

User Manual

Wide Band Repeater (20dBm)



2013 January

Information in this manual is subject to change without notice

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NOTICE:

SWITCH **AC POWER OFF** BEFORE DONOR AND SERVICE ANTENNA CONNECTS TO REPEATER.

1 Description

The wide band repeater (PORP20) is a bi-directional amplifier used to enhance signals between a mobile and a base station. This repeater type is used for digital telecommunication system:



- 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 customized frequency band, flexible installation, cost-effectiveness and ideal coverage solution, its output power varies from 20dBm to 23dBm.

It is applied to small, medium-size areas such as home, offices, shops, and basements, remote countryside , and mining well etc.

This model booster is commonly used in situations where large numbers of frequency carriers are to be repeated or when base station synthesized frequency hopping is used.

This model booster does 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.

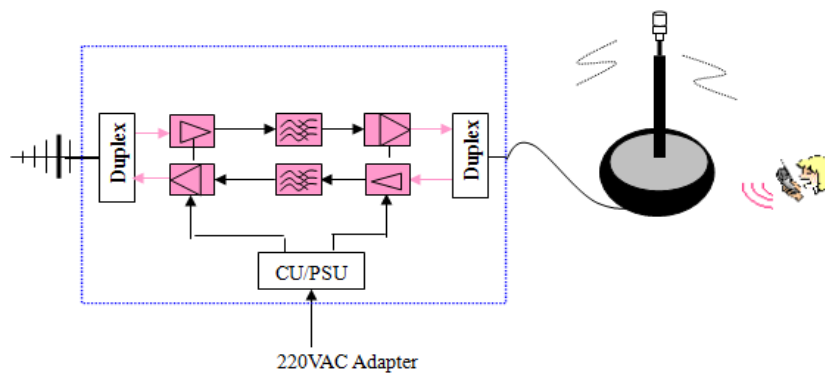
2 Technical Specifications

Items	Specification	
	Uplink	Downlink
Network(Customized)	Any one band of 800/850/900/1800/1900/2100	
Gain	≥ 65dB	≥65 dB
Output Power	20dBm	20dBm
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	
I/O Impedance	50 Ω	
VSWR	≤2	
Load VSWR Tolerance	20:1	
Noise Figure	≤ 8 dB	
Inter-modulation Attenuation	-40dBc	
Spurious Emission	≤-36dBm(9KHz~1GHz)/≤-30dBm(1~12.75GHz)	
System Delay	≤ 0.5μs	
Max Input Power Level(1minute)	-10dBm	
RF Connector	SMA-Type (Female)	
Operating Temperature	-15~ +55 °C	
Power Supply(Customized)	AC100~240VAC	
Power Supply Socket(Customized)	Connector Type B	
Dimension (mm)	150×120×22mm	
Weight(kg)	0.6kg	
Shipment Dimension (mm)	240×160×50mm	
Shipment Weight(kg)	0.8 kg	
Indication LED	DC	Light @ power supply on
	Run	Light @ repeater work

3 System Diagram

The RF link (donor) towards the base station is typically fed from an outdoor antenna while the coverage area is fed by an indoor antenna

The RF link (donor) towards the base station is typically fed from an outdoor antenna while the coverage area is fed by an indoor antenna or connected to mobile antenna directly.



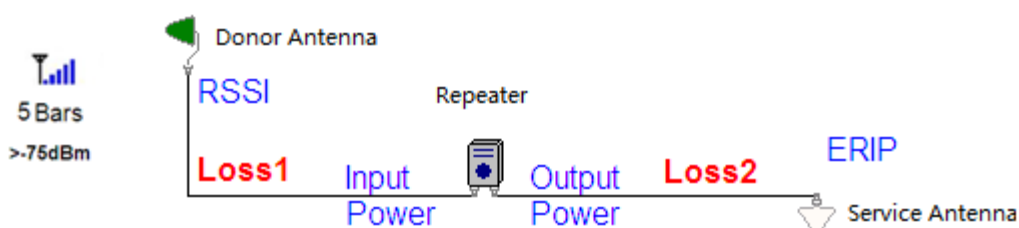
The signal from the base station is received via directly antenna, then forwarded through a duplex filter, is amplified in a low noise amplifier (LNA), enters the RF filter for wideband selective, and then amplified in the power amplifier.

The output signal passes a duplex filter, before it is fed to mobile or indoor antenna which retransmits the signal to the aim areas.

