

RV-QUADCOMM-700N

User's Manual



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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1. General

1.1. Notice

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Notice

This document describes the specifications, installation, and operation of the RV-QUADCOMM repeater.

Hardware and software mentioned in this document are subject to continuous development and improvement. Consequently, there may be minor discrepancies between the information in the document, performance, and design of the product.

Specifications, dimensions, and other statements mentioned in this document are subject to change without notice.

Questions or Comments

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1.2. Safety Precautions

Warning

Opening the RV-QUADCOMM equipment could result in electric shock and may cause severe injury.

Warning

Connect the equipment frame ground to the building ground.

Warning

Operating the RV-QUADCOMM with antennas in very close proximity facing each other could lead to severe damage to the repeater.

Caution

RF EXPOSURE INFORMATION

A minimum separation distance of 7.9 inches (20cm) must be maintained between the user and the external antenna of the repeater to satisfy FCC RF exposure requirements. For more information about RF exposure, please visit the FCC website at www.fcc.gov

Caution

This equipment is for indoor use only and enables the communication wiring to communicate inside the building only.

1.3. Version History

1.3.1. Manual Version History List

Revision History		Date	Item/Description	Reason
Approval Ver.	Issue Ver.			
V1.0.00	V1.0.00	2011-09-24	First draft issued	

1.3.2. Firmware Version History List

Revision History		Date	Item/Description	Reason
Approval Ver.	Issue Ver.			
V1.0.00	V1.0.00	2011-09-24	First draft issued	

1.3.3. WEB GUI Version History List

Revision History		Date	Item/Description	Reason
Approval Ver.	Issue Ver.			
V1.0.00	V1.0.00	2011-09-24	First draft issued	

1.4 Glossary

The following is a list of abbreviations and terms used in this manual.

Abbreviation	Definition
AC	Alternating Current
ANT	Antenna
ATT	Attenuator / Attenuation
CDMA	Code Division Multiple Access
DC	Direct Current
DL	Downlink
HPA	High Power Amplifier
GUI	Graphic User Interface
LED	Light Emitting Diode
MCU	Main Control Unit
PLL	Phase-locked loop
PSU	Power Supply Unit
RF	Radio Frequency
RSSI	Received Signal Strength Indication
SNMP	Simple Network Management Protocol
TEMP	Temperature
UL	Uplink
VSWR	Voltage Standing Wave Ratio

AGC (Automatic Gain Control)

AGC prevents the repeater from exceeding its maximum output power by reducing the gain automatically. AGC is used to adjust the gain to an appropriate level for a range of input signal levels.

ASD (Automatic Shutdown)

ASD protects the repeater from oscillation or excessive input signal and eliminates any degradation to the network.

ICS (Interference Cancellation System)

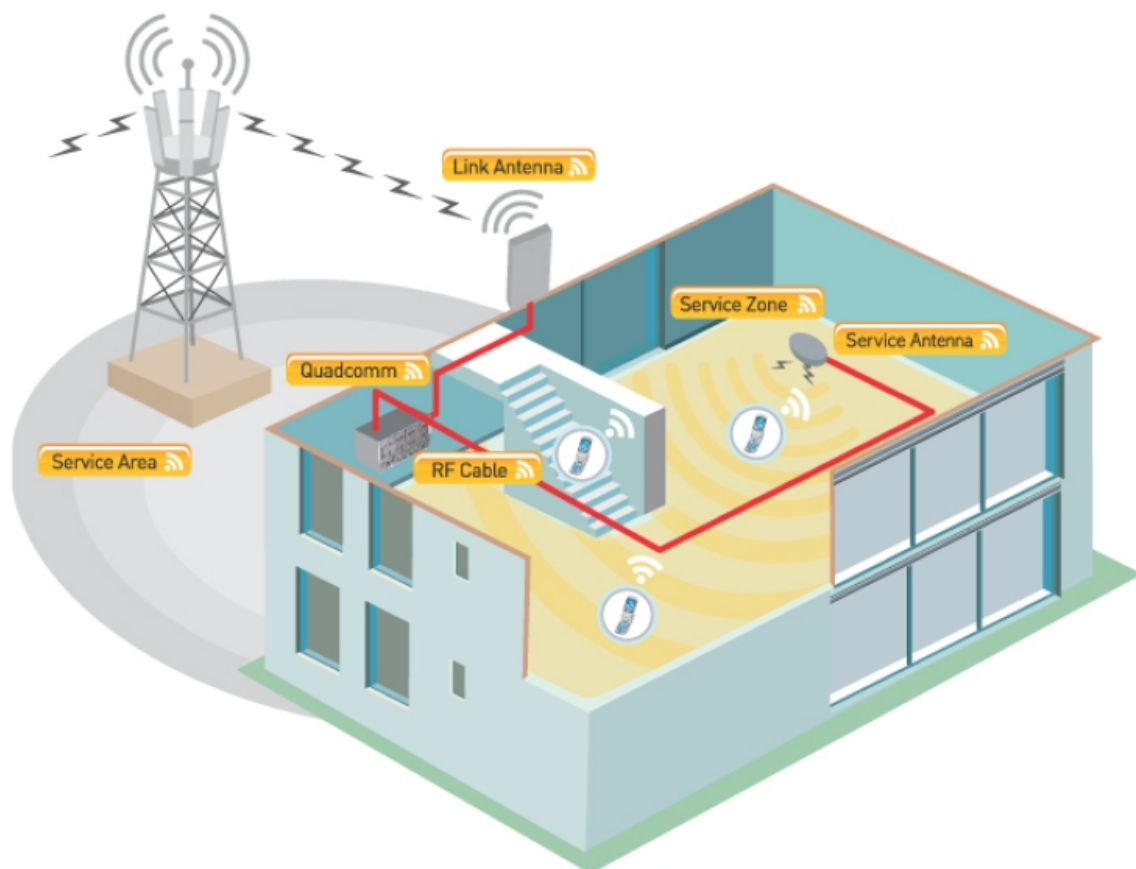
ICS is an improvement solution for wireless network service quality. Unlike a normal RF repeater, ICS cancels interference brought on by oscillation and other issues, greatly improving performance.

2. Introduction

2.1. RV-QUADCOMM

RV-QUADCOMM is used to fill out areas in RV-QUADCOMM systems, such as base station fringe areas, business and industrial building, etc.

RV-QUADCOMM receives signals from a base station, amplifies and retransmits the signals to the mobile stations. RV-Quadcomm also receives, amplifies and retransmits signals in the opposite direction. Both directions are served simultaneously with the following features:



2.2 Key Features

◆ Flexible band configuration

- Hot Swappable modular units
- Can service up to 100k square feet

◆ Powerful Features

- ICS on board (Interference cancellation Function)
- Isolation and Oscillation Check
- Auto Gain Control
- Auto Shutdown
- built in Spectrum Analyzer

◆ Composition (Main Unit and Four RF Cards by service band)

- Qualcomm-700N (700M band) for LTE Service
- Qualcomm-800 (Cellular band) for EVDO/CDMA2000 Service (LTE capable via firmware update)
- Qualcomm-1900 (PCS band) for EVDO/CDMA2000 Service
- Qualcomm-2100 (AWS band) for EVDO/CDMA2000 Service (LTE capable via firmware upgrade)
- Main Unit provides for multiple repeater modules (up to four) using a single antenna port and/or multiple antenna ports.

◆ Design (Each RF Card is channel selectable)

- Provides capability to select almost any channel combination within a service band via digital signal processing.
- Digital signal processing allows for High quality, out of band rejection and high performance

◆ User friendly Web GUI control and monitor.

- Remote monitoring and control through the Web GUI Interface
- Reports the status of connection as a function of SNMP regularly and reports an alarm if the event occurred.

2.3 Components

RV-Quadcomm consists of MU (Main unit) and RF Cards.

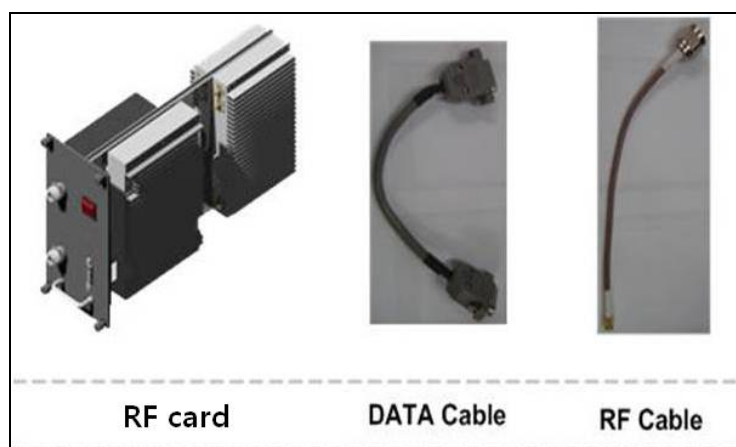
MU can combine up to 4 RF Cards which are Quadcomm 700N (LTE service band), 800 (Cellular band), 1900 (PCS band), and 2100 (AWS band). Items are as follows;

2.3.1. QUADCOMM-MU (Main Unit)



MU package		
Index	Items	Q'ty
1	MU	1
2	AC Cable	1
3	LAN Cable	1
4	Bolt	6
5	Quick Manual	1
6	User's Manual CD	1

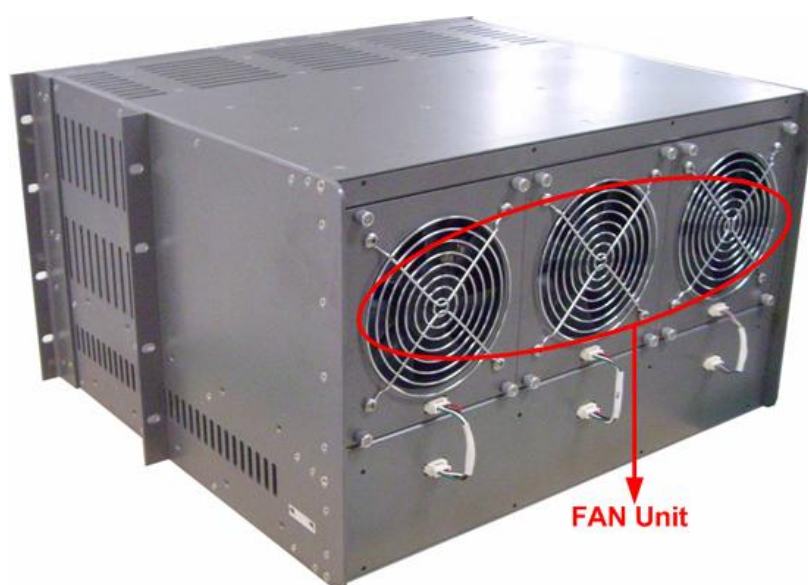
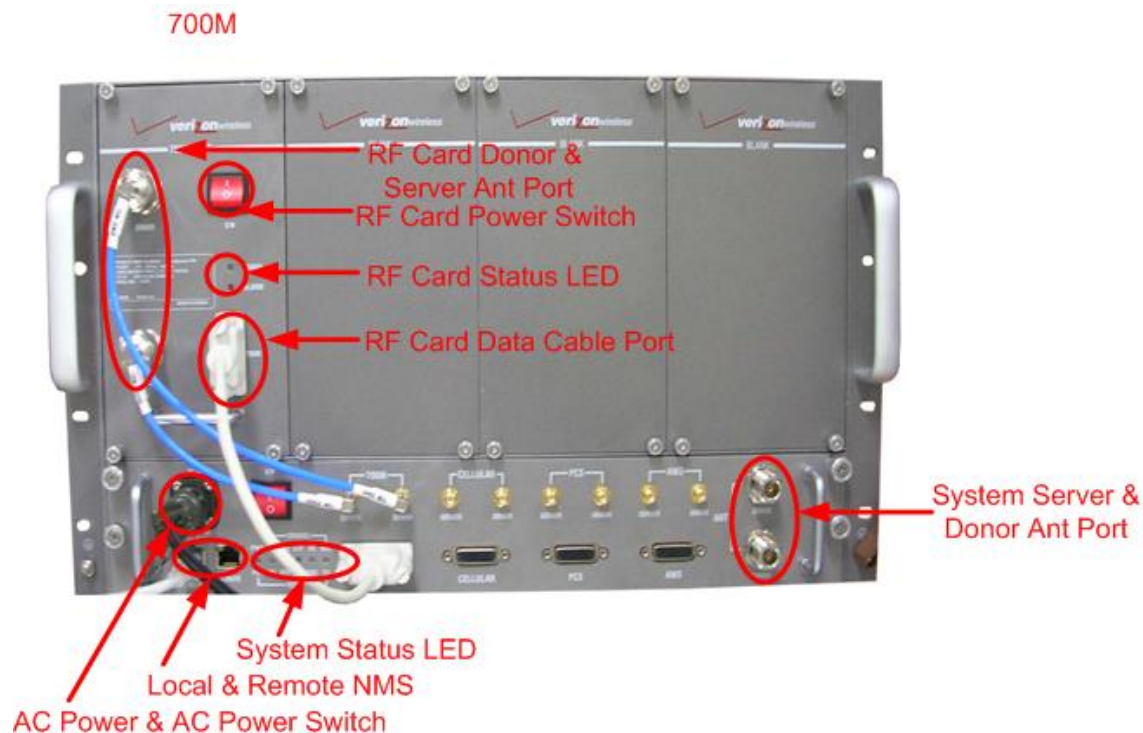
2.3.2. QUADCOMM-700N



