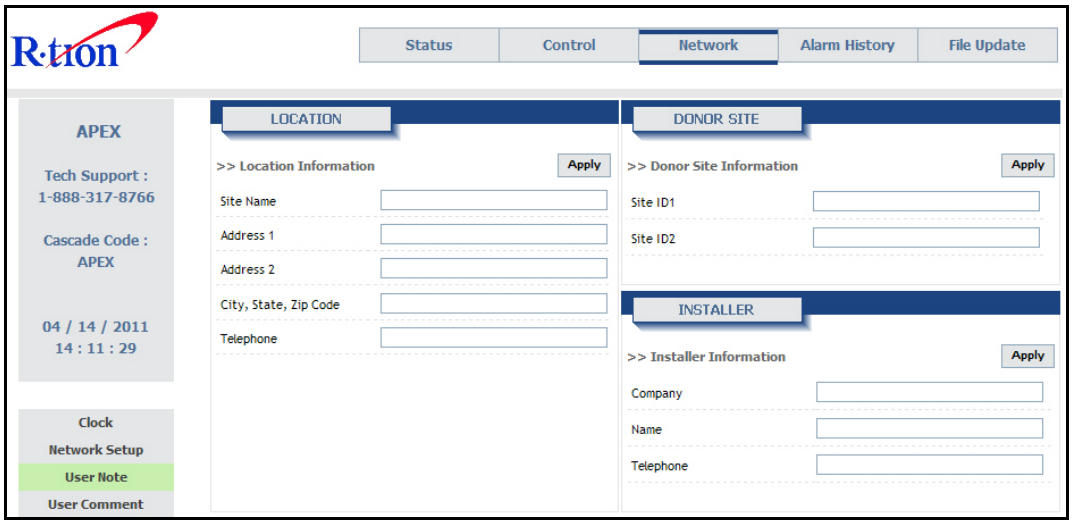
(Default value is 20 minutes.)

5.4.3. User Note



<User Note>

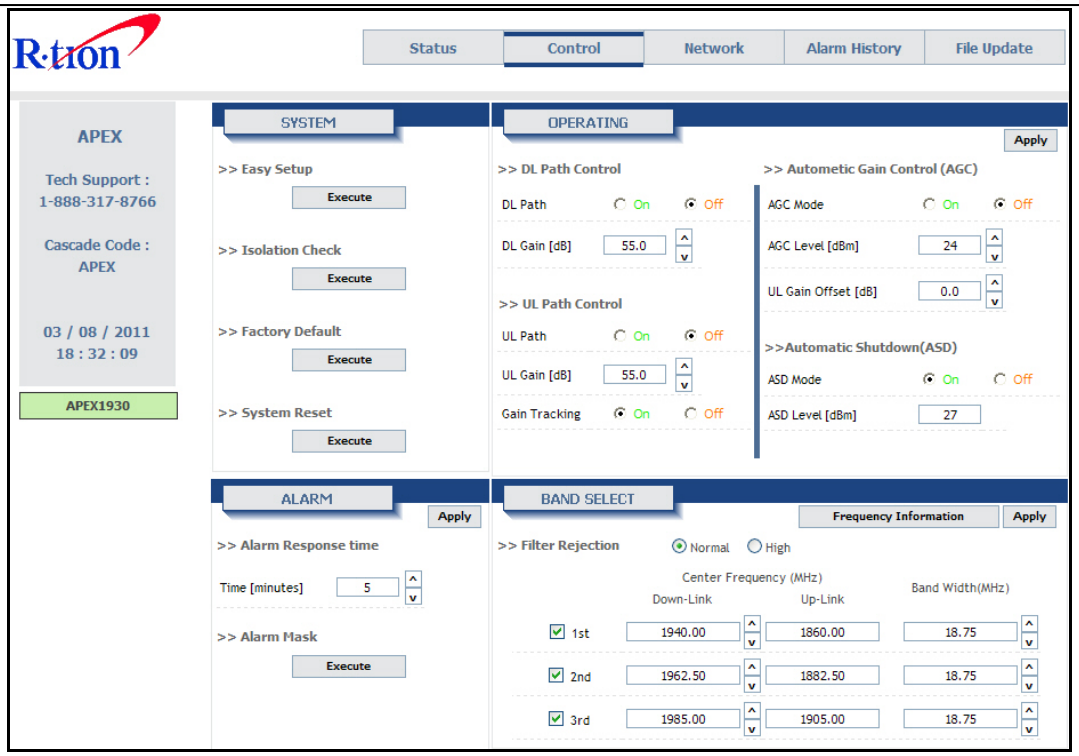
- **Location Information:** Type the location information such as the building name, address, city, state, zip code and telephone, and then click **Apply**.
- **Donor Site Information:** Type the base station's ID, and then click **Apply**.
- **Installer Information:** Type the installer information such as the company, name and telephone, Click **Apply**.

5.4.4. User Comment

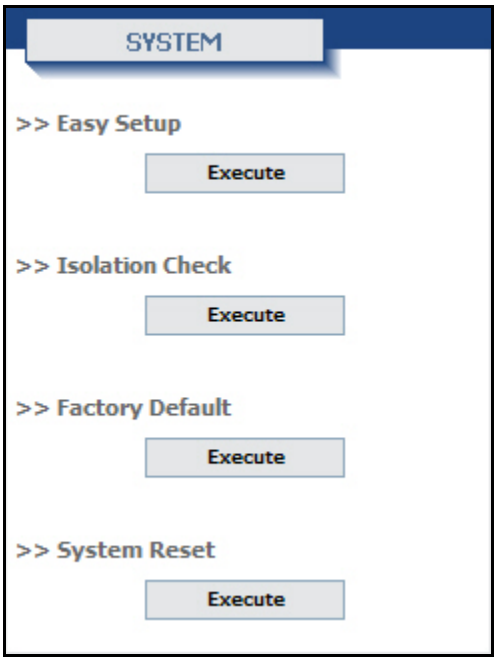
<User Comment>

- **User Comment:** The user can store up to 50 comments in memory. The length of each comment is limited to 20 characters.

5.5. GUI System Control



5.5.1. System Control

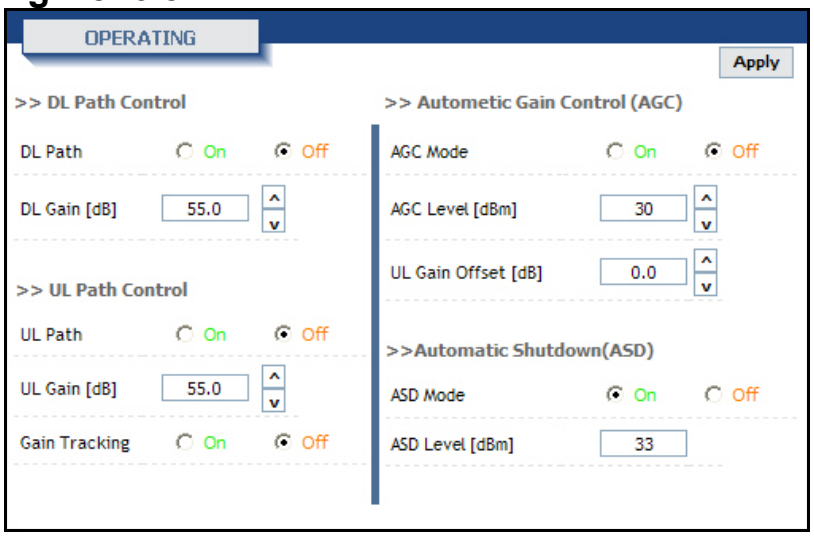


- **Easy Setup** is a fast start function. The function measures isolation, detects input level and assing gain to achieve maximum output power. The function ends with the repeater set to amplify siganals in both directions within the confines of the band selection. Before runing easy setup, set the center frequency and bandwidth (refer to 4.3.3 part 2).
  Maximum output power requires at least -71dBm input power and suficient antenna isolaiton.
- **Isolatoin Check** can be executed at anytime to measure isolation between the donor and server antennas. Isolation Check momentarily disables service. Isolation check automatically runs when factory default is initiated.
- **Factory Default** restores the amplifier to its initial state. The function ends with amplifiers off, AGC mode off, gain set to minimum(55dB) and UL gain offset set to 0dB. Band sellection and

all other system parameters are not changed. The featurs is usefull in claering abnormal conditions.

- **System Reset** cycles the microporcessor unit. The function is similar to switching off/on the repeater power switch.

5.5.2. Operating Control



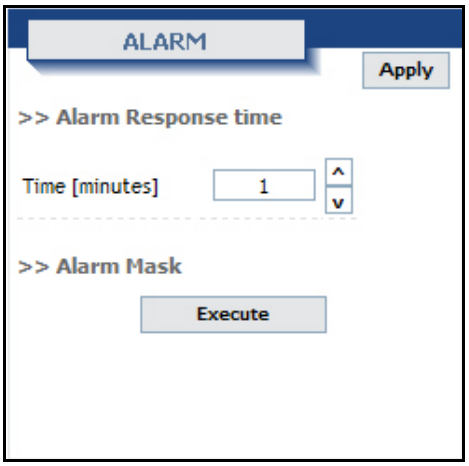
- **DL and UL Path Control** allows the user to toggle on or off the power ampligiers.
- **DL and UL Gain** is available when AGC mode is off. The user may enter gain values manually. Manual gain control is an alternative to autonatic gain control(AGC). Manual gain is disabled (grayed out) when AGC mode is on. Gain cannot be controlled manually above the available gain found on the status page. The system will not allow gain to be increased such that maximum output power(24dBm) is exceeded.
- **Gain Tracking** sets UL gain equal to DL gain. The feature helos maintain forward and reverse link ballance. The function control is grayed out when AGC mode is on.
- **Automatic Gain Control :**

- In contrast to manual gain control, **automatic gain control (AGC)** sets gain such that the desired amplifier output level (dBm) is automatically set.
- The user controls gain by adjusting the **AGC level.** The user may set the level from 0dBm to 24dBm. AGC can be used to control the signal level radiated from the server antennas.
- AGC may also be user to match the repeater to a DAS (distributed antenna system). AGC level may be restricted by available gain and DL input power.

