

Hytera DMR Conventional Series

Repeater Diagnostics And Control Application Notes



Hytera DMR Conventional Series Repeater Diagnostics And Control Application Notes

Version 1.0

Date: June 15, 2011

Web: <http://www.hytera.com>

Copyright Information

Hytera is the trademark or registered trademark of Hytera Communications Co., Ltd. (the Company) in PRC and/or other countries or areas. The Company retains the ownership of its trademarks and product names. All other trademarks and/or product names that may be used in this document are properties of their respective owners.

The product described in this document may include the Company's computer programs stored in memory or other media. Laws in PRC and/or other countries or areas protect the exclusive rights of the Company with respect to its computer programs. The purchase of this product shall not be deemed to grant, either directly or by implication, any rights to the purchaser regarding the Company's computer programs. Any of the Company's computer programs may not be copied, modified, distributed, decompiled, or reverse-engineered in any manner without the prior written consent of the Company.

Disclaimer

The Company endeavors to achieve the accuracy and completeness of this document, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technology development. No part of this document may be copied, modified, translated, or distributed in any manner without the express written permission of us.

If you have any suggestions or would like to learn more details, please visit our website at:

<http://www.hytera.com>.

Revision History

[illegible]

Contents

1. Overview	4
1.1 Definition	4
1.2 Application.....	4
1.3 Principle	4
1.4 Version	5
1.5 Restriction	5
2. References.....	6
3. Requirements.....	7
3.1 Requirements on Devices	7
3.2 Installation Environment.....	7
4. Equipment Connection	8
5. Equipment Configurations	10
5.1 Connection Mode	10
5.2 Local Mode	11
5.3 IP Site Mode	12
6. Description and Operation of Functions	16
6.1 Diagnose and Alarm.....	16
6.1.1 PSU Voltage	18
6.1.2 PA Temperature	18
6.1.3 Fan State	18
6.1.4 VSWR.....	19
6.1.5 TX FWD Power	19
6.1.6 TX REF Power	19
6.1.7 RX PLL State	20
6.1.8 TX PLL State.....	20
6.1.9 RSSI	20
6.1.10 RDAC Log.....	21

6.1.11 Alarm Report	22
6.1.12 Diagnostics Table.....	23
6.2 Control	24

1. Overview

1.1 Definition

Repeater Diagnostics And Control (RDAC) is a PC-based application that allows a system operator to diagnose or control the repeater.

1.2 Application

As a necessity for distant communication, the repeater is usually deployed outdoors, which may expose it to harsh working conditions for a long time. In order for the repeater to operate normally, it is necessary to monitor the repeater in real time and repair any problem. This is what RDAC comes for. It enables an operator to diagnose the repeater remotely and to take reparative measures.

1.3 Principle

RDAC can work in two modes: Local and IP Site.

In Local mode, the repeater is connected to a PC via USB port. Then the system operator can use RDAC to diagnose the repeater, and control its operations such as restart, channel change, power level change, repeater enabling and disabling. This mode supports connection to one repeater only. It can be applied when you need to perform local services or when the repeater is close to the transmission center.

In IP Site mode, one or more repeaters can be diagnosed and controlled over the Ethernet remotely. It allows you to create authentication key when necessary.

1.4 Version

1) DMR Conventional Series R3.5: RDAC available.

** This file (R1.0) is intended to give a rough description about functions available with RDAC R3.5. More information will be given later.*

** Consult your dealer for more information on DMR conventional series software.*

1.5 Restriction

1) RDAC must work with the repeater.

2. References

N/A

3. Requirements

3.1 Requirements on Devices

- 1) Repeaters (see Hytera device list for details)
- 2) PC
- 3) USB cable
- 4) Network cable
- 5) Routing devices (consult your supplier for details)

** Please refer to Hytera DMR Conventional Series Device List. You can contact your dealer for specific model.*

** For information on link device, consult the appropriate third party supplier.*

3.2 Installation Environment

- 1) Operating system: Windows XP, Windows Vista and Window 7.
- 2) For more information about RDAC installation and operation, see ***RDAC Installation and Operation Guide***.