RF Card package		
Index	Items	Q'ty
1	RF Card	1
2	RF Cable	2
3	DATA Cable	1

2.4. Description

2.4.1. MU and full RF Cards

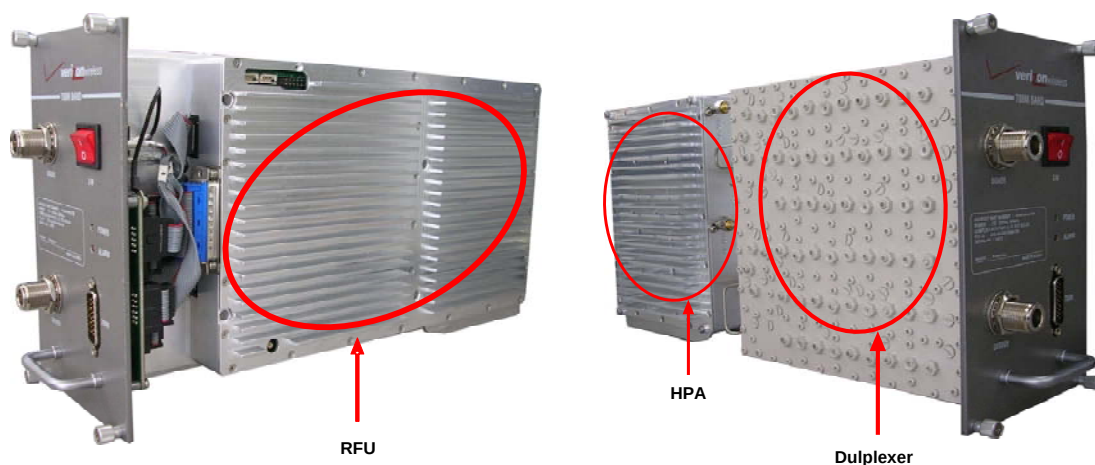


2.4.2. Internal Configuration

▷ Main Unit



▷ RF Card(700M)

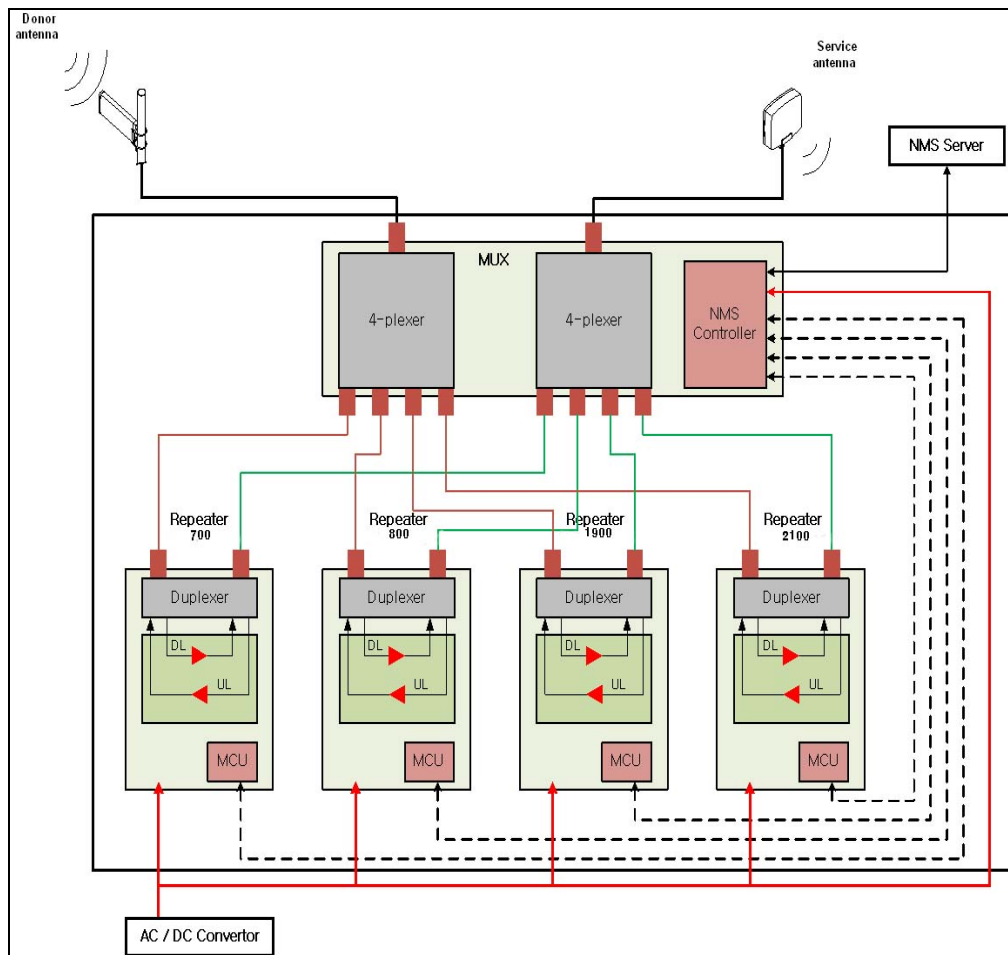


Right Side

Left Side

2.4.3. Block Diagram

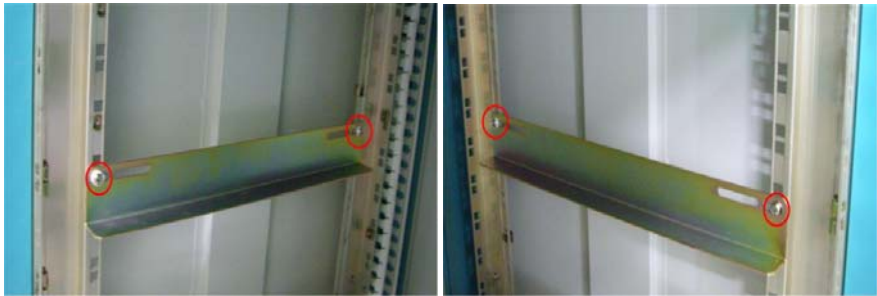
The following diagram explains how the RV-QUADCOMM serves signals.



3. Mechanical Installation

3.1. Mounting

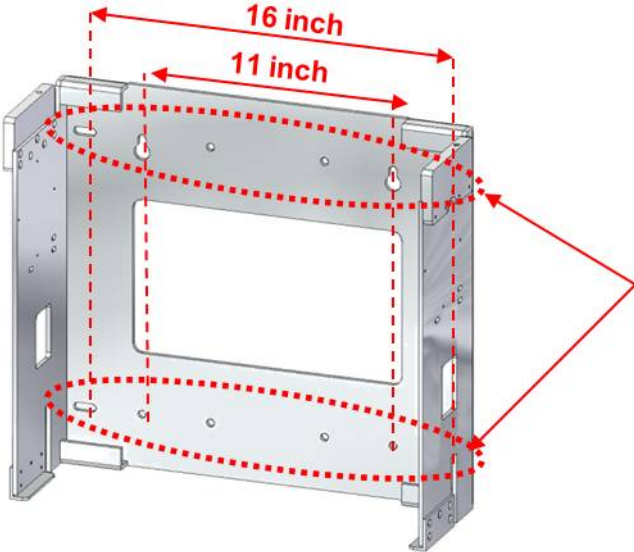
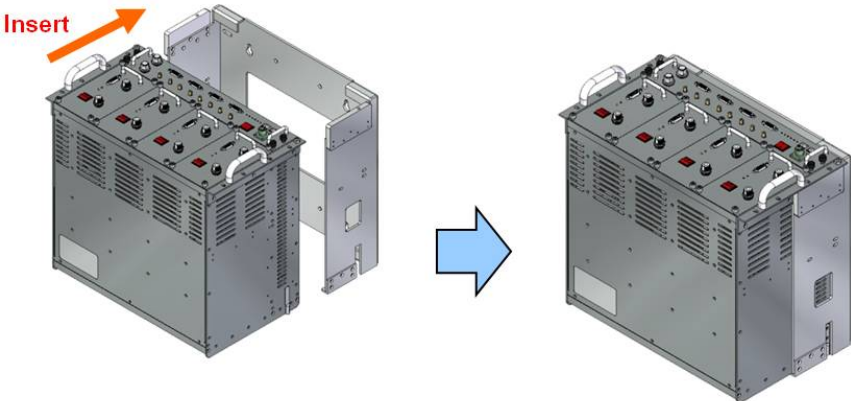
3.1.1. 19inch cabinet rack

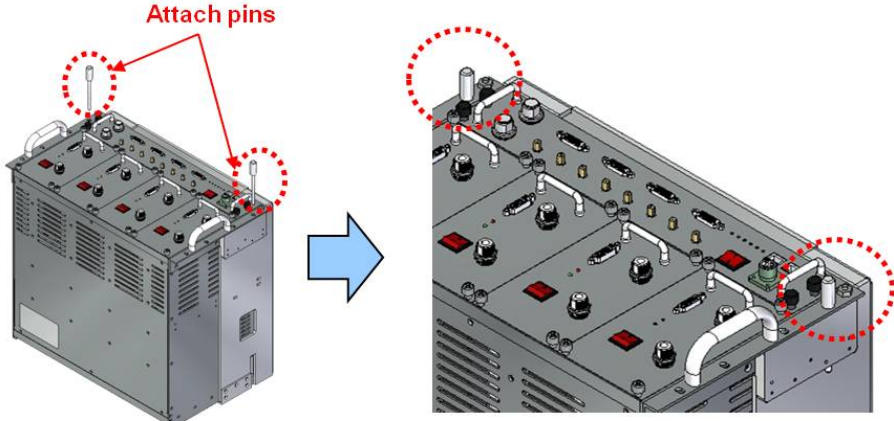
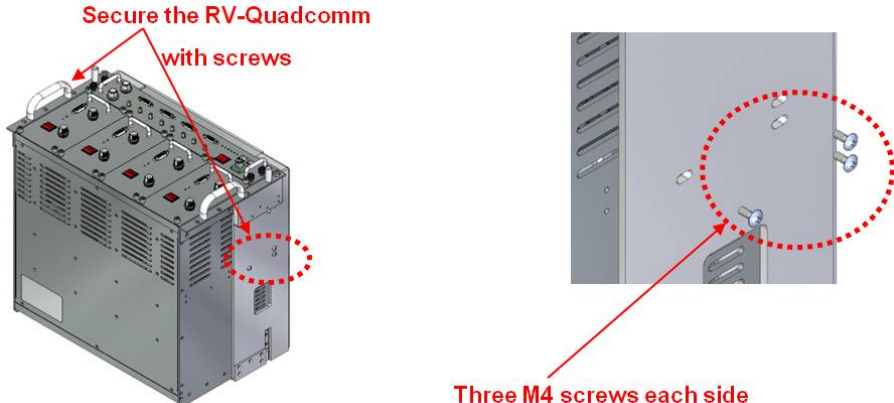
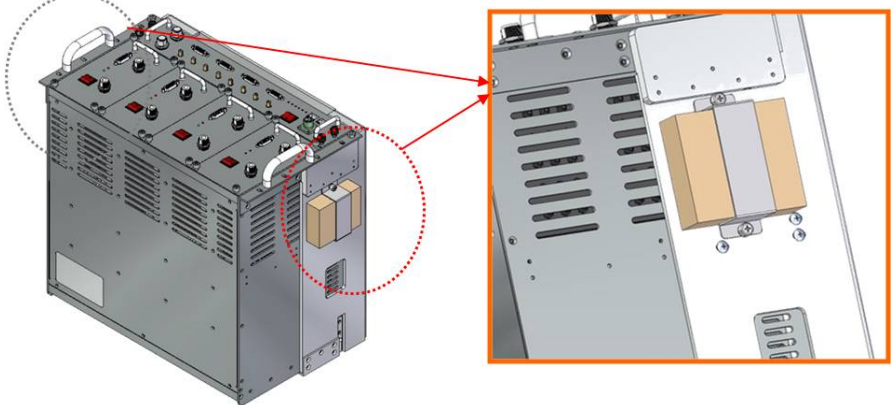
Step1		19" Rack for RV-Quadcomm
Step2		Attach the two guide rails to the vertical mounting rail of 19" rack. (please use the guide rails from the supplier of the 19" rack.)
Step3		Make sure the guide rails are level and secure.

Step4		Attach the provided six cage nuts to the rear of the vertical mounting rail of the 19" rack. (Six screws and cage nuts are included in the Quadcomm MU package.)
Step5		Slide the empty Quadcomm MU on the guide rails.
Step6		Verify the Quadcomm MU is stable and secure.
Step7		Tighten the Quadcomm MU with provided screws.

