Dual-Band Selective Repeater
User's Manual

（1900M Repeater）

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1. Introduction

Repeaters are used to fill out uncovered areas in cellular mobile systems, such as base station fringe areas, road tunnels, business and industrial buildings, etc.
A repeater receives signals from a base station, amplifies and retransmits the signals to mobile stations. Also it receives, amplifies and retransmits signals in the opposite direction. Both directions are served simultaneously.
To be able to receive and transmit signals in both directions, the repeater is connected to a donor antenna directed towards the base station and to a service antenna directed towards the area to be covered.

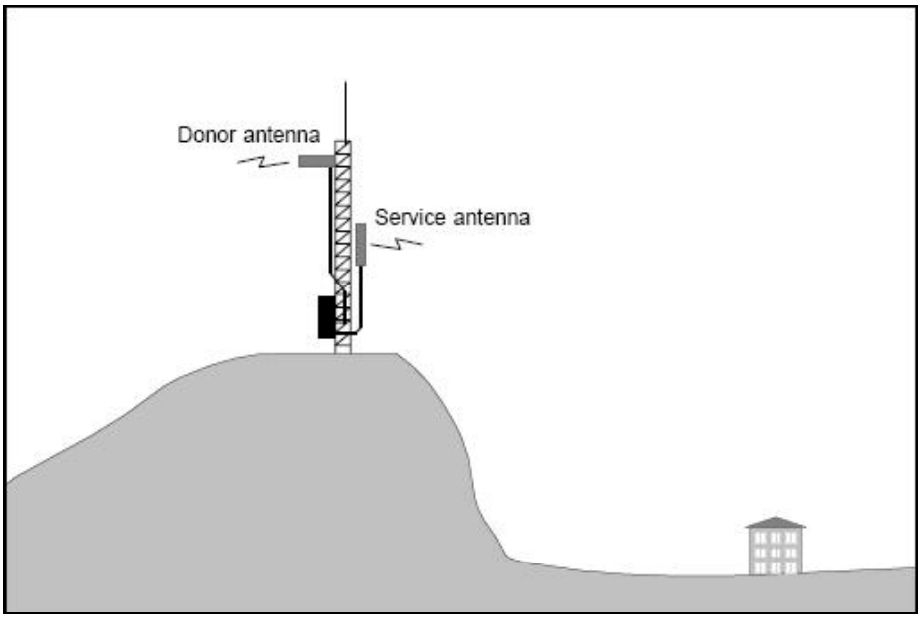


Figure 1 Outdoor Application

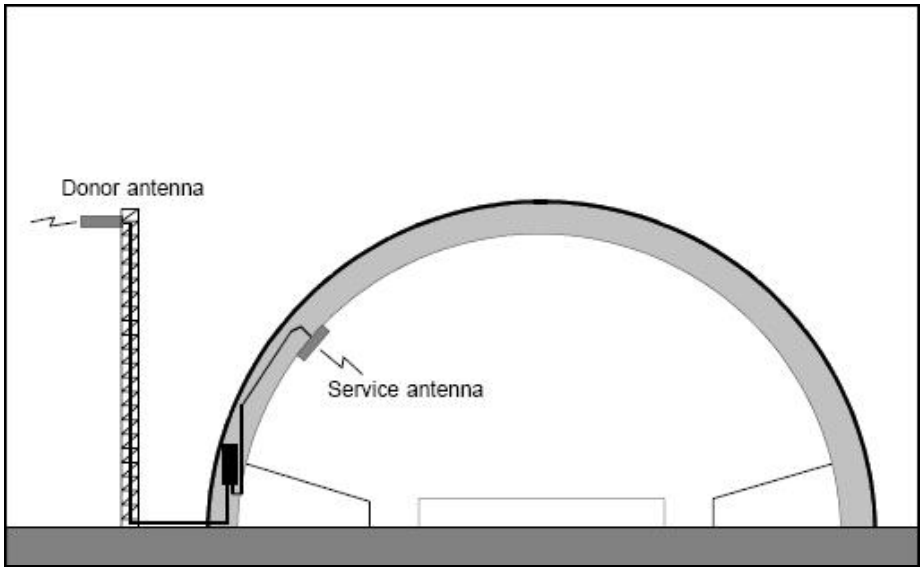


Figure 2 Indoor Application

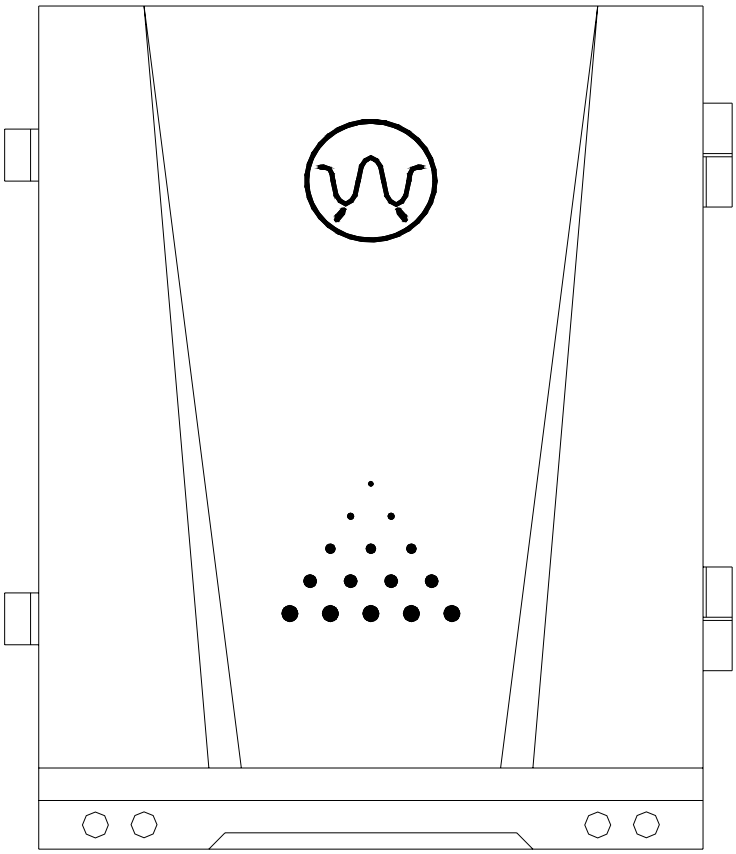
Longent dual-band selective repeaters with 2 adjustable bandwidths have filters that can be set to various bandwidths. This repeater type is suitable for the most carriers that need 2 band blocks support in 1900 MHz PCS band.

Figure 3 Longent Repeater

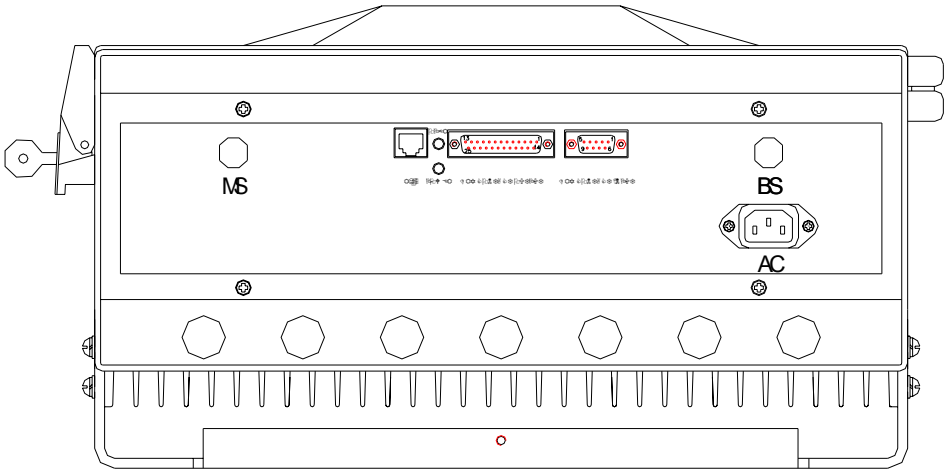
1.1. Product Features

- Full PCS band support in user definable 5, 10, or 15 MHz steps
- 2 programmable bandwidth, 0.5 MHz to 20 MHz for each
- RF output power in user definable, 30 dBm max.
- Web interface for monitoring and control
- Integrated RF module

