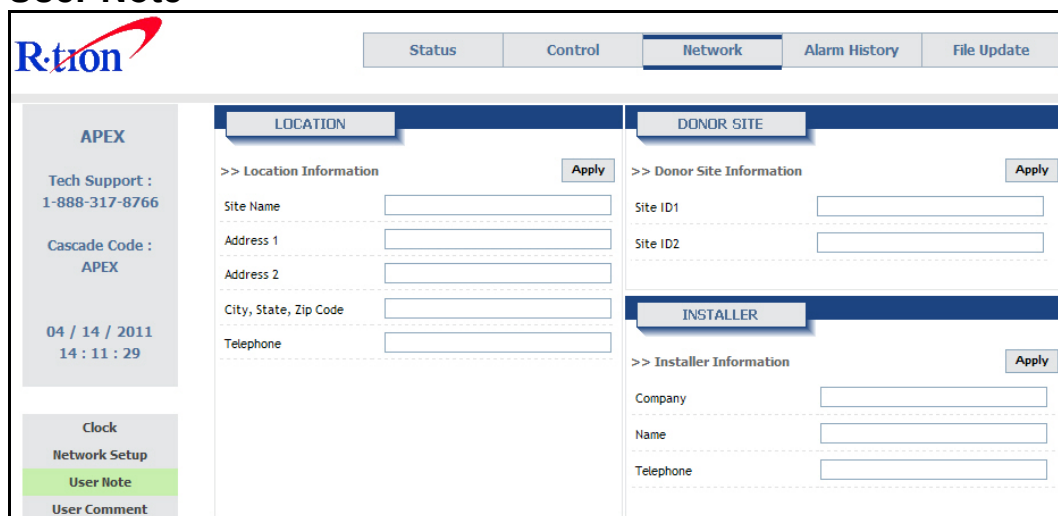


(Default value is 20 minutes.)

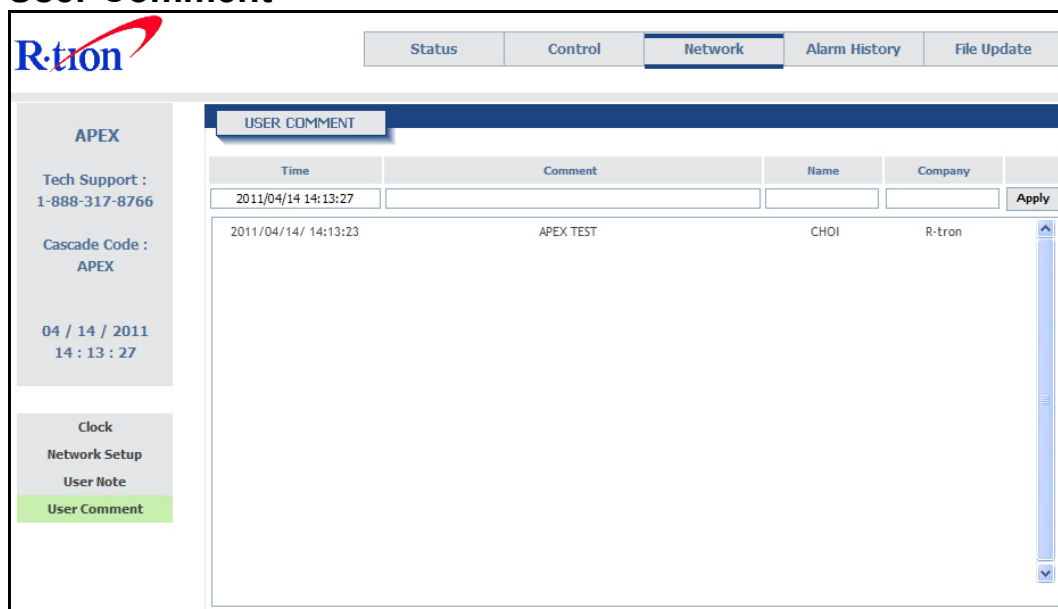
5.4.3. User Note



<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**.