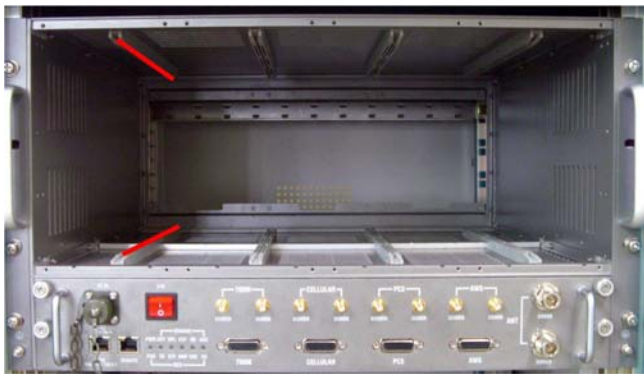
Step8		Fasten 6 points where cage nuts are attached.
-------	--	---

3.1.2. Wall Mount Bracket (Option)

Step 1		Choose a wall structure that will support the combined weight of all Quadcomm components. Drill 4 bracket mount holes. ※ The full QUADCOMM system weight is over 150 lbs so the wall must be able to sustain 200 lbs.
Step 2		Insert the case into wall mount. Continue to support the case until completing step 3.

Step 3		Attach pins both sides.
Step 4	 Three M4 screws each side	Secure the shelf in the wall mount with 6 screws
Step 5		Attach modem bracket (optional)

3.2. RF Card Installation

Step1		Step 1 : Inspect the guide rails on the top and bottom of the Quadcomm MU
Step2		Insert each RF Card through the guide rails into the Quadcomm MU.
Step3		After inserting the RF Card, fasten the 4 bolts with a phillips screwdriver. Install the other RF Card in the same manner. Cover unused module areas with blank (optional).

4. Cable Installation

4.1. Cable Connection

Step 1 : Connect a cable from the donor antenna to the Donor Antenna Port.

Step 2 : Connect a cable from a repeater's service antenna to the Server Antenna Port.



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

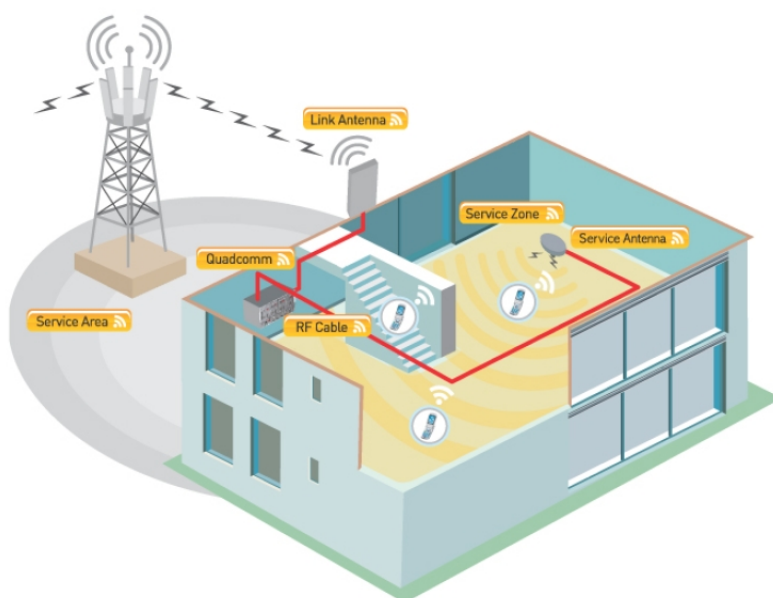
Note

Enough isolation?

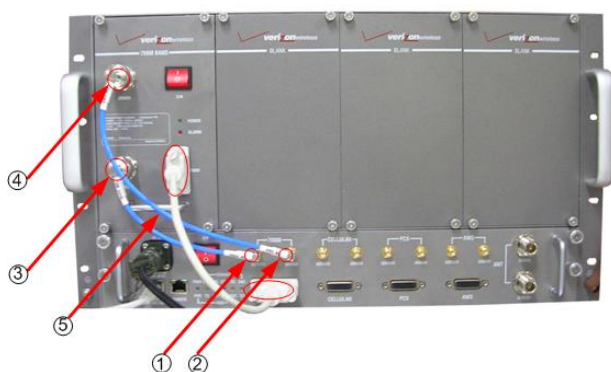
Antenna isolation = Path loss between the server antenna port and the donor antenna port

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

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



4.2. Interconnection Cabling



Step 3 : Connect the data cable ⑤.

Step 1 : Tighten RF cables to SMA connector with a thin 8mm wrench.

- ① Connect short RF cable to server side
- ② Connect long RF cable to donor side

Step 2 : Tighten the other side to N-type connector with a 20mm wrench.

- ③ Short RF cable to server side
- ④ Long RF cable to donor side

4.3. Power On



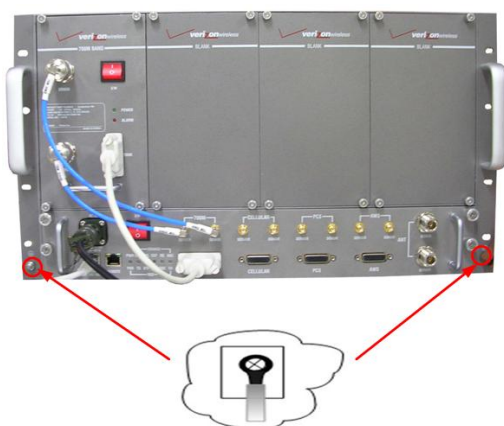
Step 1 : Connect the power cord to the MU.

Step 2 : Plug the power cord into a wall outlet.

Step 3 : Turn the red power button on

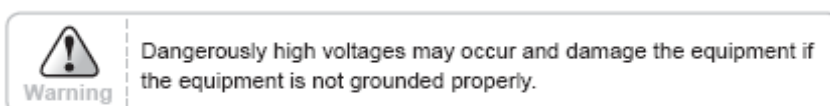
Step 4 : Check if the green LED at the Top turns on.

4.4. Grounding



Step 1 : A rod on the left side is intended for a building ground.

Step 2 : Connect the ground cable to the rod.



5. GUI Operation

RV-QUADCOMM operates on a customer provided PC based platform with the following system requirements:

- Windows® XP or Windows® Vista, Windows® 7
- Internet Explorer 6.0(Recommended) or higher
- 128 MB RAM or higher
- Pentium III processor or higher
- RJ-45 jack required

5.1. GUI Operation Flow chart

[1] Internet Network Setup

Setting in order to acquire the IP address automatically.



[2] GUI Log-in

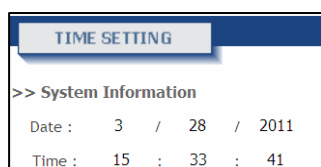
RV-Quadcomm Web GUI Log in.



[3] GUI Network Setup

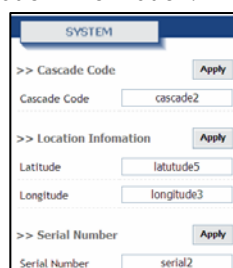
1. Time Setting

Automatically set to your PC time.



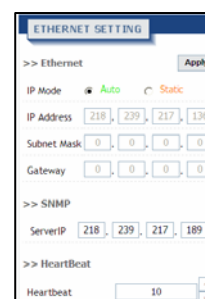
2. System Information Input

Input Cascade Code and Location Information.



3. Ethernet Setting

IP address and SNMP IP Input.

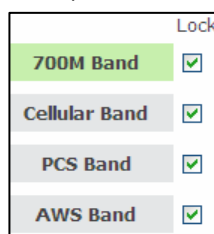


[4] GUI System Control

The user can control the repeater locally using the built-in WEB GUI.

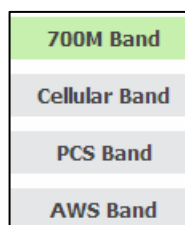
1. Lock Select

Only checked bands will report to the server.



2. Band Select

Click the band for Web GUI control.



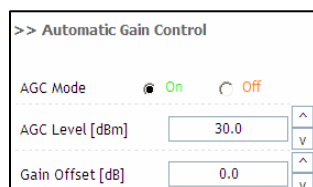
3. Channel Select

Select channel band



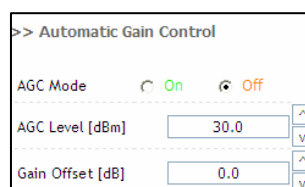
4.A. AGC control

AGC automatically assigns gain.



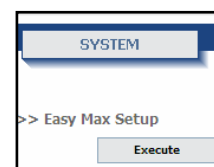
4.B. Manual Control

Gain value setting by User.



4.C. Easy Max Setup

System will be set automatically without manual operation.



[5] GUI Status Check

You can see system, operating, and alarm information on Status page.

5.2. Initial Network Setup

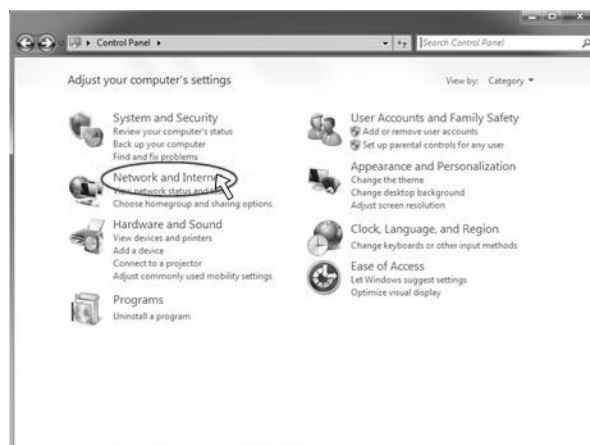
In order to acquire the IP address automatically, follow the steps:

Windows 7 (For Windows XP and Windows Vista see 5.8. Reference)

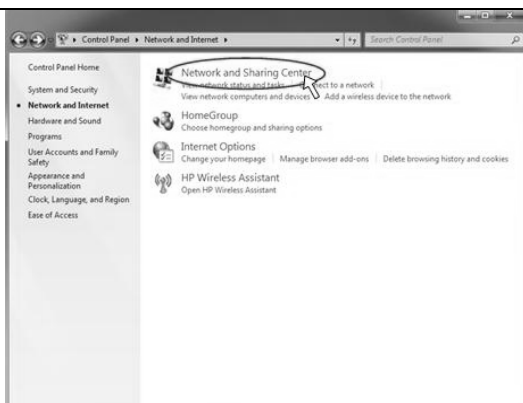
Step 1: Click the Start button and select Control Panel.



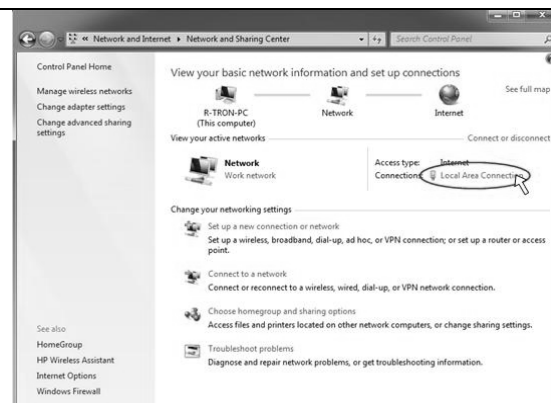
Step 2: Click Network and Internet



Step 3: Click Network and Sharing Center.



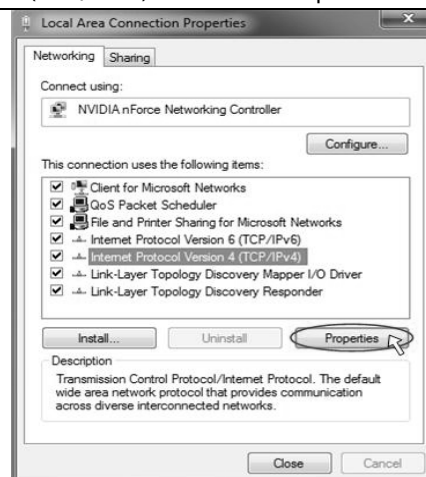
Step 4: Click View status of Local Area Connection.



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

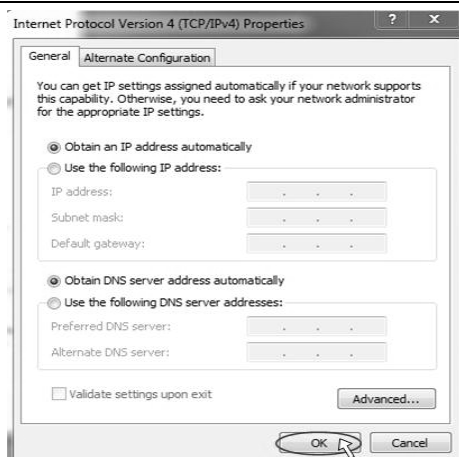


Step 6: Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.



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

Step 8: Close all windows.