1.2. Front View



1.3. Bottom View



2. Specification

2.1. RF Specifications

● Frequency Band	1850 – 1910 MHz, Uplink (Reverse Link) 1930 – 1990 MHz, Downlink (Forward Link)
● Number of Bands	2
● Bandwidth	0.5 – 20 MHz, Programmable
● Gain Adjustment Range	55 – 85 dB (1 dB Steps)
● ALC	> 30 dB
● Absolute Group Delay	< 10 μs (8 μs Typical)
● Output Power	+30 dBm, Total
● Maximum Input Power (Non-destructive)	+13 dBm
● Out of Band Spurious Emission	-30 dBm, max.
● Selectivity	< -20 dB @ +/-500 kHz out of band < -30 dB @ +/-700 kHz out of band < -50 dB @ +/-1 MHz out of band
● Pass Band Ripple	6 dB (Typical 3 dB @ +/-1 MHz departure from the edge within the selected band)
● Noise Figure at Max Gain	5 dB
● VSWR	< 1.5 : 1

2.2. Electrical Specifications

● Power Supply Voltage (default)	115 V AC
● Power Consumption, max	200 W
● DC Output of PSU	27 V, 12 V

2.3. Mechanical Specifications

● Dimensions (W×H×D)	410 mm × 520 mm × 234 mm
● Weight	23 kg
● RF Connector	N-type female
● Signal Connectors	RJ45 Modular Jack DB25 female for 8 dry contact output DB9 female for 6 dry contact input

2.4. Environmental Specifications

- Temperature Range -25 to +55 ℃
- Humidity 95%, Relative
- Casing Class IP53

2.5. Monitor and Control

Monitor

- Output Power
- ALC Attenuation
- DGC Attenuation
- PA Enable
- PA temperature
- VSWR
- Band Setting
- Used Gain

Control

- ALC level
- DGC Attenuation
- PA Enable
- Band Setting

Alarm

- PA fault
- High Temperature
- Overpower
- Synthesizer Fault (unlock)
- PSU (Power Supply Unit) fault
- Self-oscillation
- VSWR Alarm
- Door Open Alarm
- External Alarm 1 ~ 6

3. Functional Description

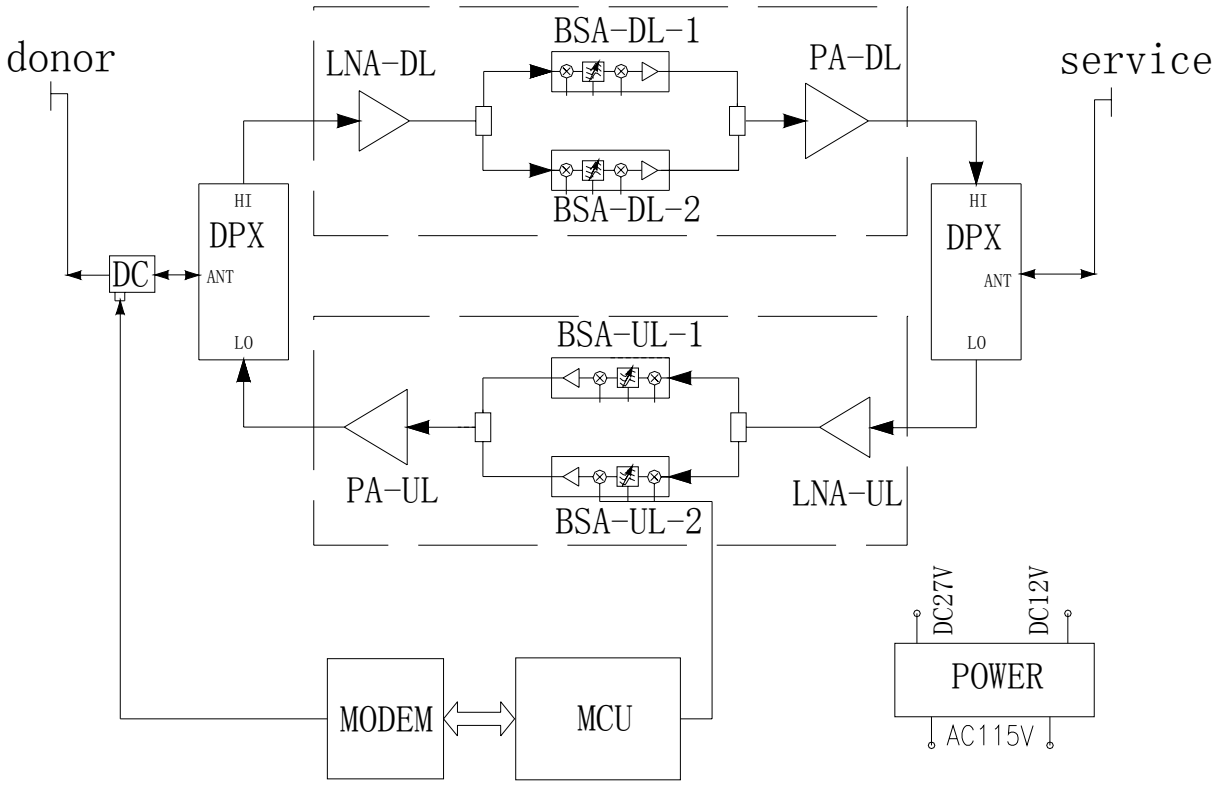
Longent repeaters work as bi-directional on-frequency amplifiers. A repeater receives, amplifies, and retransmits signals downlink and uplink simultaneously, i.e. from the base station via the repeater to the mobile stations and from the mobile stations via the repeater to the base station.

The repeater is connected to a BS antenna, directed towards the base station, and to a MS antenna directed towards the area to be covered. These antennas are connected to the repeater with N type male connectors.

Operational and power LEDs are visible on the repeater bottom.
The repeater works with convection cooling without fan.

Operational parameters such as gain (DGC attenuation), bandwidth, ALC levels, etc. are set using a notebook or keypad locally or remotely via modem with a data interface to the repeater control unit.

3.1. Block Diagram



The signal from the base station is received via the repeater donor (BS) antenna and is then forwarded through a directional coupler (DC). The signal passes a duplex filter (DPX), is amplified in a low noise amplifier (LNA), and enters the band selective amplifier (BSA), which has two parallel bands.

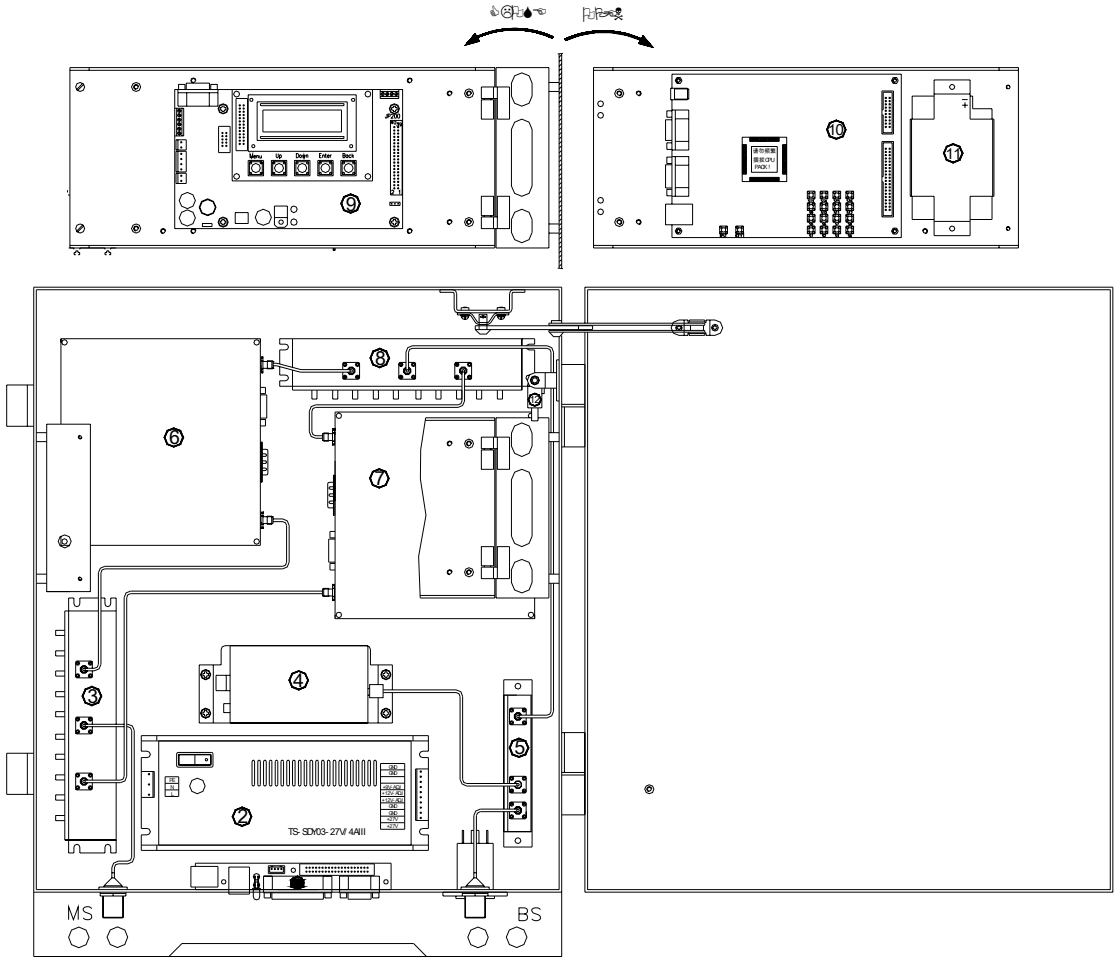
The first mixer stage on the BSA amplifier, which is controlled by a synthesizer, converts the received frequency down to the IF frequency. The signal is then filtered by a SAW band pass filter and amplified before it is fed to the second mixer stage, controlled by the same synthesizer as the previous one, for converting back to the original frequency. The SAW filter can be adjustable for each BSA has adjustable bandwidth.