4. Equipment Connection

In Local mode, you can connect one repeater to PC via the USB port, as shown below:

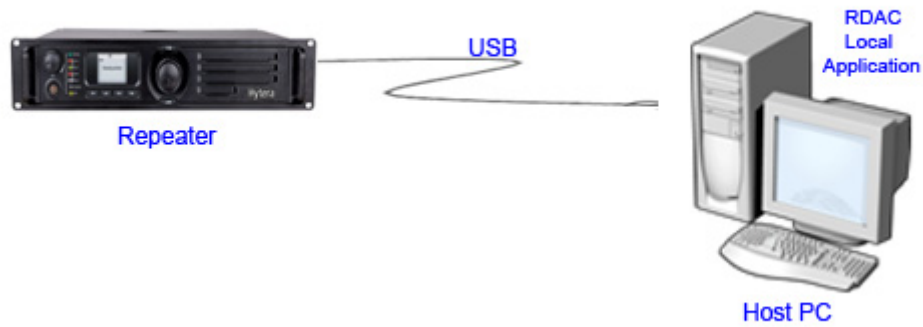


Figure 4-1 Equipment Connection in Local Mode

In IP Site mode, RDAC can establish connection with all repeaters in the IP network. First, RDAC connects with Master Repeater, which can help it obtain Slave Repeater addresses. Then the RDAC will establish connection with all Slave Repeaters automatically. See the figure below:

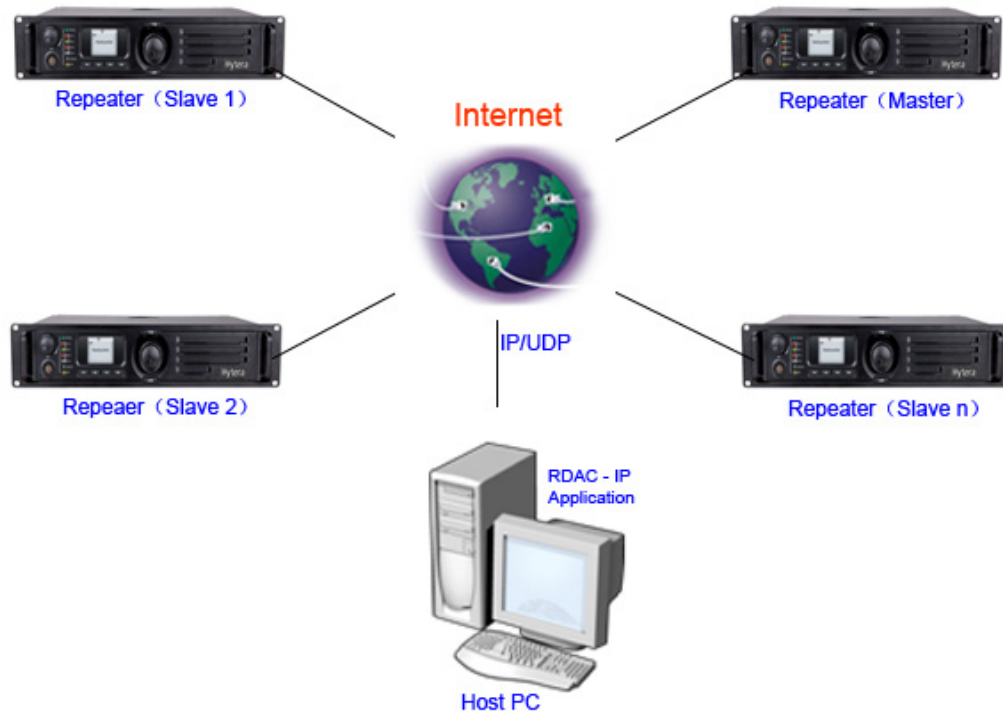


Figure 4-2 Equipment Connection in IP Site Mode


** Each Master Repeater requires a RDAC.*

** For more information on settings of Master/Slave Repeater, see IP Multi-site Connect Application Notes R2.0.*

5. Equipment Configurations

5.1 Connection Mode

RDAC supports two connection modes: Local and IP Site. You can go to the menu

“System->Connection Mode” or click the icon  from the toolbar, and a new window will pop up, where you are able to define the appropriate mode. See the following figures:

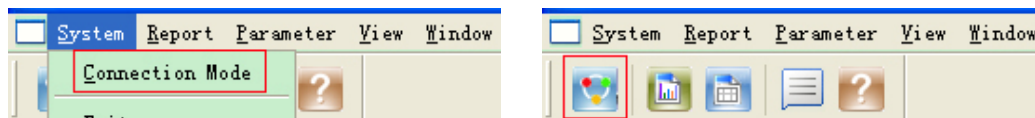


Figure 5.1-1 Way of Accessing Connection Mode

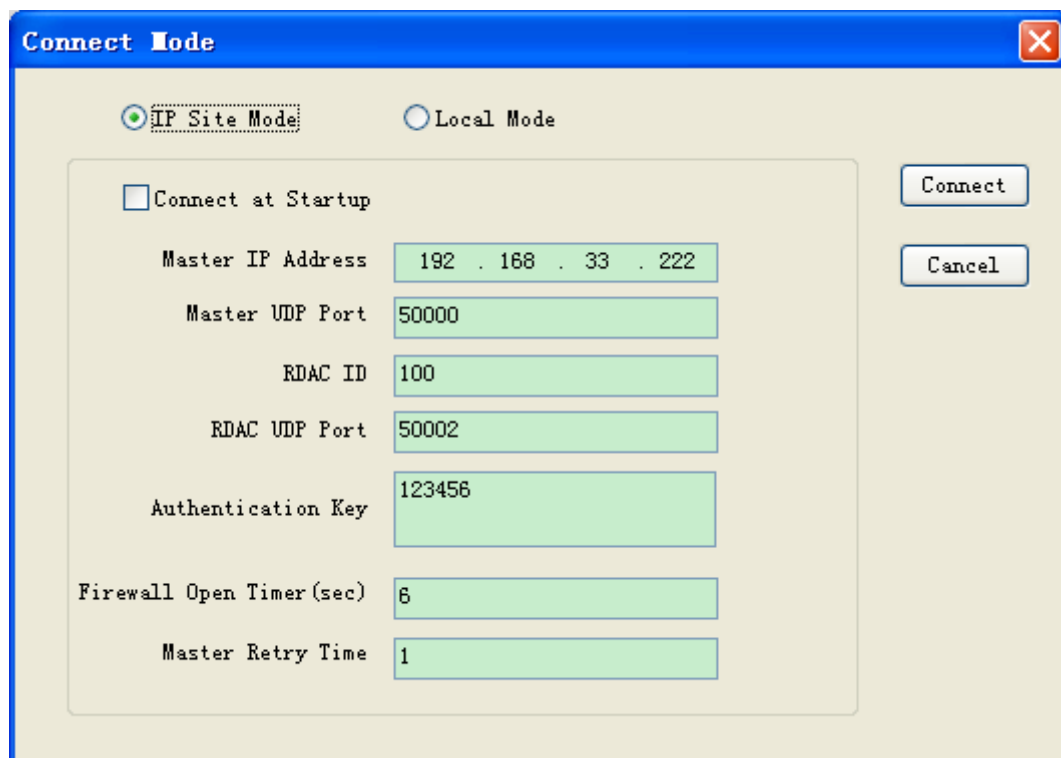


Figure 5.1-2: Connection Mode Window

In IP Site mode, the value of Master IP Address, Master UDP Port, RDAC UDP Port and Authentication Key must be consistent with that of appropriate options under IP Multi-site

Connect. See the following figure:

RD980

- Radio Information
- General Setting
 - Setting
 - Feature Control
 - Accessories
 - Alerts/Indication
 - Microphone
 - Multi CTC/CDC
 - IP Multi-site Connect**
 - Access Manager
- Zone
- Channel
- DMR Services
- Scan
- Memory Watch

IP Multi-site Connect

Repeater Type: IP Multi-site Master

Jitter Buffer Length: 1

Beacon Duration[ms]: 4320

Beacon Interval[s]: 60

Authentication Key: 123456

Master IP: 192 . 168 . 33 . 222

Master UDP Port: 50000

DHCP: ☐

Ethernet IP: 192 . 168 . 33 . 222

Gateway IP: 190 . 168 . 33 . 1

Netmask: 255 . 255 . 255 . 0

IP Multi-site Networking UDP Port: 50000

P2P Firewall Open Timer[sec]: 6

MAC Address: 64 32 00 00 00 01

IP Multi-site Service: ☒

IP Multi-site Service UDP Port: 50001

Remote RDAC: ☒

Remote RDAC UDP Port: 50002

Figure 5.1-3 CPS IP Multi-site Connect Configurations

** The authentication key for RDAC must be consistent with that of CPS.*

5.2 Local Mode

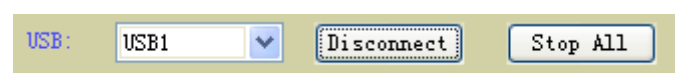
From Connection Mode window, select Local Mode, and select an appropriate USB port from USB box. See the following figure:



The 'Connect Mode' dialog box features a blue title bar with a close button. It contains two radio buttons: 'IP Site Mode' and 'Local Mode', with 'Local Mode' selected. To the right is a 'USB:' dropdown menu showing 'USB1'. Below these is a 'Connect at Startup' checkbox. A large text area contains several configuration fields: 'Master IP Address' (192 . 168 . 33 . 222), 'Master UDP Port' (50000), 'RDAC ID' (100), 'RDAC UDP Port' (50002), 'Authentication Key' (123456), 'Firewall Open Timer(sec)' (6), and 'Master Retry Time' (1). On the right side of the dialog are 'Connect' and 'Cancel' buttons.

