

NOTCHCELL

RSN-NOTCH-43-C

Quick Guide



R·tion

Please read this manual before operating this product.
After you finish reading this manual, store it in a safe place for future reference.



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Introduction

NOTCHCELL

Introduction

NOTCHCELL repeater can be used in CDMA service shaded areas like in-buildings, underground and tunnels to cover its service area. This repeater system designed for dual and simultaneous service, namely, it receives signals from the base station through donor antenna, amplifies the signals and re-transmits it to one or other mobile stations.

• R-tron implemented intelligent design in the NOTCHCELL as following:

- ♦ **Programmable Bandwidth and Band**
 - » 5, 10, 15, and 20 MHz contiguous and non-contiguous segments
 - » Any Band Combination within 65MHz PCS Band [A,D,B,E,F,C,G]
 - » Three (3) 5MHz segments
- ♦ **Remote Access and Control**
- ♦ **Built in CDMA MODEM**
- ♦ **Easy and Quick Installation**
 - » Web-based GUI
 - » Plug and Play - DHCP Server @ Local Port
 - » Automatic Easy Setup (Recommended)
 - » Isolation Detection
 - » WiFi Access on site
- ♦ **Auto Level Control & Auto Shut Down**

- NOTCHCELL utilizes the web-based user interface and web server to support the remote access. There are two physical LAN ports:
 - The Local port provides the wireless on-site access to the repeater. The two ports allow local and remote users to access the repeater simultaneously.
- DHCP server at the Local port enables Plug and Play by automatically assigning the IP address to the user's computer.
- Parameter setup is only one click away –
 - Automatic Easy Setup feature will measure the isolation and limit the maximum gain accordingly. This will also enable Auto Level Control as well as Auto Shut Down. These two features are strongly recommended to prevent the uncontrolled power output, which could have an adverse impact on the RF network and the repeater. For example, ALC will automatically apply attenuation when the input signal strength is increased due to the new base station deployment near the repeater site.

NOTCH antenna (Sold separately)

A NOTCH antenna has great front-back ratio and ensures the better isolation between the Donor Antenna and Server Antenna.

It is optimized for the NOTCHCELL models.

It is recommended to use the NOTCH antenna when installing the NOTCHCELL models.

Hardware Installation >>

The installation procedure is as follows:

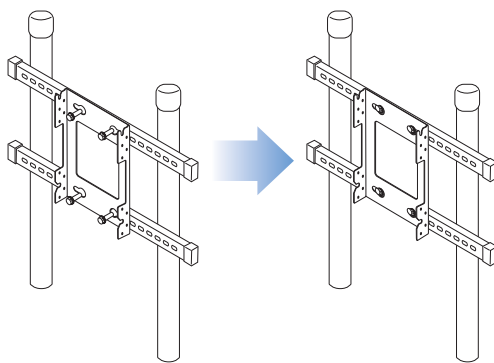
Mounting → Grounding → RF Connection → Power On

First of all, check list of items:

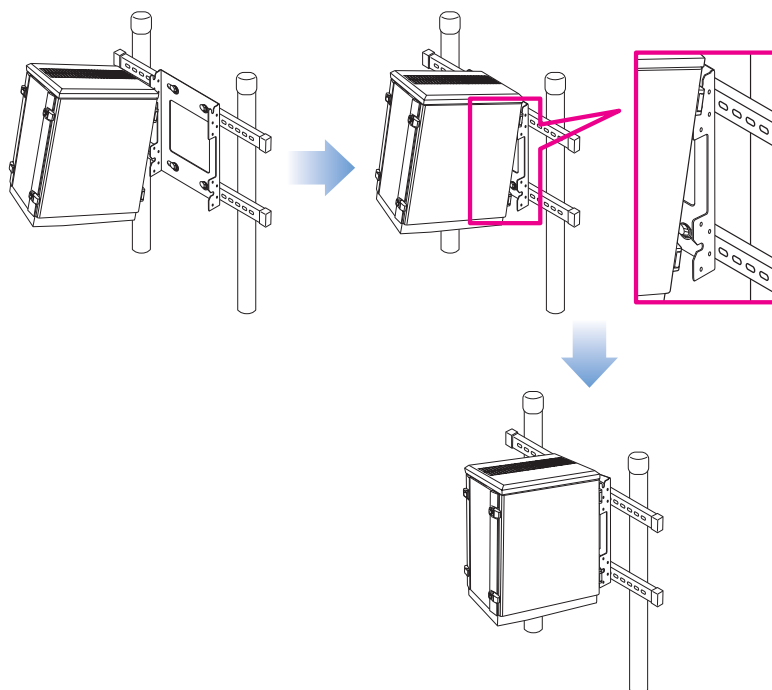
Repeater (1), AC Cord (1), Anchor Bolts (4), WiFi Antenna (1), UTP Cross LAN Cable (1), Quick Guide (1), User's Manual (1)

2 Mounting

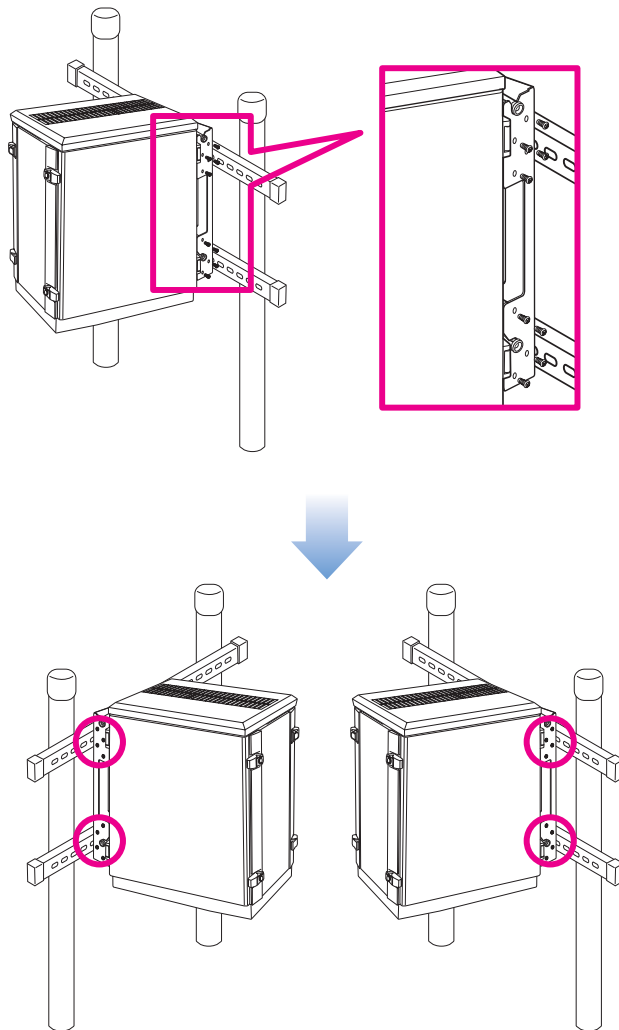
Step 1 Fixate the mounting bracket onto the structure using provided bolts or extra screws.



Step 2 Lean the NOTCHCELL to hang the topside of the Guide Ring on the mounting bracket, and push towards the structure to mount.



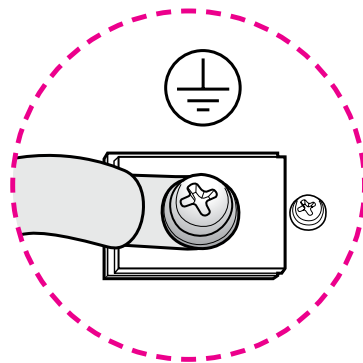
Step 3 Fix the NOTCHCELL using 16 screws provided.



Hardware Installation

2 Grounding

A rod on the bottom side is intended for a building ground. Connect the ground cable to the rod.



Warning

Dangerously high voltages may occur and damage the equipment if the equipment is not grounded properly.

3 RF Cable Connection

Step 1 Connect a cable from a donor antenna to the DONOR ANTENNA Port.

Step 2 Connect a cable from a repeater's server antenna to the SERVER ANTENNA Port.



Warning

DO NOT connect or disconnect the coaxial cable while the power is on.

Note

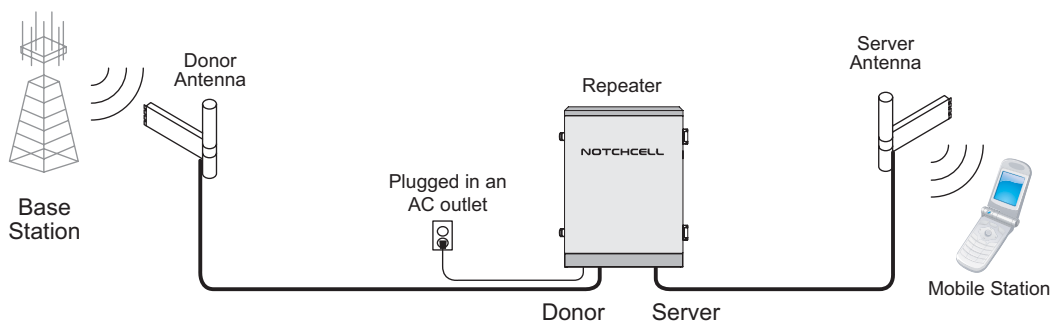
Enough isolation?