4 Product Features

- High system **gain>65dB**, High system output **power>20dBm**
- Light weight, small dimensions, easy to install
- Smart Automatic Level Control (**ALC**) to reduce interference to BTS
- Linear** power amplification to effectively suppress inter-modulation and spurious emission
- An alarm interface with unique **color LEDs** to indicate power supply and signal level of uplink and downlink
- Simple installation with external **AC/DC adapter**
- Dual ports and **full duplex design**

5 Applications Example



$$\text{RSSI} = \text{Min Reception Signal Level} + \text{Donor Antenna Gain} \quad (1)$$

$$\text{Input Power} = \text{RSSI} - \text{Loss1} \quad (2)$$

$$\text{Output Power} = \text{Input Power} + \text{Repeater Gain} \quad (3)$$

$$\text{ERIP} = \text{Output Power} - \text{Loss2} + \text{Service Antenna Gain} \quad (4)$$

5.1 Minimum Signal Levels

It requires a minimum signal level in the place where install the donor antenna. Failure to provide sufficient input signal will only result in a poor coverage inside the building for this repeater system.

To check signal levels, use the phones in the place where antenna be install (on the roof) and observe the signal bars on the phone. The Donor (outside) antenna should be placed in the location where you get the most signal.

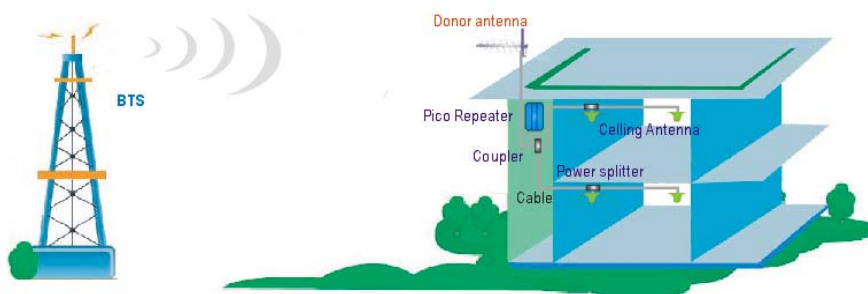


Notices:

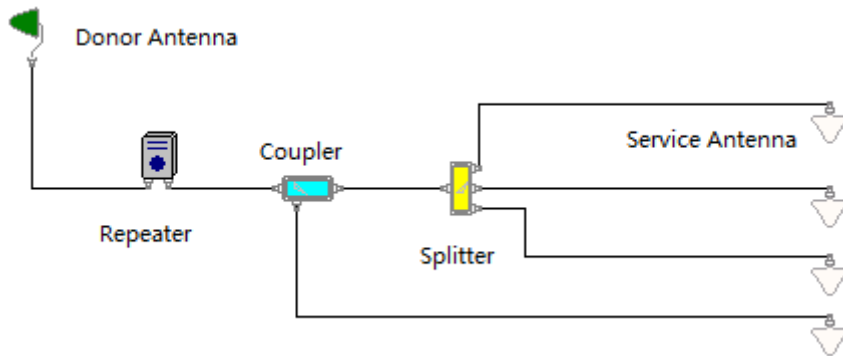
- 1) The donor antenna should have line of sight (LOS) with the BTS antenna. If the signal strength is adequate, LOS may in some cases not be necessary.
- 2) Donor antenna gains are typically 9 to 14 dB, and have a horizontal and vertical beam width of less than 30° to correctly select the donor BTS.

5.2 Custom Applications

If building is made of concrete, steel, steel roof, copper roof, brick, aluminum siding, concrete roofing tiles, metal roofing tiles or any other signal stopping material, a repeater is usually the ideal solution for your situation.



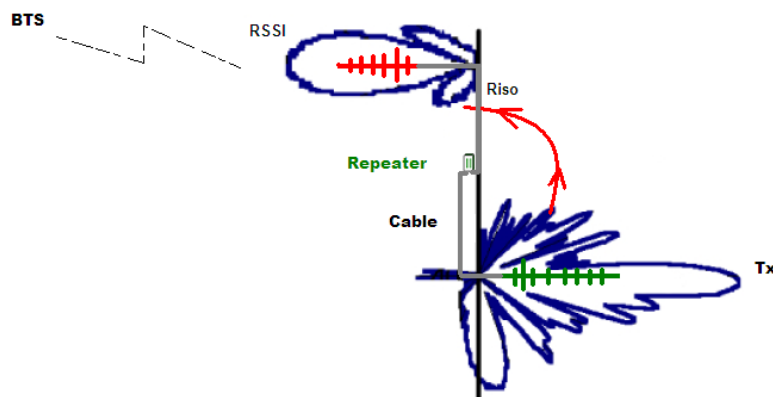
Most homes or buildings are easily covered by one repeater systems. Some buildings are larger or have multiple areas inside that need coverage.



It may need longer cables, more than 2 coverage antennas or other items in order to fully cover your building. We can make (almost) any cable length and can help design a system that fits your application.

5.3 Isolation and Separation

Isolation refers to the proper distance or separation needed to keep the Donor antenna signal pattern and the Coverage antenna signal pattern away from each other.