A detector on the PA measures continuously the output level. The signal from this detector is used by the automatic level control, ALC, to supervise and, if necessary, reduce the output power to keep it under a setting level.

The output signal passes duplex filter (DPX) and fed to the repeater service (MS) antenna.

The uplink signal path, i.e. from the mobile station through the repeater to the base station, is identical to the downlink path the other way round. Only some levels and component values differ.

3.2. Unit Descriptions



1. LAN and Dry Contact Interface board
2. PSU (Power Supply Unit)
3. MS Duplexer
4. Modem
5. BS Directional Coupler
6. Downlink Integrated Module
7. Uplink Integrated Module
8. BS Duplexer
9. Keypad and LCD
10. Control Unit board
11. Battery for Control Unit
12. Door Switch

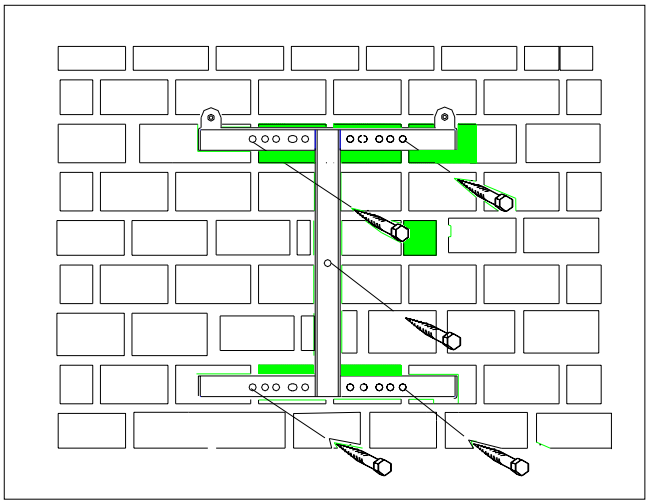
4. Installation

A preferable site for the repeater is a tempered and ventilated place. If a repeater is placed outdoor and can be exposed to direct sunshine, it is essential that the air can circulate around the repeater with no obstacle.
Do not install or open a repeater at bad weather, such as intense rainfall, snowfall or hail, storm or high wind, extremely low or high temperature and high humidity.

4.1. Mounting

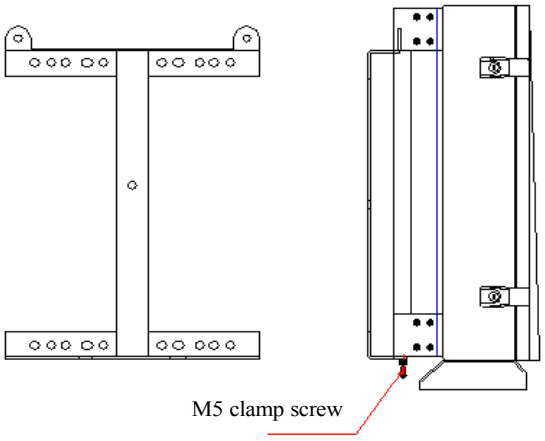
1. Mount the provide bracket

Normally, the repeater is mounted on a wall. The mounting bracket is attached to a wall using locking screws.



2. Hang the repeater

After attached the bracket, hang the repeater on the two upper supports and use one M5 screw to fasten the repeater to the bracket.



4.2. Connection

1. Connect antennas

Connect the service antenna (MS) and donor antenna (BS) coaxial cables to the N type female connectors marked with MS and BS.

2. Connect repeater to AC supply

Plug in the power connector on the bottom of the repeater.

3. Station ground

For the repeater supplied from mains, the mains outlet must be grounded. There is a ground screw (M5) on the right side of the repeater.

5. Operation and Maintenance

5.1. WEB Interface

5.1.1. Introduction

Longent repeaters allow you to read and modify the current status via local WEB as well as remote SNMP.
The main program features:

- Supporting local WEB interface to show and modify the status value
- Supporting Http 1.0
- Supporting remote SNMP to show and modify the status value
- Supporting SNMP versions 1, 2.

5.1.2. Hardware and Software Requirements

Your computer must meet the following requirements to be able to connect the repeaters via local WEB interface:

- Pentium III processor 600MHz or higher
- RAM 64 MB minimum, 256 MB recommended
- SVGA-compatible video card supporting the resolution of 800*600 or higher
- Network adaptor
- A cross cable to connect your computer and the repeater
- A WEB browser like IE 5.0 or higher
- Installed and configured TCP/IP protocol stack

Your computer must meet the following requirements to be able to connect the repeaters via remote SNMP:

- Pentium III processor 600MHz or higher
- RAM 64 MB minimum, 256 MB recommended
- SVGA-compatible video card supporting the resolution of 800*600 or higher
- A wireless CDMA Modem to connect through the Asynchronous and Fax Service
- A SNMP Manager to append MIB file and read repeater

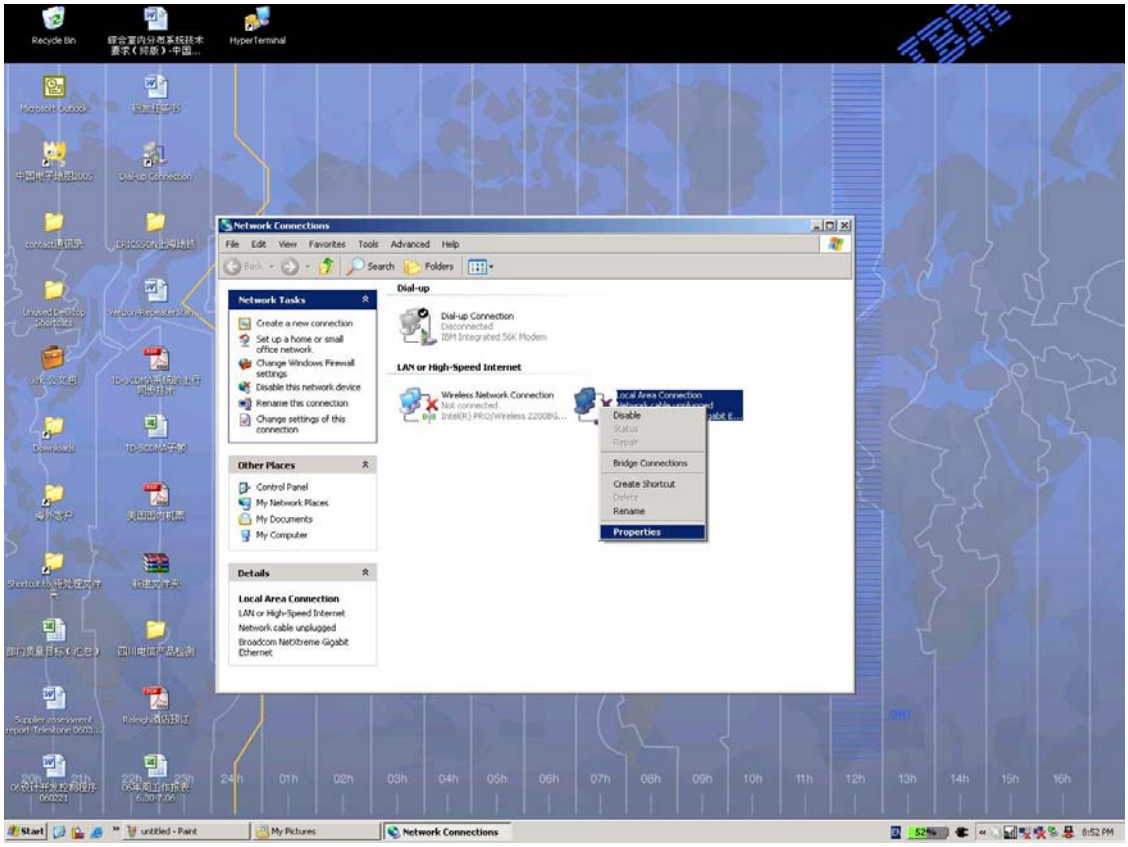
5.1.3. Environment Configuration

The repeater uses the WEB interface to Configure. It used the static IP. Default IP is 192.168.1.199. So your computer must use the static IP too and the same subnet mask (255.255.255.0). Your computer can use all the IP from 192.168.1.1 to 192.168.1.254 except the repeater's one (default is 192.168.1.199).