Antenna isolation = Path loss between the server antenna port and the donor antenna port

Antenna isolation $\geq$ Repeater max. gain +15dB

If antenna isolation < Repeater max. gain +15dB $\rightarrow$ System oscillation or Low gain

Model	Max Gain	Minimum required isolation (@Max Gain)
RSN-NOTCH-43-C	95dB	$\geq 110(=95+15)$

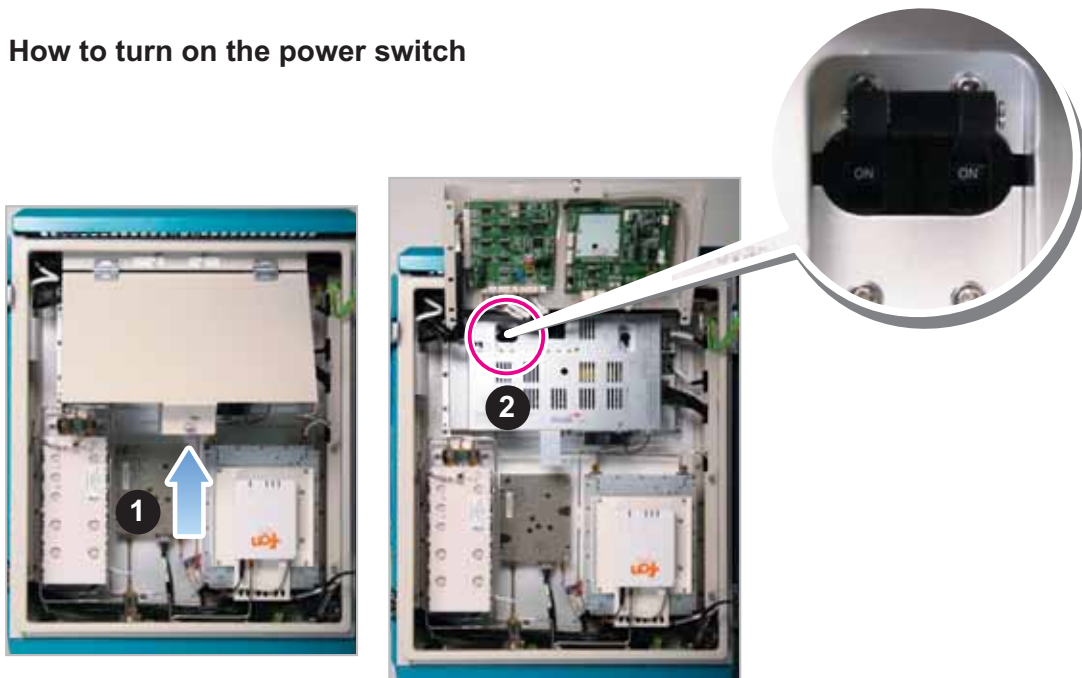


Hardware Installation >>

4 Power On

- Step 1** Connect the power cord.
Align the grooves fit into each other before connecting the power cord.
- Step 2** Plug the power cord into a wall outlet.
- Step 3** Power Switch turns on.

How to turn on the power switch



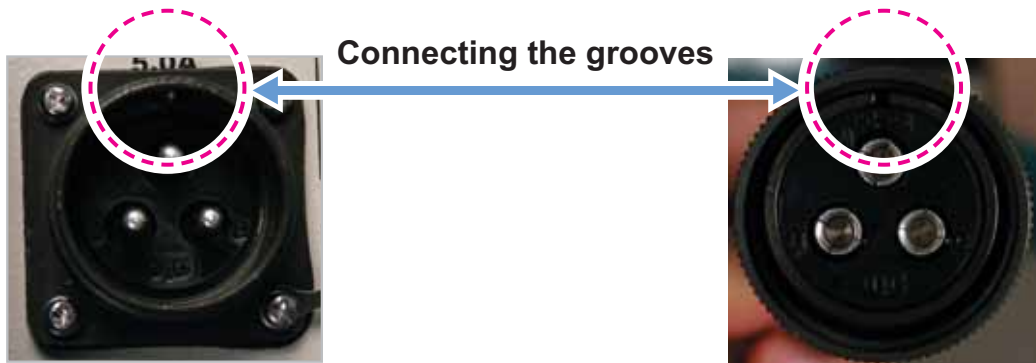
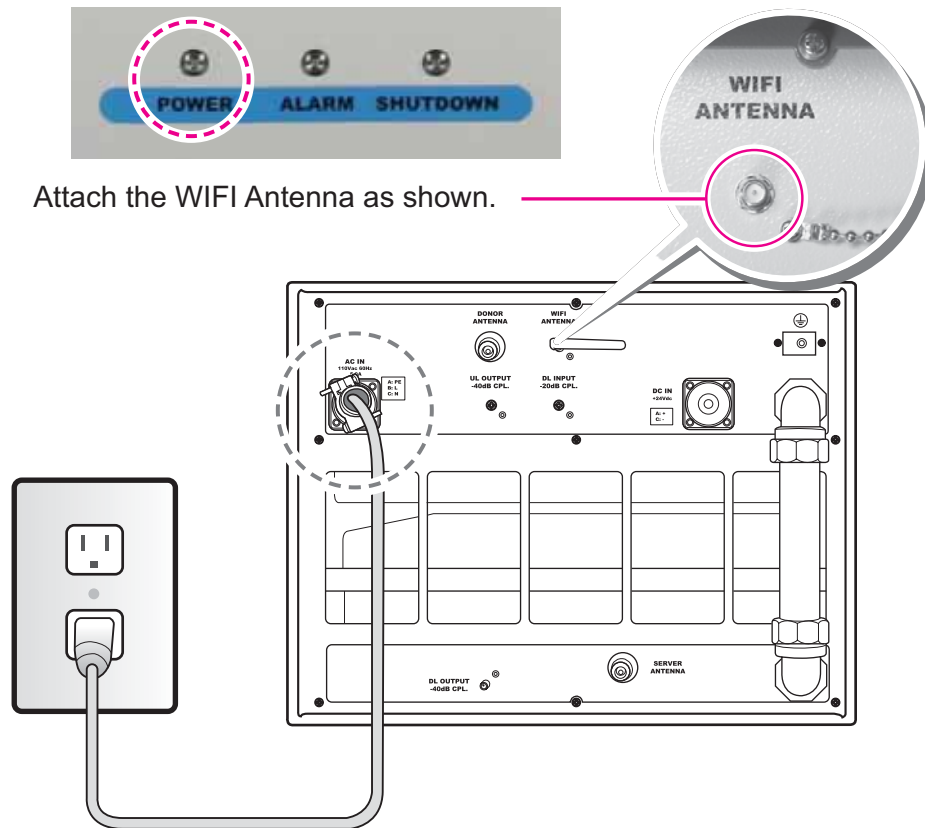
Note

It will take approximately 1 minute to boot after turning it on.
Attach the WiFi Antenna before turning on the power.

Step 4 Check if the Power LED turns on.



Attach the WIFI Antenna as shown.



Match the each groove when connecting the power cord.

Operation >>

1 System Requirements

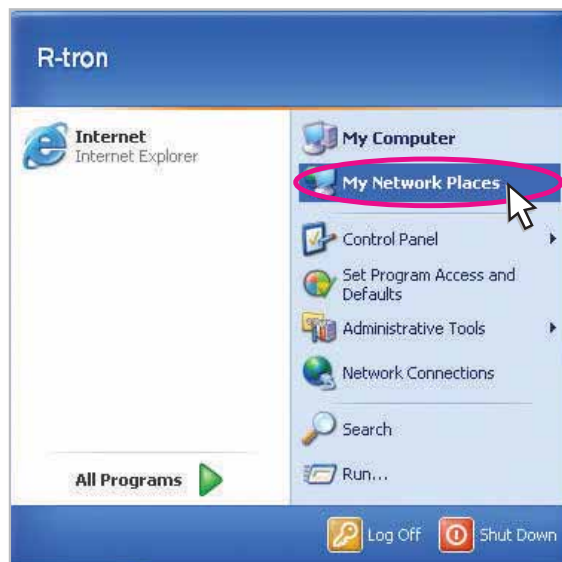
NOTCHCELL operates on a customer provided PC based platform with the following system requirements:

- Windows® 2000, Windows® XP or Windows® Vista
- Internet Explorer 6.0 (Recommended) or higher
- 128 MB RAM or higher
- Pentium processor or higher
- RJ-45 jack required

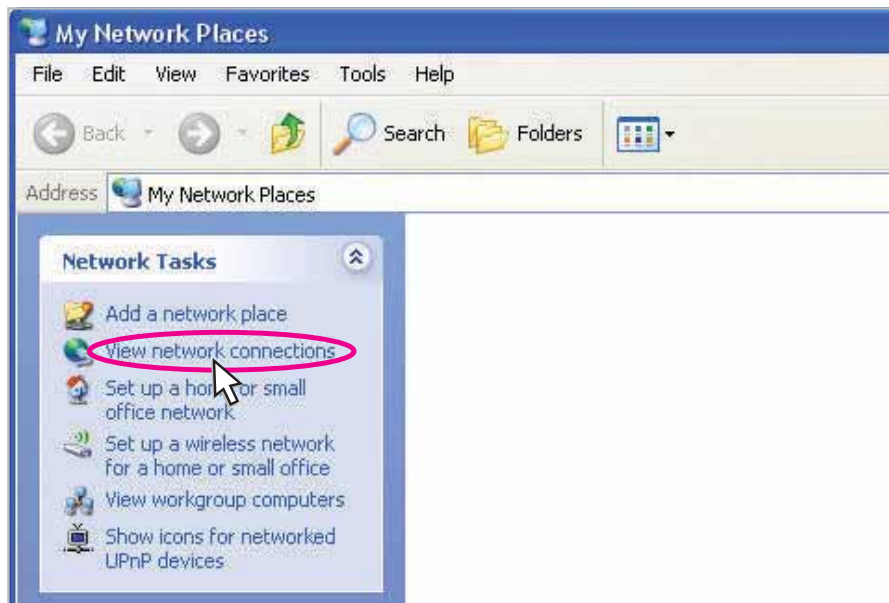
2 Network Setup

2.1 Windows XP

Step 1 Click the **Start** button and **My Network Places**.