- **UL Gain offset** is used in conjuction with AGC to reduce the amount of amplification in the reverse direction (uplink). In the cases UL offset is set to 0dB.
- **Automatic Shutdown (ASD):**

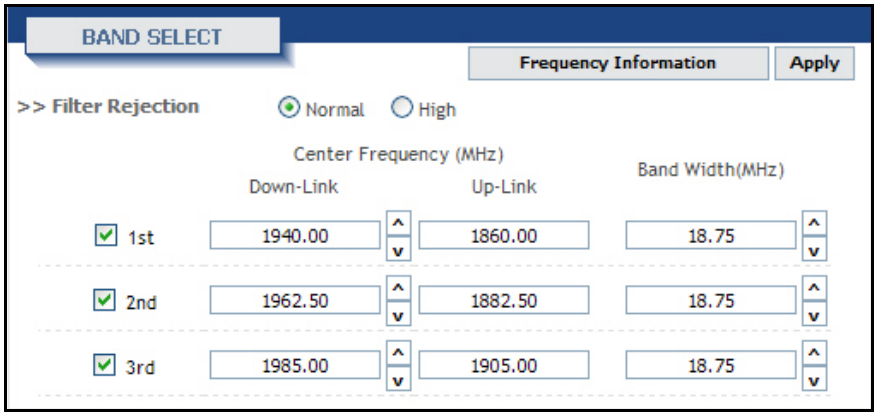
- ASD temporarily shuts down the amplifier if the ASD level is exeded. It is not necessary to turn off ASD. ASD events are stored in the alarm hostory log. Repeated ASD events will evenually shutdown the amplifier permanently and trigger the external shutdown lamp.
- ASD Level is set to 27dBm by default. It is not necessary to change the default level.

5.5.3. Alarm Control



- **Alarm response time** may be set between 1 and 5 minutes.
- **Alam Mask** allows the user to customize the type of alarms sent to the SNMP server when remote monitoring is in use.

5.5.4. Band select



- Band select sets the digital filter to the **center frequency and bandwidth** of the local service for which the repeater is intended to ampligy. Likewise, all other signals outside of the selected **Center Frequency and Bandwidth** are rejected.
- The user can select one, two three distinct sections within the PCS band. Each of the **1st, 2nd and 3rd** filter blocks can be set to 1MHz to 20MHz of **Bandwidth.** Only the downlink center frequency is set by the user. The uplink center frequency are automatically set in acordance with the downlink frequencies.
- **Filter Rejection** allows the user to change the digital filter characteristics. Normal rejectrion is used for CDMA and EVDO service. High regection is used for LTE service.
- **Frequency information** is available as a reference for seting the center frequency and band width (refer to section 7).

5.6. GUI System Control

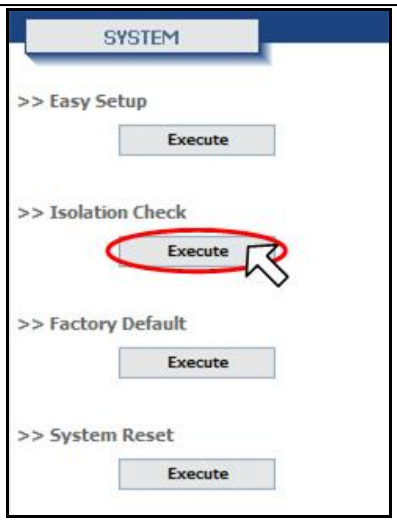
5.6.1. Manual Setting [Recommended]

5.6.1.1. Auto Gain Control Setting

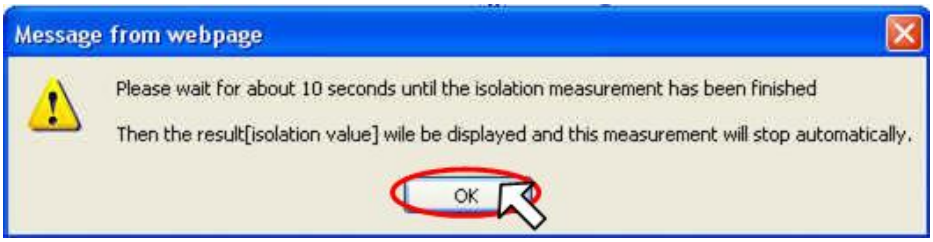
Step 1. Isolation Check

The Isolation will calculate the Available Maximum Gain which defines the maximum gain to be setup.

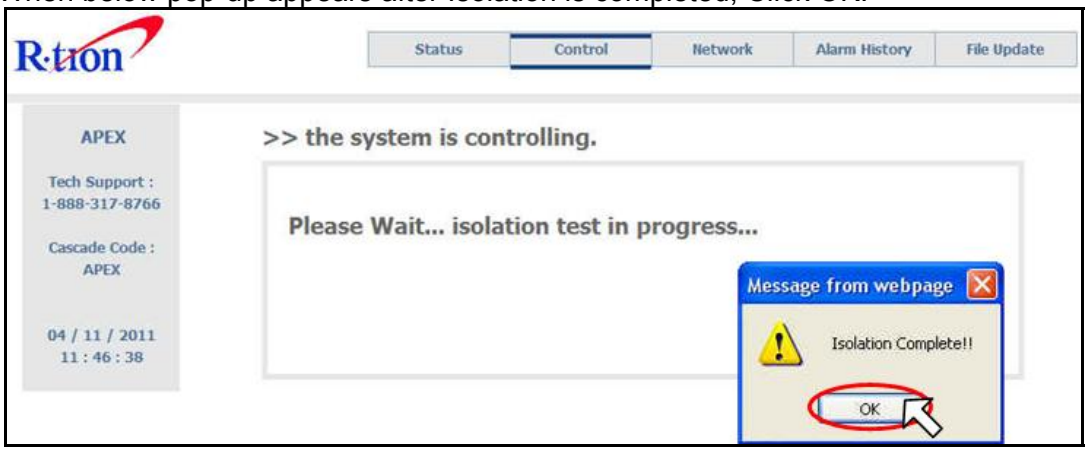
Click Isolation



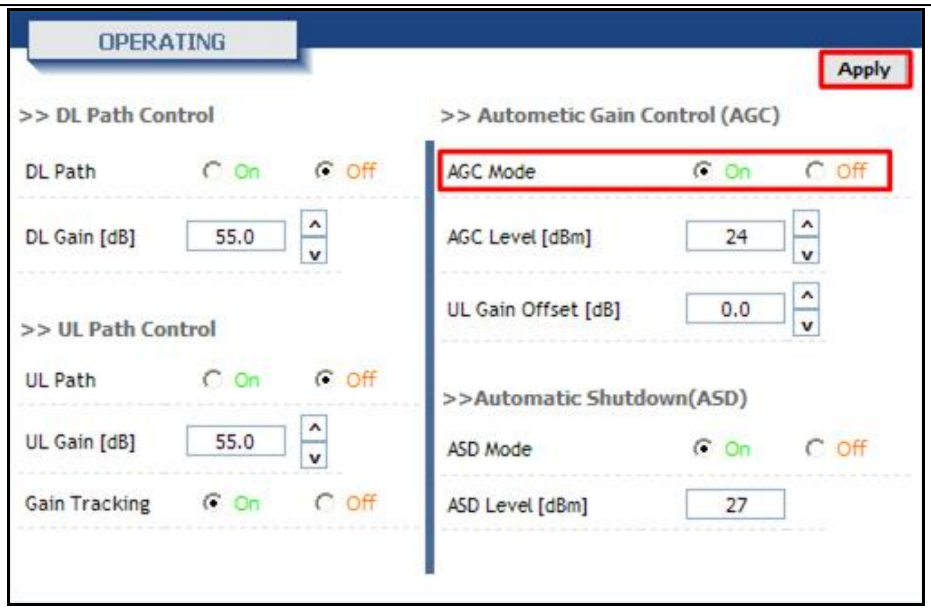
Step 2. Click OK.



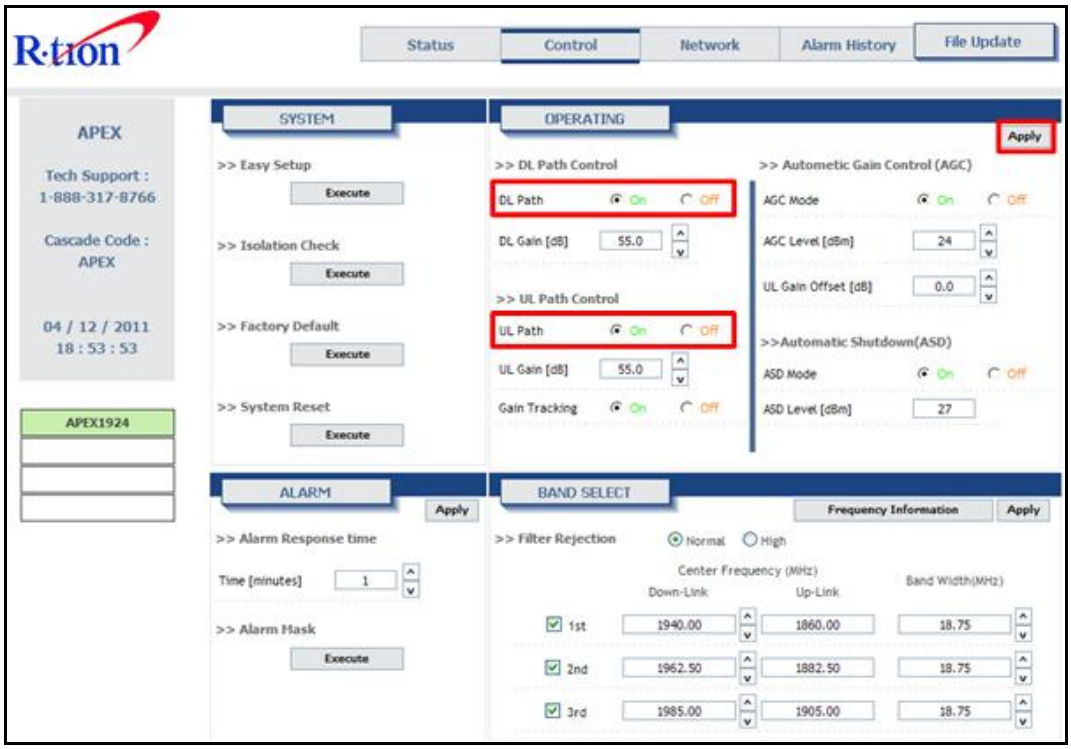
Step 3. When below pop-up appears after Isolation is completed, Click OK.