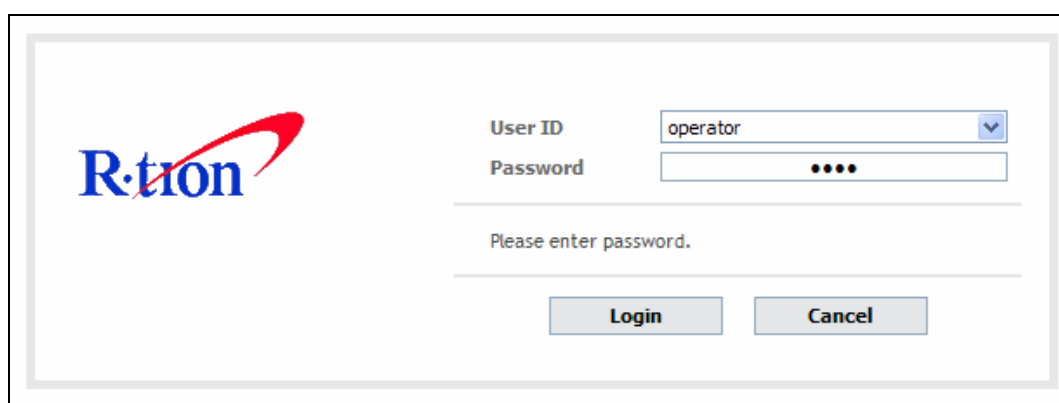
5.3. GUI Log in

Open your Web browser and type "192.168.0.1" into the URL address box.



Enter a User ID and password

Type "**operator**" for the ID and "**1234**" for the password. Click **OK**.

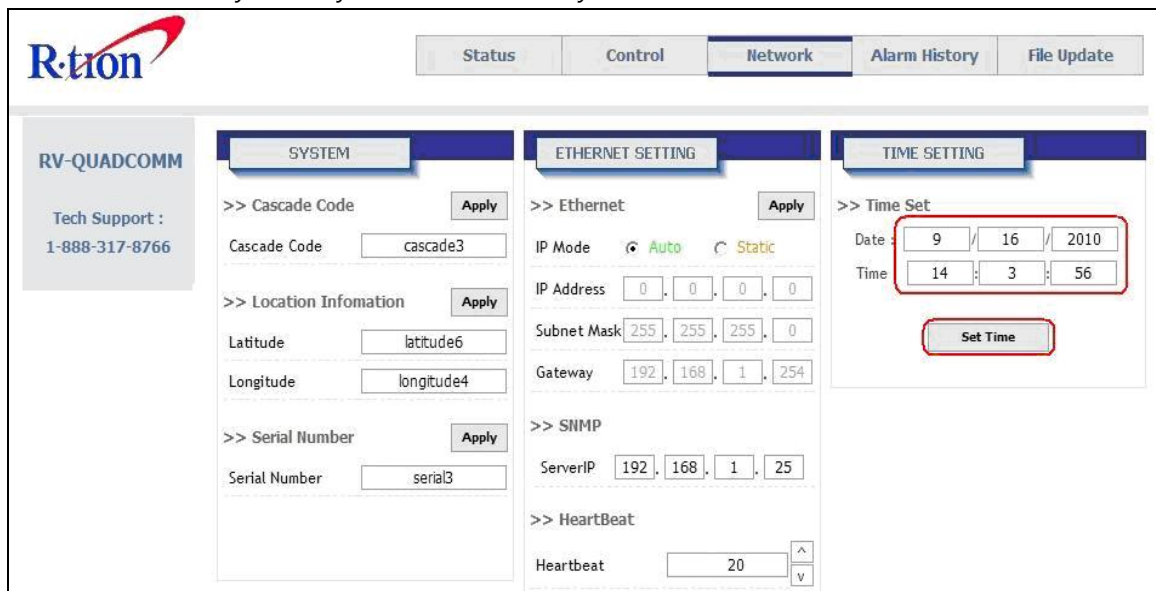


5.4. GUI Network Setup

The network page allows you to set up system information, configure Ethernet parameters, and set time.

5.4.1. Time Setting

The time will automatically set to your PC time when you click the **Set Time**.



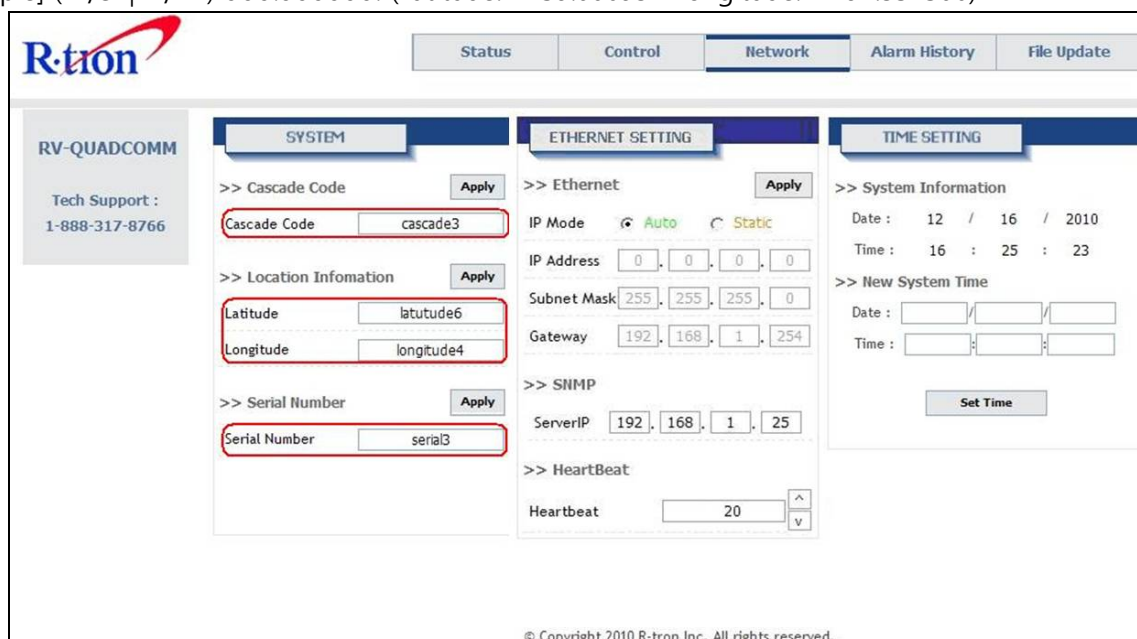
The screenshot shows the R-tron RV-QUADCOMM Network Setup GUI. The 'Network' tab is selected, and the 'TIME SETTING' sub-tab is active. The 'Time Set' section is highlighted with a red box, showing the date as 9/16/2010 and the time as 14:35. A 'Set Time' button is also highlighted with a red box. Other sections include 'SYSTEM' (Cascade Code, Location Information, Serial Number) and 'ETHERNET SETTING' (IP Mode, IP Address, Subnet Mask, Gateway, SNMP, HeartBeat).

5.4.2. System Information

Cascade Code: Type the pre-assigned code.

Location Information: Enter the latitude and longitude of the location otherwise you cannot access the system setup. You can input values either in Decimal Degrees or Degrees-Minutes-Seconds.

[Example] ('N/S' | 'E/W') ddd.ddddddd (Latitude: N 39.006957 Longitude: W 94.532306)



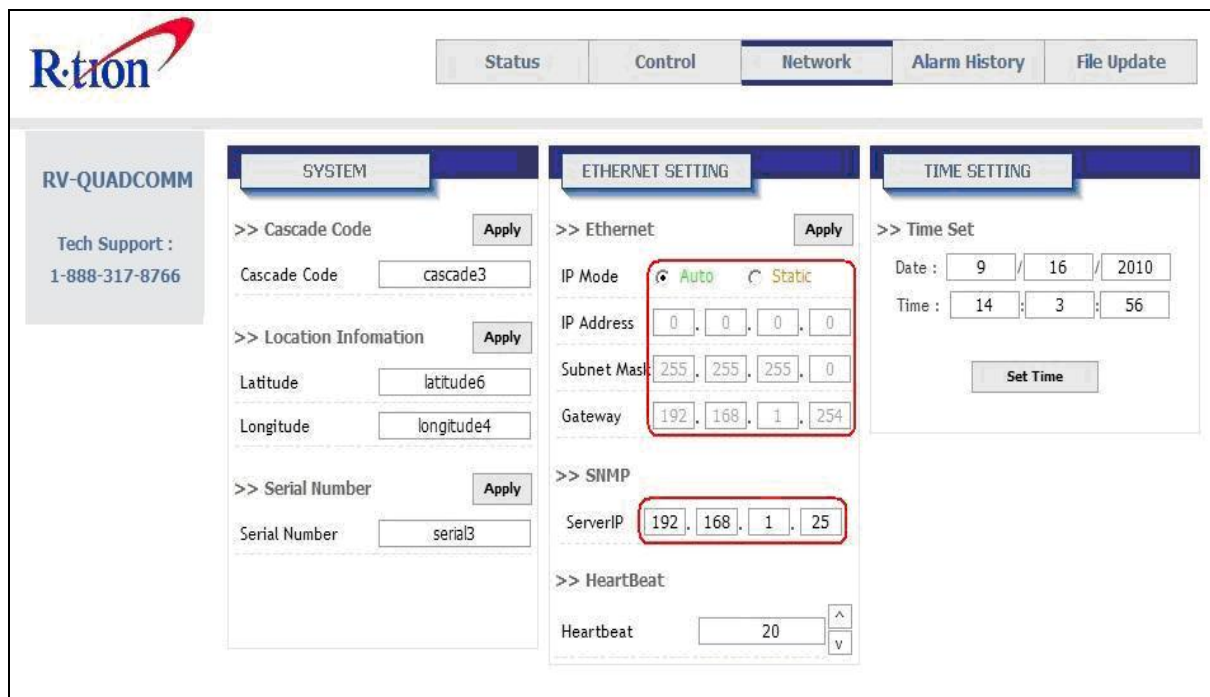
The screenshot shows the R-tron RV-QUADCOMM Network Setup GUI. The 'Network' tab is selected, and the 'SYSTEM' sub-tab is active. The 'Cascade Code' field is highlighted with a red box, showing 'cascade3'. The 'Location Information' section is also highlighted with a red box, showing 'latitude6' and 'longitude4'. The 'Serial Number' field is highlighted with a red box, showing 'serial3'. The 'TIME SETTING' sub-tab is also visible, showing the current date and time. A 'Set Time' button is present at the bottom of the 'TIME SETTING' section.

5.4.3. Ethernet setting

Ethernet and SNMP IP address are automatically updated every 5 seconds.

When you select AUTO, the assigned IP address will appear.

Select STATIC to enter and IP address manually.



RV-QUADCOMM
Tech Support :
1-888-317-8766

SYSTEM
 >> Cascade Code
 Cascade Code
 >> Location Infomation
 Latitude
 Longitude
 >> Serial Number
 Serial Number

ETHERNET SETTING
 >> Ethernet
 IP Mode ☒ Auto ☐ Static
 IP Address
 Subnet Mask
 Gateway
 >> SNMP
 ServerIP
 >> HeartBeat
 Heartbeat

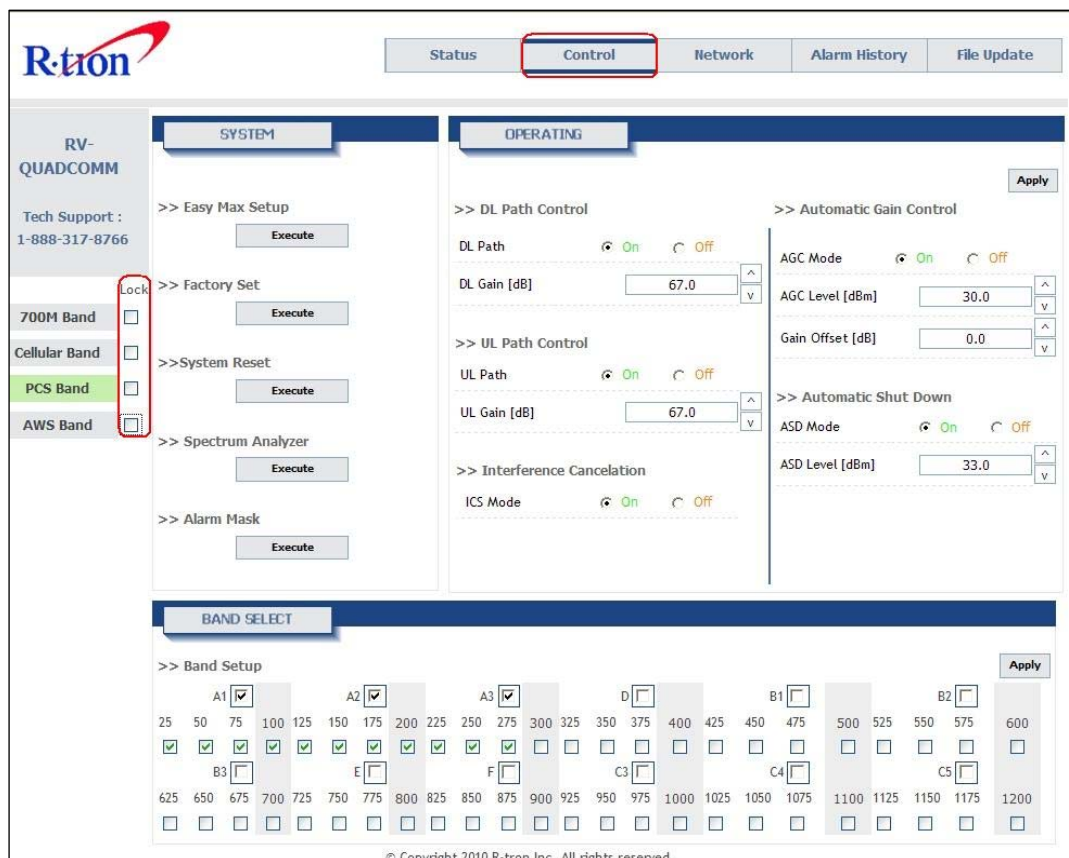
TIME SETTING
 >> Time Set
 Date : / /
 Time : : :