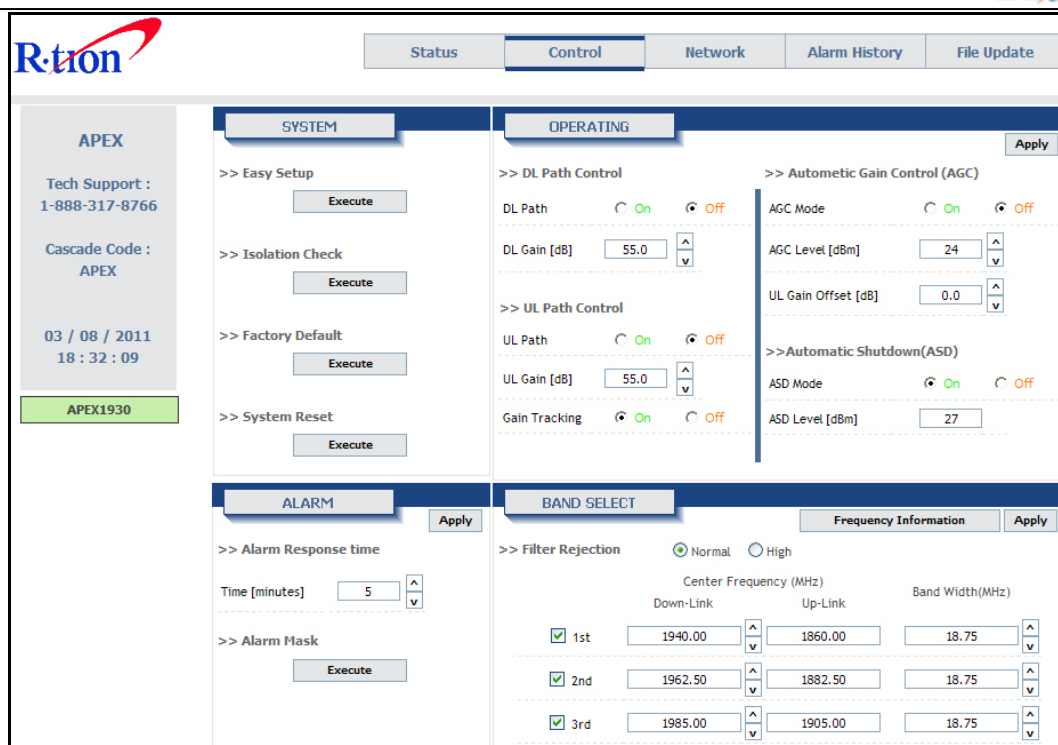
5.4.4. User Comment



<User Comment>

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

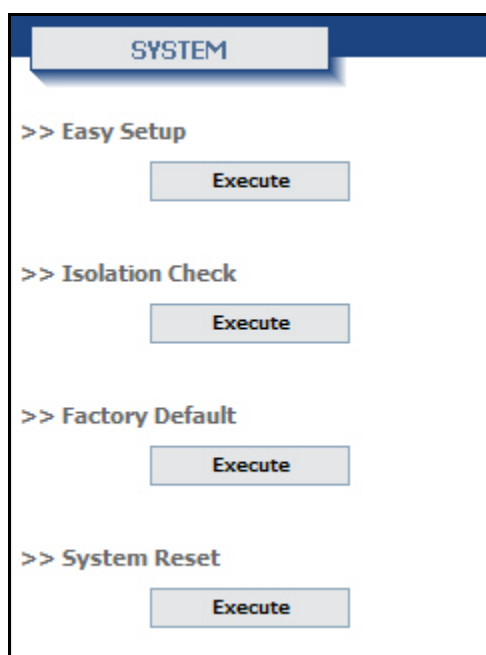
5.5. GUI System Control



The screenshot displays the R-tion APEX1930 control interface. It features a top navigation bar with tabs: Status, Control (selected), Network, Alarm History, and File Update. The main interface is divided into several sections:

- Left Sidebar:** Contains the 'APEX' logo, 'Tech Support : 1-888-317-8766', 'Cascade Code : APEX', the date/time '03 / 08 / 2011 18 : 32 : 09', and a green 'APEX1930' button.
- SYSTEM Section:** Includes four options with 'Execute' buttons: '>> Easy Setup', '>> Isolation Check', '>> Factory Default', and '>> System Reset'.
- OPERATING Section:** Contains three sub-sections:
 - >> DL Path Control:** DL Path (On/Off), DL Gain [dB] (55.0).
 - >> UL Path Control:** UL Path (On/Off), UL Gain [dB] (55.0), Gain Tracking (On/Off).
 - >> Automatic Gain Control (AGC):** AGC Mode (On/Off), AGC Level [dBm] (24), UL Gain Offset [dB] (0.0).
 - >> Automatic Shutdown (ASD):** ASD Mode (On/Off), ASD Level [dBm] (27).
- ALARM Section:** Includes '>> Alarm Response time' (Time [minutes] set to 5) and '>> Alarm Mask'.
- BAND SELECT Section:** Includes '>> Filter Rejection' (Normal/High), 'Center Frequency (MHz)' (Down-Link, Up-Link), and 'Band Width (MHz)'.

5.5.1. System Control



This close-up screenshot shows the 'SYSTEM' section of the interface. It lists four control options, each with an 'Execute' button:

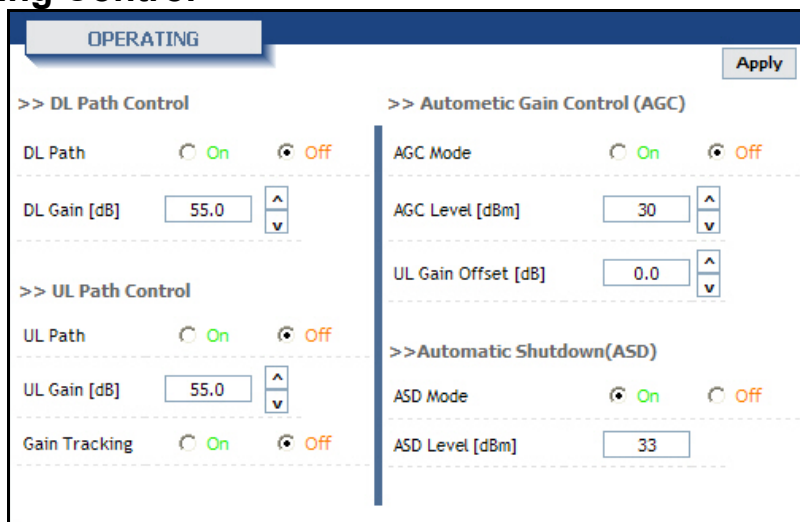
- >> Easy Setup
- >> Isolation Check
- >> Factory Default
- >> System Reset

- **Easy Setup** is a fast start function. The function measures isolation, detects input level and assigns gain to achieve maximum output power. The function ends with the repeater set to amplify signals in both directions within the confines of the band selection. Before running 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 sufficient antenna isolation.
- **Isolation 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 selection and

all other system parameters are not changed. The feature is useful in clearing abnormal conditions.

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

5.5.2. Operating Control



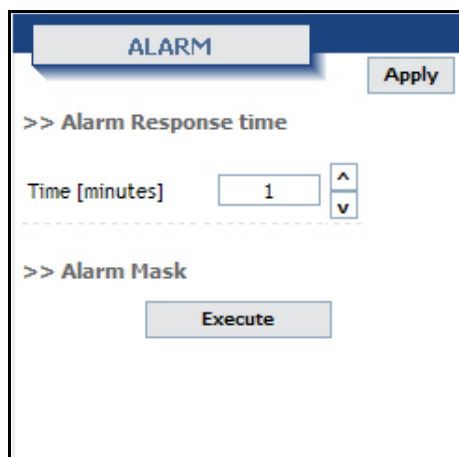
The screenshot shows a web-based control interface titled "OPERATING". It contains four main sections:

- >> DL Path Control:** Includes a "DL Path" toggle (On/Off), a "DL Gain [dB]" input field set to 55.0, and a "Gain Tracking" toggle (On/Off).
- >> UL Path Control:** Includes a "UL Path" toggle (On/Off), a "UL Gain [dB]" input field set to 55.0, and a "Gain Tracking" toggle (On/Off).
- >> Automatic Gain Control (AGC):** Includes an "AGC Mode" toggle (On/Off), an "AGC Level [dBm]" input field set to 30, and a "UL Gain Offset [dB]" input field set to 0.0.
- >> Automatic Shutdown (ASD):** Includes an "ASD Mode" toggle (On/Off) and an "ASD Level [dBm]" input field set to 33.

An "Apply" button is located in the top right corner of the interface.

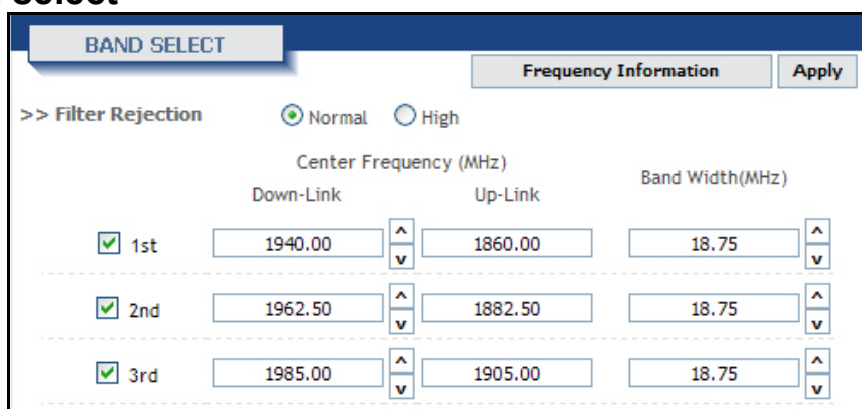
- **DL and UL Path Control** allows the user to toggle on or off the power amplifiers.
- **DL and UL Gain** is available when AGC mode is off. The user may enter gain values manually. Manual gain control is an alternative to automatic gain control (AGC). Manual gain is disabled (grayed out) when AGC 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 helps maintain forward and reverse link balance. 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 used 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 conjunction 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 exceeded. It is not necessary to turn off ASD. ASD events are stored in the alarm history log. Repeated ASD events will eventually 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.
- **Alarm 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



	Center Frequency (MHz)		Band Width(MHz)
	Down-Link	Up-Link	
<input checked="" type="checkbox"/> 1st	1940.00	1860.00	18.75
<input checked="" type="checkbox"/> 2nd	1962.50	1882.50	18.75
<input checked="" type="checkbox"/> 3rd	1985.00	1905.00	18.75

- Band select sets the digital filter to the **center frequency and bandwidth** of the local service for which the repeater is intended to amplify. 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 accordance with the downlink frequencies.
- **Filter Rejection** allows the user to change the digital filter characteristics. Normal rejection is used for CDMA and EVDO service. High rejection is used for LTE service.
- **Frequency information** is available as a reference for setting the center frequency and band width (refer to section 7).

5.6. GUI System Control

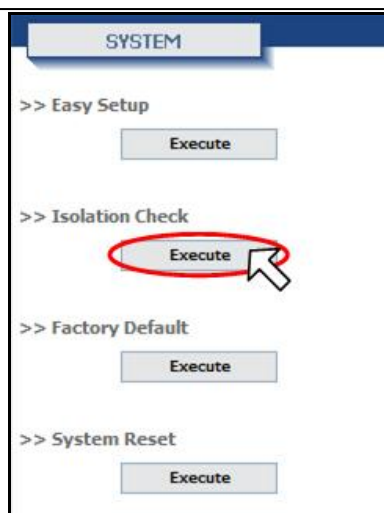
5.6.1. Manual Setting [Recommended]