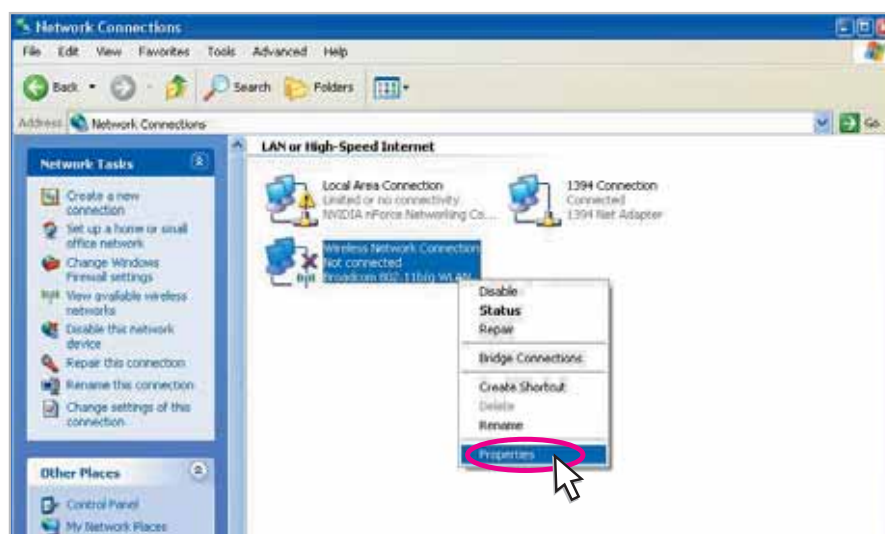


Step 2 Click **View network connections**.



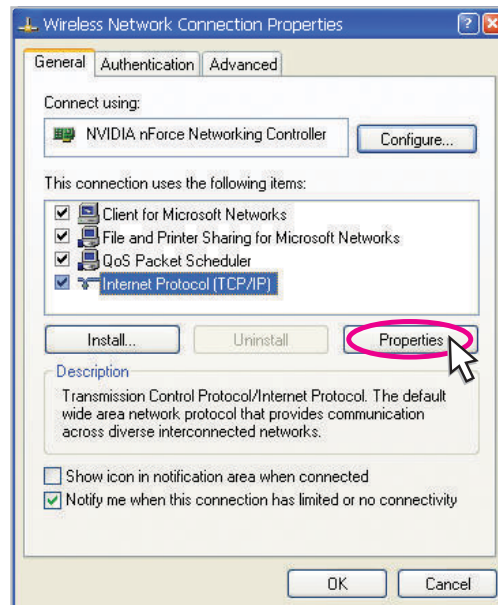
To use the wireless network connection, precede the “Step 3” shown in the following and then go to the next Steps.

Step 3 Right-click **Local Area Connection** to see a shortcut menu and click **Properties**.

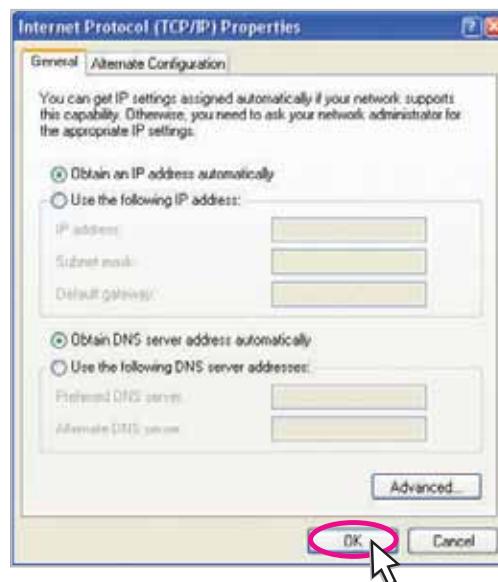


Operation

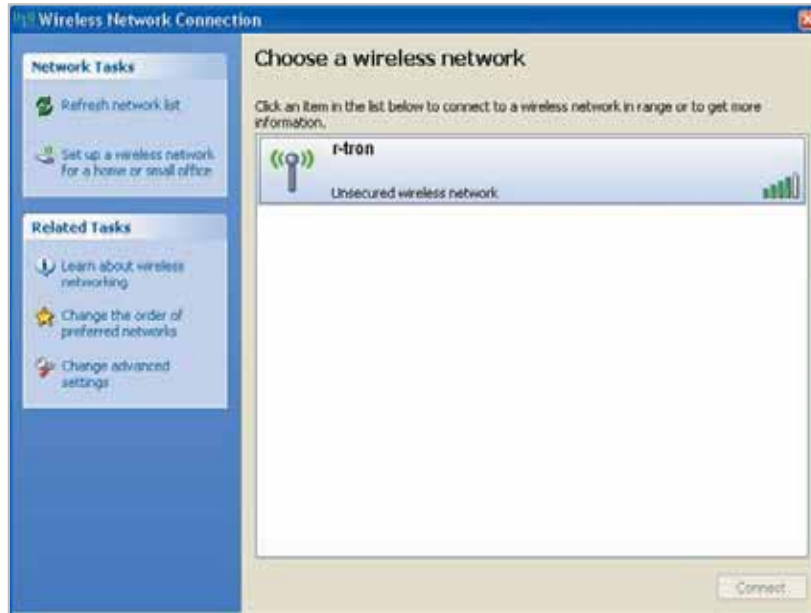
- 1) Select **Internet Protocol (TCP/IP)** and click **Properties**.



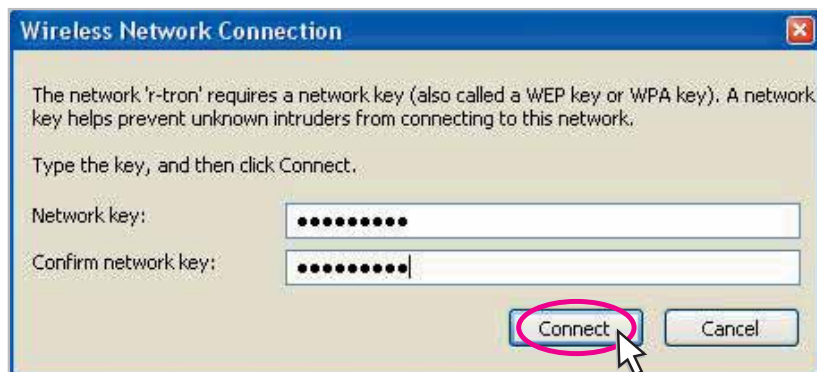
- 2) Check **Obtain an IP address automatically** and click **OK**.



- 3) Click **View available wireless networks** and then the following screen appears.

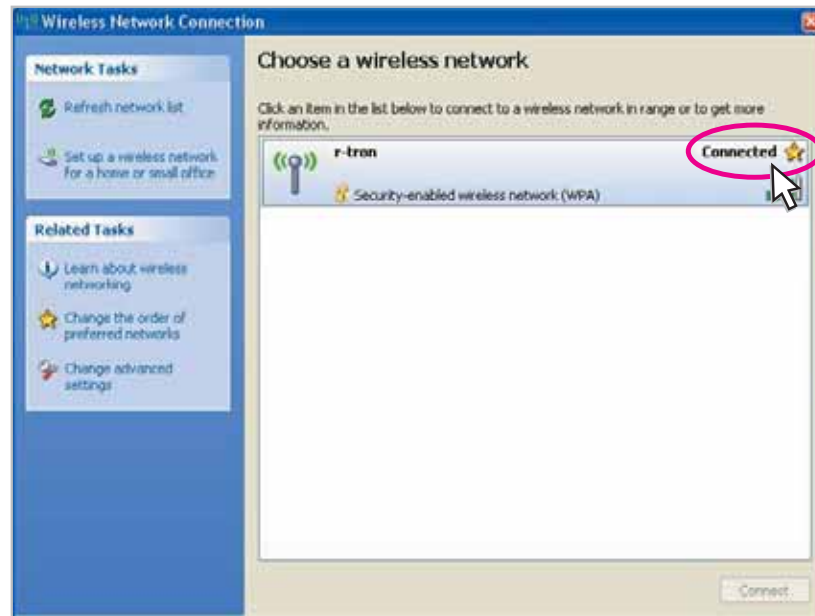


- 4) Double click **r-tron** and then you will be asked for the network key. Type the network key, "notchcell" and click **Connect**.



