

# User Manual

## Wide Band Repeater



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Information in this manual is subject to change without notice

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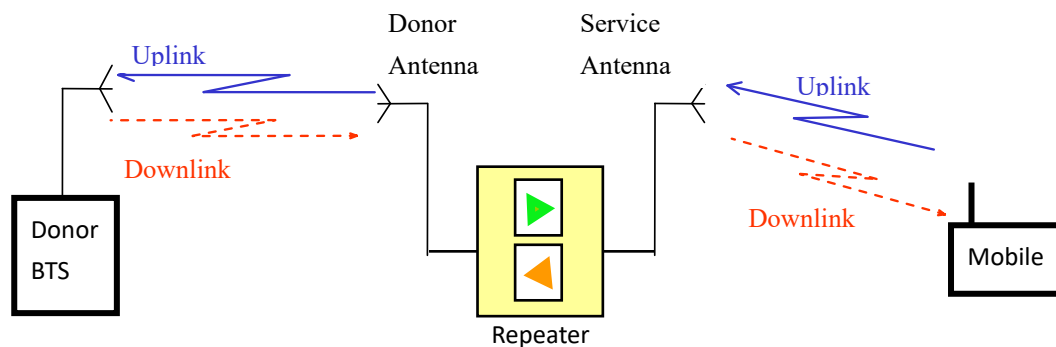
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### NOTICE:

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

## 1 Description

Repeater is a device that receives, amplifies and transmits the radiated or conducted RF carrier both in the down-link direction (DL, from the base station to the mobile area) and in the up-link direction (UL, from the mobile to the base station).



**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.

## 2 Product Features

- High system **gain>65dB**, High system output **power>17dBm**
- 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**

## 3 Technical Specifications

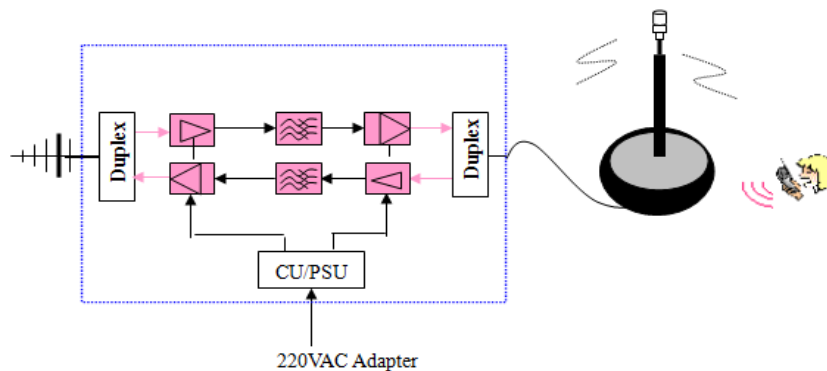
Items	Specification	
	Uplink	Downlink
<b>Network(Customized)</b>	Any one band of 800/850/900/1800/1900/2100	
<b>Gain</b>	≥ 65dB	≥65 dB
<b>Output Power</b>	17dBm	17dBm
<b>Gain Adjustment Range</b>	≥ 30 dB	
<b>Gain Adjust precision</b>	0~10dB/±1dB#10~20dB/±1.5dB#20~31dB/±2dB	
<b>ALC Scope</b>	≥ 20dB	
<b>In-Band Ripple</b>	≤ 3 dB	
<b>I/O Impedance</b>	50 Ω	
<b>VSWR</b>	≤2	
<b>Load VSWR Tolerance</b>	20:1	
<b>Noise Figure</b>	≤ 8 dB	
<b>Inter-modulation Attenuation</b>	-40dBc	
<b>Spurious Emission</b>	≤-36dBm(9KHz~1GHz)/≤-30dBm(1~12.75GHz)	
<b>System Delay</b>	≤ 0.5μs	
<b>Max Input Power Level(1minute)</b>	-10dBm	
<b>RF Connector</b>	SMA-Type (Female)	
<b>Operating Temperature</b>	-15~ +55 °C	
<b>Power Supply(Customized)</b>	<b>AC100~240VAC</b>	
<b>Power Supply Socket(Customized)</b>	<b>Connector Type B</b>	
<b>Dimension (mm)</b>	150×120×22mm	
<b>Weight(kg)</b>	0.6kg	
<b>Shipment Dimension (mm)</b>	240×160×50mm	
<b>Shipment Weight(kg)</b>	0.8 kg	