Step 4. 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 24dBm, Gain Offset -3dB → DL Output +24dBm, UL Output +21dBm**
AGC Level 24dBm, Gain Offset 0dB → DL Output +24dBm, UL Output +24dBm



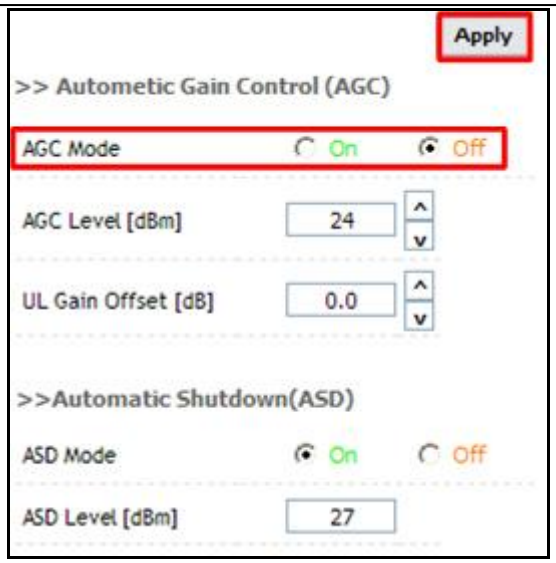
Step 5. Turn on the **DL** and **UL path controls.**



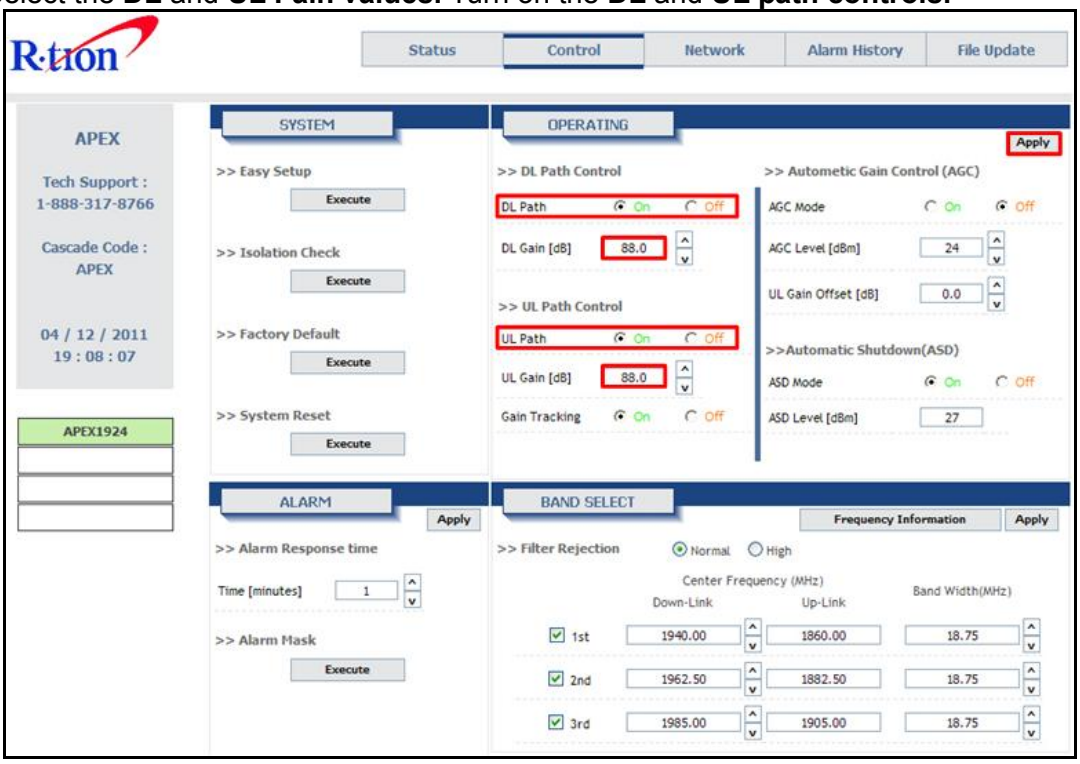
5.6.1.2. Manual Gain setting

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.



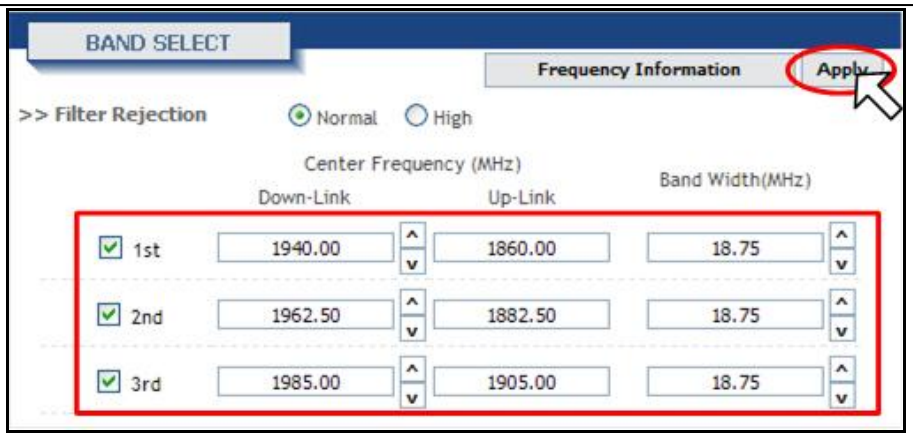
Step 2. The user can select any gain value as long as it does over-drive the amplifier or exceed isolation requirements. Gain is automatically limited where conditions do not permit high gain. Select the **DL** and **UL Fain values.** Turn on the **DL** and **UL path controls.**



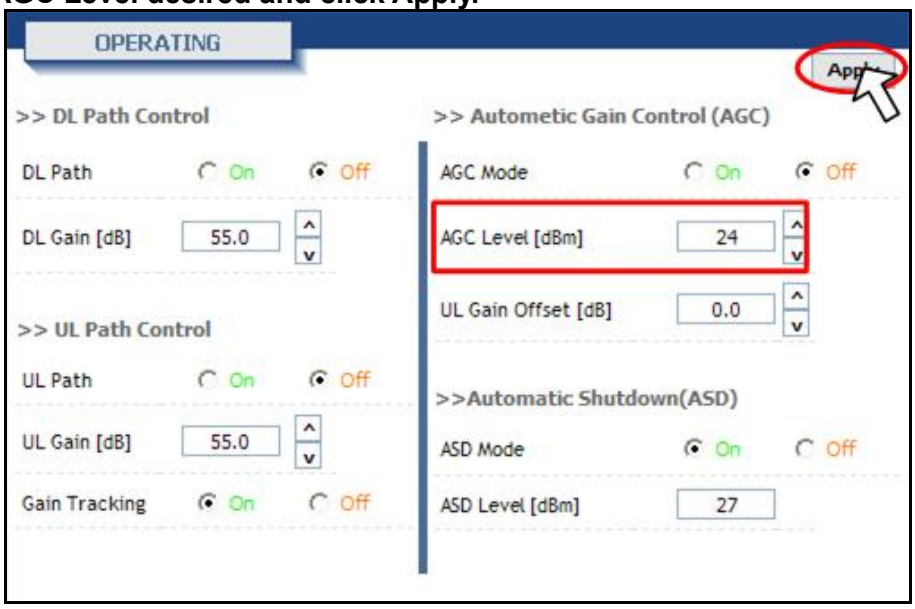
5.6.2. Easy Setup [NOT Recommended]

5.6.2.1. AGC Level 24dBm

Step 1. Click Apply after setting Center Frequency and Band With in use



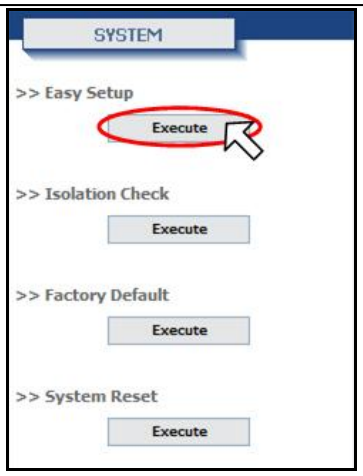
Step 2. Input AGC Level desired and click Apply.



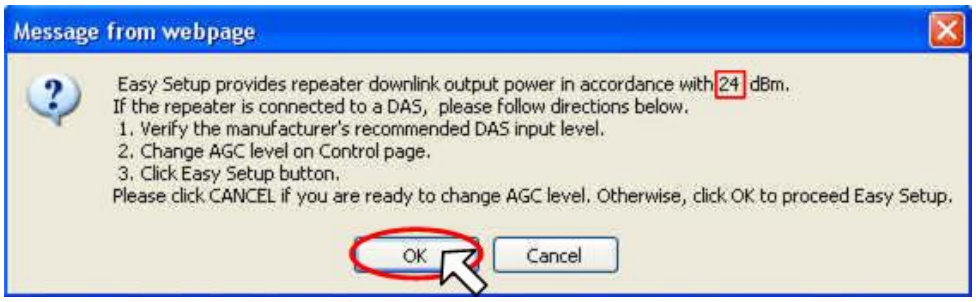
Step 3. Easy Setup proceeds to:

- Data Initial execution
- Isolation Test exeduted
- Calculation of Available Maximum Gain by the isolation
- DL/UL Path On
- AGC On to obtain DL Output Power AGC Level or Maximum Gain 95dB
- ASD On
- AGC Off
- Easy setup takes about 2minutes.