5.5. GUI System Control

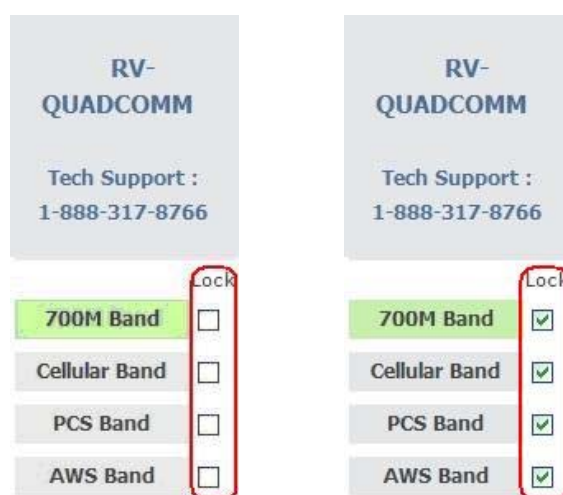
The user can control the repeater locally using the built-in WEB GUI.

5.5.1. Lock Select

Lock allows you to select alarm reporting via SNMP for each band.



The screenshot shows the 'Control' tab of the RV-QUADCOMM WEB GUI. On the left, there is a 'Lock' checkbox and a list of bands: 700M Band, Cellular Band, PCS Band, and AWS Band. The 'BAND SELECT' section at the bottom shows a grid of frequency bands with checkboxes for selection. The 'Lock' checkbox is highlighted in red.



The image shows two side-by-side panels of the RV-QUADCOMM WEB GUI. Both panels show the 'Lock' checkbox and the list of bands. The left panel shows the 'Lock' checkbox unchecked, and the right panel shows it checked. The '700M Band' is highlighted in green in both panels.

- **No Lock checked:** Reporting will not be made to the server.
- **Lock Checked:** Only lock checked bands will report to the server. When you don't use full bands, leave the band you are not using unchecked.

5.6. GUI System Control for Each Band

5.6.1. QUADCOMM-700N (700M Band)

1. Band select

Select the repeater band.



RV-QUADCOMM

Tech Support :
1-888-317-8766

Lock

700M Band ☒

Cellular Band ☒

PCS Band ☒

AWS Band ☒

2. Channel select

Select channel band for the donor cell site and click Apply.



BAND SELECT

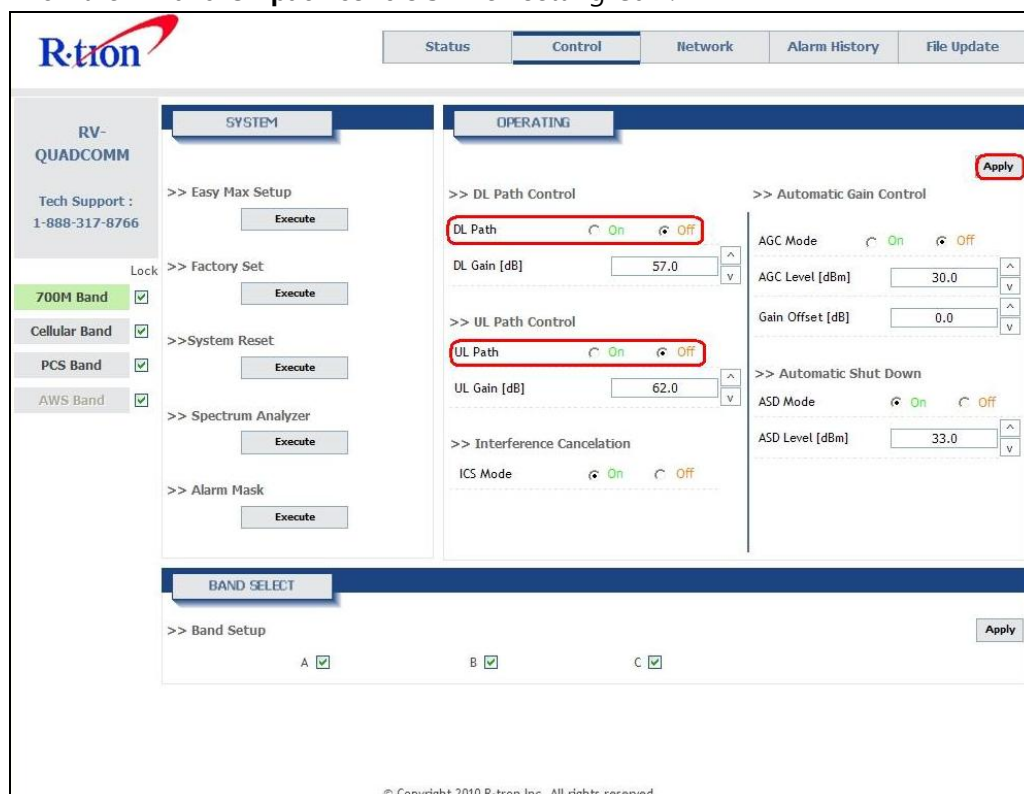
>> Band Setup

A ☒ B ☒ C ☒

Apply

3. DL and UL Path Control

Turn off the **DL** and **UL** path controls when setting Gain.



RV-QUADCOMM

Tech Support :
1-888-317-8766

Lock

700M Band ☒

Cellular Band ☒

PCS Band ☒

AWS Band ☒

>> Easy Max Setup

>> Factory Set

>> System Reset

>> Spectrum Analyzer

>> Alarm Mask

BAND SELECT

>> Band Setup

A ☒ B ☒ C ☒

Apply

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4. A. Auto Gain Control Setting

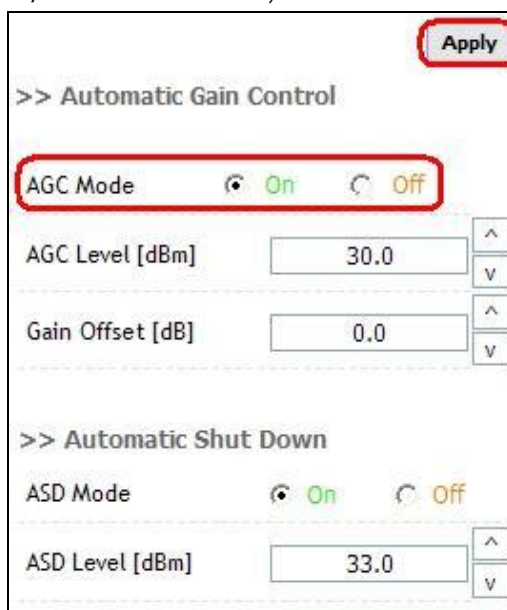
Step 1. AGC must be turned on. AGC automatically assigns gain in accordance with AGC level. Use AGC level to increase or decrease gain.

(**Gain Offset** is a gain differential between DL output gain and UL output gain.)

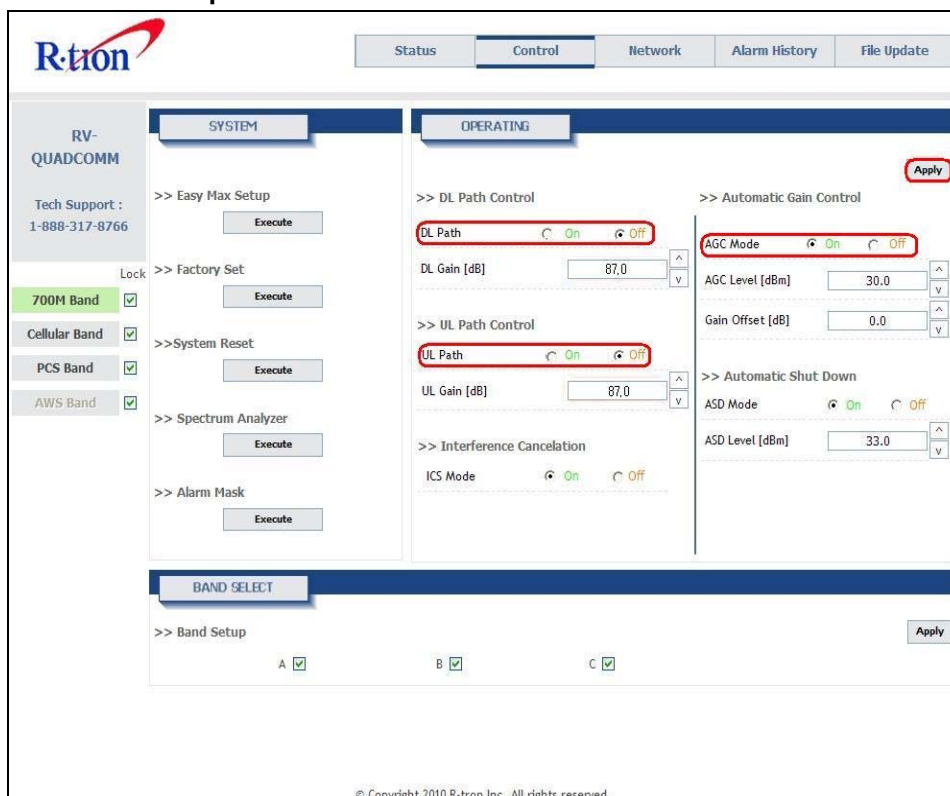
Ex> **AGC Level 30dBm, Gain Offset -3dB → DL Output +30dBm, UL output +27dBm**

AGC Level 30dBm, Gain Offset +1dB → DL Output +30dBm, UL output +31dBm

(700M, PCS, AWS : 30dBm / CELLUAR : 25dBm)



Step 2. Turn on the **DL** and **UL** path controls

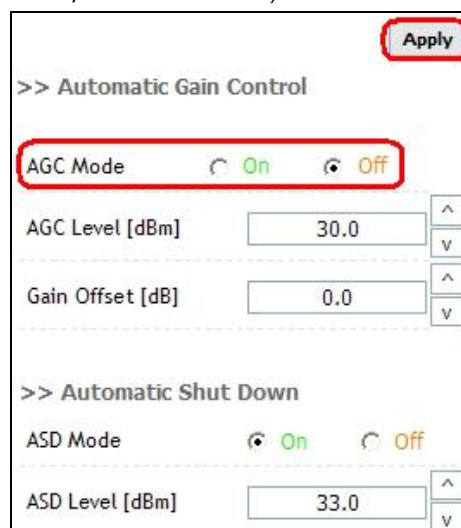


4.B. Manual Gain Setting

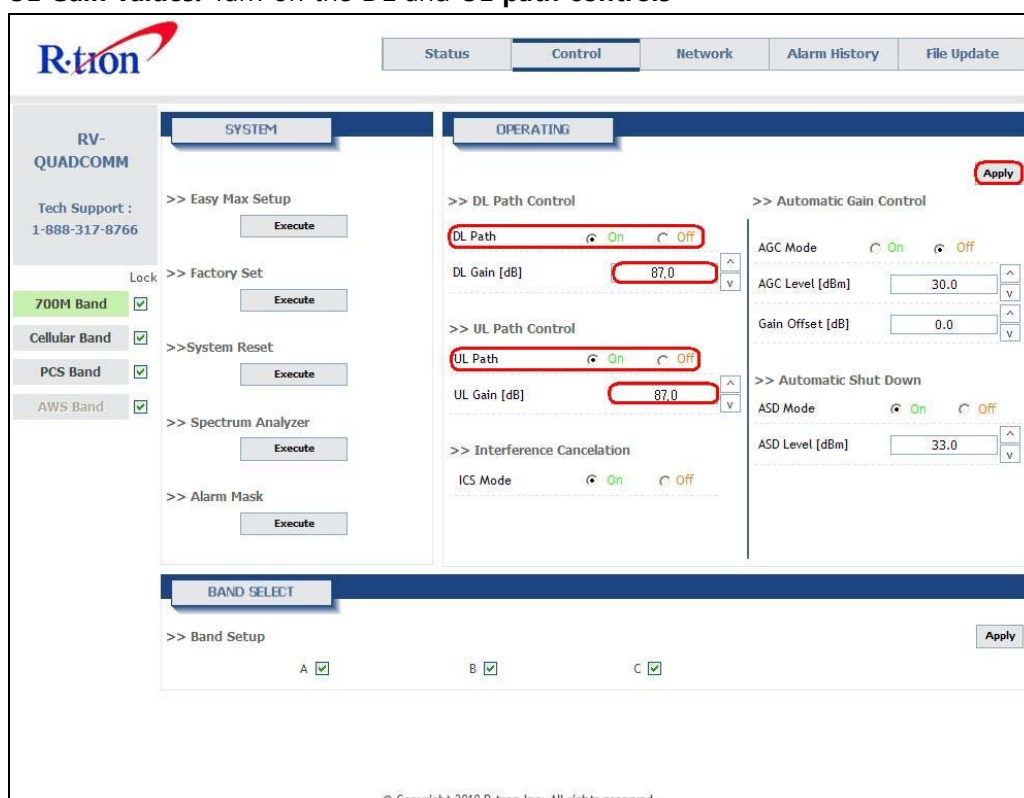
When you want to set gain value not using Auto Gain control refer to the following;