Figure 5.2-1 Local Mode Selection

Click **Connect**, and a new window will pop up. When the connection is established successfully, you can view repeater information and perform appropriate operations in this window. At the bottom, there is a USB control bar. See the following figure:



The 'USB Control Bar' is a horizontal bar with a light green background. It contains a 'USB:' label, a dropdown menu showing 'USB1', a 'Disconnect' button, and a 'Stop All' button.

Figure 5.2-2 USB Control Bar

In Local mode, the repeater information will be refreshed in real time and displayed in RDAC main window.

5.3 IP Site Mode

From Connection Mode window, select IP Site Mode, and configure other parameters

properly. See the following figure:

Figure 5.3-1 Configuration Window for IP Site Mode

Click **Connect**, and RDAC will try to establish remote connection over IP. The status bar at the bottom of the interface will show connection status. See the following figure:



Figure 5.3-2 Configuration Window for IP Site Mode

When the connection is established successfully, RDAC main window will pop up, where you can view the related information of the connected repeater and slave repeater (if any). Information in the window will be refreshed upon successful connection. See the following figure:

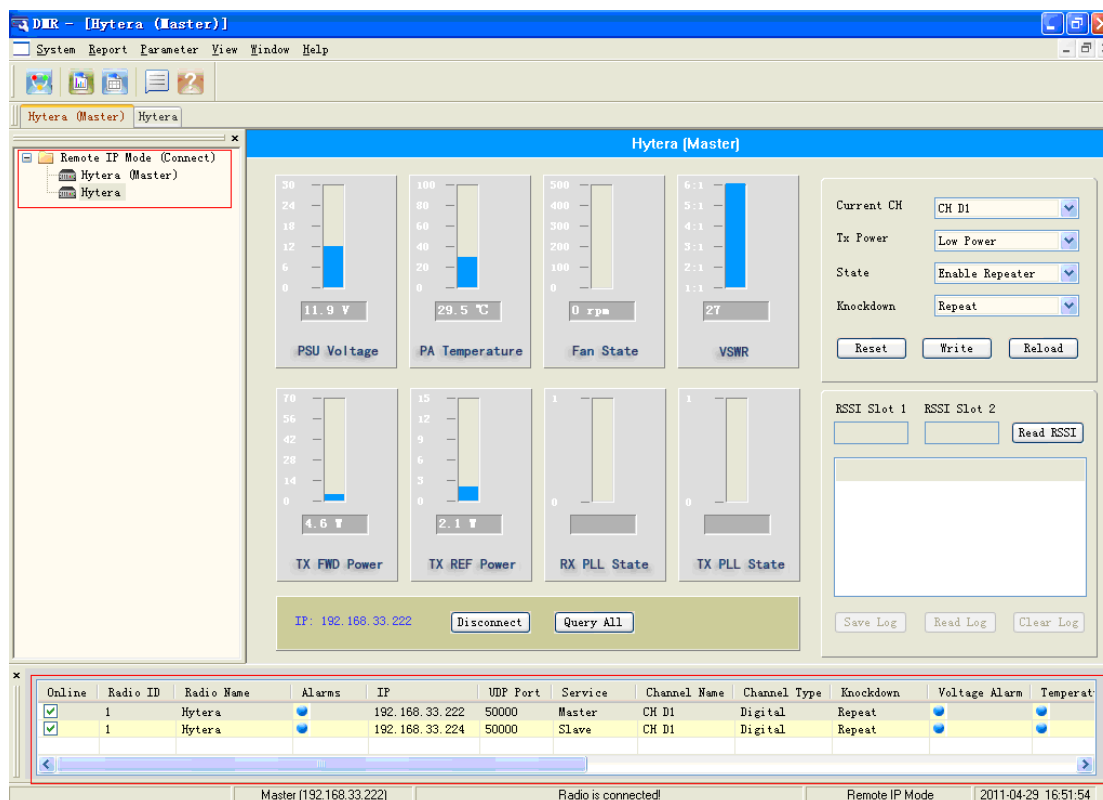


Figure 5.3-3 RDAC Main Window in IP Site Mode

In IP Site mode, the repeater information will not be updated in real time. However, you can refresh it manually by double clicking the icon of each unit, or click **Query All** to refresh all units. Clicking **Disconnect** can disconnect the RDAC from the current repeater. See the following figure:

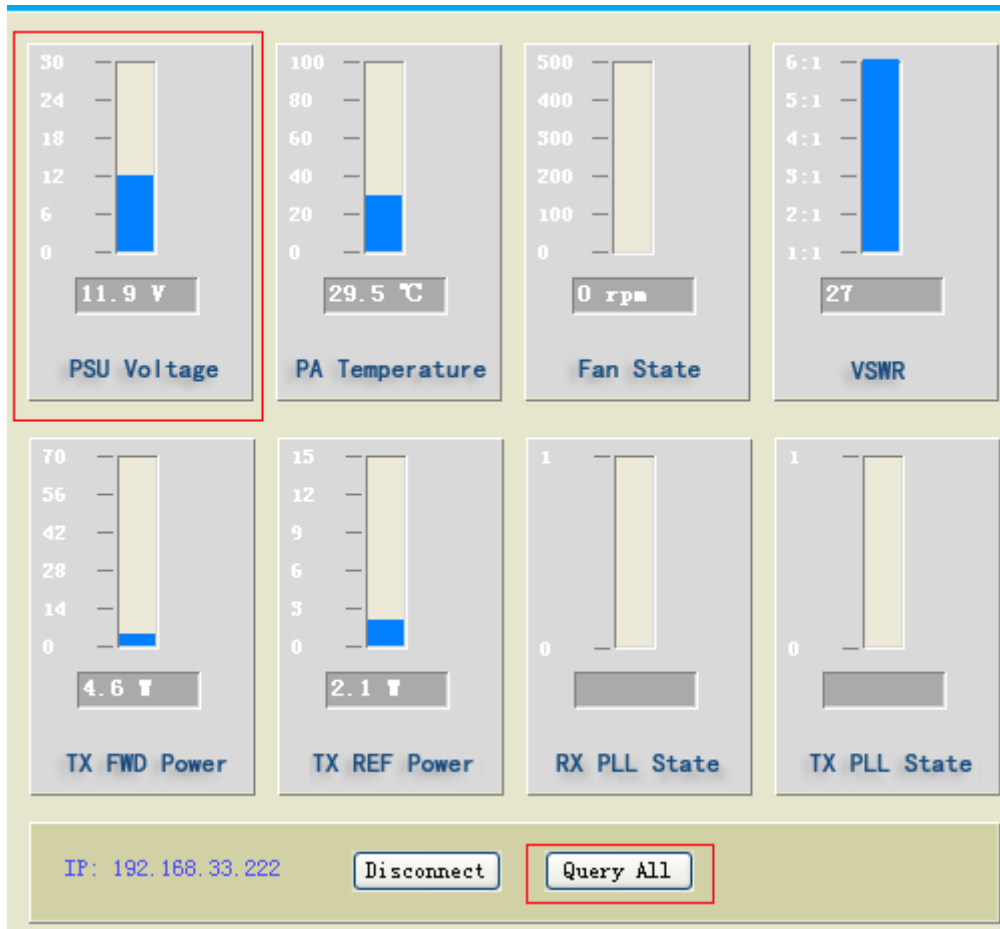


Figure 5.3-4 Update of Repeater Information

** For more information on IP Site mode, see IP Multi-site Connect Application Notes R2.0.*

6. Description and Operation of Functions

RDAC is an application designed for diagnosing and controlling a repeater. In Local mode, RDAC can work with one repeater only. However, it can work with multiple repeaters in IP Site mode.

6.1 Diagnose and Alarm

The Diagnose function allows you to view the current status of all registered repeaters on your PC, and to edit the alarm information.

The current status of selected repeater (s) is displayed in the diagnosing window. Details will be given in the box at the bottom of the window. See the following figure:

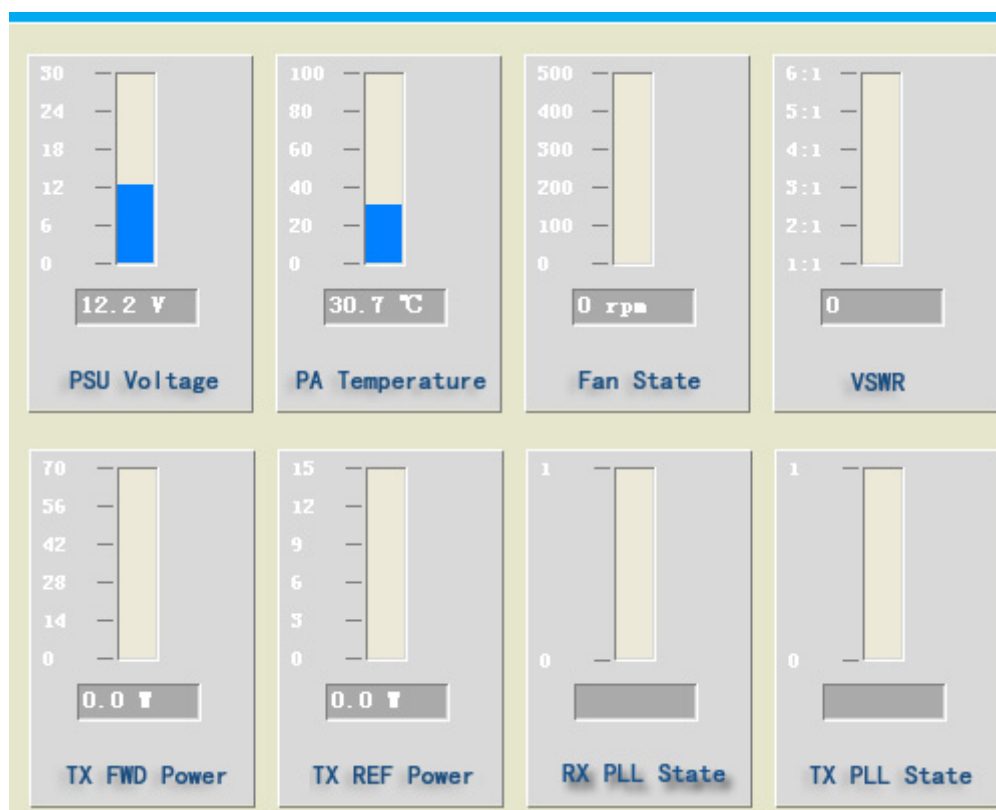


Figure 6.1-1 (a) Diagnosing Window

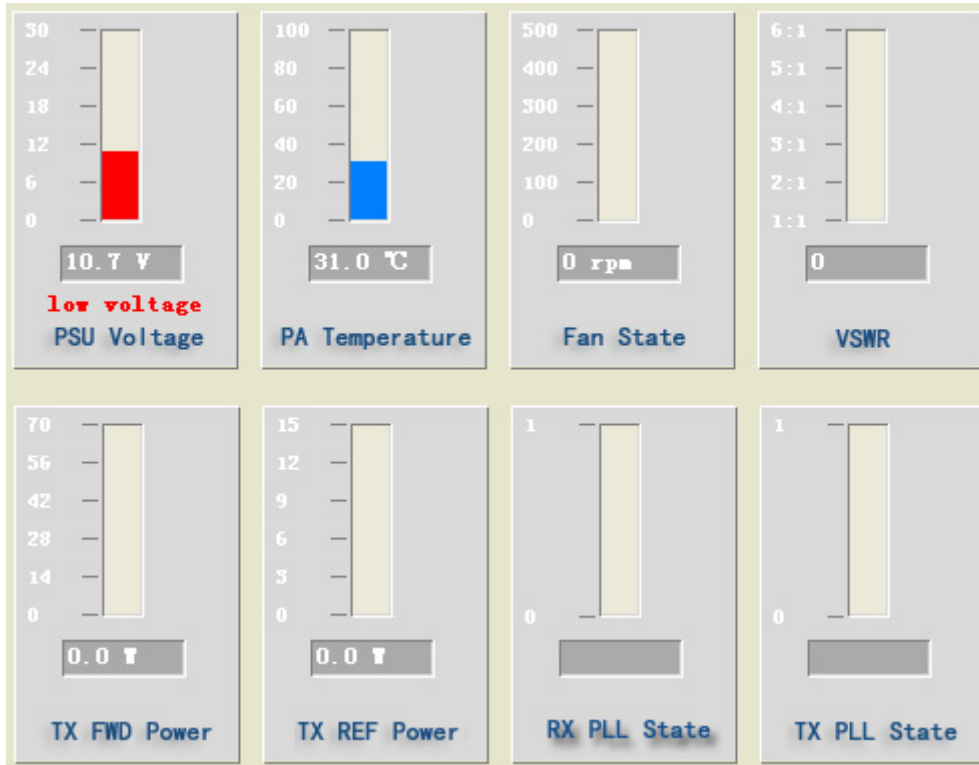


Figure 6.1-1 (b) Alarm Occurrence

Online	Radio ID	Radio Name	Alarms	IP	UDP Port	Service	Channel Name	Channel Type	Knockdown	Voltage Alarm	Temperat
<input checked="" type="checkbox"/>	1	Hytera	<input checked="" type="checkbox"/>	192.168.33.222	50000	Master	CH D1	Digital	Repeat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	Hytera	<input checked="" type="checkbox"/>	192.168.33.223	50000	Slave	CH D1	Digital	Repeat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 6.1-2 (a) Diagnosing Table

Online	Radio ID	Radio Name	Alarms	IP	UDP Port	Service	Channel Name	Channel Type	Knockdown	Voltage Alarm	Temperat
<input checked="" type="checkbox"/>	1	Hytera	<input checked="" type="checkbox"/>	192.168.33.222	50000	Master	CH D1	Digital	Repeat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	Hytera	<input checked="" type="checkbox"/>	192.168.33.223	50000	Slave	CH A2	Analog	Repeat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 6.1-2 (b) Alarm Occurrence

The information in diagnosing window/table is generated automatically. From the tree view on the left, you can choose the repeater to be diagnosed. See the following figure:

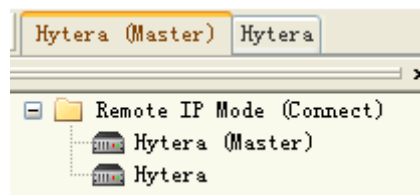


Figure 6.1-3 Tree View

6.1.1 PSU Voltage

When the repeater is working, its power supply unit (PSU) voltage will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in the RDAC main screen, where you can view detailed alarm information. See figure 6.1-1 and 6.1-2.