Click Excute button of Easy Setup



Step 4. Click OK.



Step 5. Setup will automatically begin. This process takes approximately 3minute.

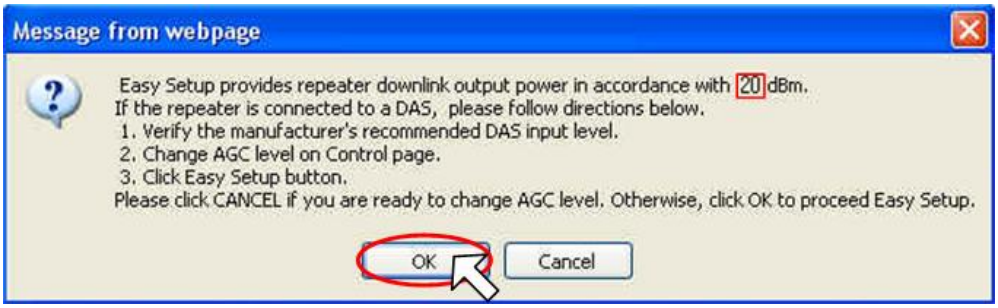
Result 1. Constant Maximum DL Output Power 24dBm (AGC Level 24dBm)
If the DL input Power ≥ -71dBm

Result 2. Maximum Gain 95dB if the DL input Power <-71dBm

5.6.2.2. AGC Level 20dBm

Step 1. Click Execute button of Easy Setup after setting AGC Level to 20dBm.

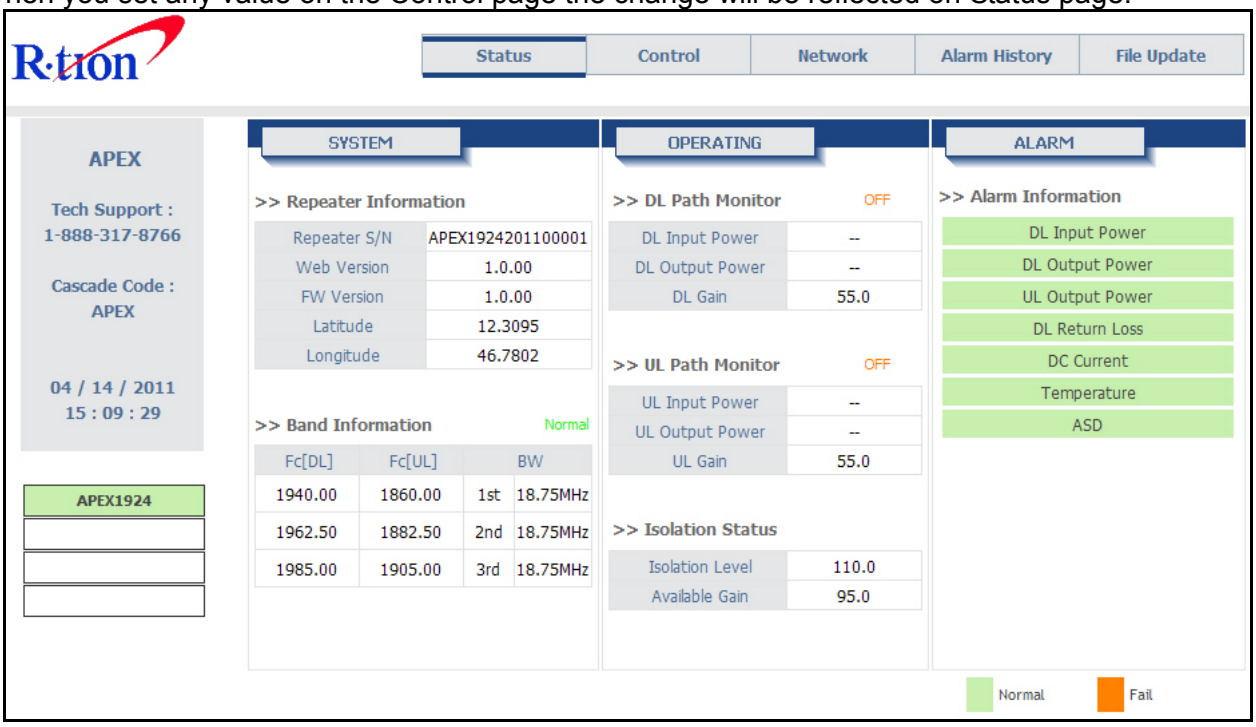
Step 2. Click OK.



Result. Constant Maximum DL Output Power 20dBm (AGC Level 20dBm)
If the DL input Power ≥ -71dBm

5.7. GUI Status

The status page display system, operating, and alarm information.
When you set any value on the Control page the change will be reflected on Status page.



<Status>

5.7.1. System

- **Repeater information** such as firmware version and location
- The **current band** setting, set from the control page, is shown in bold font.

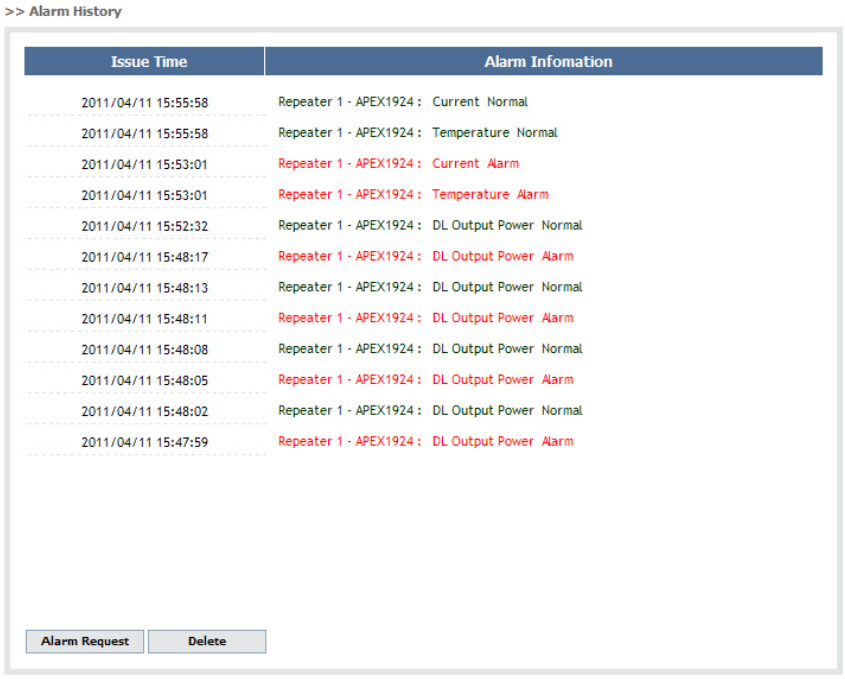
5.7.2. Operating

- **DL Path Monitor** displays input from the donor antenna circuit, output power at repeater server antenna port, and downlink amplifier gain.

- **UL Path Monitor** displays input from the server antenna circuit, output powr at repeater donor port, and uplink amplifier gain.
- **Isolation Status** shows isolation value (dB) between the donor antenna and server antennas.
- **Available gain** allowed by isolation measurement. Available gain is derived from the antenna isolation value plus 15dB. Full system gain(95dB) is available if the isolation value is at least 110dB.

5.7.3. Alarm

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

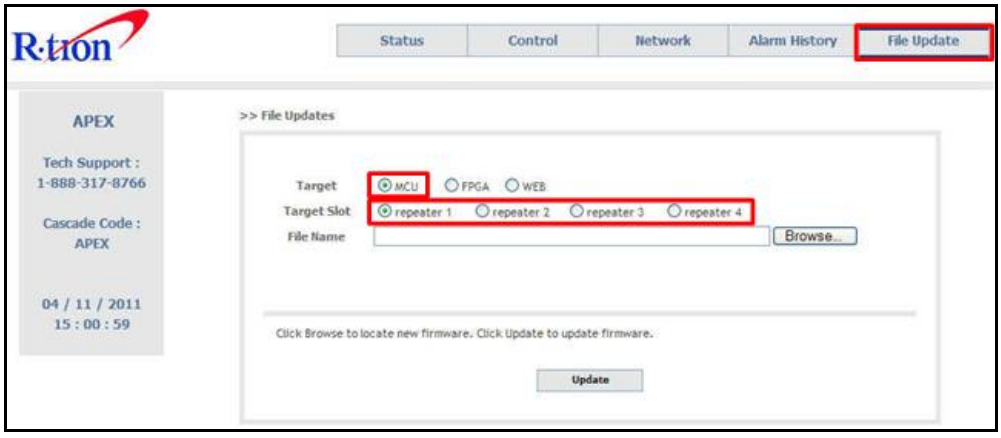


For corrective action please refer to 6. Troubleshooting section.