Step 1. For manual gain control AGC must be turned off

(700M, 1900M, 2100M : 30dBm / 800M : 25dBm)



Step 2. The user can select any gain value as long as it does not over-drive the amplifier or exceed isolation requirements. Gain is automatically limited where conditions do not permit high gain. Select the **DL** and **UL Gain** values. Turn on the **DL** and **UL path controls**



Result 1 DL and UL gain are fixed and the output power depends on the input power

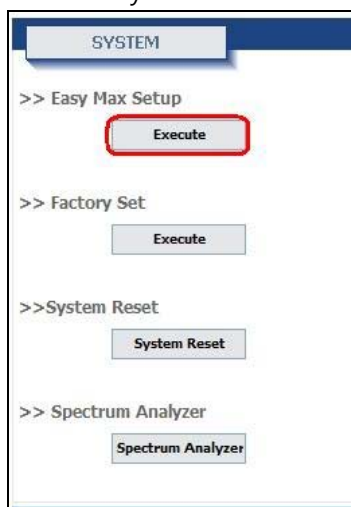
Result 2 Maximum DL Output Power 30dBm

If the DL Input Power ≥ -57 dBm and the isolation value is $\geq \text{max gain} + 15$ dB

4.C. Easy Max Setup

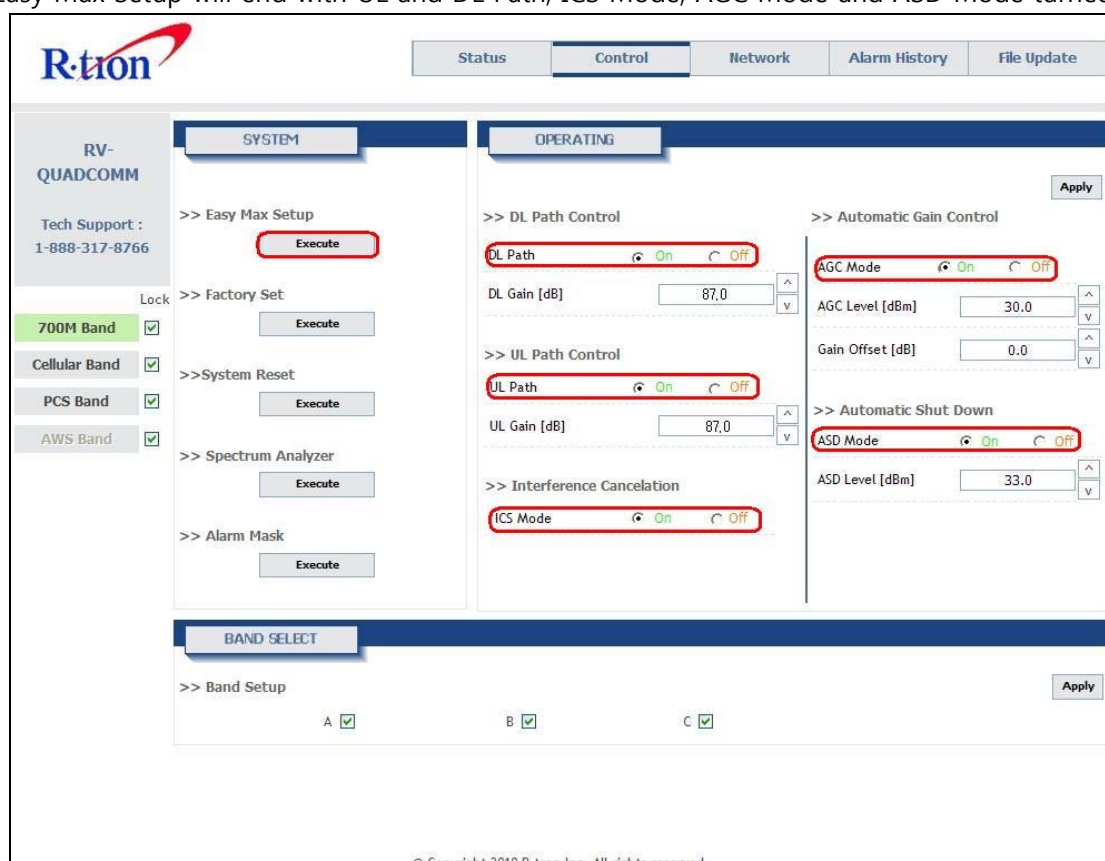
You can configure the system automatically without manual operation.

Step 1. Easy Max Setup function will automatically run with one click of Execute button.



Step 2. With Execute button clicked, **Output Power will be set by AGC level automatically.**

Easy Max Setup will end with UL and DL Path, ICS Mode, AGC Mode and ASD Mode turned On.



Result 1 DL and UL gain are fixed and the output power depends on the input power

Result 2 Maximum DL Output Power 30dBm

If the DL Input Power $\geq -57\text{dBm}$ and the isolation value is $\geq \text{max gain} + 15\text{dB}$

5.7. GUI STATUS

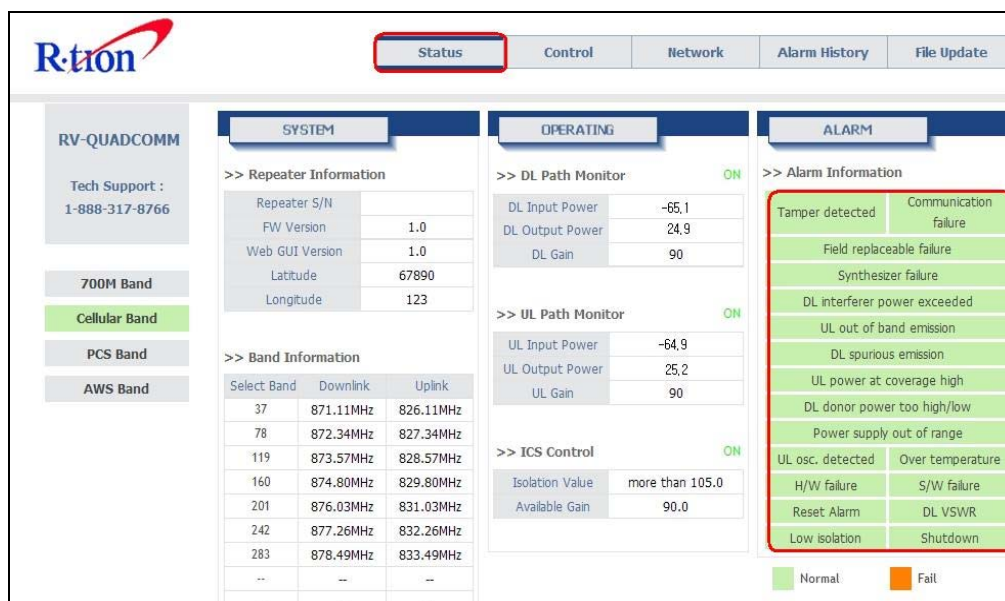
The status page displays system, operating, and alarm information.

When you set any value on the Control page the change will be reflected on Status page.

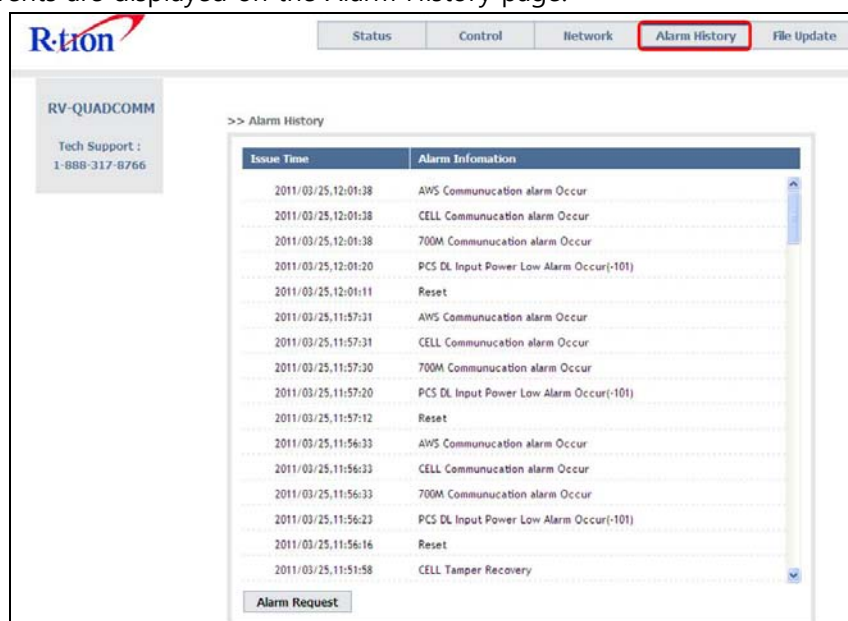
- Alarms

If an alarm occurs, the alarm LED on the repeater will turn on.

Alarms shown on the status page will have orange (alarm) or green (normal) background depending on the condition.



Details for alarm events are displayed on the Alarm History page.

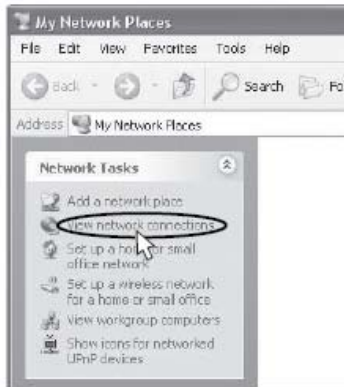


For corrective action please refer to the troubleshooting section.

5.8. Reference

5.8.1. Initial Network Setup

- Windows XP

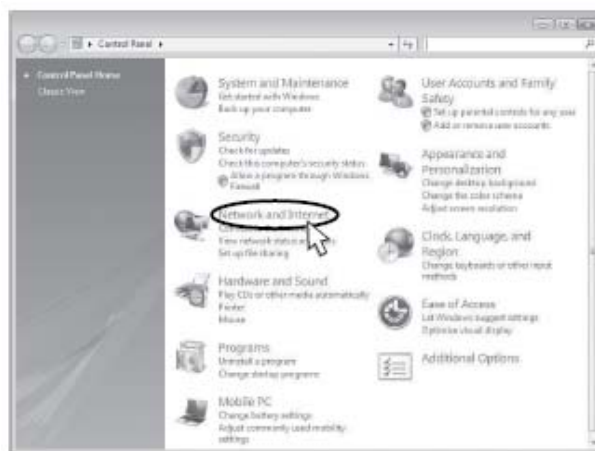
Step 1 : Click the Start button and select My Network Places.	Step 2 : Click View network connections
	
Step 3 : Right-click Local Area Connection to see a shortcut menu and click Properties	Step 4 : Select Internet Protocol (TCP/IP) and click Properties
	
Step 5 : Check Obtain an IP address automatically and click OK	Step 6 : Close all windows.
	

- Windows Vista

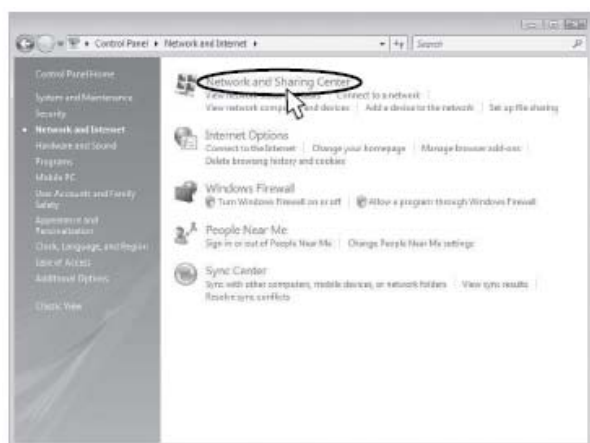
Step 1 : Click the **Start** button and select **Control Panel**



Step 2 : Click **Network and Internet**.