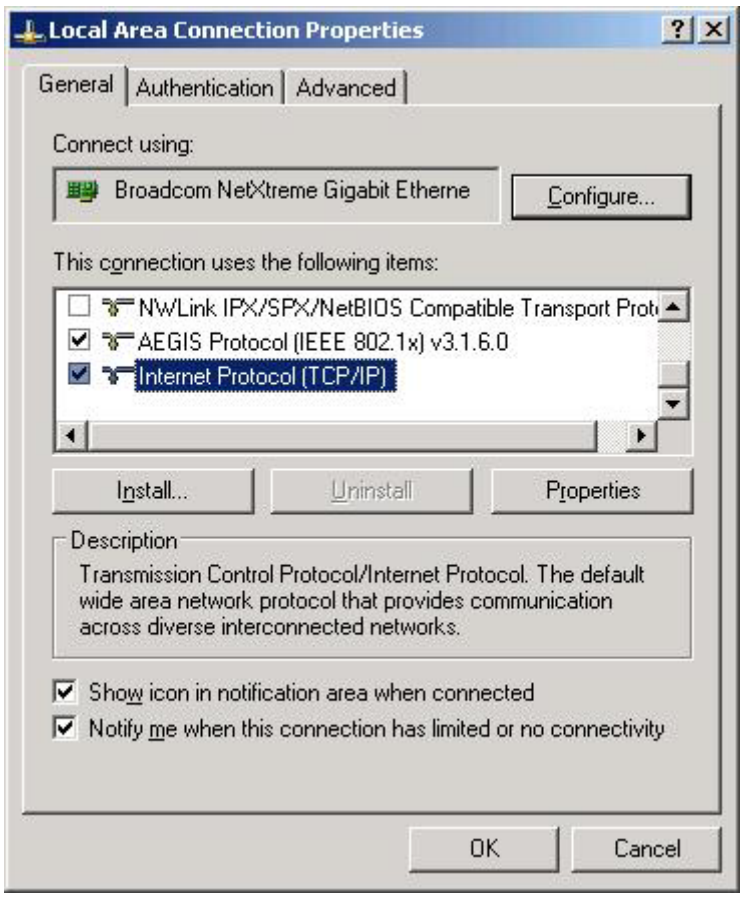
The method of configuration is following:

First, open the "**start**" menu. Choose the "**Show all the connects**" from the "**Connect to**".

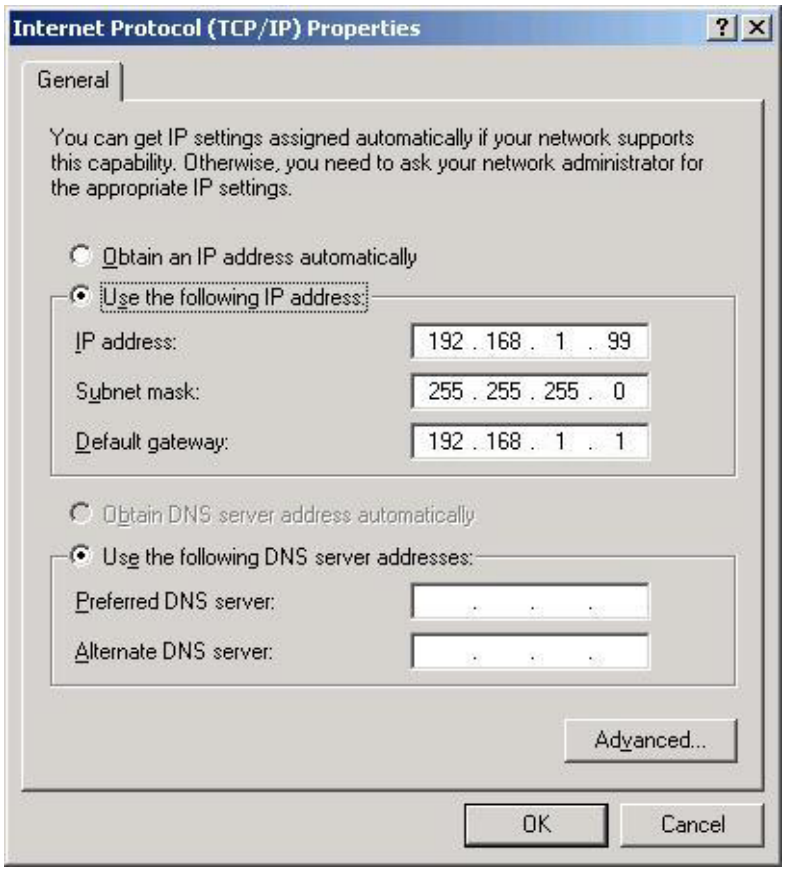
In the "**Network Connections**" window, right click the "**Local Area Connection**" and choose the "**Properties**" in the pop menu.



In the "**Local Area Connection Properties**", there is a "**General**" page. In this page, choose the "**Internet Protocol(TCP/IP)**" in the "**This connection uses the following items**" list. Click the "**Properties**" button.



In this "**Internet Protocol (TCP/IP) Properties**" page, choose the "**Use the following IP address**", and sign the "**IP address**" like 192.168.1.99 and "**Subnet mask**" 255.255.255.0 "**Default gateway"**192.168.1.1 .Others are empty.

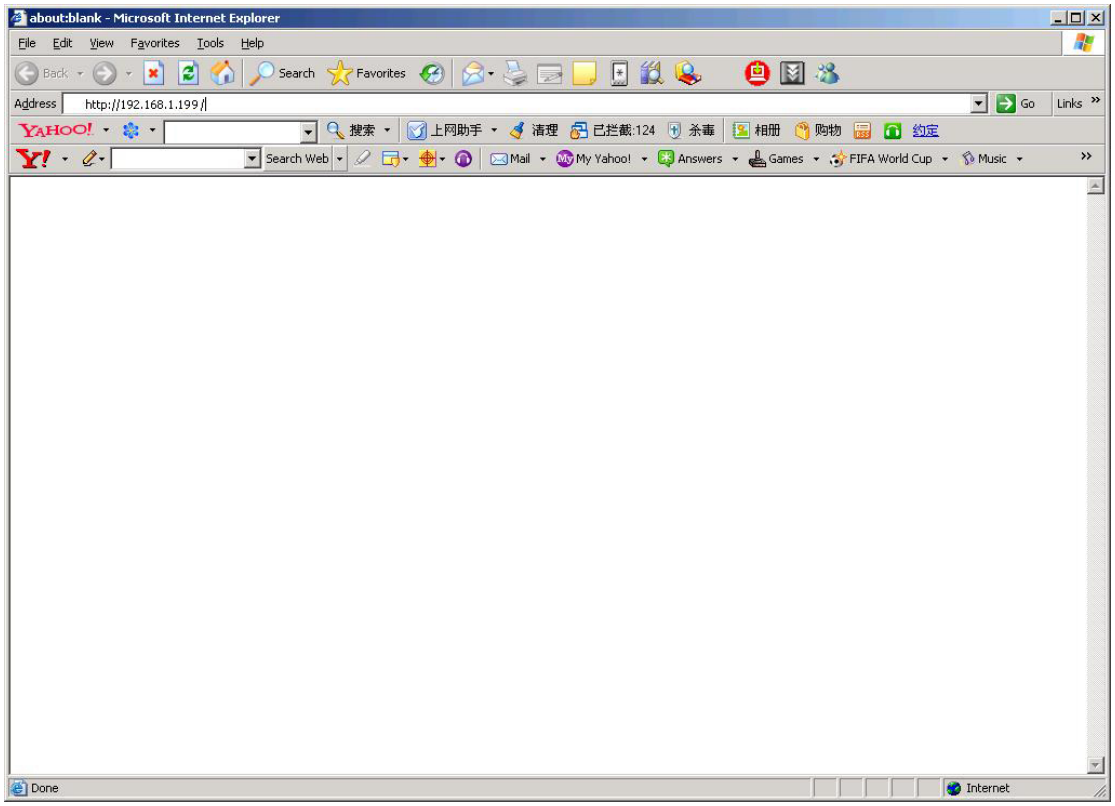


Press the "**OK**" button, you'll finish the configuration.
Now you can use a cross cable to connect your computer and the repeater. You can use IE to read and notify the repeater information.