** Normal voltage: 11—15.6V.*

6.1.2 PA Temperature

When the repeater is working, its power amplifier (PA) temperature will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in the RDAC main screen, where you can view detailed alarm information. See figure 6.1-1 and 6.1-2.

** Normal temperature: 0-100 °C.*

6.1.3 Fan State

When the repeater is working, its fan state will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in the RDAC main screen, where you can view detailed alarm information. See figure 6.1-1 and 6.1-2.

** Normal fan rotation speed: 0-500RPM.*

6.1.4 VSWR

VSWR refers to voltage standing wave ratio. When the repeater is transmitting with an improper antenna, damage or even failure may occur to the PA and transmitter.

You can view VSWR information at PC end in real time. In case of any abnormality, an alarm will be given in the RDAC main screen. See figure 6.1-1 and 6.1-2.

** VSWR diagnosing is available only when the repeater is transmitting.*

** VSWR range: 1.0: 1—6.0: 1.*

The VSWR is abnormal if it is above 2.6:1.

6.1.5 TX FWD Power

When the repeater is transmitting, the TX FWD power will be displayed at the PC end. In case that the power is below the threshold value defined in CPS, an alarm will be given in the RDAC main screen. See figure 6.1-1 and 6.1-2.

The threshold value of Low Forward Power is set in the following window:

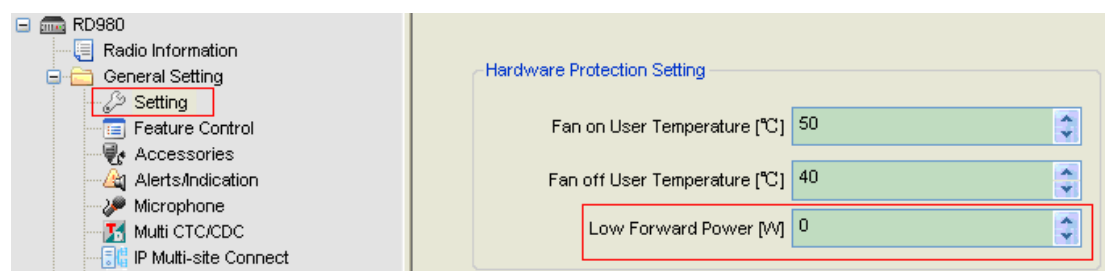


Figure 6.1.5-1 Setting of Low Forward Power in CPS

** TX power diagnosing is available only when the repeater is transmitting.*

6.1.6 TX REF Power

REF power is generated when the repeater is transmitting. It will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in RDAC main screen.

See figure 6.1-1 and 6.1-2.

** REF power diagnosing is available only when the repeater is transmitting.*

6.1.7 RX PLL State

When the repeater is receiving, the RX PLL State will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in RDAC main screen. See figure 6.1-1 and 6.1-2.

PLL has two states: Locked and Unlocked. 1 means “locked”, and 0 means “unlocked”.

** PLL state diagnosing is available only when the repeater is transmitting.*

6.1.8 TX PLL State

When the repeater is transmitting, the TX PLL State will be displayed at the PC end in real time. In case of any abnormality, an alarm will be given in RDAC main screen. See figure 4.1-1 and 4.1-2.

PLL has two states: Locked and Unlocked. 1 means “locked”, and 0 means “unlocked”.

** PLL state diagnosing is available only when the repeater is transmitting.*

6.1.9 RSSI

RSSI refers to received signal strength indication. In RSSI window, you can view RSSI information of the selected repeater. For analog/mixed channels, there is only one RSSI value; for digital channels, RSSI value is available with Slot 1 and Slot 2. See the following figure:

RSSI		RSSI Slot 1		RSSI Slot 2	
-200.00		-200.00		-200.00	
Read RSSI		Read RSSI		Read RSSI	

and then click **Inquiry**.

To delete a selected entry, click **Delete Row**.

To delete all entries, click **Delete All**.

6.1.11 Alarm Report

The alarm report allows you to view all RDAC alarm information. Go to “Report -> Alarm

Report” or click the icon  from the toolbar, and the alarm report window will pop up.