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



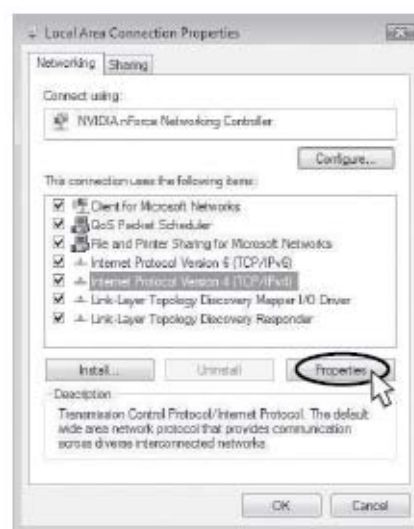
Step 4 : Click **View status** of **Local Area Connection**.



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



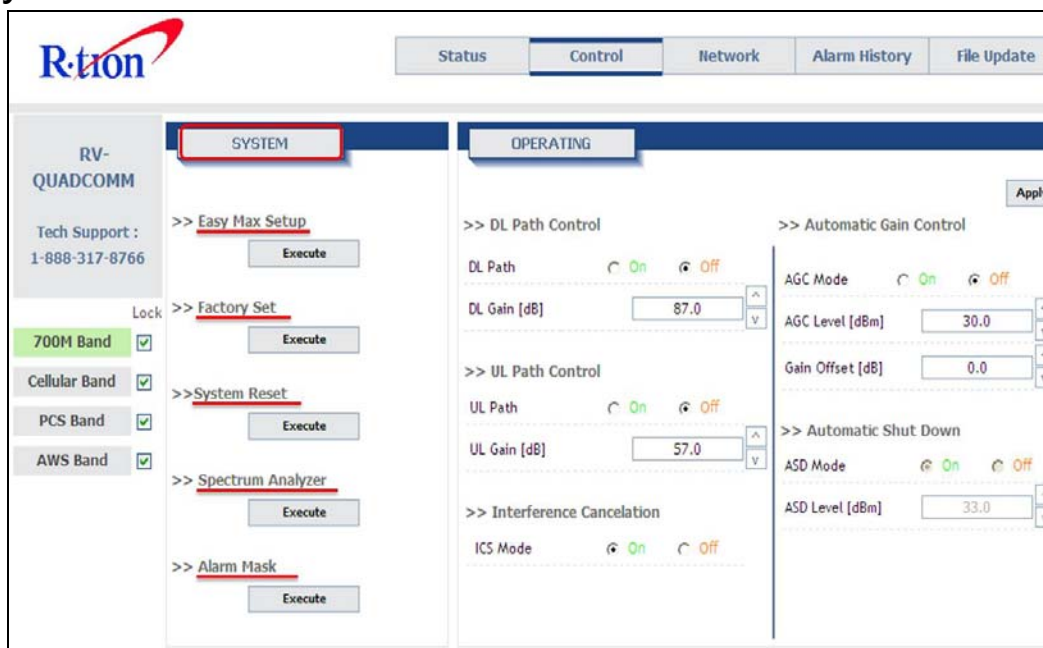
Step 6 : Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



Step 7 : Check Obtain an IP address automatically and click OK.	Step 8 : Close all windows
	

5.8.2. GUI Control Functions

5.8.2.1. System Function



1. Easy Max Setup :

Allows for automatic system setup without manual operation.

(DL/UL Path Off => Min Gain setting => DL/UL Path, ICS, AGC, ASD On)

2. Factory Set :

Resets values on the Control page to the factory value.

(DL/UL Path Off => Min Gain setting => DL/UL Path, AGC Off / ICS, ALC, ASD On)

3. System Reset :

Rests the system without changing user settings. Execute this function after a firmware download or when you suspect system errors.

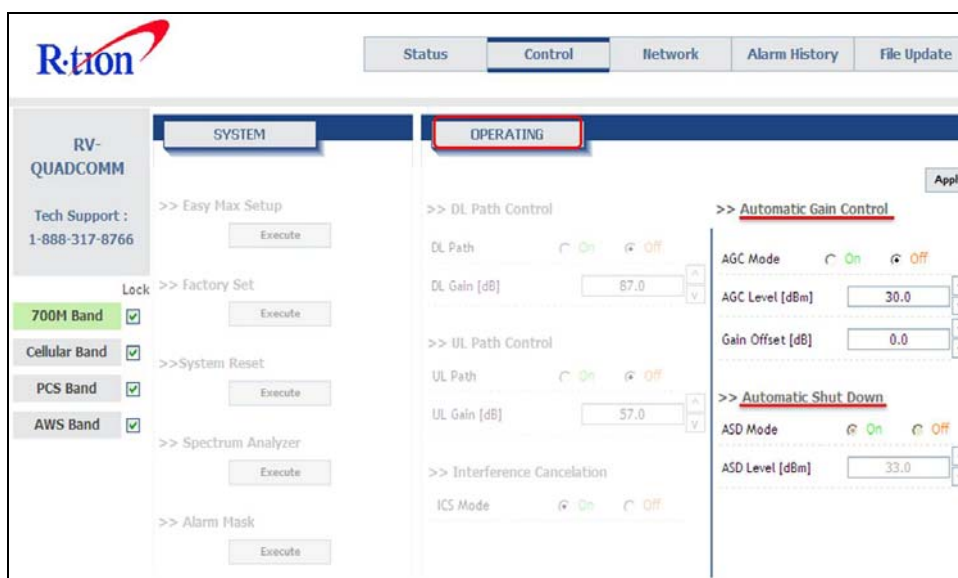
4. Spectrum Analyzer :

A virtual spectrum analyzer is provided for your continence.

5. Alarm Mask :

De-select alarms that you don't want.

5.8.2.2. AGC and ASD Function



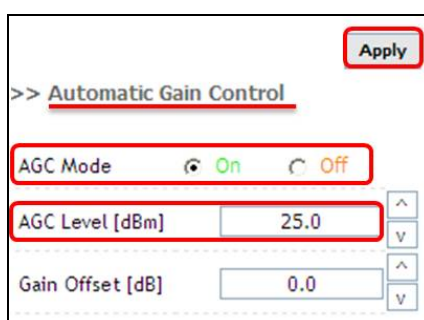
AGC (Automatic Gain Control) : AGC feature prevents the repeater from exceeding its maximum output power by reducing the gain automatically. AGC is used to adjust the gain to an appropriate level for a range of input signal levels.

ASD (Automatic Shut Down) : ASD protects the repeater from oscillation or excessive input signal and eliminates any degradation to the network.

There are three parameters: **ASD Level**, **ASD Time**, and **ASD Iteration**.

If the output power reaches higher than the “**ASD LEVEL**”, the repeater will shut down for “**ASD TIME**” seconds and then turn the amp back on to measure output power. If shut down repeats “Iteration” times, the repeater will shut down permanently.

<AGC Example>



[applied at the Quadcomm-800]

Select AGC On and enter a value equal to or less than 30dBm, click **APPLY** and **ON**.

For a repeater with 25dBm maximum output power, 90dB maximum gain/25dB gain Control range,

→ If the input signal is -65dBm and AGC level is 15dBm, the gain will be 80dB.

* To apply this for each Band refer to Automatic Gain Control Setting following section of 5.6.

<ASD Example>

ASD is set On.

>> Automatic Shut Down

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

(700N, PCS, AWS)

>> Automatic Shut Down

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

(CELLULAR)

Only Admin can control ASD Mode and ASD Level.

Type the desired value for the ASD Level and then Click **APPLY** and **ON**.

For a repeater with 30dBm Maximum Output Power, 97dB Maximum Gain/
30dB gain control range, assuming **ASD Level: 33dBm, ASD Time, ASD Count**
are already fixed at 3 seconds, 10 times.

If the composite output power is 33dBm(ASD Level) and higher, the repeater
will shutdown for 3 seconds (ASD Time). If the shutdown occurs 10 times (ASD Count),
the 11th shutdown will be permanent.

After shutdown the repeater runs Easy setup automatically.

Finally, following multiple shutdown events, isolation check function executes.

6. Troubleshooting

Before contacting your service center, please make sure you refer to the following guide. If the RV-QUADCOMM does not work normally after completing the following troubleshooting tips, please contact your local dealer or service center.

6.1. LED Alarm

Problem	Check Point	Solution
Critical	POR LED is red	Power supply out of range - Confirm AC 85-264V common use power and power cable.
	TD LED is red	Tamper detected - Check the status of the RF Card equipment.
	BTF LED is red	Built-in test failure - Check which alarm occurred by the WEB GUI Alarm Status. - UL Out-of-band emissions, DL Spurious emissions, DL Interferer power exceeded, DL Low isolation, Over temperature.
	RMF LED is red	Replaceable module failure - select RF Card's alarm LED is red - reset RF Card's power - RF Card's alarm LED is still red, Contact Technical Support
	OSC LED is red	Oscillation detected - Check Donor/Server ant. Isolation. Reduce gain and/or increase antenna isolation.
	SD LED is red	Shutdown - Check the S/D reason using WEB GUI. - If the DL and UL Path controls are Off, turn it back On. - If Overpower S/D occurred reduce manual gain value or AGC level.
Minor	DCF LED is orange	Donor Circuit failure - DL Donor Power too high - After checking the DL input Power, adjust the location of the antenna or install the external Atten antenna to be the permitted range if it is over the permitted level.
	DCF LED is orange	Donor Circuit failure - DL Donor Power too high - After checking the DL input Power, adjust the location of the antenna or install the external Atten antenna to be the permitted range if it is over the permitted level

Problem	Check Point	Solution
	DPL LED is orange	Donor power too low - DL Donor Power too low - If the DL input Power is too low, adjust the location and/or azimuth of the antenna.
	CCF LED is orange	Coverage Circuit failure - UL Power at coverage high, DL VSWR - If the DPL LED is normal but the CCF LED is in alarm, check mobile device for excessive TX power level.
	RE LED is orange	Reset engaged - Reset alarm - Do not control the Repeater during reset.
	AGC LED is orange	AGC active - AGC On - It means that AGC is On and operating.

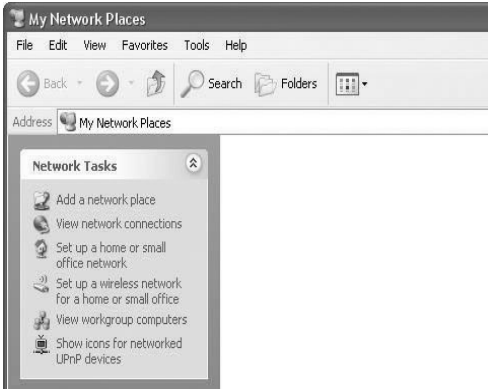
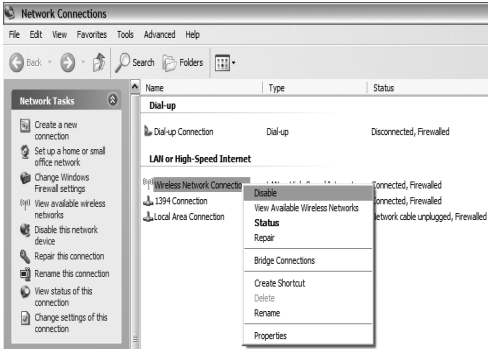
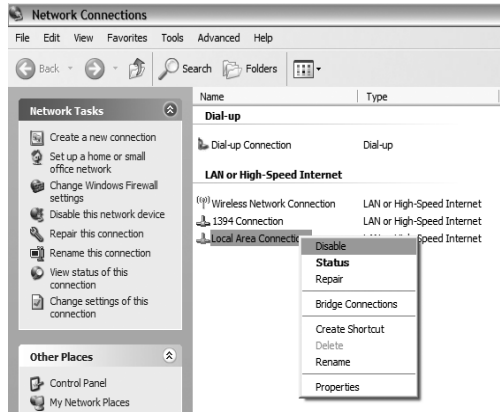
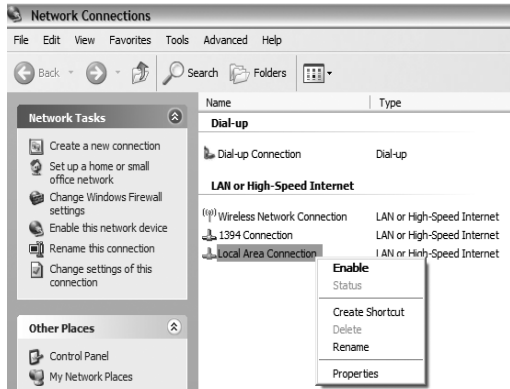
6.2. GUI Alarm

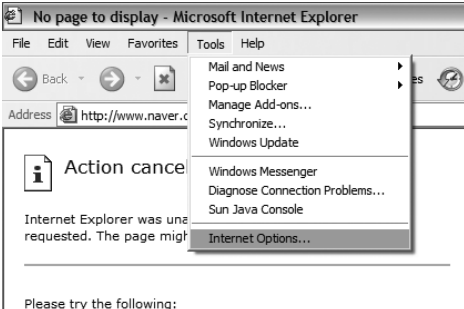
Problem	Check Point	Solution
General	Tamper detected	Install the RF Card and set the Lock using the WEB GUI.
	Power supply out of range	- Check if the input power is AC85-264V and if it is normal, Contact Technical Support.
	Communication failure	Check the status of the Data Cable connection. If communication failure occurred at every connected RF Card, Reset the MCU. If communication failure occurred at a particular RF Card, Reset RF Card.
	Field replaceable module failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Reset alarm	Do not control anything during the reset.
	Manual shutdown alarm	This may be caused when any of DL and UL path controls are off by Manual gain setting.
	Heartbeat	Check the connection of the Remote NMS Cable. Check the interval of Heartbeat on the WEB GUI.
Uplink	Oscillation detected	Check Donor/Server antenna Isolation value. If the gain value is lower than repeater gain +15dB, adjust the antenna location and or reduce gain.