Exception: Access without the IP.

5.1.4. Basic Operation of WEB Interface

After configuration is done, you're able to use IE to read and notify the repeater information. Open a new IE. Input the http://192.168.1.199 (or http:// IP you had set before) in the "**Address**".

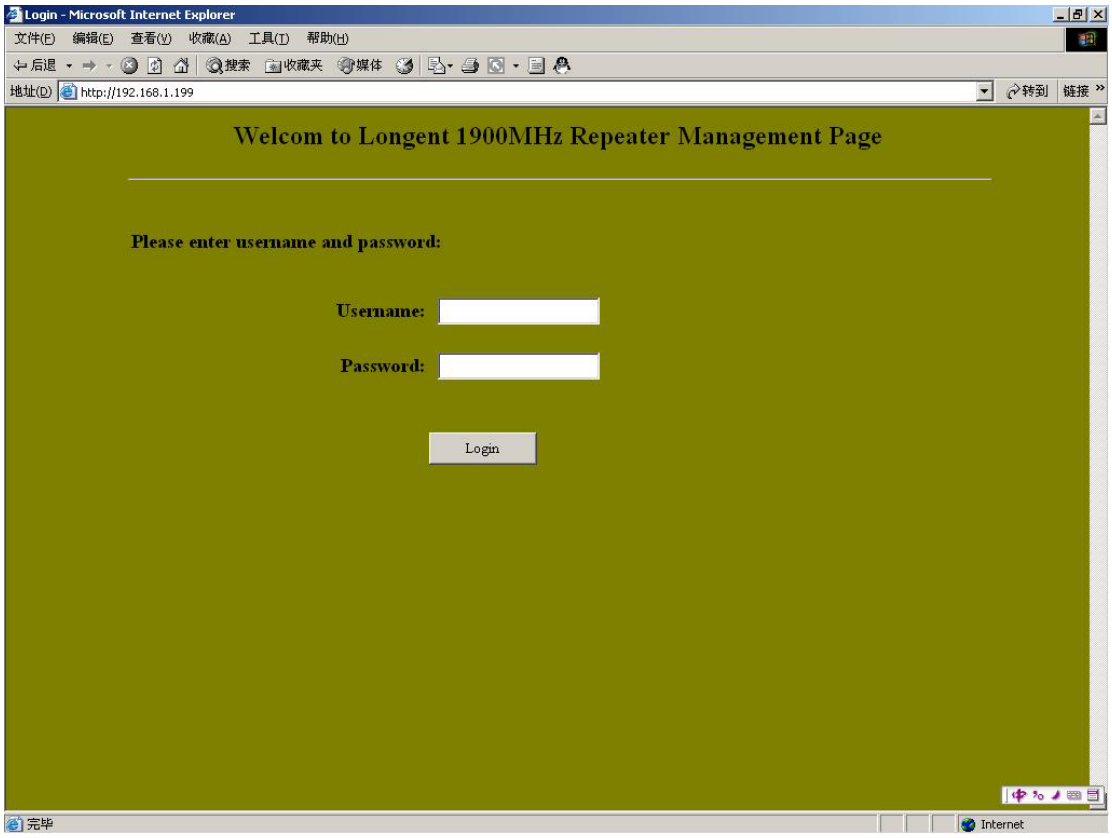


The IE will show the "**Station WEB**" page.

1. Login

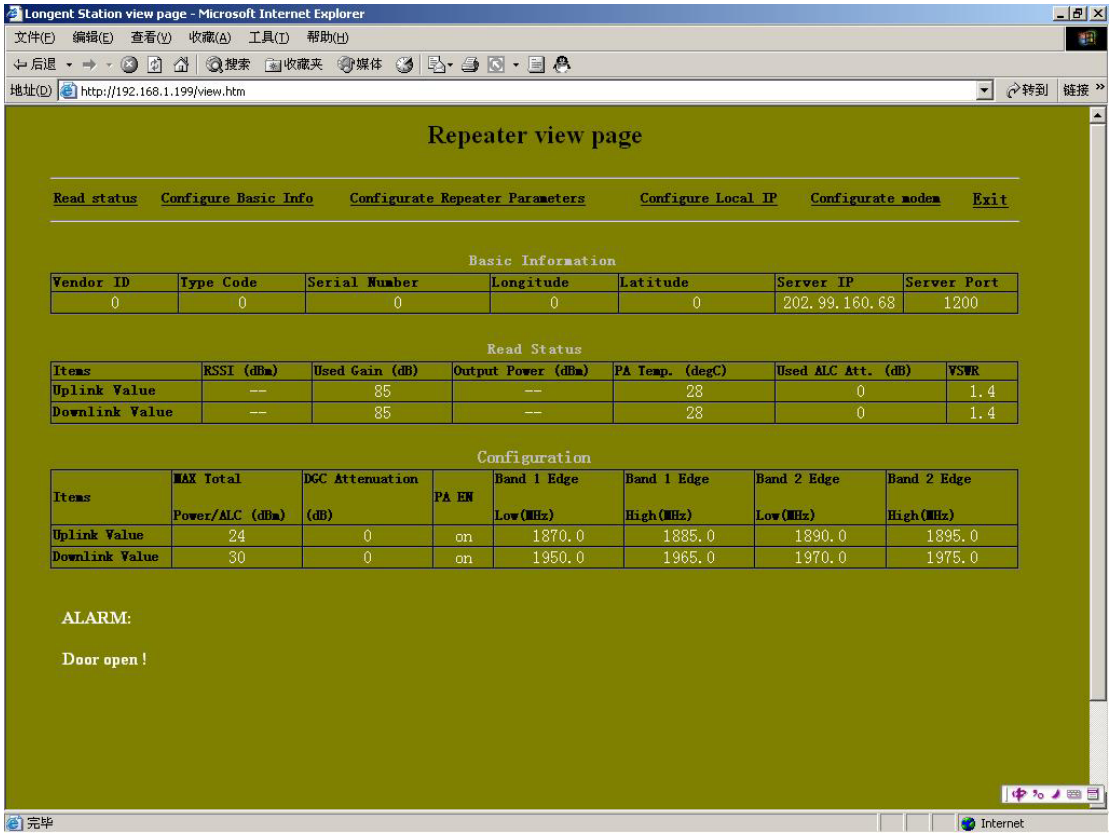
The first page is the "**Login**" page. You must input the correct *user name* and *password*. Default value "enter your *name" is* " user ", " *password" is* "123"

Then you will press the "**Enter**" or "**login**" to login.



2. Repeater View Page

If you input the right *user name* and *password*, the page will jump to the main page – "**Repeater View Page**".



This page has three parts divided by a line. The top part is the link to other operation page. The other is showing the station information.

Operation page link:

- **Read Status** Read the new information of the station.
- **Configure Repeater Basic** Configure the basic information like Vendor ID, Type Code etc.
- **Configure Repeater Parameters** Configure the basic Parameters like ALC, DGC etc.
- **Configure Repeater IP** Configure the local IP for next connect.
- **Configure Modem** Configure the modem to the wireless connect.
- **Exit** End of the using and return login page.

Station Information:

- **Basic Information** Show the basic information of the repeater.
- **Read Status** Show the parameters of the repeater that can read only.
- **Configuration** Show the parameters that you can change to change the repeater state.
- **Alarm Information** Show the Alarm state that the repeater has then. If don't have show "No alarm".