Indication LED	DC	Light @ power supply on
	Run	Light @ repeater work

#### 4 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

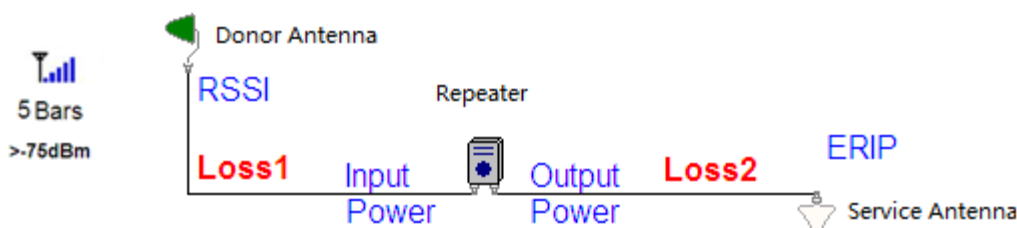
The RF link (donor) towards the base station is typically fed from an outdoor antenna while the coverage area is fed by an indoor antenna or connected to mobile antenna directly.



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.

#### 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.

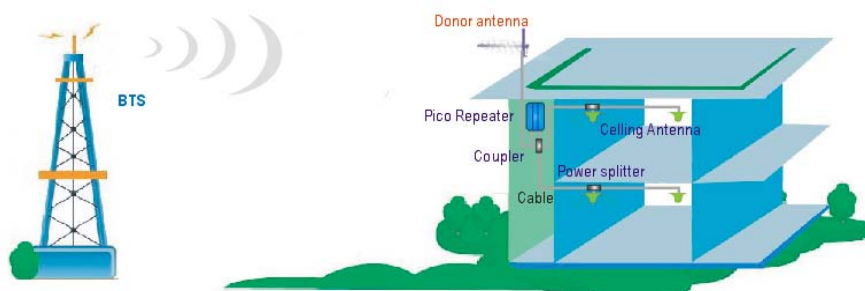


Notices:

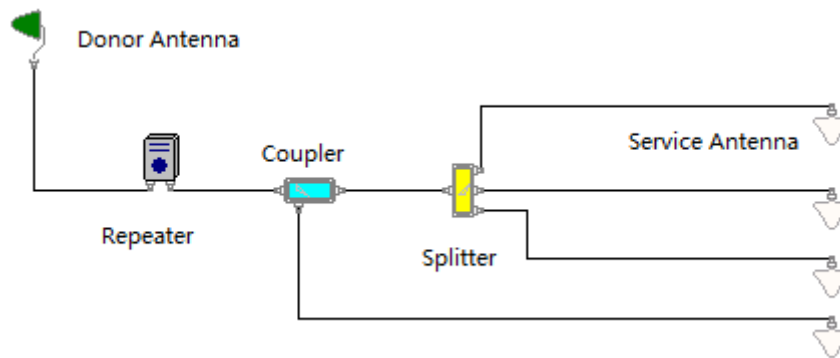
- 1) The donor antenna should have line of sight (LOS) with the BTS antenna. If the signal strength is adequate, LOS may in some cases not be necessary.
- 2) Donor antenna gains are typically 9 to 14 dB, and have a horizontal and vertical beam width of less than 30° to correctly select the donor BTS.

### 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.



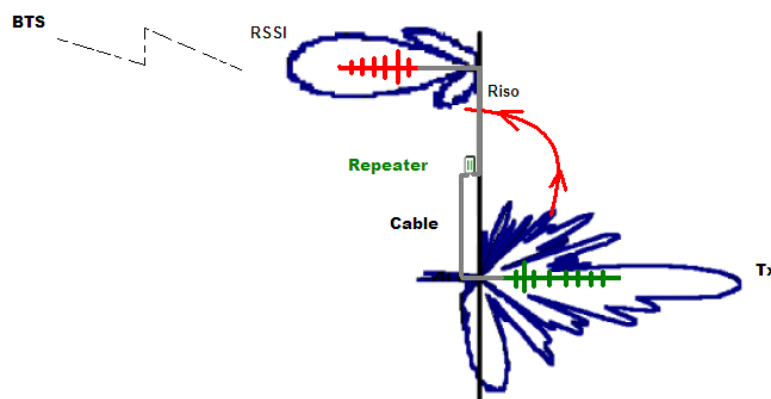
Most homes or buildings are easily covered by one repeater systems. Some buildings are larger or have multiple areas inside that need coverage.