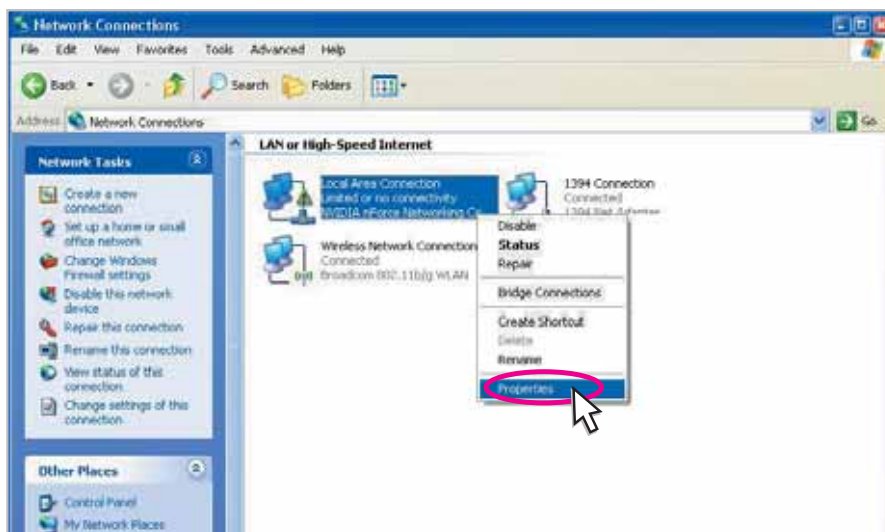
Operation ➤

5) Your wireless network connection has been completed if you see the **Connected** as in the following screen.

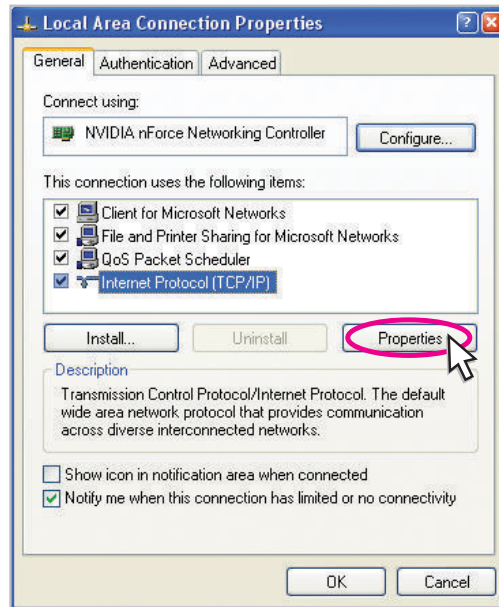


To use the local area network connection, repeat the “Step 1 and 2” in the page 8 and then go to the next Steps.

Step 3 Right-click **Local area Connection** to see a shortcut menu and click **Properties**.



- 1) Select **Internet Protocol (TCP/IP)** and click **Properties**.



- 2) Check **Obtain an IP address automatically** and click **OK**.

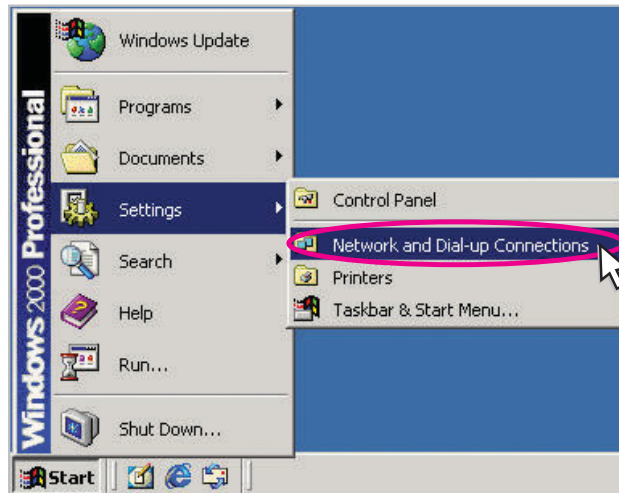


- Step 4** Close all windows.

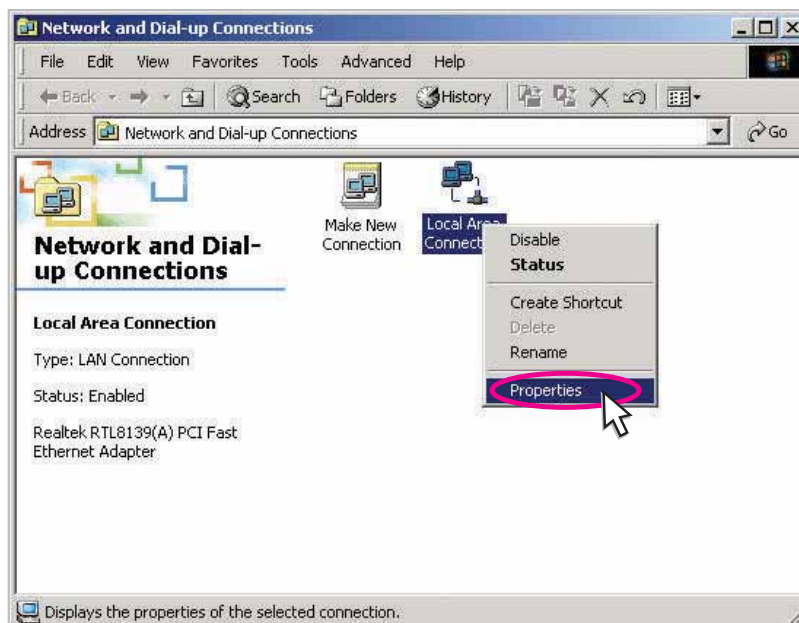
Operation >>

2.2 Windows 2000

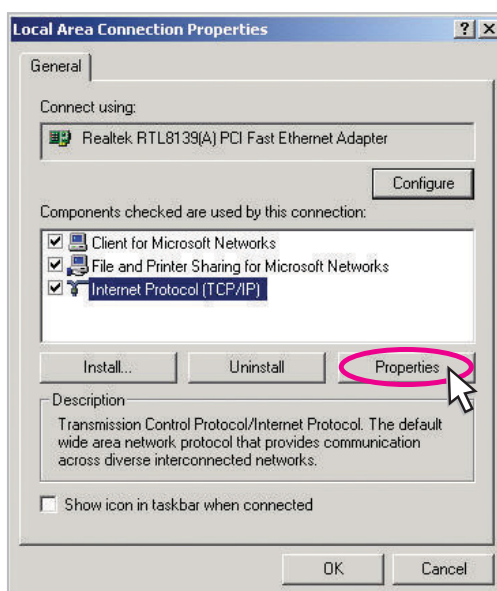
Step 1 Click the **Start** button, point to **Settings**, and then click **Network and Dial-up Connections**.



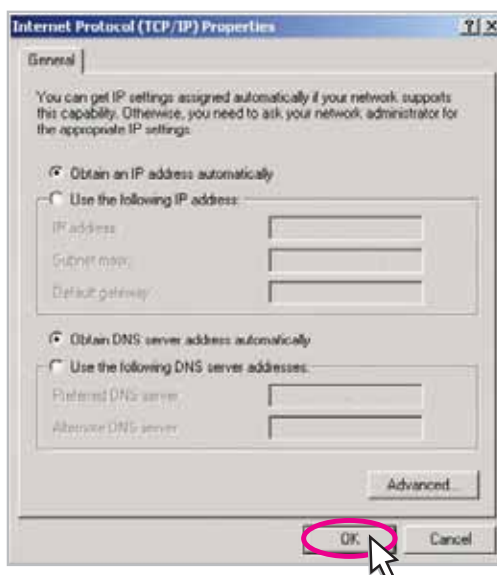
Step 2 Right-click **Local Area Connection** to see a shortcut menu and click **Properties**. Wireless network connection is available for the Windows 2000 if connected to the network card(Sold separatly).



Step 3 Select **Internet Protocol (TCP/IP)** and click **Properties**.



Step 4 Check **Obtain an IP address automatically** and click **OK**.



Step 5 Close all windows.

Operation >>

2.3 Windows Vista

Step 1 Click the **Start** button and **Control Panel**.

Step 2 Click **Network and Internet**.

Step 3 Click **Network and Sharing Center**.

To use the wireless network connection, precede the “Step 4” shown in the following and then go to the next Steps.

Step 4 Click **Connect to a network** in the following screen.

- 1) Double click **r-tron** as shown in the following screen.
- 2) You will be asked for the network key. Input the network key, “notchcell” in the following screen.
- 3) **Connect to a network** screen appears.
- 4) Click **View status** of Wireless Network Connection.

To use the local area network connection, repeat the Step 1,2, 3 and then go to the next Steps.

Step 4 Click **View status** of **Local Area Connection**.

Step 5 Click **Properties** and a caution pop-up window will appear. Click **OK**.

Step 6 Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.

Step 7 Check **Obtain an IP address automatically** and click **OK**.

