considerations that must be addressed.

The repeater has been designed for simple easy installation requiring no special tools. With just a few site preparation tasks out of the way, installation can be accomplished in several hours.

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2. Technical Specifications

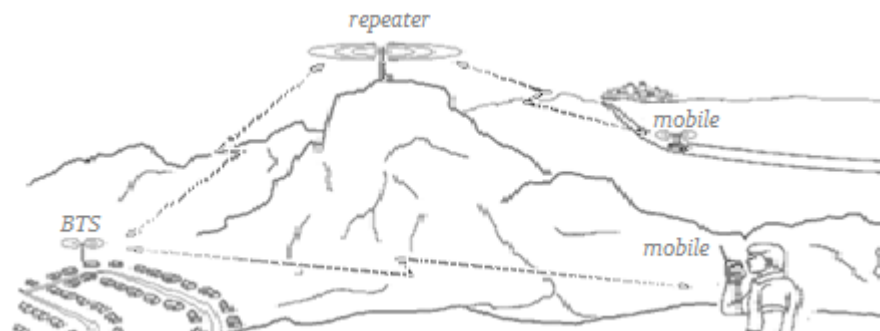
Items	Specification	
	Uplink	Downlink
Frequency Range (Customized)	1850~1910MHz	1930~990MHz
Gain (Customized)	≥93 dB	≥ 95 dB
Output Power (Customized)	33±2 dBm	37±2 dBm
Gain Adjustment Range	≥ 30 dB	
Gain Adjust precision	0~10dB/±1dB#10~20dB/±1.5dB#20~31dB/±2dB	
ALC Scope	≥ 20dB	
In-Band Ripple	≤ 3 dB	
Out-of-Band Suppression	±600kHz > 30dB, ±1MHz > 40dB, ±5MHz > 50dB,	
I/O Impedance	50 Ω	
VSWR	≤1.5	
Load VSWR Tolerance	20:1	
Noise Figure	≤ 5dB	
Inter-modulation Attenuation	45dBc	
Spurious Emission	≤-36dBm(9KHz~1GHz)/≤-30dBm(1~12.75GHz)	
System Delay	≤ 5μs	
Max Input Power Level(1minute)	-10dBm	
RF Connector	N-Type (Female)	
Temperature Range	Operation: -25°C ~ + 55°C;Storage: -30°C ~ +60°C	
Relative humidity	5~95% RH	
Power consumption	200W	
Power Supply (Customized)	AC220V	
Power Supply socket (Customized)	BP3 Type	
Dimensions	454mm×340mm×160mm	
Weight	15kg	
Shipment Dimensions	530mm×420mm×240mm	
Shipment Weight	18kg	
Cabinet Color	Silver white	
Installation	Wall-mounted	
RG45 Interface	Local : Base on Embedded Web Server	
Monitor/Setting Parameter	Power, Gain, VSWR, Alarm, Switch	

3. Product Introduction

3.1 Description

The Band Selective Repeater is a bi-directional amplifier used to enhance signals between a mobile and a base station. This repeater type is used for digital systems- **GSM/CDMA/DCS/UMTS network**.

- 1) -It picks up the strongest signal from BTS via the Donor Antenna,
- 2) -Linearly amplifies the signal and then retransmits it via the Indoor Signal Distribution System to the weak/blind coverage area.
- 3) -And the mobile signal is also amplified and retransmitted to the BTS via the opposite direction.



It features with flexible installation, cost-effectiveness and ideal coverage solution, its output power varies from 33dBm to 43dBm. Available in a wide range of RF powers, this repeater extends the coverage area of mobile networks where installation of additional BTS is not financially.

Band selective repeaters are commonly used in situations where large numbers of frequency carriers are to be repeated or when base station synthesized frequency hopping is used.