5.8. File Update

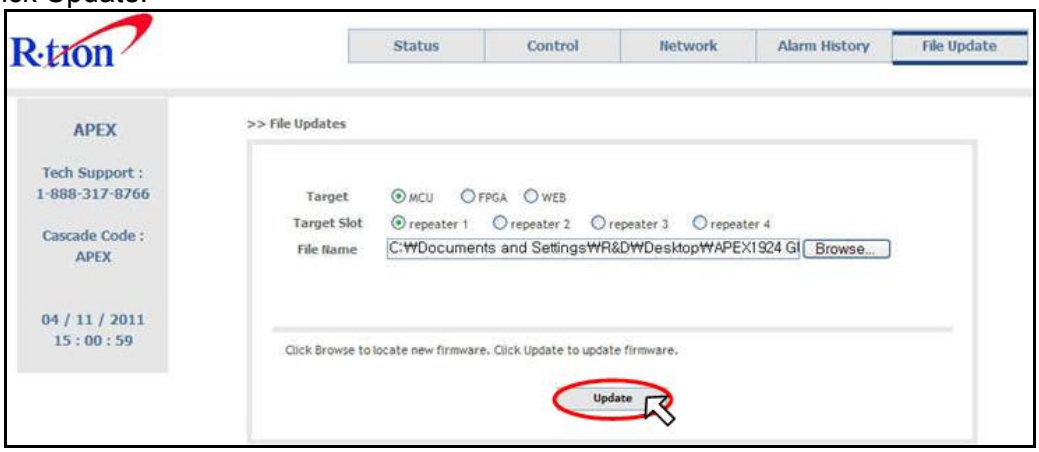
5.8.1. MCU Firmware Download

Step 1. Select MCU of Target and applicable repeater of Target Slot which you desire to download. Click Browse.

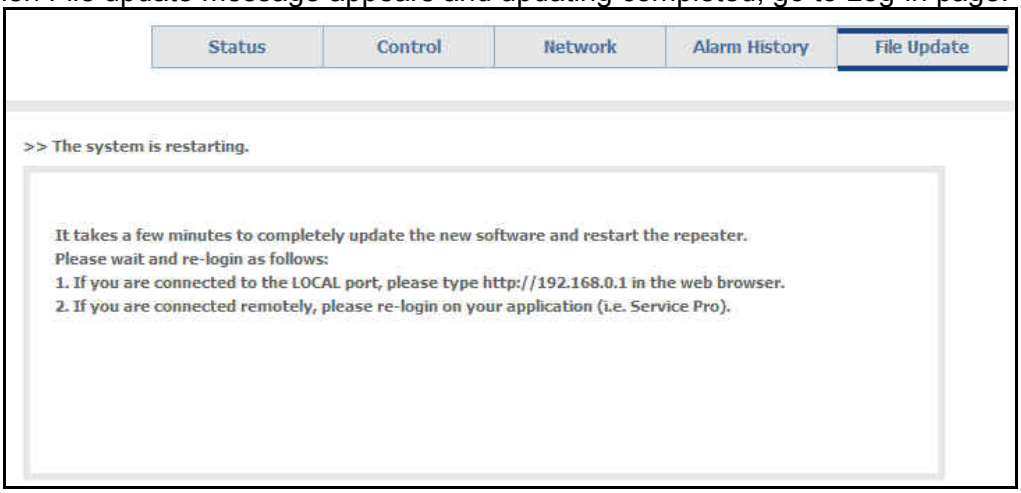


Step 2. Select Firmware file which has ".bin" filename extention to download. Click Open.

Step 3. Click Update.

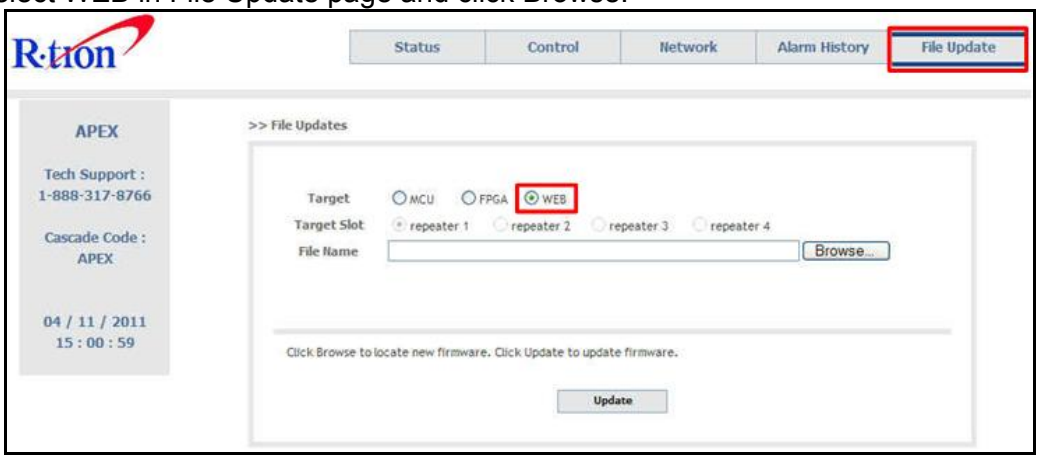


Step 4. When File update message appears and updating completed, go to Log-in page.



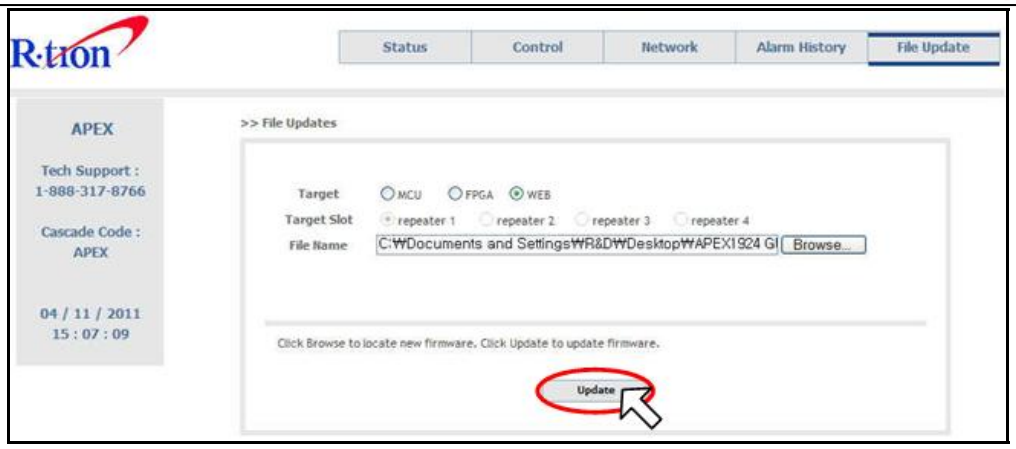
5.8.2. Web GUI Download

Step 1. Select WEB in File Update page and click Browse.

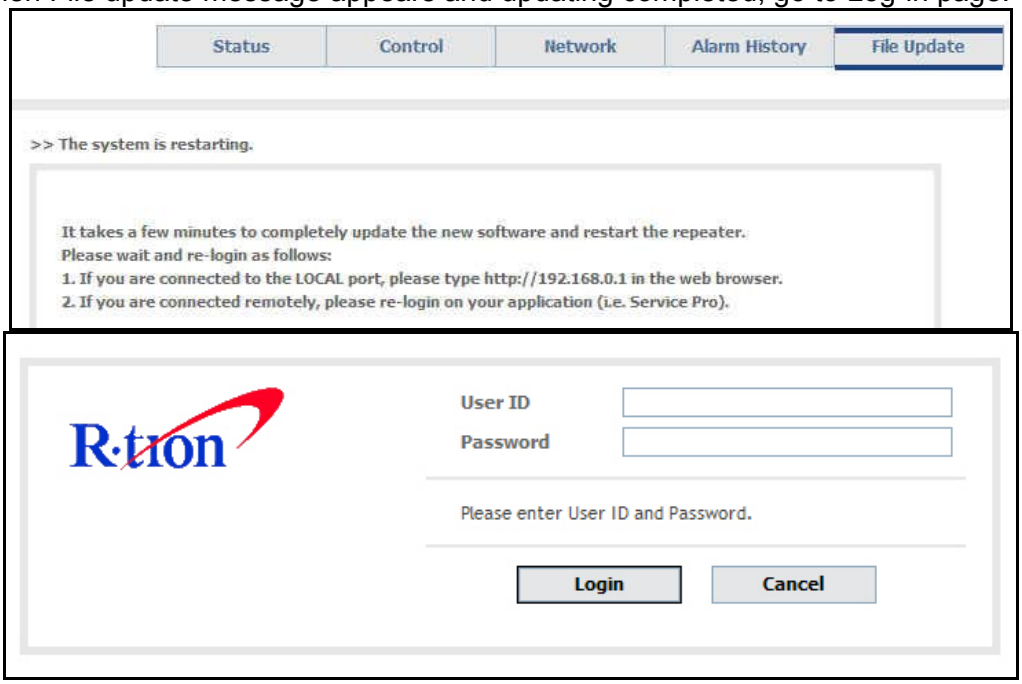


Step 2. Select Firmware file which has ".web" filename extention to download. Click Open.

Step 3. Click Update.



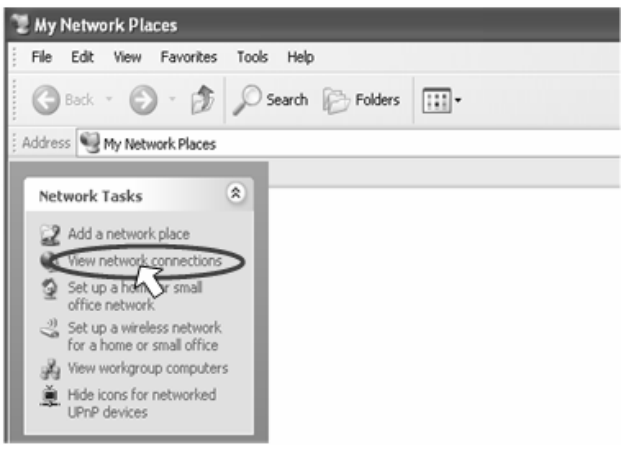
Step 4. When File update message appears and updating completed, go to Log-in page.