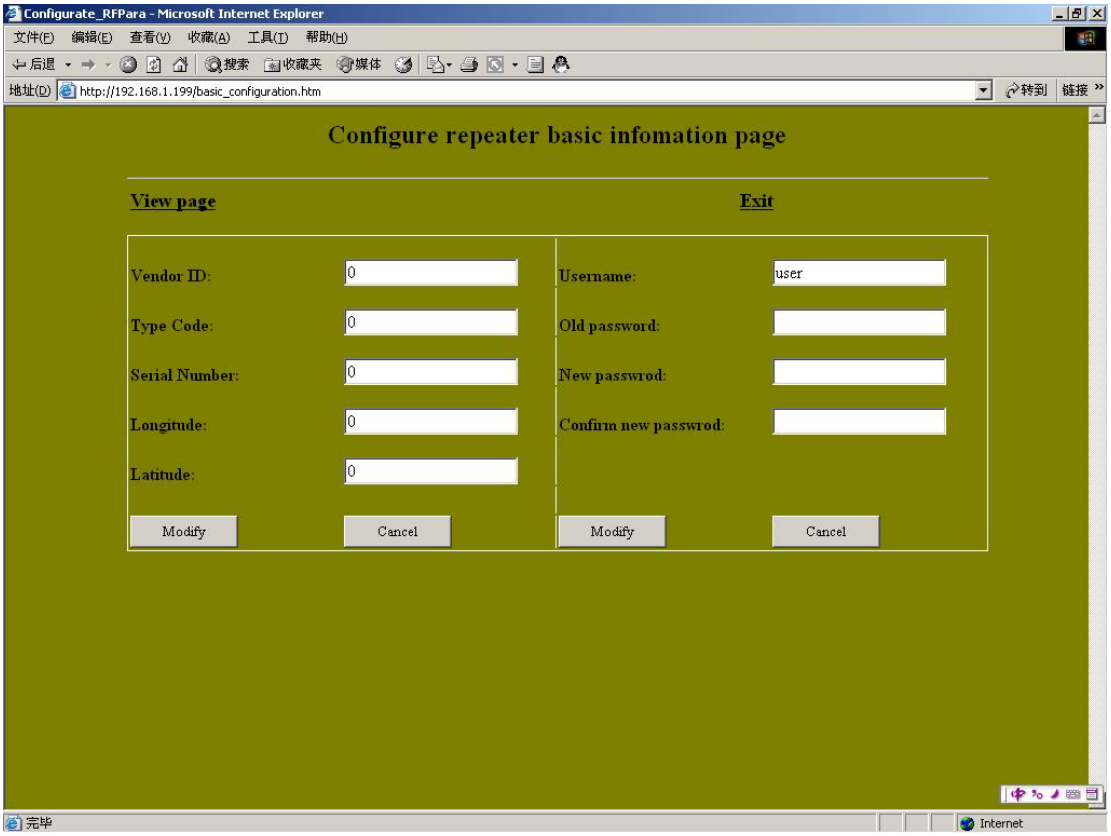
3. Read the repeater status

If you press the **Read Status** link, wait for a minute, the page will refresh and show the new status of the repeater.

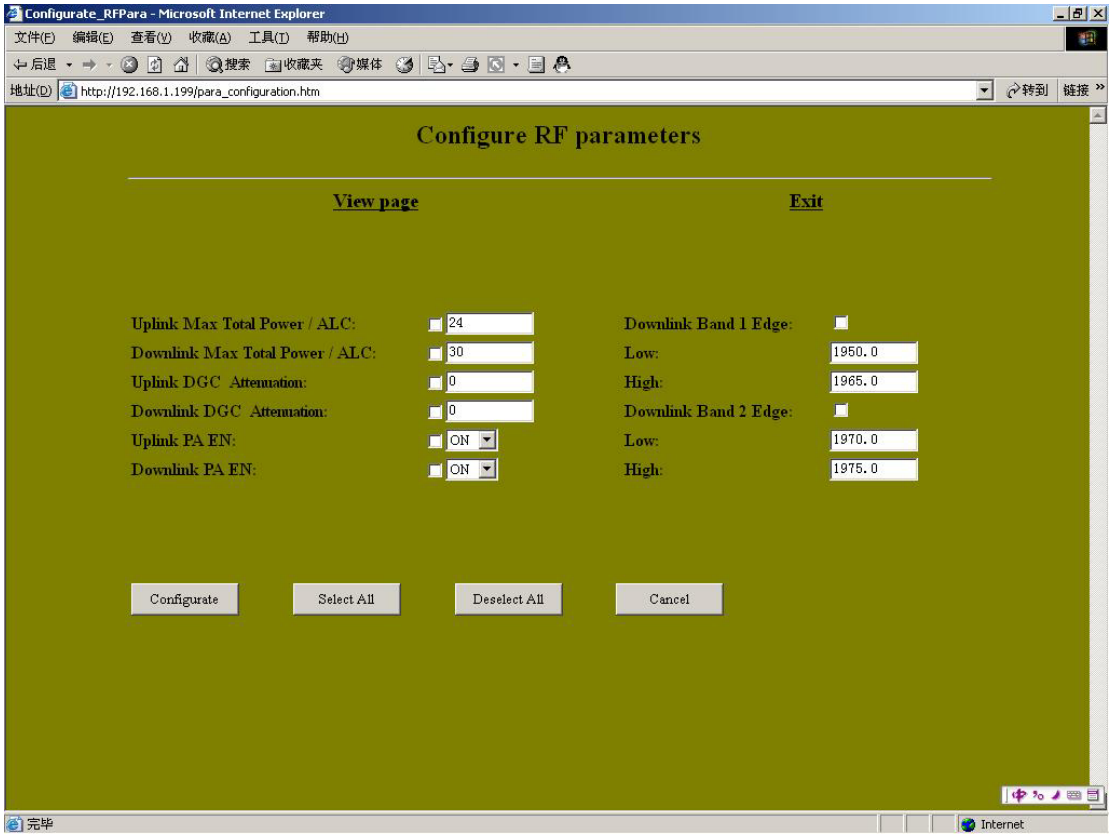
Note: If there are some wrong strings or illegal strings on the page, please press the "**refresh**" on the IE, and then the page will show the right one.

4. Configure the repeater

If you press the **Configure Repeater Basic** link, you will in the **Configure Repeater Basic** page. In this page you can change the basic information.



If you press the **Configure Repeater Parameters** link, you will in the **Configure Repeater Parameters** page. In this page you can change the settable information.



There are two links in the Configure Repeater:

- **View Page** Return the view page and do nothing of configuration.
- **Exit** End of configuration, do nothing of configuration and return the login page.

Two parts you can Configure:

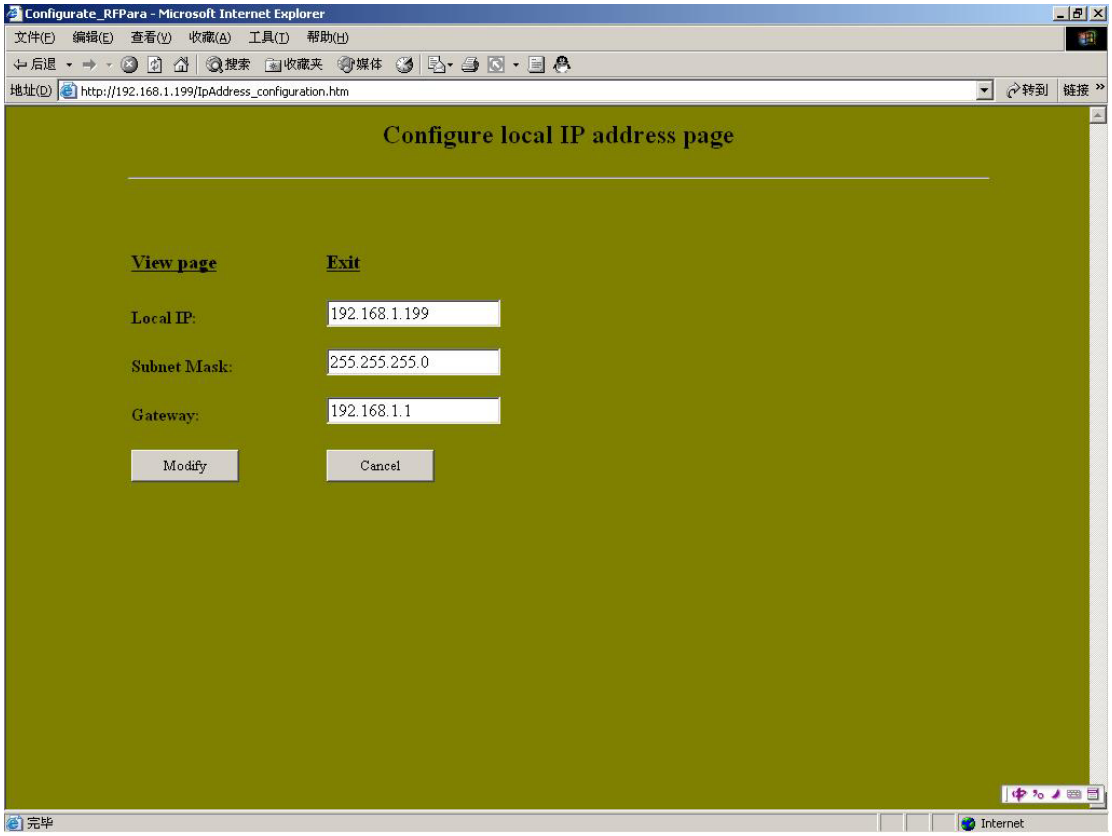
- **Basic Information Setting** Change the basic information of the repeater.
- **RF Parameters Setting** Change the parameters of the repeater and the repeater will work as the input.