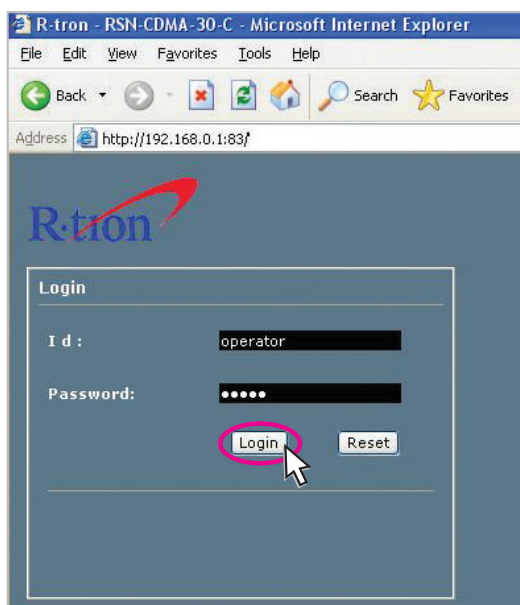
Step 8 Close all windows.

3 System Login

Step 1 Open your Web browser and type “**192.168.0.1:83**” into the URL address box. Then press the **Enter** key.



Step 2 The login screen will appear. Type “**operator**” for the ID and “**rtron**” for the password and then click **OK**.



Step 3 The pop-up message for the login success will appear. Click **OK**.



Operation >>

4 System Setup

4.1 Security

In the Operator mode, only the password can be changed in this Security page.

Password Setup

All passwords must be 4 to 8 characters in length

Operator :

Current ID : operator

New ID :

APPLY

Current Password :

New Password :

Retype New Password :

APPLY

Viewer :

Current ID :

New ID :

APPLY

4.2 Network

Click **Network** in the left menu.

Network Setup

1. Cascade Code (Mandatory)

[RTRCNTESTW0TCH43C] APPLY

2. Location Information (Mandatory) - (example : N37.123456 , W98.123456)

Decimal Degrees

Latitude : [N37.123456] N °

Longitude : [W98.123456] W °

APPLY

Degrees Minutes Seconds

N

W

APPLY

3. Heartbeat Interval (1 ~ 59 minutes : Default=20)

[20] Minutes APPLY

4. Product Information

Serial Number [0987] [RTRNC43080300001] APPLY

*** MAC IP Address (Option) ***

[10.22.25.11] APPLY

Network Setup

- **Cascade Code [Mandatory]:** Type in the pre-assigned code. **Otherwise, you cannot access system setup.**
- **Location Information:** Enter the latitude and longitude of a location, otherwise you cannot access the system setup. You can input either Decimal Degrees or Degrees-Minutes-Seconds.
[Example.]
('N/S ' | 'E/W ') ddd.ddddddd: (Latitude: N 39.006957 Longitude: W 94.532306)
- **Heartbeat Interval:** Sets the time to transmit the Heartbeat to NMC Server. (Default value is 20 minutes. At the setup, temporarily reduce the value to 1 minute. After conforming heartbeat report, set the value back to 20 minutes.)
- **Product Information:** This is for manufacturer used only. DO NOT change this value.
- **Static IP for Remote Control:** Connect to the External Monitoring Device for Remote Access. Do not enter any value unless a static IP is assigned. DHCP client.
- **NMC Server IP: Do not change this value;** otherwise, the Heartbeat transmission or Remote Access may not work.

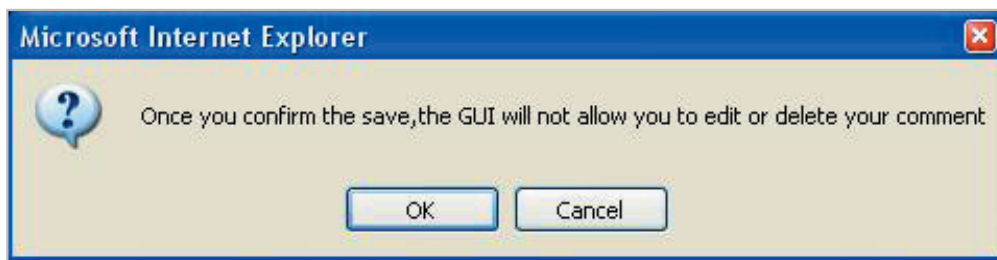
The screenshot displays the 'User Note (Optional)' section of the system setup interface. It is divided into three main sections: Location Information, Device Site Information, and Installer Information. Each section contains input fields for various details, with a 'SAVE' button next to each section. The 'Location Information' section includes fields for Site Name, Address 1, Address 2, City, State, Zip Code, and Telephone. The 'Device Site Information' section includes fields for Site ID 1 and Site ID 2. The 'Installer Information' section includes fields for Company, Name, and Telephone. At the bottom, there is a 'User Comment' section with a table showing a log of changes. The 'SAVE' button in the 'User Comment' section is highlighted with a red circle.

Time	Comment	Name	Company
2008/03/24 16:00:08	ALC Changed	James	R-tron

Operation >>

User Note

- **Location Information:** Type the location information such as the building name, address, city, state, zip code and telephone, and then click **SAVE** to save the information you provide.
- **Donor Site Information:** Type the base station's ID, and then click **SAVE** to save the information you provide.
- **Installer Information:** Type the installer information such as the company, name and telephone, and then click **SAVE** to save the information you provide.
- **User Comment:** You can add comments. Up to 50 comments can be stored in the memory. The length of characters for each comment is limited to 60 characters.
 - After you click **SAVE** in the **User Comment** option, the following pop up window appears. Click **OK** to save.



4.3 Modem

1. Modem Status

RF Mode	Analog	MDN	
Band Class	300 MHz cellular	ESN Hex	00000000
SID	0	ESN Decimal	0000000000
NID	0	Local Time	0000-00-00 00:00:00
Receive FET[%]	0	Phone Status	
RX Power	0 dBm	Call Type	Voice Call Type
TX Power Adjust	0 dB	Call Status	Idle
Slot Cycle Index	0	Data Call Type	Data Service is not in any call
Pilot Fft Offset	0	Data Call Status	Idle
Service Option	0	Active PIN	0 0 0 0 0 0
Ec/No	0 dB	Forward Data Rate	0
Channel	0	Reverse Data Rate	0
Call Drop Reason	Phone Is Offline	Modem IP	0.0.0.0

2. Heartbeat Transmission History

2008/03/20/ 21:05:45	Heartbeat has been transmitted.
2008/03/20/ 21:00:23	Heartbeat has been transmitted.
2008/03/24/ 15:12:38	Heartbeat has been transmitted.
2008/03/24/ 15:00:36	Heartbeat has been transmitted.
2008/03/22/ 00:15:29	Heartbeat has been transmitted.

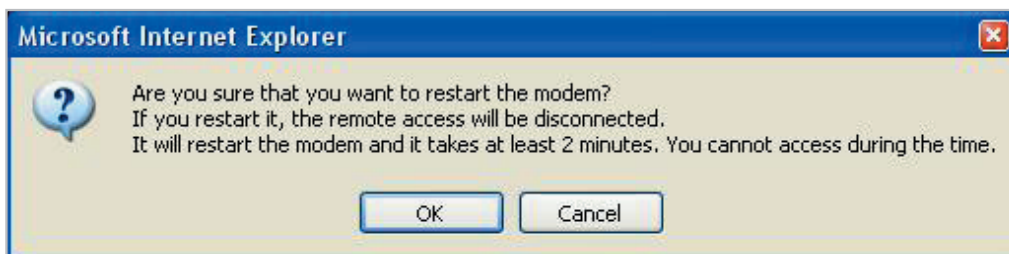
3. Modem Restart

RESTART

4. Call Drop Reason History

15	2008/00/00/ 00:00:00	Phone Is Offline
14	2008/00/00/ 00:00:00	Phone Is Offline
13	2008/00/00/ 00:00:00	Phone Is Offline
12	2008/00/00/ 00:00:00	Phone Is Offline
11	2008/03/21/ 13:55:04	Phone Is Offline
10	2008/03/21/ 13:53:42	Phone Is Offline
9	2008/03/21/ 13:52:19	Phone Is Offline
8	2008/03/21/ 13:50:56	Phone Is Offline
7	2008/03/21/ 13:47:33	Phone Is Offline
6	2008/03/21/ 13:44:21	Phone Is Offline
5	2008/03/21/ 13:42:59	Phone Is Offline
4	2008/03/24/ 15:32:28	Phone Is Offline
3	2008/03/24/ 15:27:43	Phone Is Offline
2	2008/03/24/ 15:12:38	Phone Is Offline
1	2008/03/24/ 15:01:36	Phone Is Offline

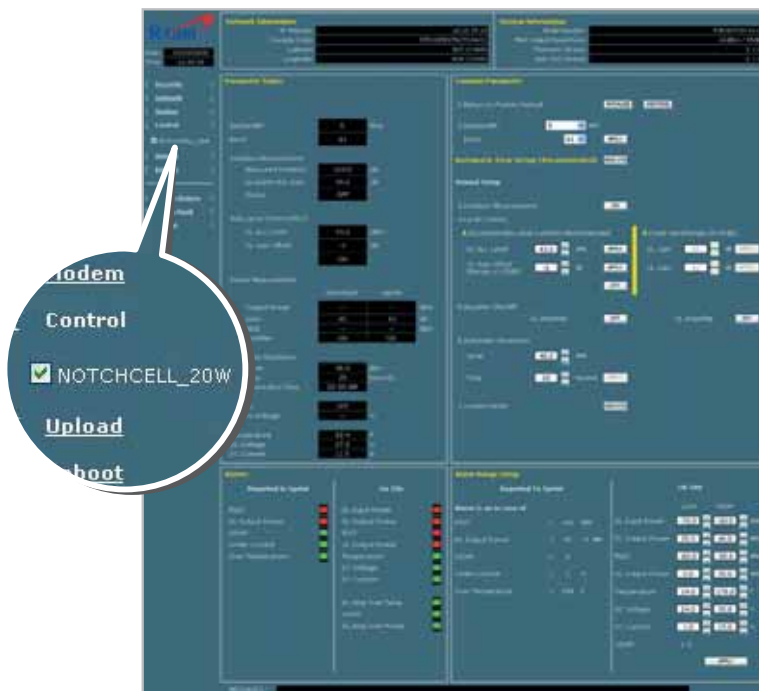
- After you click **RESTART** in the **Modem Restart** option, the following pop up window appears. Click **OK** to restart.