5.9. Attachment

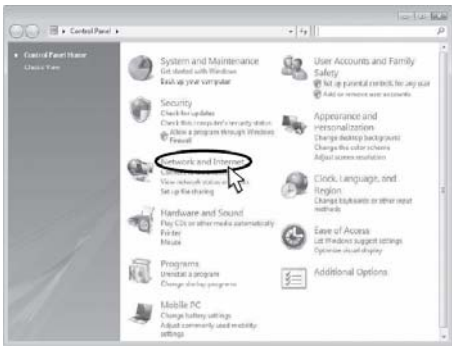
5.9.1. Internet Network Setting

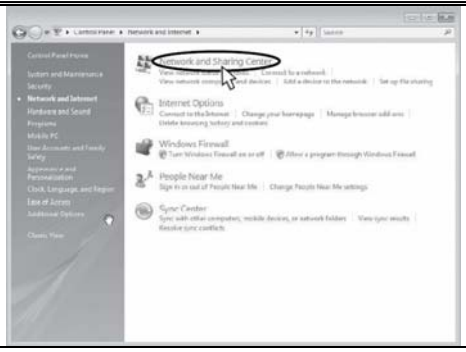
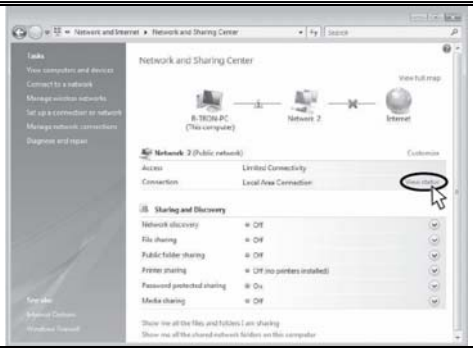
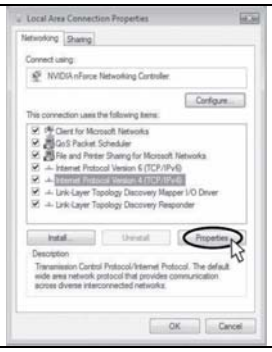
5.9.1.1. Window XP

Step 1: Click the Start button and select My Network places.	Step 2: Click View network connections.
	

Step 3: Right-click on the Local Area Connection and select Properties to view the shortcut menu.	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 widows.
	

5.9.1.2. 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.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Step 5: Click Properties and a caution pop-up window will appear. Click OK.</td><td>Step 6: Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Step 7: Check Obtain an IP address automatically and Click OK.</td><td>Step 8: Close all windows.</td></tr>
<tr><td>  </td><td></td></tr>
</table>

6. Troubleshooting

Before contacting your service dealer, refer to the following guidelines. If the APEX1930 repeater does not work normally after completing the following troubleshooting, please contact your local dealer or R-tron America's Tech support line (1-888-31R-TRON).

External alarm lamps on the front of the repeater indicate current condition. Green lamp indicates power to the repeater, yellow indicates caution, and red indicates shut sown

6.1 LED Alarm

Problem	Cause	Solution
No LED on	Power failure	Check the power cord for secure connection
Mobile device has poor performance.	Repeater service degraded or not available.	Login to the web GUI. Check the setting, alarm status and input/output power status.

Gain, Input/ Output power or DC Current are changing randomly or appear to be unstable.	Oscillation	Most common cause for unstable gain and power is feedback brought on by insufficient antenna isolation. 1. Reduce repeater gain and/or AGC level. 2. Improve the field conditions that cause poor antenna isolation.
The red light is on.	Automatic Shutdown	Automatic shutdown occurs when the amplifier is over driven. The amplifier is most commonly overdriven by: 1. Oscillation due to poor antenna isolation. 2. High input power combined with high gain settings including high UL input from the mobile device. User the alarm history page to determine the cause of the shutdown. Eliminate the root cause of the shutdown and restart the repeater. Technical Support Web site: www.r-tronamerica.com Toll Free: 888-317-8766

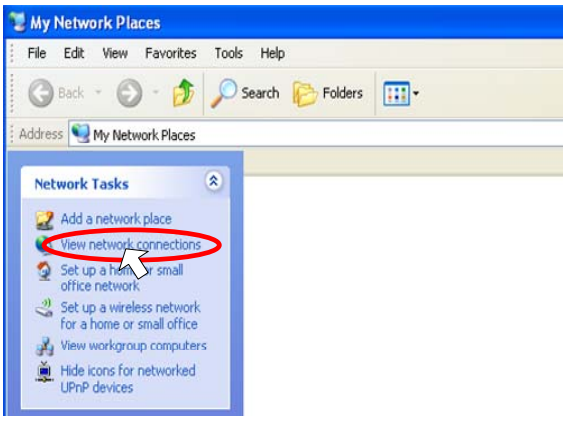
6.2 GUI Alarm

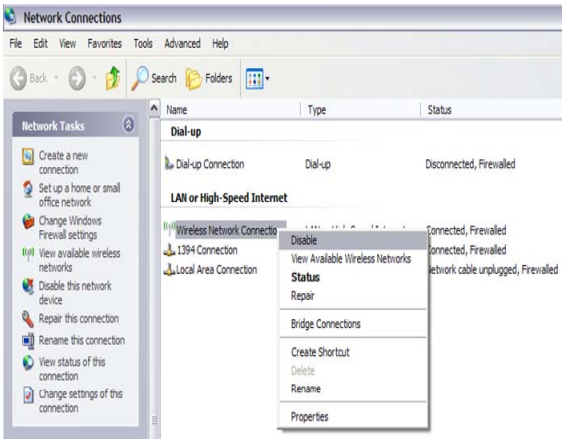
Problem	Check Point	Solution
General	DC Current	If the same alarm occurs after reset Power, request technical support.
	Temperature	Execute of System Reset (NCU) on Network Setup page. If the same alarm occurs request technical support.
	ASD	Check Isolation and DL/UL Input power.. This may be caused when any of DL and UL path controls if off by Manual gain setting.
	Heartbeat	Check the connection of the Remote NMS Cable. Check the interval of Heartbeat on the WEB GUI
Downlink	DL Input Power	Check Input power level to Donor antenna port. Connect fixed attenuator into Donor antenna port when actual Input Power is high.
	DL Output Power	Check the DL input Power, need to adjust the antenna location, azimuth or install attenuator.
	DL Return Loss	Ensure cable connected to Antenna port. If the same alarm occurs after connecting termination to antenna port, request technical support.
Uplink	UL Output Power	If the UL Input Power is too high, suspect excessive mobile TX power. Determine root cause of high mobile TX power.

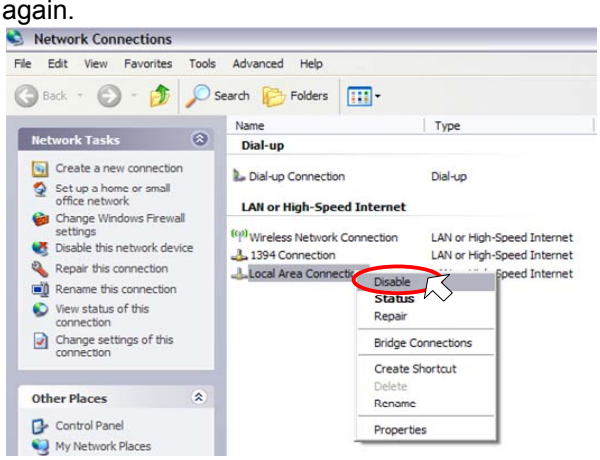
6.3 Communication Alarm

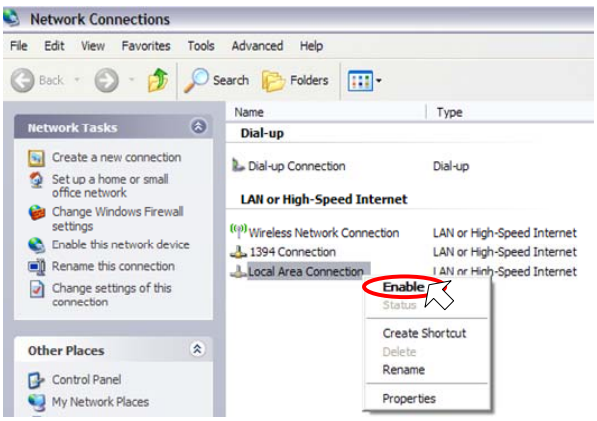
When you cannot login to the web GUI.

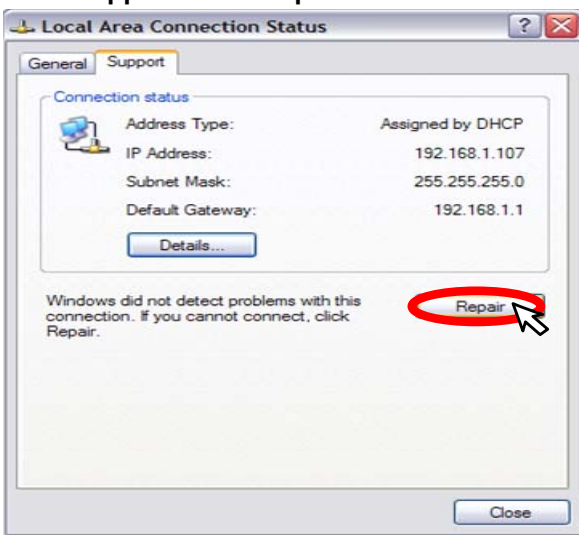
Solution	
1. Click **My Network places → View network connections.** Right-click on the **Wireless Network Connection** and then click **Disable.**	2. Right-click on the **Local Area Connection** and then click **Disable.** After clicking **Disable,** click **Enable** again.
	3. Double click the **Local Area Connection** and then click the **Support** tab → **Repair.**