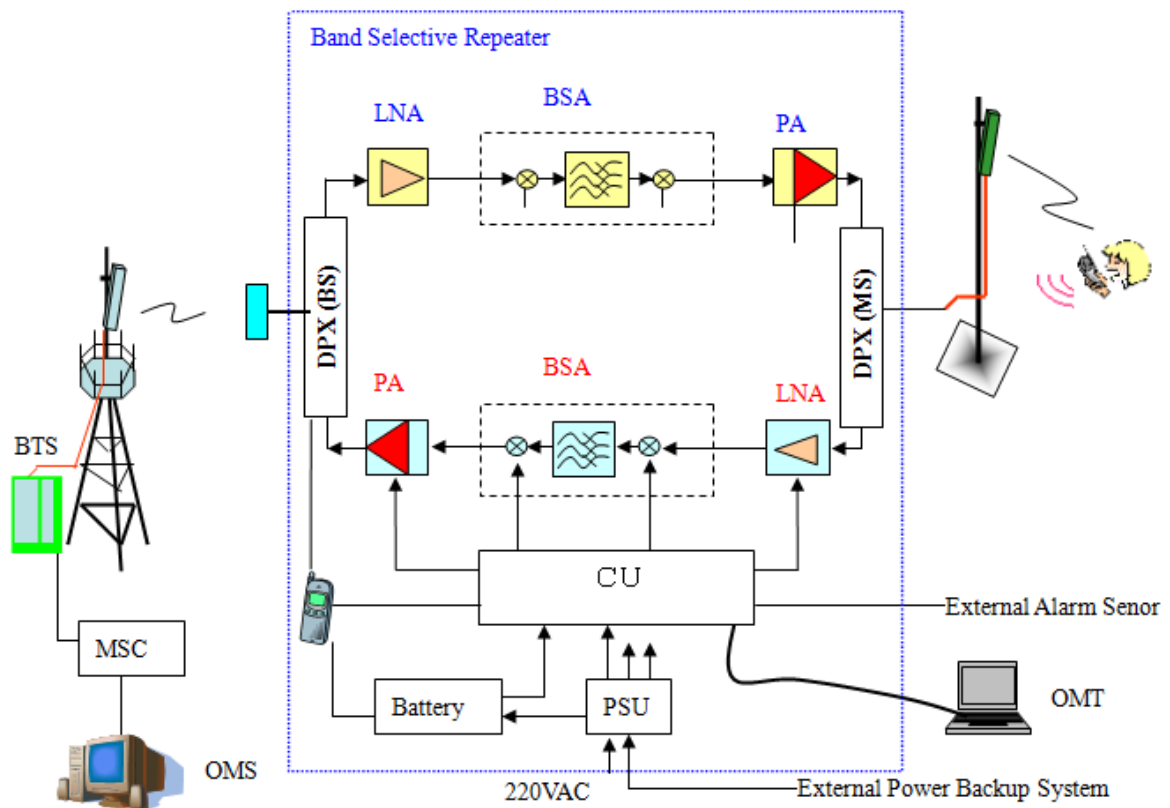
Band selective repeaters do not separate out specific carriers but amplify and retransmit all signals within a defined frequency band. Inter-modulation distortion caused by band selective repeaters usually means that lower output power per carrier can be realized compared to channel selective repeaters.

The adjustable frequency band allocation is a feature enabling less noise and interference caused by signals from operators' selective frequency band.

A band selective repeater with fixed band width has fixed filters for a certain band width.

A band selective repeater with adjustable band width has filters that can be set to various band widths.

3.2 System Diagram



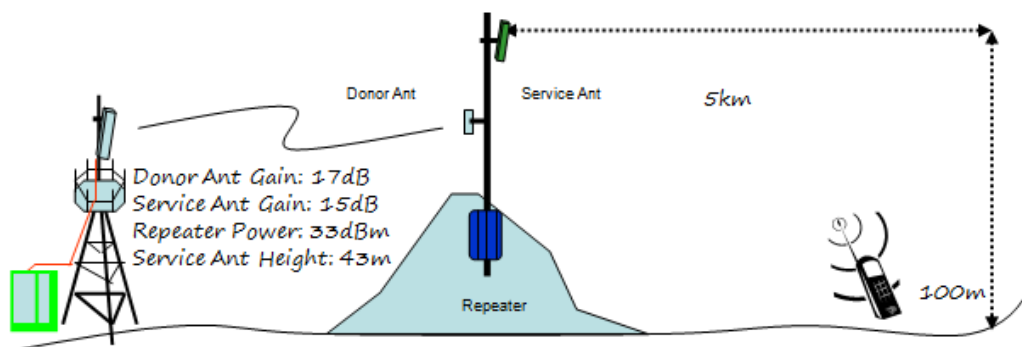
- ☞ The signal from the base station is received via the repeater Donor antenna and is then forwarded through a duplex filter (DPX), is amplified in a low noise amplifier (LNA), and enters the band selective amplifier board (BSA).
- ☞ The first mixer stage on the BSA amplifier board, which is controlled by a synthesizer, converts the received frequency down to the IF frequency. The signal is then filtered by a SAW band-pass filter and amplified before it is fed to the second mixer stage, controlled by the same synthesizer as the previous one, for converting back to the original frequency.
- ☞ The SAW filter can be either fixed or adjustable depending on the BSA board used. If the BSA board has fixed band width, this SAW filter is fixed and selected for the current band width. If the BSA board has adjustable band width, the SAW filter can be software changed.
- ☞ The output signal from the mixer is then amplified in the power amplifier, which is controlled by the CU. The output gain can be reduced to avoid instability due to poor antenna isolation. If necessary, reduce the output power to keep it under a maximum level.
- ☞ The output signal passes a duplex filter (DPX), before it is fed to the repeater MS antenna which retransmits the signal at the same frequency to the aim areas.