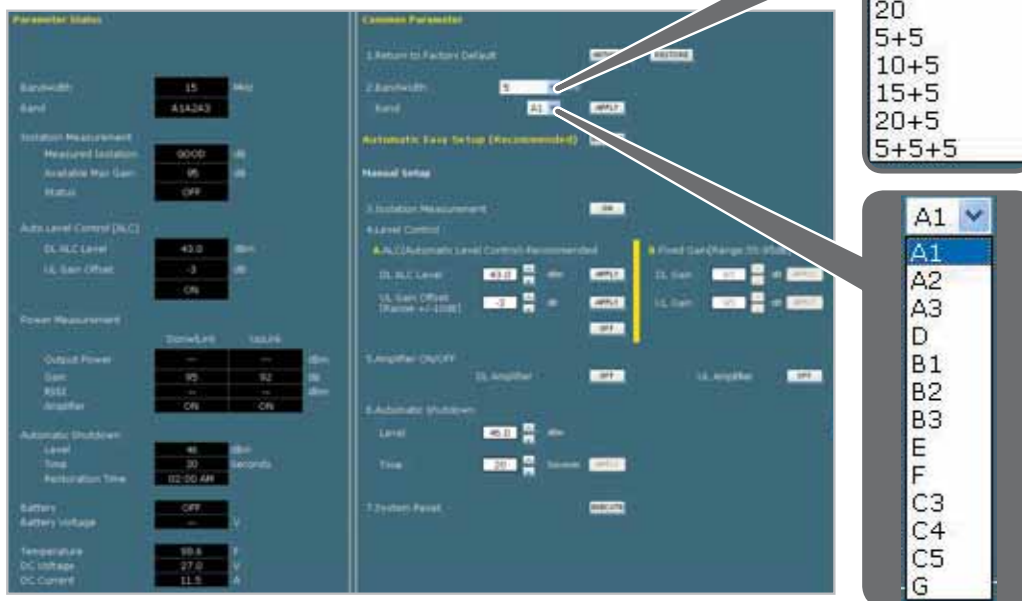
Operation

4.4 Control

Check **NOTCHCELL_20W** in the left menu.



Setup



Solution 1. Automatic Easy Setup (Recommended)

Step 1 Return To Factory Defaults

1. Return to Factory Default

INITIALIZE

RESTORE

- To reset to factory defaults, click **INITIALIZE**.

Step 2 Select Bandwidth and Band and click **APPLY**.

The first screenshot shows the '2. Bandwidth' dropdown set to '15' MHz. The 'Band' dropdown is open, showing options: 5, 10, 15 (highlighted), 20, 5+5, 10+5, 15+5, 20+5, and 5+5+5. The 'Automatic Easy Setup (Recommended)' button is visible. Below it, the 'Manual Setup' section is empty. The '3. Isolation Measurement' is set to 'ON'. The '4. Level Control' is also visible.

The second screenshot shows the '2. Bandwidth' dropdown set to '5' MHz. The 'Band' dropdown is open, showing options: A1 (highlighted), A2, A3, D, B1, B2, B3, E, F, C3, C4, C5, and G. The 'APPLY' button is circled in red, and a mouse cursor is pointing at it. The 'EXECUTE' button is also visible. Below the dropdowns, the 'Automatic Easy Setup (Recommended)' button is visible. The 'Manual Setup' section is empty. The '3. Isolation Measurement' is set to 'ON'. The '4. Level Control' is also visible. At the bottom, there are two checkboxes: 'A. ALC (Automatic Level Control) - G' and 'B. Fixed Gain [Range: 55-95dB]'.

Step 3 Automatic Easy Setup (Recommended)

Automatic Easy Setup proceeds to:

- Isolation measurement On
- Calculation of Available Maximum Gain by the isolation.
- ASD On
- ALC On to get Maximum DL Output Power 43dBm [Default] or Maximum Gain 95dB.

Operation

Click **Execute**.

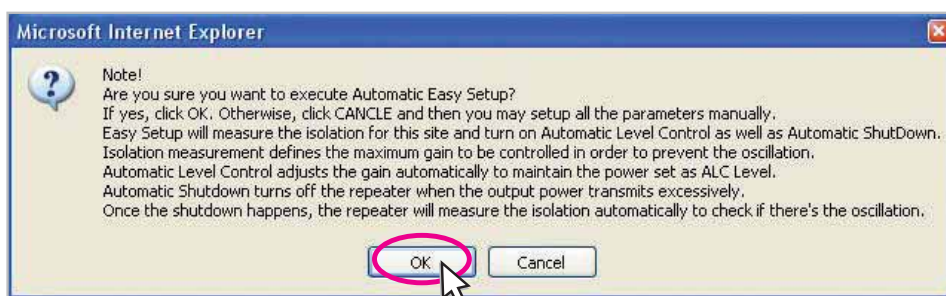


Automatic Easy Setup feature will measure the isolation and limit the maximum gain accordingly. This will also enable Auto Level Control as well as Auto Shut Down. These two features are strongly recommended to prevent the uncontrolled power output, which could have an adverse impact on the RF network and the repeater. For example, ALC will apply attenuation automatically when the input signal strength is increased due to the new base station deployment near the repeater site.

Step 4 Click **OK**.



Step 5 Click **OK** again.



Step 6 Setup will automatically begin.

Note

Automatic Easy Setup process will take approximately 20 seconds.

Result 1 Constant Maximum DL Output Power 43dBm if DL Input Power $\geq$ -52dBm.

Isolation Measurement		
Measured Isolation	GOOD	dB
Available Max Gain	95.0	dB
Status	OFF	

Result 2 Maximum Gain 85dB if DL Input Power $<$ -52dBm.

Isolation Measurement		
Measured Isolation	100	dB
Available Max Gain	85.0	dB
Status	OFF	

After running **Automatic Easy Setup** or **Isolation Measurement**, **Isolation value** is displayed with “GOOD” when the isolation is higher than 110dB, or it is displayed with the actual value when the isolation is lower than 110dB.

• **Automatic Level Control:** Type under 43 and then click **APPLY** and **ON**.

[Example]

For the repeater with 43dBm maximum output power, 95dB maximum gain/ 40dB gain control range, → If input signal -45dBm and ALC is set as 43dBm, the gain will be 88dB to adjust to the output power.

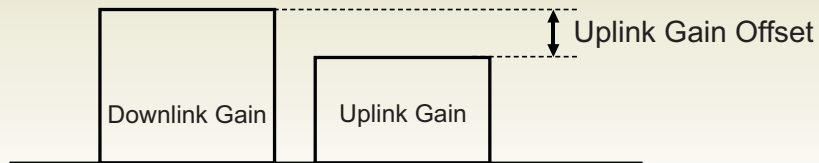
If input signal is -60dBm, the output power will be 35dBm by the limitation of the maximum gain even though the ALC is set as 43dBm.

Operation >>

Tip

Applying Uplink Gain Offset

Perform the following steps to adjust the Uplink Gain by the offset relative to the Downlink Gain.



- **Automatic Shutdown:** Type the desired values for **dBm**, **seconds**, and then click **APPLY**. (e.g. 46dBm, 20seconds)

[Example]

For the repeater with 46dBm maximum output power, 95dB maximum gain / 40dB gain control range, Assuming **ASD Level: 46dBm**, **ASD Time: 20seconds**.

If the output power is 46dBm (ASD LEVEL) and higher, the repeater will shutdown for 20 seconds (ASD TIME).

Restoration

Restoration recovers the service by turning on the amplifiers of repeater fundamentally.

After a permanent shutdown, the **Restoration** turns on the amplifiers of the repeater at the **Restoration Time** everyday.

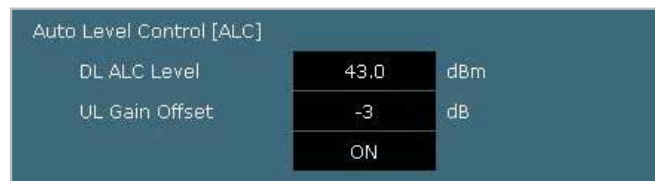
Solution 2. DL Output Power < Max. 43dBm

Step 1A Repeat **Step 1** through **Step 6**.

Step 2A Change the level at **Automatic Level Control** and click **APPLY**.



Result Constant output power set as the ALC level.



Operation

Solution 3. Fixed Gain [Not Recommended]

Step 1B Repeat **Step 1** through **Step 6**.

Automatic Easy Setup will calculate the **Available Maximum Gain** which defines the maximum gain to be setup.

4. Level Control

A. ALC (Automatic Level Control) - Recommended

DL ALC Level: 43.0 dBm

UL Gain Offset: -3 dB

B. Fixed Gain [Range: 55-95dB]

DL Gain: 95 dB

UL Gain: 92 dB



Warning

DO NOT setup the gain higher than the Available Maximum Gain.