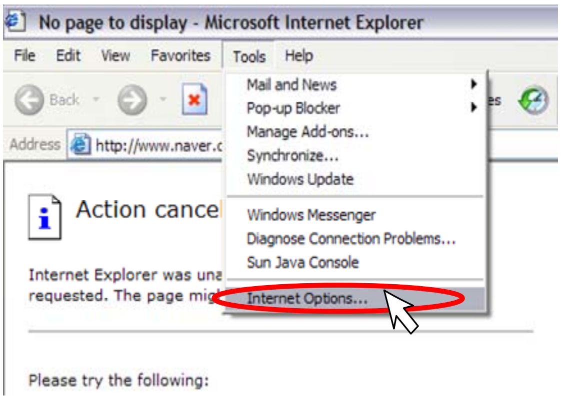


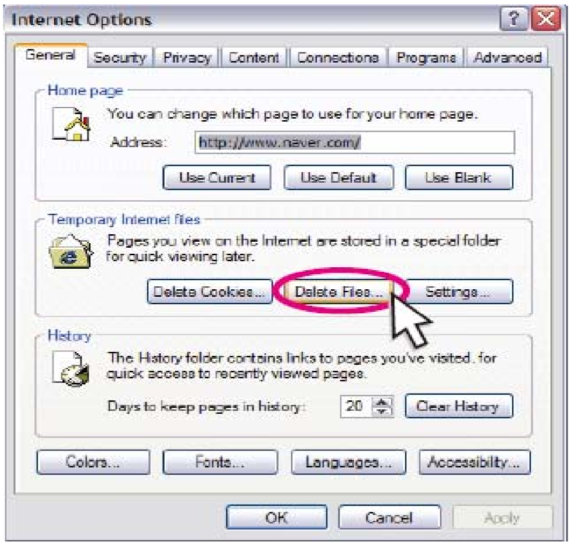


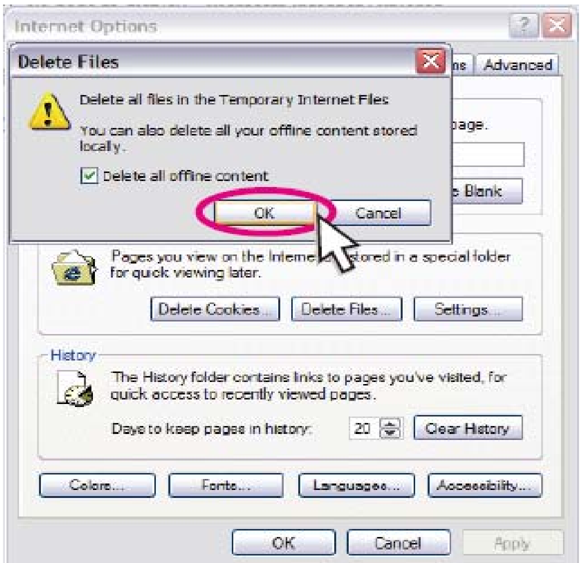


Solution

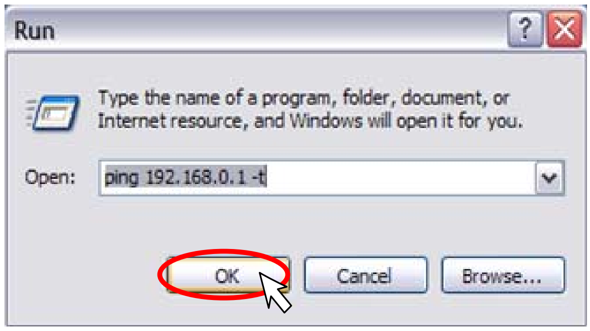
4. Open the Internet Browser, select **Tools → Internet Options.**
Click **Delete Files** in the Temporary Internet files section.

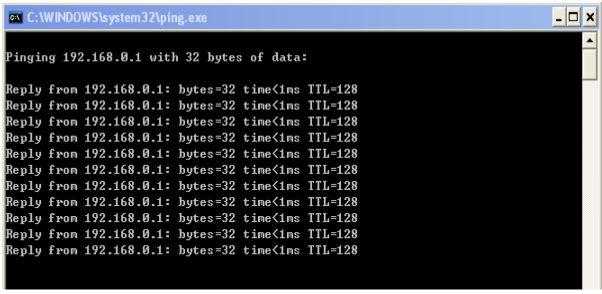






5. Click **Start** and select **Run.**
Type "ping 192.168.0.1-t" and click **OK.**





7. Specifications

7.1 RF Characteristics

Electrical Specifications			
Parameter		**Down-Link**	**Up-Link**
Frequency Range		1930 - 1995 MHz (65M B.W)	1850 - 1915 MHz (65M B.W)
Service		CDMA2000 or LTE(FDD) Service	
Channel Select		Center frequency + BW (1M - 20MHz) Non-continuous 3 channel	
Input Power Range		-65 ~ -25 dBm	-65 ~ -25 dBm
Composite Output Power Range		30 dBm	30 dBm
Gain Range		55 - 95 dB	55 - 95 dB
AGC	Range	40 dB (min)	
	Time	AGC must track only slow variations with time on the order of 100ms.	
Gain Ripple		± 1.5 dB	
Noise Figure	Max Gain	5 dB (max)	5 dB (max)
	Min Gain	-	12 dB (max)
Roll-off	Filter set Normal	> 50dBc at ± 1 MHz from band edge	
		> 50dBc at ± 2 MHz from band edge	
	Filter set High	> 65dBc at ± 0.5 MHz from band edge	
		> 65dBc at ± 2 MHz from band edge	
Propagation Delay	Filter set Normal	6 μs (max)	
	Filter set High	8 μs (max)	
Spurious Emission		Section 24 and section 27 of FCC	
VSWR		1.4 : 1 (max)	
Impedance		50Ω	

7.2 Environmental Specification

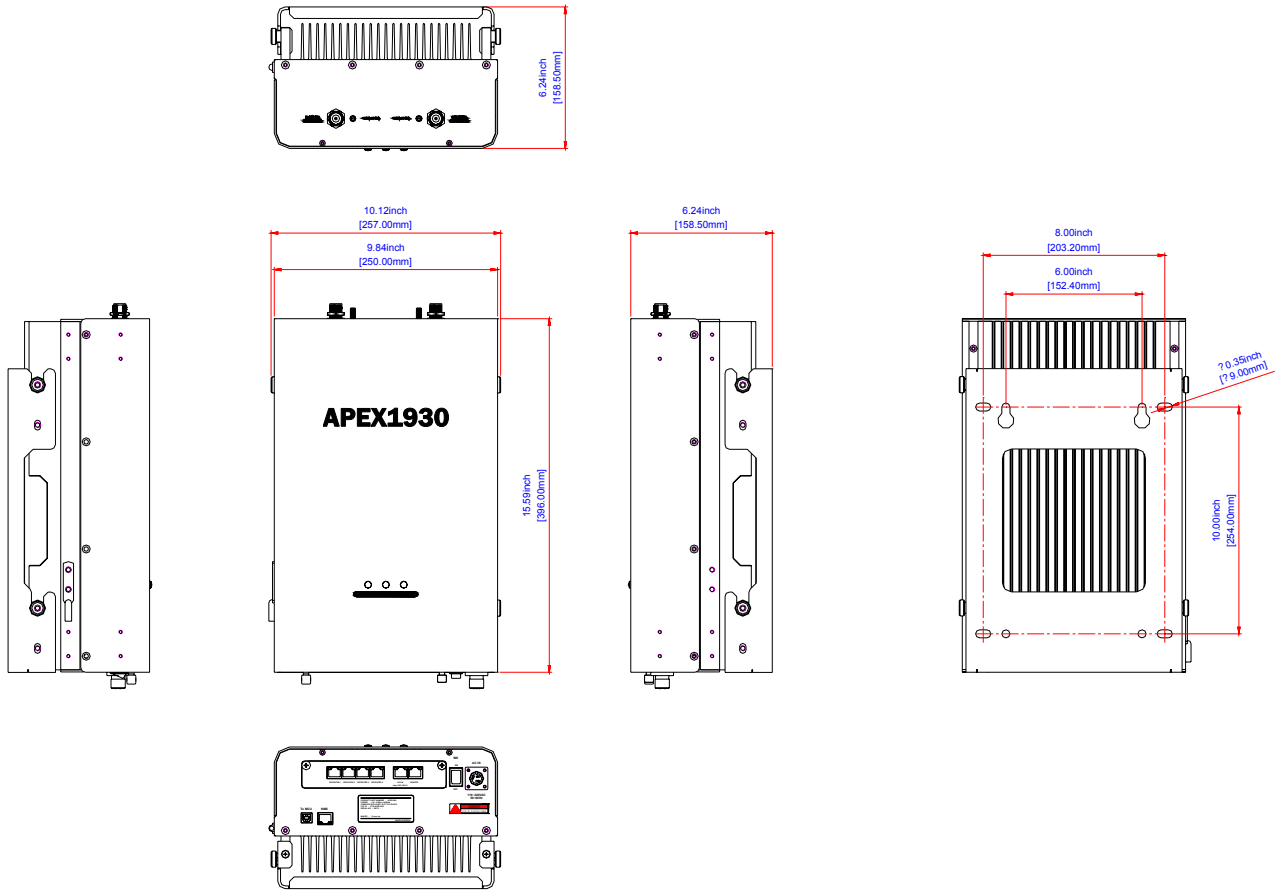
Parameter		**Specification**
Environmental	Operating Temp	-10˚C~50˚C (14˚F~122˚F)
	Humidity	20%~90%RH
	Cooling method	Convection.