If you finish changing, you will press "**Enter**" or "**Set**" button to affirm the change. Please wait for a moment, and then the page will jump to the View Page and show the new status.

Note: If there are some wrong strings or illegal strings on the page, please press the "**refresh**" on the IE, and then the page will show the right one.

5. Configure the repeater IP

If you press the **Configure Repeater IP** link, you will in the **Configure Repeater IP** page. In this page you can change the IP that you next time connect to.



There are two links in the Configuration Repeater:

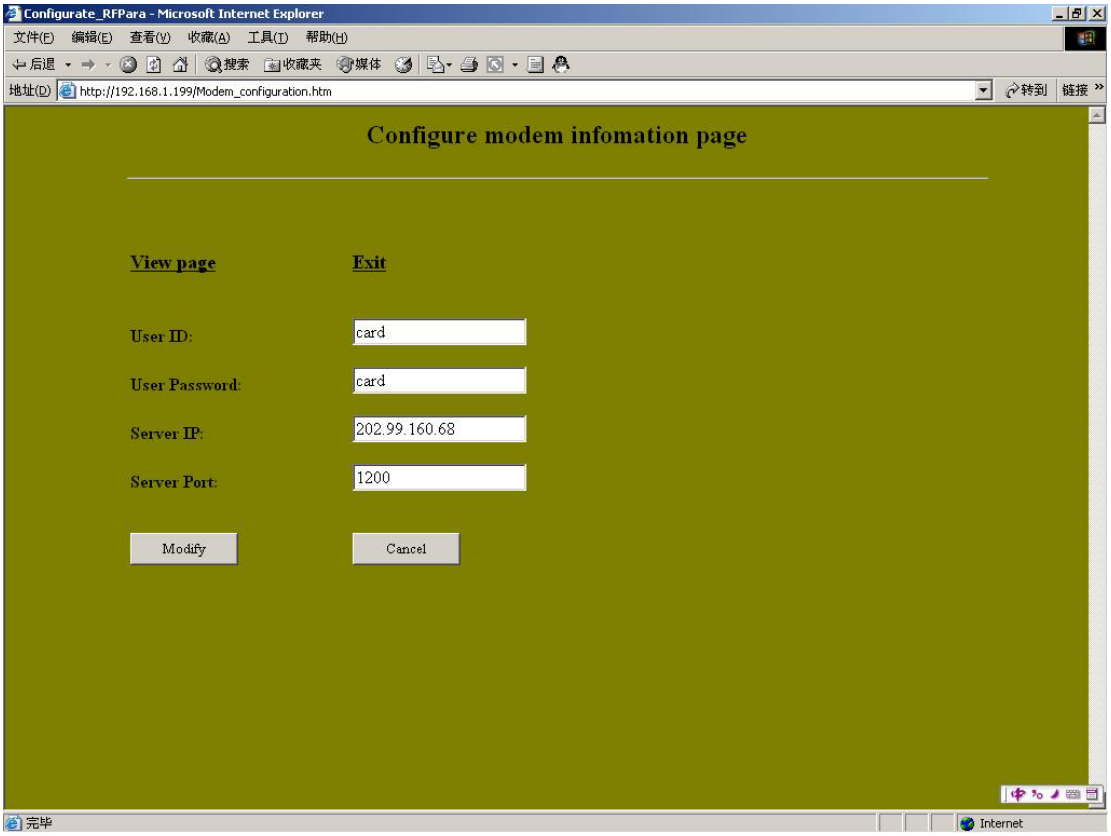
- **View Page** Return the view page and do nothing of configuration.
- **Exit** End of configuration, do nothing of configuration and return the login page.

The input box has the IP now. You can input the new one and press "**Set**" to affirm.

Note: If there are some wrong strings or illegal strings on the page, please press the "**refresh**" on the IE, and then the page will show the right one.

6. Configure the Modem

If you press the **Configure Modem** link, you will in the **Configure Modem** page. In this page you can change the IP that you next time connect to.



There are two links in the Configuration Repeater:

- **View Page** Return the view page and do nothing of configuration.
- **Exit** End of configuration, do nothing of configuration and return the login page.

The input box has the modem information. You can input the new one and press "**Set**" to affirm.

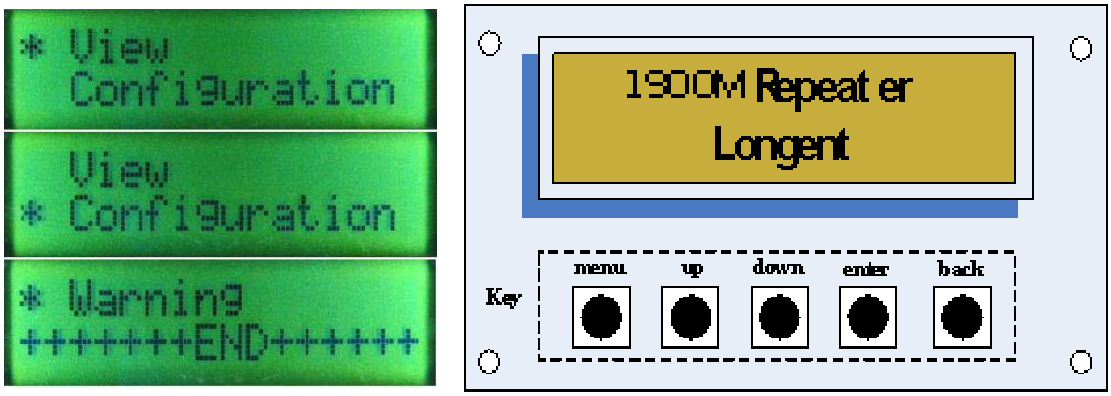
Note: If there are some wrong strings or illegal strings on the page, please press the "**refresh**" on the IE, and then the page will show the right one.

7. Exit

If you don't want to do the read or configuration, you can press the "Exit" to end of you operation and do nothing of the configuration.