Step 2B Read DL Input Power and the gain controlled by Automatic Easy Setup.

Power Measurement			
	DownLink	UpLink	
Output Power	43	--	dBm
Gain	95	92	dB
RSSI	-52	--	dBm
Amplifier	ON	ON	

Step 3B Turn off **DL Amplifier** and **UL Amplifier**.

Alarms

< Alarm Status >

< Alarm Range >

Alarm Status		Alarm Range Setup	
Reported to Sprint	On Site	Reported To Sprint	On Site
RSSI	☒	Alarm is on in case of	DL Input Power
DL Output Power	☒	RSSI	DL Output Power
VSWR	☒	DL Output Power	RSSI
Under Current	☒	VSWR	UL Output Power
Over Temperature	☒	Under Current	Temperature
		Over Temperature	DC Voltage
			DC Current
			DL Amp Over Temp
			VSWR
			DL Amp Over Power

- **Reported to Sprint** : If an alarm occurs, the repeater will report directly to Sprint as a SNMP Trap so the LED of ALARM on the repeater does not blink.
- **On Site Alarm** : If an alarm occurs, the alarm LED on the repeater will turn on. Please refer to the troubleshooting section of this manual.
- No change of the values in the alarm range is recommended.

4.5 Update

Click **Update** in the left menu.

5.5.1 Update: System Firmware

Step 1 Click **Browse**.

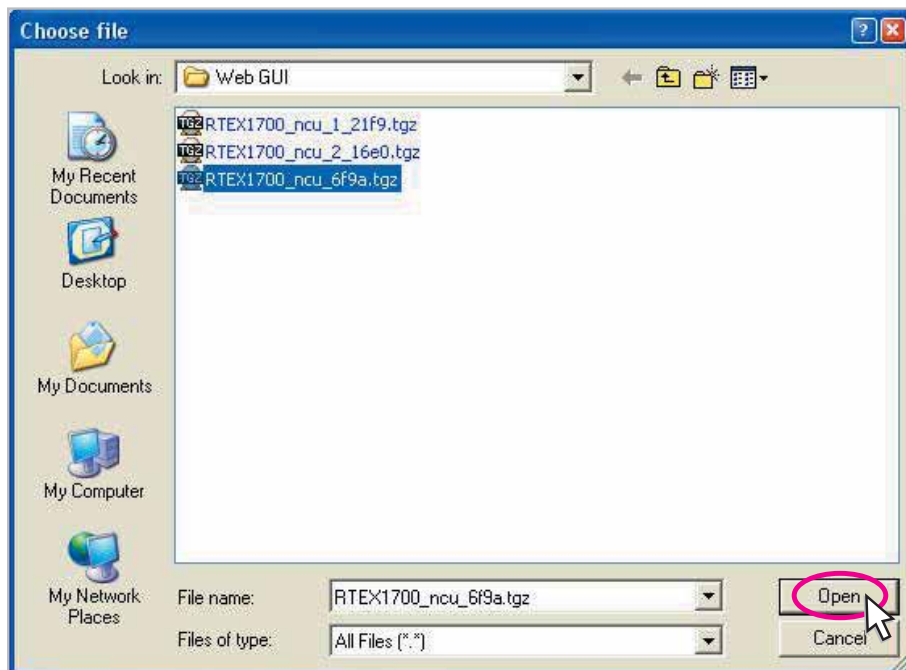
Update: System Firmware

For the latest version update, browse for the appropriate file and click "UPDATE"

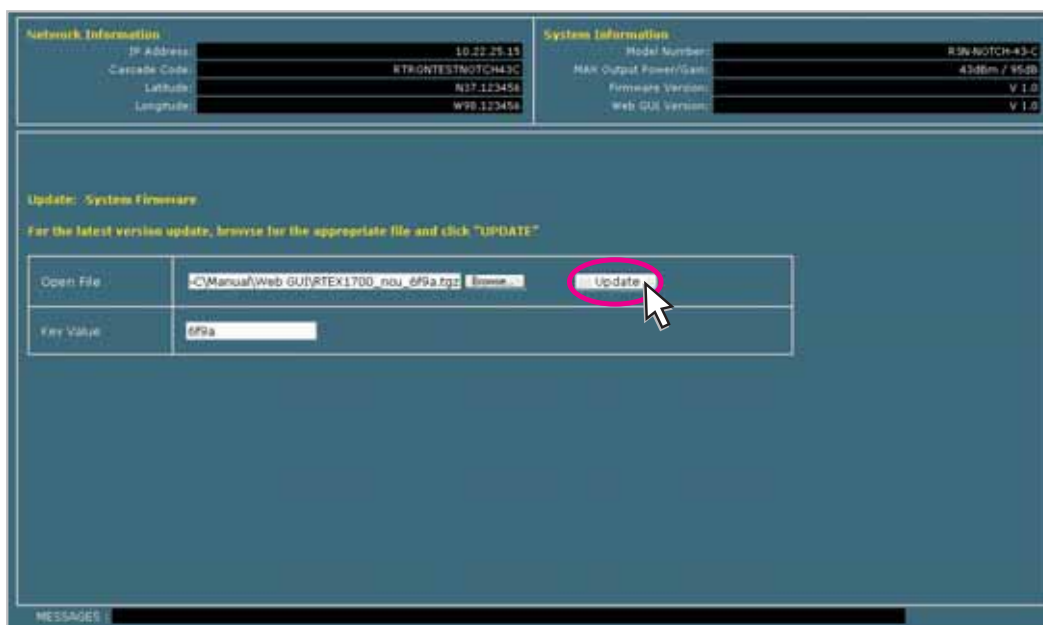
Open File	Browse	Update
Key Value		

Operation >>

Step 2 A pop-up window will appear. Select the **firmware file** and click **Open**.



Step 3 Fill in the Key Value by using the last four characters in the file name and Click **Update**.



- Step 4** A pop-up window will appear after completing all the update processes. Click **OK** to reboot the system.



- Step 5** It will take a few minutes to update the new Web GUI.
If the system reboots, go to the login page and login again.
* Login page: <http://192.168.0.1:83> (Local access)
A specified IP address on DHCP(Remote access).



Operation >>

5.5.2 Restore

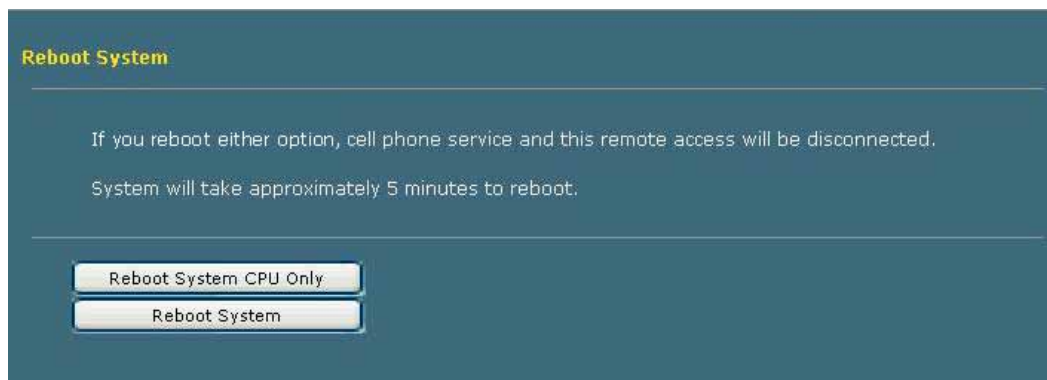
RESTORE builds up the values of parameters before the initialization.



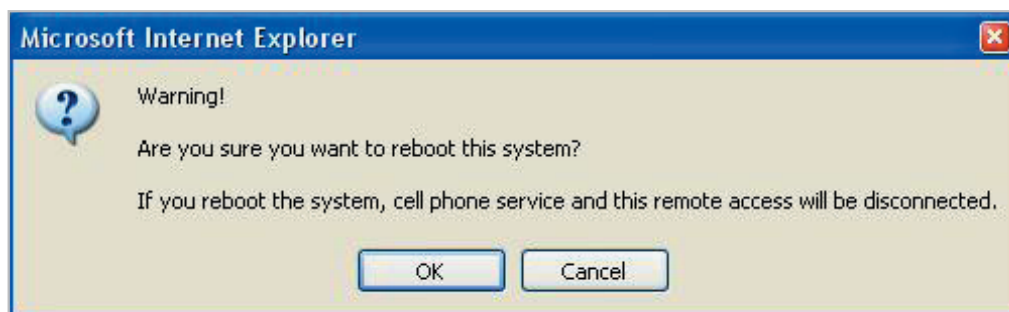
4.6 Reboot

Click **Reboot** in the left menu.

In this menu, you can reboot the system.



If you click the button to reboot, the following pop up window appears. Click **OK** to reboot the system.



4.7 Alarm History

Click **Alarm History** in the left menu.

Click **GET HISTORY**. The history list of alarm issued will be displayed.