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.

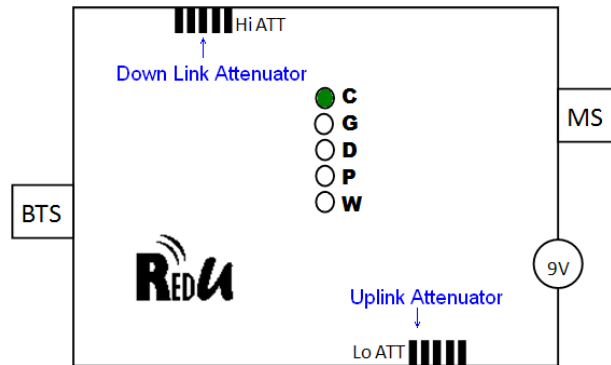
**Step 6:** Connect coaxial cable between the coverage antenna and the repeater output port.



**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

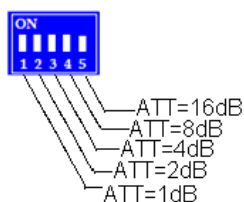


Port	Usage	
<b>BTS</b>	Connect to Donor antenna, Receive BTS signal source	
<b>MS</b>	Connect to Service antenna, Retransmitted signal to target coverage area	
<b>Lo ATT</b>	Set gain for uplink by switch PIN ON/OFF	
<b>Hi ATT</b>	Set gain for downlink by switch PIN ON/OFF	
<b>LED Indicator</b>	Power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

#### DIP SWITCHES

There are downlink (BTS site to )DIP Switches (Hi ATT) and uplink DIP Switches (Lo ATT) for single band.

- ON- means Attenuation
- OFF- means no attenuation.



Example:

1 and 2 ON	ATT= 1+2 =3dB
1 and 3 ON	ATT= 1+4 =5dB
1, 4 and 5ON	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

- Hi ATT are used when BTS signal is acquired is too strong via donor antenna (external antenna), which usual are set to lower gain (higher attenuation), and protect repeater to work at good signal situation (NOT Over-power state). This simply setting way is:

- Set ALL DIP switch off.
- Check signal bar of mobile phone in edge of coverage area.
- Set Attenuation as following table until cell phone make calling is well.

No.	PIN1	PIN2	PIN3	PIN4	PIN15	Att Value
1	ON	ON	ON	ON	ON	31
2	off	ON	ON	ON	ON	30
3	ON	off	ON	ON	ON	29
4	off	off	ON	ON	ON	28
5	ON	ON	off	ON	ON	27
6	off	ON	off	ON	ON	26
7	ON	off	off	ON	ON	25
8	off	off	off	ON	ON	24
9	ON	ON	ON	off	ON	23
10	off	ON	ON	off	ON	22
11	ON	off	ON	off	ON	21
12	off	off	ON	off	ON	20
13	ON	ON	off	off	ON	19
14	off	ON	off	off	ON	18
15	ON	off	off	off	ON	17
16	off	off	off	off	ON	16
17	ON	ON	ON	ON	off	15
18	off	ON	ON	ON	off	14
19	ON	off	ON	ON	off	13
20	off	off	ON	ON	off	12
21	ON	ON	off	ON	off	11
22	off	ON	off	ON	off	10
23	ON	off	off	ON	off	9
24	off	off	off	ON	off	8
25	ON	ON	ON	off	off	7
26	off	ON	ON	off	off	6
27	ON	off	ON	off	off	5
28	off	off	ON	off	off	4
29	ON	ON	off	off	off	3
30	off	ON	off	off	off	2
31	ON	off	off	off	off	1
32	off	off	off	off	off	0

- Lo ATT are used to control interference to BTS network. It is usually set UL ATT= DL ATT+5dB to balance the downlink and uplink.

- 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.

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