5.2. Keypad Interface

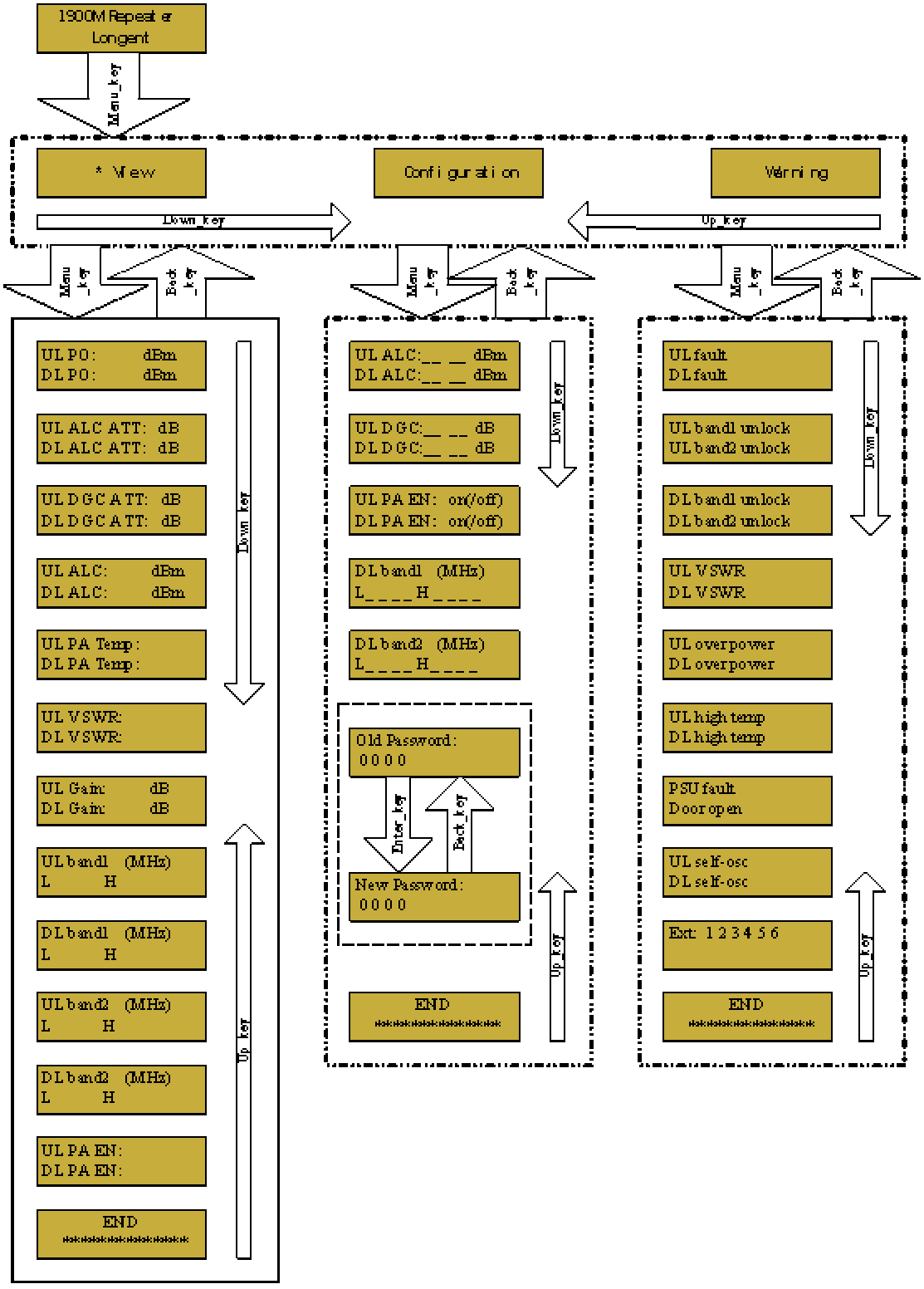
Longent repeater can be operated via a keypad interface, which offers three main menus: **View Menu**, **Configuration Menu** and **Warning Menu**. There are five key buttons: **Menu**, **Up**, **Down**, **Enter**, **Back** and a LCD panel.



The **Menu** key is used to launch the main menus and enter the corresponding submenu. The **Up** and **Down** key are used to scroll through the submenus within current main menu, and also will be used to modify the blinking bit of data by one digit increment or decrement in editing state. The **Enter** key is used to start and end the editing operation, also alter certain bits of data in editing state. The **Back** key is used to turn back to the upper menu or cancel the current operation in editing state.

It should be noted that the system does not respond to any key for 15 seconds' boot process when power up the repeater.

5.2.1. Menu Tree



5.2.2. View Menu

Output Power Display

The Output Power Display menu shows the instantaneous power of the repeater.

This screen shows that the composite power is 30 dBm on the output of downlink, while the composite power is less than 3 dBm on the output of uplink.
When the power is less than 3 dBm, the display will show "--" instead of a usual digit.

ALC Attenuation Display

The ALC Attenuation Display menu shows whether or not the gain is being actively attenuated by Automatic Level Control to keep the power under a certain level.

DGC Attenuation Display

The DGC Attenuation Display menu shows the value of Digital Gain Control attenuation, which is used to adjust the maximum gain of the repeater.

ALC Setting Display

The ALC Setting Display menu shows the Automatic Level Control points that determine the limits of the composite power for output.

PA Temperature Display

The PA Temperature Display menu shows the temperature of PA modules in centigrade.

VSWR Display

The VSWR Display menu shows the VSWR value of the repeater terminals.

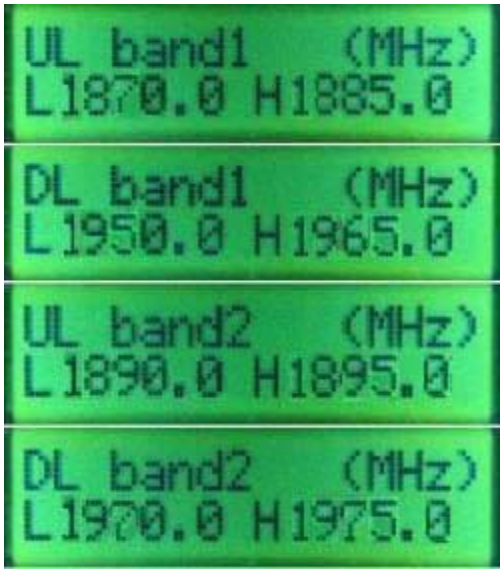
Gain Display

The Gain Display menu shows the current gains of the repeater. The gain is determined by the equation:

Gain = 85 dB – (DGC Att.) – (ALC Att.)

Pass Band Display

The Pass Band Display menu shows the frequencies of the two pass bands.

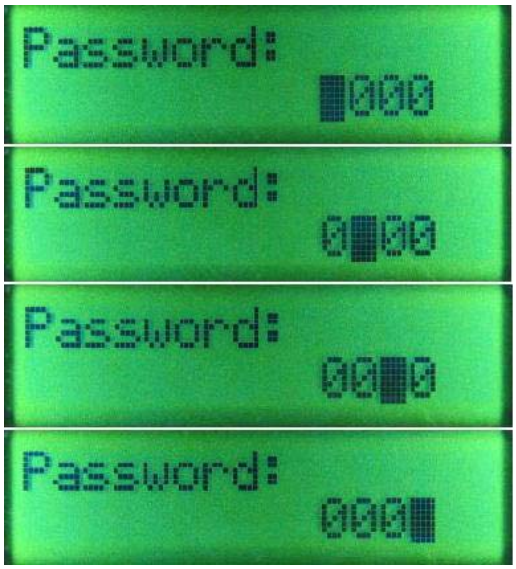


PA Enable Display

The PA Enable Display menu shows the working status of the PA modules, i.e. on or off.

5.2.3. Configuration Menu

Pressing the Menu key will begin to enter the Configuration Menu, which is selected in the main menus. A password is requested from the user with the first digit blinking, the Up and Down keys are used to change the blinking digit, the Enter key is used to confirm the blinking digit and shift to the next one. The password consists of 4 digits and defaults to 4 zeros: "0000". Successful password will permit the user to configure the repeater.



ALC Level Setting

Press Enter key to start edit, the first digit of uplink ALC will blink, then press Up or Down key to select a desired value, press Enter key to confirm it and shift to the next one. When the setting of the second digit is finished, the display will steady.
Pressing Down key that the star will switch to the downlink, the process is the same.

This screen shoes that the uplink ALC Level is set to 24 dBm, and the downlink ALC Level is set to 30 dBm.

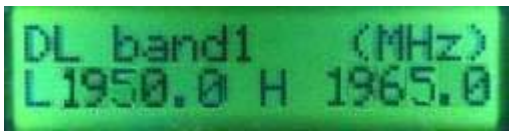
DGC Attenuation Setting

The DGC Attenuation setting process is much the same as the ALC Level setting process.

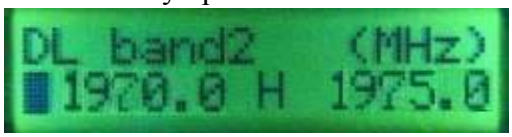
PA Enable Setting

Press Enter key to start, the Up key and Down key can be used to trigger on or off, and press Enter key again to end.

Pass Band Setting



Press Enter key to start, after setting the low-end frequency and high-end frequency of pass band 1 on downlink, press Enter key to end. The frequencies on uplink are set automatically upon the downlink band.



Change Password

The screen asks for the current password. If the current password is entered successfully, it will allow the user to create a new password. Pressing the Enter key for the last digit of the new password will save the new password for the future.
A password can consist of 4 digits from 0000 to 9999.

5.2.4. Warning Menu

Any of the following alarms will cause a warning in the Warning Menu. The warnings will appear in a sequence, if several alarms occur. The Up and Down keys are used to scroll through the warnings.
A warning will be ceased if the cause of the alarm is no longer detected.

- **PA Fault**
- **Unlock / Synthesizer Fault**
- **Over VSWR**
- **Over Power**
- **Over Temperature**
- **PSU Fault and Door Open**
- **Self-Oscillation**
- **External Alarm**

This screen shows that the door is opened.

Federal Communications Commission Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/ TV technician for help.

CAUTION:
Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

FCC RF Radiation Exposure
This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 30cm between the radiator and your body.