See the following figure:

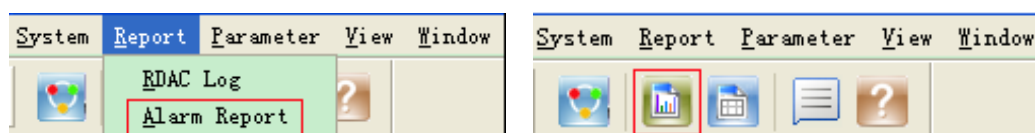


Figure 6.1.11-1 Way of Accessing Alarm Report Window

Alert Report						
Radio Name	IP	Item Name	Alert Name	State	Alert Date	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:48	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:45	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:42	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:41	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:35	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:36	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:35	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:35	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:32	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:31	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:25	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:25	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:22	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:21	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:19	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:18	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:15	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:15	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:12	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:11	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:05	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:05	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:05	
Hytera	192.168.33.222	VSWR	VSWR Alert	Alert	2011-04-29 14:49:05	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:49:02	
Hytera	192.168.33.222	VSWR		Restore	2011-04-29 14:48:55	

Start Date: 2011- 4-29

End Date: 2011- 4-29

Inquiry

Delete Row

Delete All

Record: 410

Figure 6.1.11-2 Alarm Report Window

To search for alarm information, select “Start Date” and “End Date” on the right, and then click **Inquiry**.

To delete a selected entry, click **Delete Row**.

To delete all entries, click **Delete All**.

6.1.12 Diagnostics Table

The diagnostics table is located at the bottom of the window. See the following figure:







Online	Radio ID	Radio Name	Alarms	IP	UDP Port	Service	Channel Name	Channel Type	Knockdown	Voltage Alarm	Temperat
<input checked="" type="checkbox"/>	1	Hytera		192.168.33.222	50000	Master	CH D1	Digital	Repeat		
<input checked="" type="checkbox"/>	2	Hytera		192.168.33.223	50000	Slave	CH D1	Digital	Repeat		

Figure 6.1.12-1 Diagnostics Table

In this table, you can view the repeater information in detail. The first column “Online” shows whether the repeater is connected, where “checked” means “connected” while “unchecked” means “disconnected”, and the appropriate row would be grayed out. See the following figure:

Online	Radio ID	Radio Name	Alarms	IP	UDP Port	Service	Channel Name	Channel Type	Knockdown	Voltage Alarm	Temperat
<input type="checkbox"/>	1	Hytera		192.168.33.222	50000	Master	CH D1	Digital	Repeater		

Ready Connecting (192.168.33.222) Master is disconnect Remote IP Mode 2011-06-14

Figure 6.1.12-2 Repeater Disconnection

The color ball represents whether there is an active alarm. Red ball means “Yes” and blue ball means “No”. See the following figure:




Online	Radio ID	Radio Name	Alarms	Channel Name	Channel Type	Knockdown	Voltage Alarm	Temperature Alarm	F
<input checked="" type="checkbox"/>	1	Hytera		CH D1	Digital	Repeat			

Figure 6.1.12-3 Repeater Alarm Information

6.2 Control

This function allows you to control a repeater's operations locally or remotely. The control window is shown in the following figure:

Current CH	CH D1
Tx Power	Low Power
State	Enable Repeater
Knockdown	Repeat

Reset Write Reload

Figure 6.2-1 Control Window

(1) Current CH: shows which channel the repeater is operating on. You can change it if necessary. To make your change take effect, click **Write** and restart the repeater. When you have defined a channel via CPS for the repeater to operate on, that definition shall prevail over the change here.

(2) TX Power: shows which power the repeater is transmitting at. You can change it if necessary. To make your change take effect, click **Write** and restart the repeater.

(3) State: shows whether the repeater is enabled or disabled. You can change it if necessary. When the repeater is enabled, it can transmit, receive and repeat properly. When disabled, all such operations will be unavailable. To make your change take effect, click **Write** and restart the repeater.

(4) Knockdown: to enable or disable the Repeat function. When enabled, the repeater can retransmit voice and data services; when disabled, all such services will be unavailable. To make your change take effect, click **Write** and restart the repeater.

(5) Reset: click this button to restart the repeater.

(6) Write: click this button to write your changes into the repeater. When writing is done,

the repeater will restart automatically to make your change take effect.

(7) Reload: click this button to cancel changes made here, and to refresh the current window.

During resetting or writing, any other function or service will be interrupted.

Additionally, its IP connection with RDAC will be disconnected temporarily, and the control window will be grayed out. IP connection will be initiated automatically when the repeater is restarted. See the following figure:



Figure 6.2-2 Grayed Control Window

** This control window will be grayed out to disable all features, if TX PLL or RX PLL issues an alarm.*