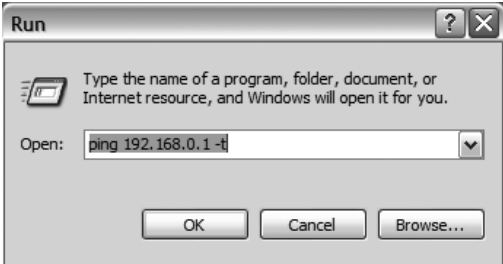
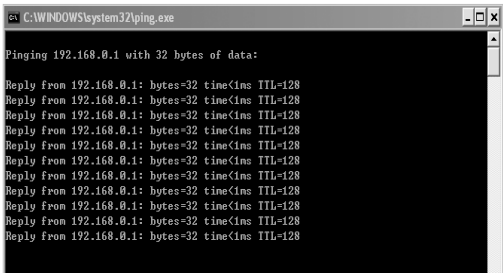
Problem	Check Point	Solution
Uplink	Power at coverage port too high	If the UL Input Power is too high, suspect excessive mobile TX power. Determine root cause of high mobile TX power.
	Synthesizer failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Hardware failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Software failure	If the same alarm is occurs after resetting the RF Card, request technical support.
	Out-of-band emissions out of spec	This may be caused by inter-modulation when other signal is too high. You can solve this problem by adjusting antenna location.
Downlink	Donor Power too high/low	Check the DL Input Power, need to adjust the antenna location, azimuth or install attenuator.
	Low isolation	Check Donor/Server antenna Isolation value. If the Gain value is lower than repeater gain +15dB, adjust the antenna location and/or use less repeater gain.
	Synthesizer failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Hardware failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Software failure	If the same alarm occurs after resetting the RF Card, request technical support.
	Spurious emissions out of spec.	Check for high VSWR and/or RF interference.
	Interferer power exceeded	This may be caused by inter-modulation when other signal is too high. You can solve this problem by adjusting antenna location.

6.3. Communication Alarm

Problem 1	Check Point	Solution
WEB GUI display error	1. WEB GUI failure 2. Failure to restore WEB GUI display error by Refresh (F5)	Execute Ctrl + F5 and verify WEB GUI display restore

Problem 2	Solution
Cannot communicate with the repeater.	1. Click My Network Places → View network connections. Right-click on the Wireless Network Connection and then click Disable.    2.. Right-click on the Local Area Connection and then click Disable. After clicking Disable, click Enable again.  

Problem. 2	Solution	
Cannot communicate with the repeater.	3. Double click the Local Area Connection and then click Support tab → Repair. 	4. Open the Internet Browser and then select Tools → Internet Options. Click Delete Files button in the Temporary Internet files section.   

Problem. 2	Solution	
Cannot communicate with the repeater.	5. Click Start and select Run. Type "ping 192.168.0.1 -t" and click OK.   	

7. Specifications

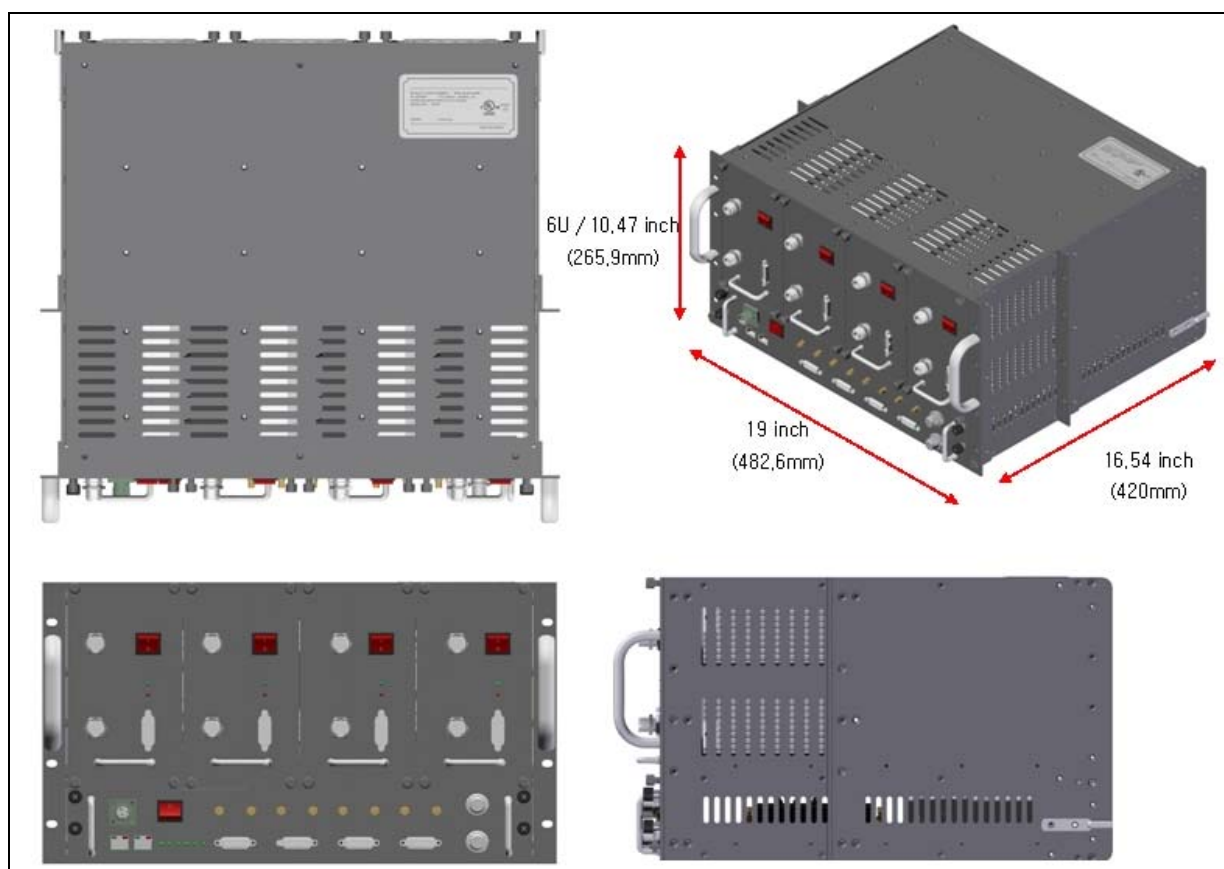
7.1. RF Characteristics

7.1.1. QUADCOMM-700N (700M Band)

Parameter		700M	
		TX(Down-Link)	RX(Up-Link)
Frequency Range		728.5 - 733.5MHz (A) 734.5 - 739.5MHz (B) 746 - 756 MHz (C)	698.5 - 703.5MHz (A) 704.5 - 709.5MHz (B) 777 - 787 MHz (C)
Band Select		A, B, C block	
Channel Select		Max assumes 1x10 MHz or 2x5 MHz channels	
Service		LTE Service	
Max. Composite Input Power		-27dBm	-27dBm
Composite Output Power Range		30 dBm	30 dBm
Gain Range		57 - 87 dB	57 - 87 dB
Gain Offset			recommend -2dB
AGC	Range	30 dB	
Gain Ripple		1 dB peak to peak	
Noise Figure	RF Card Only	≤ 5 dB	≤ 5 dB
	System	≤ 7 dB	≤ 7 dB
EVM		8%-12.5%	12.5%-17.5%
Operation at Minimum Stability Point (EVM)	15dB Coupling	8%	12.50%
	10dB Coupling	12.50%	14.50%
	5dB Coupling	17.50%	17.50%
Cancellation Window		1 μsec	
Cancellation Depth		Isolation +5dB	
Roll-off		50 dBc at ± 1 MHz	
Spurious Emission		FCC rule	
Return Loss		> 15dB	
Propagation Delay		< 6 μs	
Impedance		50Ω	

7.2. Mechanical Specification

Parameter	Specifications	Remark
RF connectors	N-female x 2	
Dimensions (W x H x D)	19 * 10.47 * 17.72 Inch 482.6 * 265.9 * 450 mm	W x D x H
Weight	134.3 lb / 60.9 Kg max	



7.3. Environmental Specification

Parameter	Specifications	Remark
Cooling	Convection	
Working Temperature	-10°C~50°C (14°F~122°F)	
Splash, Dust	IP -40	Indoor enclosure
Humidity	20%~90%RH	

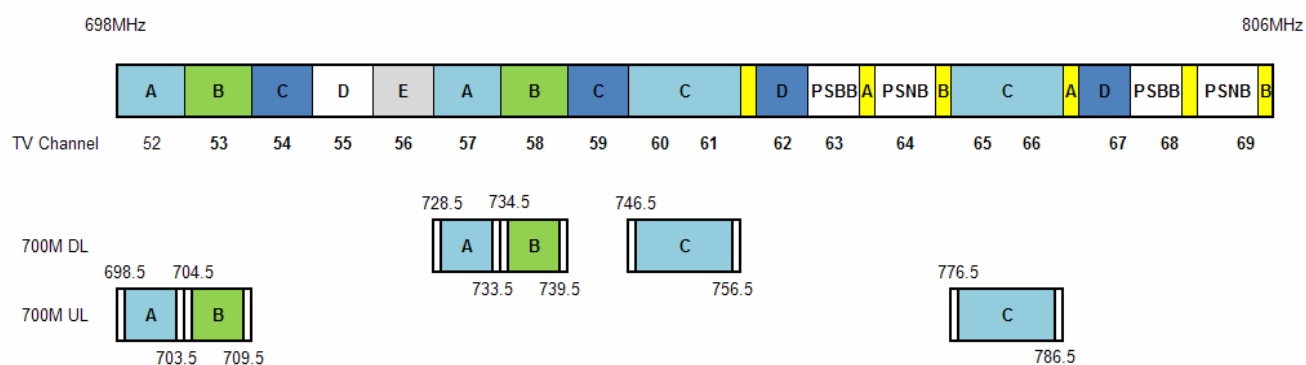
7.4. Electronical Specification

Parameter	Specification
Voltage	AC 85-264V
Current	+24V/27A (600W)
Frequency	50/60 (47-63)

8. Appendix

8.1. RV-Quadcomm Channel

700MHz Band



8.2. Warranty

LIMITED WARRANTY

This product, as supplied and distributed by R-tron, in the original carton, is warranted by R-tron against manufacturing defects in materials and workmanship for a limited warranty period of:

Five (5) Year Parts and Labor

This limited warranty begins on the original date of purchase, and is valid only on products purchased and used in the United States. R-tron will repair or replace this product, at our option and at no charge as stipulated herein, with new or reconditioned parts or products if found to be defective during the limited warranty period specified above. All replaced parts and products become the property of R-tron and must be returned to R-tron. Replacement parts and products assume the remaining original warranty.

This limited warranty covers manufacturing defects in materials and workmanship encountered in normal, and except to the extent otherwise expressly provided for in this statement, use of this product, and shall not apply to the following, including, but not limited to: damage which occurs in installation; applications and uses for which this product was not intended; altered product or serial numbers; cosmetic damage or exterior finish; accidents, abuse, neglect, fire, water, lightning or other acts of nature; use of products, equipment, systems, utilities, services, parts, supplies, accessories, applications, installations, repairs, external wiring or connectors not supplied or authorized by R-tron which damage this product or result in service problems; or incorrect electrical line voltage, fluctuations and surges; customer adjustments and failure to follow operating instruction. R-tron does not warrant uninterrupted or error-free operation of the product.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE LISTED AND DESCRIBED ABOVE, AND NO WARRANTIES WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY AFTER THE EXPRESS WARRANTY PERIODS STATED ABOVE, AND NO OTHER EXPRESS WARRANTY OR GUARANTY GIVEN BY ANY PERSON, FIRM OR CORPORATION WITH RESPECT TO THIS PRODUCT SHALL BE BINDING ON R-tron.

8.3. Return Material Authorization (RMA) Procedure

The return and exchange of products are not allowed without prior approval from R-tron America, Inc. Please follow the exchange procedure below.

1. Call Tech Support for troubleshooting.
2. If the device has hardware problem, R-tron will replace it if it is within warranty.
A RMA number will be issued for the return.
3. R-tron will ship the replacement and a return label will be provided.
4. The customer must return the product using the original packaging, including accessories.