3.3 Product Features

- ☞ Oscillation suppression feature (IF filtering Technology)
- ☞ High selectivity hence excellent out-of-band signals rejection
- ☞ Low noise and highly linear RF performance
- ☞ Smart ALC (Automatic Level Control) for optimal linear output power
- ☞ System Monitor through RJ45 port with easy to view GUI for local supervision or GMS SMS to communicate with the NMS that can remotely supervise repeater's working status and download operational parameters to the repeater(Optional).
- ☞ Designed for all outdoor installation – waterproof, damp-proof and Omni-sealed (IP65)

3.4 Applications Example-- Shadow Coverage

A valley is shaded by hills. There is a base station 5 kilometres away, but the lowest signal strength in the valley is less than -100dBm . A mast used for other purposes is available for a repeater installation. The mast height is 42 meter and it is located on a hill. The scenario is illustrated as following picture.



- 1) The signal strength (includes donor antenna) from donor BTS must be 5dB larger than from neighbour BTs in GSM network and larger $>-50\text{dBm}$, so the repeater can amplifier in high efficiency with full output power.
- 2) The donor antenna should have line of sight (LOS) with the BTS antenna. If the signal strength is adequate, LOS may in some cases not be necessary.
- 3) Donor antenna gains are typically 18 to 25 dB, and have a horizontal and vertical beam width of less than 30° to correctly select the donor BTS.
- 4) There is large physical separation between the antennas in order to prevent degradation of signal quality and risk of oscillation (Antenna isolation). Ways to achieve this can be usage of highly directional antennas with good front-to-back interference ratio or external shielding between the antennas. Another option is to use a Frequency Translating Repeater or ICS repeater.

4. Operation & Software



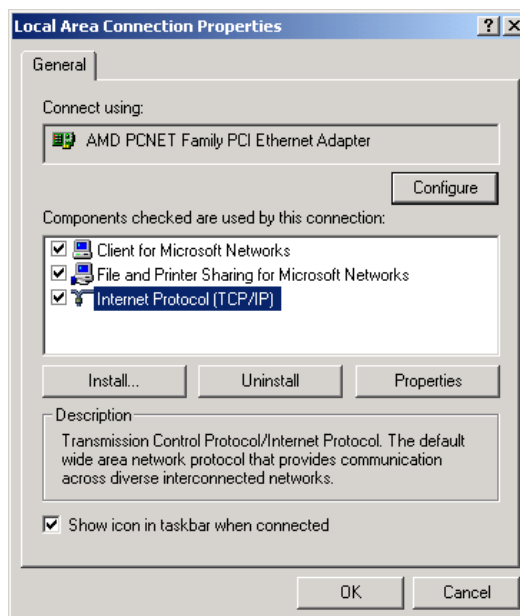
Port	Connection	Usage
BTS	Connect to Donor antenna	Receive BTS signal source
MS	Connect to Service antenna	Retransmitted signal to target coverage area
LAN	Connect to Laptop LAN port	Set and inquire repeater parameter and status
LED	Repeater RF Switch indicator	LED ON when repeater RF switch on or Alarm

Step 1:

Connect **repeater LAN** port to **laptop LAN** port via attached **LAN cable**;