5.6.1.1. Auto Gain Control Setting

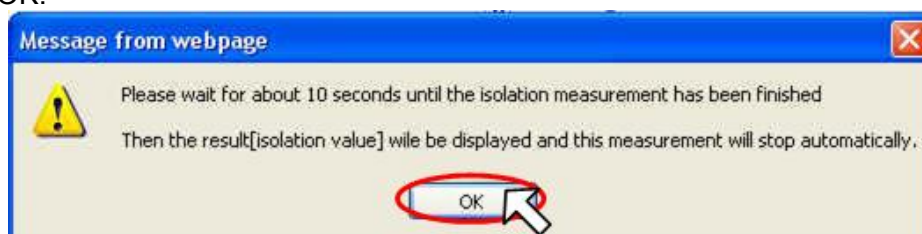
Step 1. Isolation Check

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

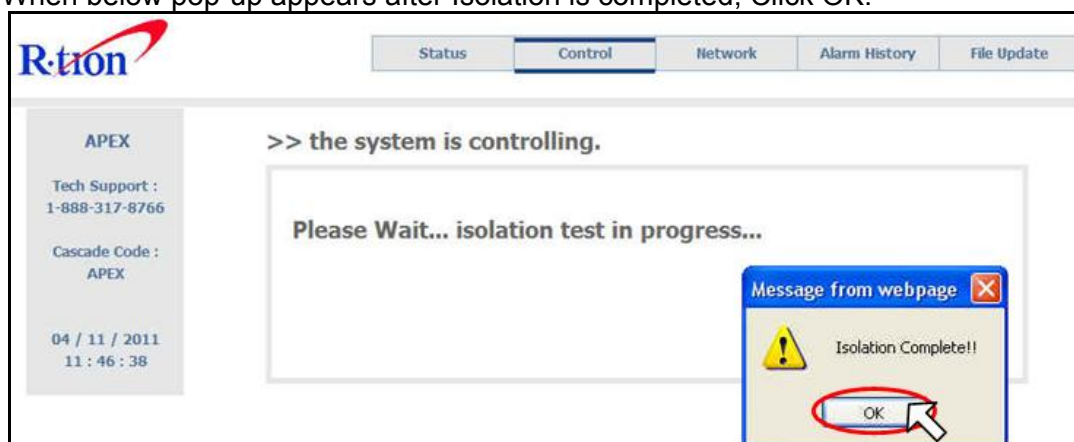
Click Isolation



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

OPERATING

Apply

>> DL Path Control

DL Path ☒ On ☐ Off

DL Gain [dB] ^
v

>> UL Path Control

UL Path ☒ On ☐ Off

UL Gain [dB] ^
v

Gain Tracking ☒ On ☐ Off

>> Automatic Gain Control (AGC)

AGC Mode ☒ On ☐ Off

AGC Level [dBm] ^
v


UL Gain Offset [dB] ^
v

>> Automatic Shutdown(ASD)

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

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


Status **Control** Network Alarm History File Update

APEX

Tech Support :
1-888-317-8766

Cascade Code :
APEX

04 / 12 / 2011
18 : 53 : 53

APEX1924

SYSTEM
OPERATING

>> Easy Setup

Execute

>> Isolation Check

Execute

>> Factory Default

Execute

>> System Reset

Execute

DL Path Control
Automatic Gain Control (AGC)

DL Path ☒ On ☐ Off

DL Gain [dB] ^
v

>> UL Path Control

UL Path ☒ On ☐ Off

UL Gain [dB] ^
v

Gain Tracking ☒ On ☐ Off

AGC Mode ☒ On ☐ Off

AGC Level [dBm] ^
v

UL Gain Offset [dB] ^
v

>> Automatic Shutdown(ASD)

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

ALARM
BAND SELECT

>> Alarm Response time

Time [minutes] ^
v

>> Alarm Mask

Execute

>> Filter Rejection ☒ Normal ☐ High

Center Frequency (MHz)

	Down-Link	Up-Link	Band Width(MHz)
<input checked="" type="checkbox"/> 1st	<input type="text" value="1940.00"/>	<input type="text" value="1860.00"/>	<input type="text" value="18.75"/>
<input checked="" type="checkbox"/> 2nd	<input type="text" value="1962.50"/>	<input type="text" value="1882.50"/>	<input type="text" value="18.75"/>
<input checked="" type="checkbox"/> 3rd	<input type="text" value="1985.00"/>	<input type="text" value="1905.00"/>	<input type="text" value="18.75"/>

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.