Isolation becomes particularly problematic when Omni-directional antennas are used for both the Donor and the Coverage antennas. Since these antennas transmit in a circle (or more accurately a sphere) it is very easy for these spheres to overlap and thus negate the repeater system.

6 Production Operation

6.1 Notices

Follow below safety items carefully before installation, implementation, maintenance and operation for this product

- ☞ BS and MS port must be connected to donor antenna and service antenna when powers supply on; otherwise the equipment will be damage for long term use.
- ☞ When use repeater for outdoor, the distance between donor antenna and service antenna must be >20metes, otherwise the repeater will be damage because isolation problem for long term use.
- ☞ Donor antenna need to be lighting proof and lighting rod need to be install for donor antenna installation pole outside
- ☞ Check input power, require input power less than maximum input power of repeater, otherwise the repeater cannot work well.
- ☞ Keep clear for label and indicator on surface of repeater to be identified.

6.2 Installation

Step 1: Start by taking phone up to the roof or other location outside to find where the signal is strongest.

Step 2: Temporarily mount the Donor (outside) antenna in that location. It may need to adjust and move the antenna later.

Step 3: Run coaxial cable into the building to a convenient location where you can also get standard 220VAC power for the repeater.

Step 4: Place the repeater in that location and connect the coaxial cable to the Donor Side of the repeater and the donor antenna.

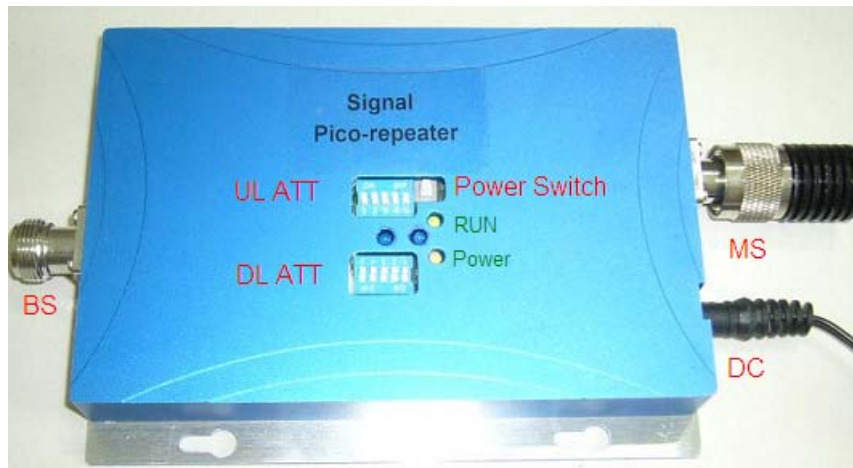
Step 5: Mount coverage (inside) antenna in a productive location. It may need to adjust or move the antenna later.

Step 6: Connect coaxial cable between the coverage antenna and the repeater output port.

Step 7: Power up the system and check for signal inside the building. If needed, tune system by moving and or pointing the Donor and Coverage antennas until get the most signal possible.

Step 8: Secure all antennas and cables, securely mount the repeater and clean up the installation.

6.3 Commissioning

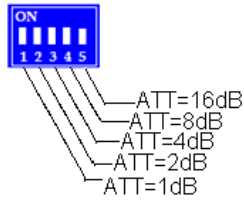


Port	Usage	
BTS	Connect to Donor antenna, Receive BTS signal source	
MS	Connect to Service antenna, Retransmitted signal to target coverage area	
UL ATT	Set gain for uplink by switch PIN ON/OFF	
DL ATT	Set gain for downlink by switch PIN ON/OFF	
Switch	Power supply Switch ON/OFF	
LED Indicator	Power	Light @ power supply on
	RUN	Light @ work and Power supply switch on

After switch on power supply, please check indication LED as following items.

- You can switch attenuation value by using repeater side switch, If you want to set attenuation 18, you push switch16 and switch 2 on.
- Make sure the repeater full output power LED (Downlink output power) is on when finishes commissioning.
- And set $UL\ ATT > DL\ ATT + 5dB$ to balance the downlink and uplink and limited the interference to BTS in uplink direction.
- You can change donor antenna direction or installation position to get bigger signal;

- You can set attenuation to add or reduce repeater gain; or you can check cable and connector link status to reduce cable loss and insert loss between repeater and antenna.



Example:

1 and 2 ON	$ATT = 1+2 = 3dB$
1 and 3 ON	$ATT = 1+4 = 5dB$
1, 4 and 5 ON	$ATT = 1+8+16 = 25dB$
2, 3 and 4 ON	$ATT = 2+4+8 = 14dB$
1,2,3,4 and 5 ON	$ATT = 1+2+4+8+16 = 31dB$