7.3 Electronic Specification

Parameter		Specification
Electronic	Voltage	AC 85-264V
	Current	+24V/6.5A (150W)
	Frequency	50/60(47-63)

7.4 Mechanical Specification

Parameter	Specifications	Remark
RF connectors	N-female x 2	
Dimensions (WxHxD)	9.35 * 16.8 * 5.67 Inch 242 * 426 * 144 mm	W * D * H
Weight	44.09 lb 20 Kg max	



8. Appendix

8.1 US PCS Channel

USPCS			Down Link				Up Link			
No	Block	Channel	Center	Start	Stop	BW	Center	Start	Stop	BW
1	A1	25	1931.250	1930.625	1931.875	1.25	1851.250	1850.625	1851.875	1.25
2		50	1932.500	1931.875	1933.125	1.25	1852.500	1851.875	1853.125	1.25
3		75	1933.750	1933.125	1934.375	1.25	1853.750	1853.125	1854.375	1.25
4		100	1935.000	1934.375	1935.625	1.25	1855.000	1854.375	1855.625	1.25
5	A2	125	1936.250	1935.625	1936.875	1.25	1856.250	1855.625	1856.875	1.25
6		150	1937.500	1936.875	1938.125	1.25	1857.500	1856.875	1858.125	1.25
7		175	1938.750	1938.125	1939.375	1.25	1858.750	1858.125	1859.375	1.25
8		200	1940.000	1939.375	1940.625	1.25	1860.000	1859.375	1860.625	1.25
9	A3	225	1941.250	1940.625	1941.875	1.25	1861.250	1860.625	1861.875	1.25
10		250	1942.500	1941.875	1943.125	1.25	1862.500	1861.875	1863.125	1.25
11		275	1943.750	1943.125	1944.375	1.25	1863.750	1863.125	1864.375	1.25
12		300	1945.000	1944.375	1945.625	1.25	1865.000	1864.375	1865.625	1.25
13	D	325	1946.250	1945.625	1946.875	1.25	1866.250	1865.625	1866.875	1.25
14		350	1947.500	1946.875	1948.125	1.25	1867.500	1866.875	1868.125	1.25
15		375	1948.750	1948.125	1949.375	1.25	1868.750	1868.125	1869.375	1.25
16		400	1950.000	1949.375	1950.625	1.25	1870.000	1869.375	1870.625	1.25
17	B1	425	1951.250	1950.625	1951.875	1.25	1871.250	1870.625	1871.875	1.25
18		450	1952.500	1951.875	1953.125	1.25	1872.500	1871.875	1873.125	1.25
19		475	1953.750	1953.125	1954.375	1.25	1873.750	1873.125	1874.375	1.25
20		500	1955.000	1954.375	1955.625	1.25	1875.000	1874.375	1875.625	1.25
21	B2	525	1956.250	1955.625	1956.875	1.25	1876.250	1875.625	1876.875	1.25
22		550	1957.500	1956.875	1958.125	1.25	1877.500	1876.875	1878.125	1.25
23		575	1958.750	1958.125	1959.375	1.25	1878.750	1878.125	1879.375	1.25
24		600	1960.000	1959.375	1960.625	1.25	1880.000	1879.375	1880.625	1.25
25	B3	625	1961.250	1960.625	1961.875	1.25	1881.250	1880.625	1881.875	1.25
26		650	1962.500	1961.875	1963.125	1.25	1882.500	1881.875	1883.125	1.25
27		675	1963.750	1963.125	1964.375	1.25	1883.750	1883.125	1884.375	1.25
28		700	1965.000	1964.375	1965.625	1.25	1885.000	1884.375	1885.625	1.25
29	E	725	1966.250	1965.625	1966.875	1.25	1948.313	1885.625	1886.875	1.25
30		750	1967.500	1966.875	1968.125	1.25	1948.375	1886.875	1888.125	1.25
31		775	1968.750	1968.125	1969.375	1.25	1948.438	1888.125	1889.375	1.25
32		800	1970.000	1969.375	1970.625	1.25	1890.000	1889.375	1890.625	1.25
33	F	825	1971.250	1970.625	1971.875	1.25	1891.250	1890.625	1891.875	1.25
34		850	1972.500	1971.875	1973.125	1.25	1892.500	1891.875	1893.125	1.25
35		875	1973.750	1973.125	1974.375	1.25	1893.750	1893.125	1894.375	1.25
36		900	1975.000	1974.375	1975.625	1.25	1895.000	1894.375	1895.625	1.25
37	C3	925	1976.250	1975.625	1976.875	1.25	1896.250	1895.625	1896.875	1.25
38		950	1977.500	1976.875	1978.125	1.25	1897.500	1896.875	1898.125	1.25
39		975	1978.750	1978.125	1979.375	1.25	1898.750	1898.125	1899.375	1.25
40		1000	1980.000	1979.375	1980.625	1.25	1900.000	1899.375	1900.625	1.25
41	C4	1025	1981.250	1980.625	1981.875	1.25	1901.250	1900.625	1901.875	1.25
42		1050	1982.500	1981.875	1983.125	1.25	1902.500	1901.875	1903.125	1.25
43		1075	1983.750	1983.125	1984.375	1.25	1903.750	1903.125	1904.375	1.25
44		1100	1985.000	1984.375	1985.625	1.25	1905.000	1904.375	1905.625	1.25
45	C5	1125	1986.250	1985.625	1986.875	1.25	1906.250	1905.625	1906.875	1.25
46		1150	1987.500	1986.875	1988.125	1.25	1907.500	1906.875	1908.125	1.25
47		1175	1988.750	1988.125	1989.375	1.25	1908.750	1908.125	1909.375	1.25
48		1200	1990.000	1989.375	1990.625	1.25	1910.000	1909.375	1910.625	1.25
49	G	1225	1991.250	1990.625	1991.875	1.25	1911.250	1910.625	1911.875	1.25
50		1250	1992.500	1991.875	1993.125	1.25	1912.500	1911.875	1913.125	1.25
51		1275	1993.750	1993.125	1994.375	1.25	1913.750	1913.125	1914.375	1.25
52		1300	1995.000	1994.375	1995.625	1.25	1915.000	1914.375	1915.625	1.25

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

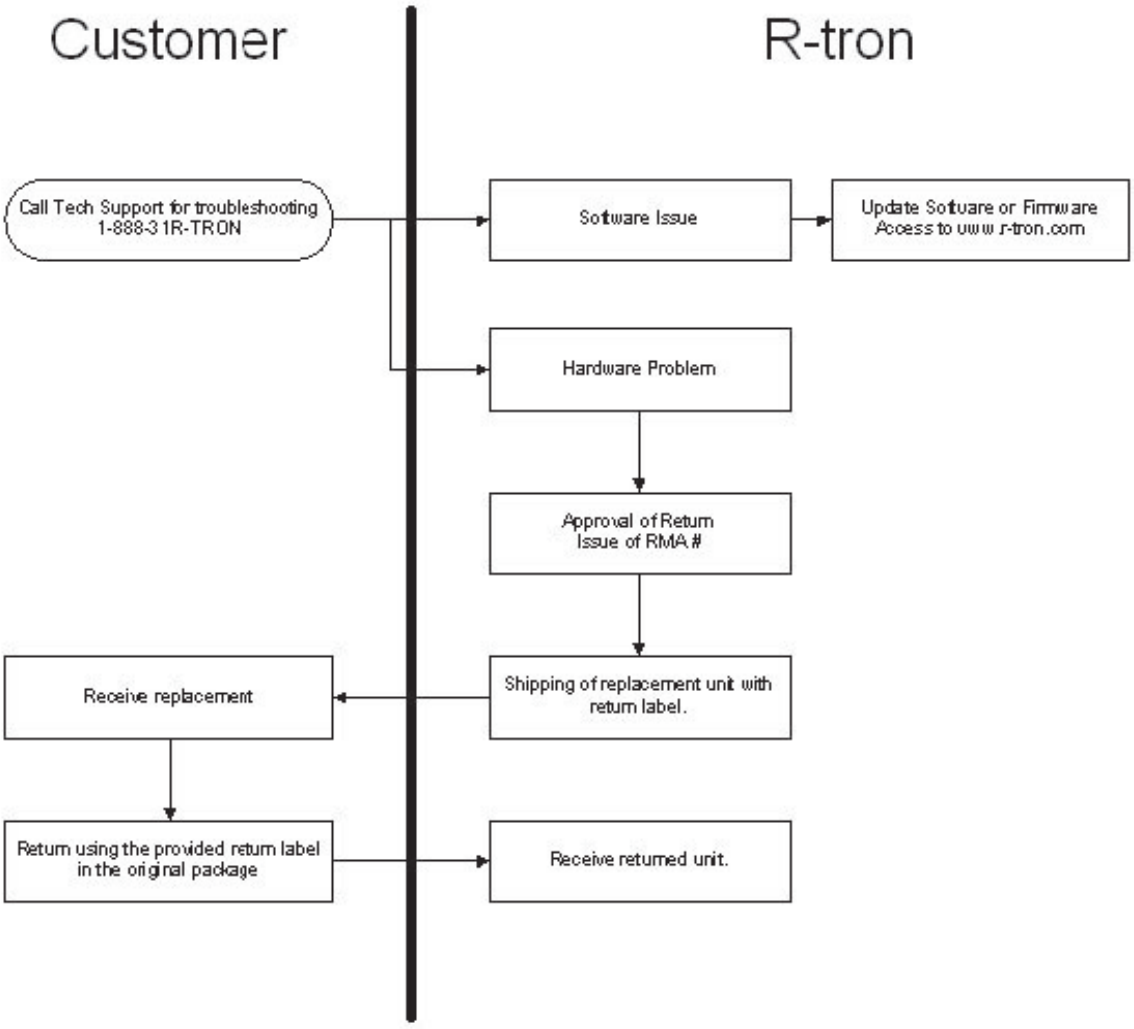
This limited warranty begins on the original date of purchase, and is valid only on products purchased and used in the United States. R-tron will repair or replace this product, at our option and at no charge as stipulated herein, with new or reconditioned parts or products if found to be defective during 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 a 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 unit with a return shipping label.
4. The customer must return the product using the original packaging, including all accessories and/or parts.


Customer
R-tron
Call Tech Support for troubleshooting
1-888-31R-TRON
Software Issue
Update Software or Firmware
Access to www.r-tron.com
Hardware Problem
Approval of Return
Issue of RMA #
Receive replacement
Shipping of replacement unit with
return label.
Return using the provided return label
in the original package
Receive returned unit.