Alarm History

Alarm Count :

Index	Time Stamp	Device	Name	Status
4	2008/03/24 17:47:56	20W	DL Input Power	Fail
4	2008/03/24 17:47:56	20W	DL Amp Over Temp	Normal
3	2008/03/24 17:47:56	20W	DL Output Power	Fail
2	2008/03/24 17:47:39	20W	DL Input Power	Normal
1	2008/03/24 17:47:39	20W	DL Output Power	Normal

To erase the alarm history on the memory, click **ERASE HISTORY**.
A confirmation pop-up window will appear and click **OK**.



To clear the alarm history on the screen, click **CLEAR**.

Note

Up to 50 alarm lists can be stored in the memory.

Operation >>

4.8 Alarm Mask

If you enable the alarms by selecting the check boxes, only the checked items are listed in the alarm history.

To enable the alarm to be saved in the alarm history list, select the check boxes as shown in the followings:



4.9 Logout

If you want to logout, click **Logout** in the left menu.

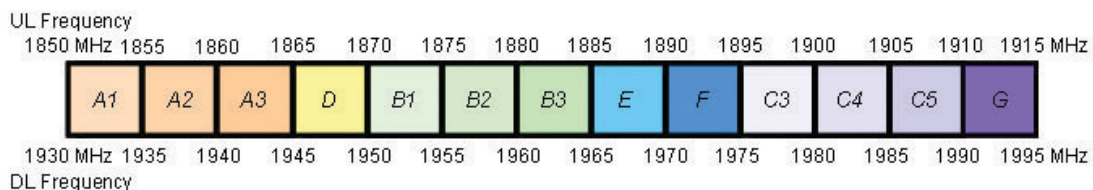
A warning pop-up window will appear and then click **OK** to logout.



Appendix

NOTCHCELL

• Bandwidth/Frequency:



The values of the bandwidth and frequency of CDMA

Bandwidth	Operating Frequency
5	A1, A2, A3, D, B1, B2, B3, E, F, C3, C4, C5, G
10	A1A2, A2A3, A3D, DB1, B1B2, B2B3, B3E, EF, FC3, C3C4, C4C5, C5G
15	A1A2A3, A2A3D, A3DB1, DB1B2, B1B2B3, B2B3E, B3EF, EFC3, FC3C4, C3C4C5, C4C5G
20	A1A2A3D, A2A3DB1, A3DB1B2, DB1B2B3, B1B2B3E, B2B3EF, B3EFC3, EFC3C4, FC3C4C5, C3C4C5G
5+5	A1+A3, A1+D, A1+B1, A1+B2, A1+B3, A1+E, A1+F, A1+C3, A1+C4, A1+C5, A1+G, A2+D, A2+B1, A2+B2, A2+B3, A2+E, A2+F, A2+C3, A2+C4, A2+C5, A2+G, A3+B1, A3+B2, A3+B3, A3+E, A3+F, A3+C3, A3+C4, A3+C5, A3+G, D+B2, D+B3, D+E, D+F, D+C3, D+C4, D+C5, D+G, B1+B3, B1+E, 1+F, B1+C3, B1+C4, B1+C5, B1+G, B2+E, B2+F, B2+C3, B2+C4, B2+C5, B2+G, B3+F, B3+C3, B3+C4, B3+C5, B3+G, E+C3, E+C4, E+C5, E+G, F+C4, F+C5, F+G, C3+C5, C3+G
10+5	A1A2+D, A1A2+B1, A1A2+B2, A1A2+B3, A1A2+E, A1A2+F, A1A2+C3, A1A2+C4, A1A2+C5, A1A2+G, A2A3+B1, A2A3+B2, A2A3+B3, A2A3+E, A2A3+F, A2A3+C3, A2A3+C4, A2A3+C5, A2A3+G, A3D+B2, A3D+B3, A3D+E, A3D+F, A3D+C3, A3D+C4, A3D+C5, A3D+G, DB1+B3, DB1+E, DB1+F, DB1+C3, DB1+C4, DB1+C5, DB1+G, B1B2+E, B1B2+F, B1B2+C3, B1B2+C4, B1B2+C5, B1B2+G, B2B3+F, B2B3+C3, B2B3+C4, B2B3+C5, B2B3+G, B3E+C3, B3E+C4, B3E+C5, B3E+G, EF+C4, EF+C5, EF+G, FC3+C5, FC3+G, C3C4+G

Appendix >>

Bandwidth	Operating Frequency
15+5	A1A2A3+B1, A1A2A3+B2, A1A2A3+B3, A1A2A3+E, A1A2A3+F, A1A2A3+C3, A1A2A3+C4, A1A2A3+C5, A1A2A3+G, A2A3D+B2, A2A3D+B3, A2A3D+E, A2A3D+F, A2A3D+C3, A2A3D+C4, A2A3D+C5, A2A3D+G, A3DB1+B3, A3DB1+E, A3DB1+F, A3DB1+C3, A3DB1+C4, A3DB1+C5, A3DB1+G, DB1B2+E, DB1B2+F, DB1B2+C3, DB1B2+C4, DB1B2+C5, DB1B2+G, B1B2B3+F, B1B2B3+C3, B1B2B3+C4, B1B2B3+C5, B1B2B3+G, B2B3E+C3, B2B3E+C4, B2B3E+C5, B2B3E+G, B3EF+C4, B3EF+C5, B3EF+G, EFC3+C5, EFC3+G, FC3C4+G
20+5	A1A2A3D+B2, A1A2A3D+B3, A1A2A3D+E, A1A2A3D+F, A1A2A3D+C3, A1A2A3D+C4, A1A2A3D+C5, A1A2A3D+G, A2A3DB1+B3, A2A3DB1+E, A2A3DB1+F, A2A3DB1+C3, A2A3DB1+C4, A2A3DB1+C5, A2A3DB1+G, A3DB1B2+E, A3DB1B2+F, A3DB1B2+C3, A3DB1B2+C4, A3DB1B2+C5, A3DB1B2+G, DB1B2B3+F, DB1B2B3+C3, DB1B2B3+C4, DB1B2B3+C5, DB1B2B3+G, B1B2B3E+C3, B1B2B3E+C4, B1B2B3E+C5, B1B2B3E+G, B2B3EF+C4, B2B3EF+C5, B2B3EF+G, B3EFC3+C5, B3EFC3+G, EFC4+G
5+5+5	A1+A3+B1, A1+A3+B2, A1+A3+B3, A1+A3+E, A1+A3+F, A1+A3+C3, A1+A3+C4, A1+A3+C5, A1+A3+G, A1+D+B2, A1+D+B3, A1+D+E, A1+D+F, A1+D+C3, A1+D+C4, A1+D+C5, A1+D+G, A1+B1+B3, A1+B1+E, A1+B1+F, A1+B1+C3, A1+B1+C4, A1+B1+C5, A1+B1+G, A1+B2+E, A1+B2+F, A1+B2+C3, A1+B2+C4, A1+B2+C5, A1+B2+G, A1+B3+F, A1+B3+C3, A1+B3+C4, A1+B3+C5, A1+B3+G, A1+E+C3, A1+E+C4, A1+E+C5, A1+E+G, A1+F+C4, A1+F+C5, A1+F+G, A1+C3+C5, A1+C3+G, A1+C4+G, A2+D+B2, A2+D+B3, A2+D+E, A2+D+F, A2+D+C3, A2+D+C4, A2+D+C5, A2+D+G, A2+B1+B3, A2+B1+E, A2+B1+F, A2+B1+C3, A2+B1+C4, A2+B1+C5, A2+B1+G, A2+B2+E, A2+B2+F, A2+B2+C3, A2+B2+C4, A2+B2+C5, A2+B2+G, A2+B3+F, A2+B3+C3, A2+B3+C4, A2+B3+C5, A2+B3+G, A2+E+C3, A2+E+C4, A2+E+C5, A2+E+G, A2+F+C4, A2+F+C5, A2+F+G, A2+C3+C5, A2+C3+G, A2+C4+G, A3+B1+B3, A3+B1+E, A3+B1+F, A3+B1+C3, A3+B1+C4, A3+B1+C5, A3+B1+G, A3+B2+E, A3+B2+F, A3+B2+C3, A3+B2+C4, A3+B2+C5, A3+B2+G, A3+B3+F, A3+B3+C3, A3+B3+C4, A3+B3+C5, A3+B3+G, A3+E+C3, A3+E+C4, A3+E+C5, A3+E+G, A3+F+C4, A3+F+C5, A3+F+G, A3+C3+C5, A3+C3+G, A3+C4+G, D+B2+E, D+B2+F, D+B2+C3, D+B2+C4, D+B2+C5, D+B2+G, D+B3+F, D+B3+C3, D+B3+C4, D+B3+C5, D+B3+G, D+E+C3, D+E+C4, D+E+C5, D+E+G, D+F+C4, D+F+C5, D+F+G, D+C3+C5, D+C3+G, D+C4+G, B1+B3+F, B1+B3+C3, B1+B3+C4, B1+B3+C5, B1+B3+G, B1+E+C3, B1+E+C4, B1+E+C5, B1+E+G, B1+F+C4, B1+F+C5, B1+F+G, B1+C3+C5, B1+C3+G, B1+C4+G, B2+E+C3, B2+E+C4, B2+E+C5, B2+E+G, B2+F+C4, B2+F+C5, B2+F+G, B2+C3+C5, B2+C3+G, B2+C4+G, B3+F+C4, B3+F+C5, B3+F+G, B3+C3+C5, B3+C3+G, B3+C4+G, E+C3+C5, E+C3+G, E+C4+G, F+C4+G