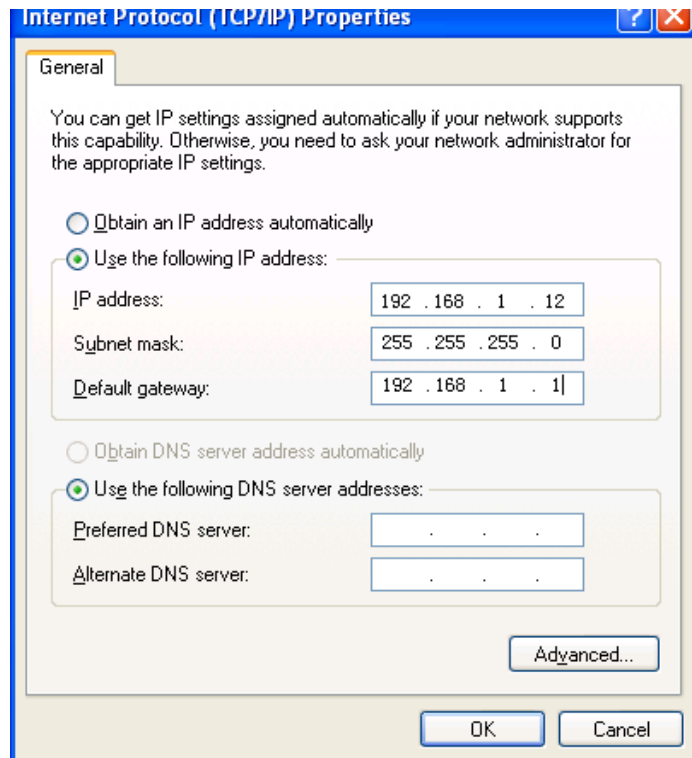
Step 2:

Open laptop network connection



Step 3:

Set laptop IP address and Mask as following picture.

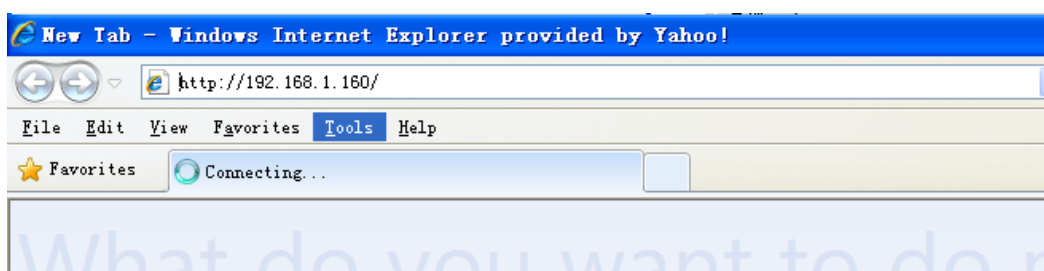


Notice:

- 1) The repeater default IP address is 192.168.1.160, and subnet mask is 255.255.255.0
- 2) The laptop ip address be set like 192.168.1.X, X=1~159 and 161~254

Step 4:

Run **IE**, and input IP: **192.168.1.160**, then **Enter**



Step 5:

Set RF switch ON/OFF and/or set Downlink and uplink attenuation(0~31)

then click Button **Submit:**

Inquire Repeater working status, such as temperature, downlink input value by click Button **Refresh:**

New Tab - Windows Internet Explorer provided by Yahoo!

http://192.168.1.160/

File Edit View Favorites Tools Help

★ Favorites Connecting...

ManufacturerID	80	PATemperature	44	°C
EquipmentSort	1	DownlinkInput	-71	dBm
EquipmentType	KDEH-43-A1	DownlinkOutput	-4	dBm
ProductSN.	01040001-061110-0014	DownlinkGain	-----	dB
VersionInfo.	H2-G-KDH-V01.80	UplinkOutput	34	dBm
		UplinkGain	93	dB
EquipmentID	255	VSWR	1.3	
StationID	0			

RF_On/Off On Off

Uplink_ATT dB

Downlink_ATT dB

5. Package List



No	Item	description	Remark
1	LAN Cable	Connect to Laptop LAN port	1pcs
2	RS232 Cable	Connect to Laptop RS232 port	1pcs
3	Grounding Cable	Repeater grounding	2pcs
4	Mounting Ears	Repeater installation bracket	4pcs
5	Fixing Screw	Fix mounting ears to wall or poll	12pcs
6	Expansion Screw	Install repeater to wall or poll	4pcs

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