APEX1930 USER MANUAL V1.0.00

Tech Support: 1-888-317-8766

23

Apply

>> Automatic Gain Control (AGC)

AGC Mode ☒ On ☐ Off

AGC Level [dBm] ^
v

UL Gain Offset [dB] ^
v

>> Automatic Shutdown (ASD)

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

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 Gain values**. Turn on the **DL** and **UL path controls**.

R-tion
Status **Control** Network Alarm History File Update

APEX

Tech Support :
1-888-317-8766

Cascade Code :
APEX

04 / 12 / 2011
19 : 08 : 07

APEX1924

SYSTEM
OPERATING

>> Easy Setup Execute

>> Isolation Check Execute

>> Factory Default Execute

>> System Reset Execute

>> DL Path Control
Apply

DL Path ☒ On ☐ Off

DL Gain [dB] ^
v

>> UL Path Control

UL Path ☒ On ☐ Off

UL Gain [dB] ^
v

Gain Tracking ☒ On ☐ Off

>> Automatic Gain Control (AGC)
Apply

AGC Mode ☒ On ☐ Off

AGC Level [dBm] ^
v

UL Gain Offset [dB] ^
v

>> Automatic Shutdown (ASD)

ASD Mode ☒ On ☐ Off

ASD Level [dBm]

ALARM
Apply

>> Alarm Response time

Time [minutes] ^
v

>> Alarm Mask Execute

BAND SELECT
Frequency Information Apply

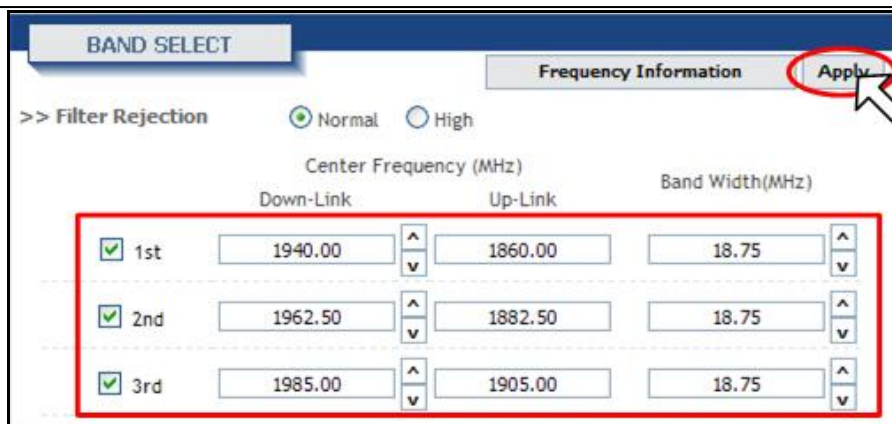
>> Filter Rejection ☒ Normal ☐ High

	Center Frequency (MHz)		Band Width (MHz)
	Down-Link	Up-Link	
<input checked="" type="checkbox"/> 1st	<input type="text" value="1940.00"/> ^ v	<input type="text" value="1860.00"/> ^ v	<input type="text" value="18.75"/> ^ v
<input checked="" type="checkbox"/> 2nd	<input type="text" value="1962.50"/> ^ v	<input type="text" value="1882.50"/> ^ v	<input type="text" value="18.75"/> ^ v
<input checked="" type="checkbox"/> 3rd	<input type="text" value="1985.00"/> ^ v	<input type="text" value="1905.00"/> ^ v	<input type="text" value="18.75"/> ^ v

5.6.2. Easy Setup [NOT Recommended]

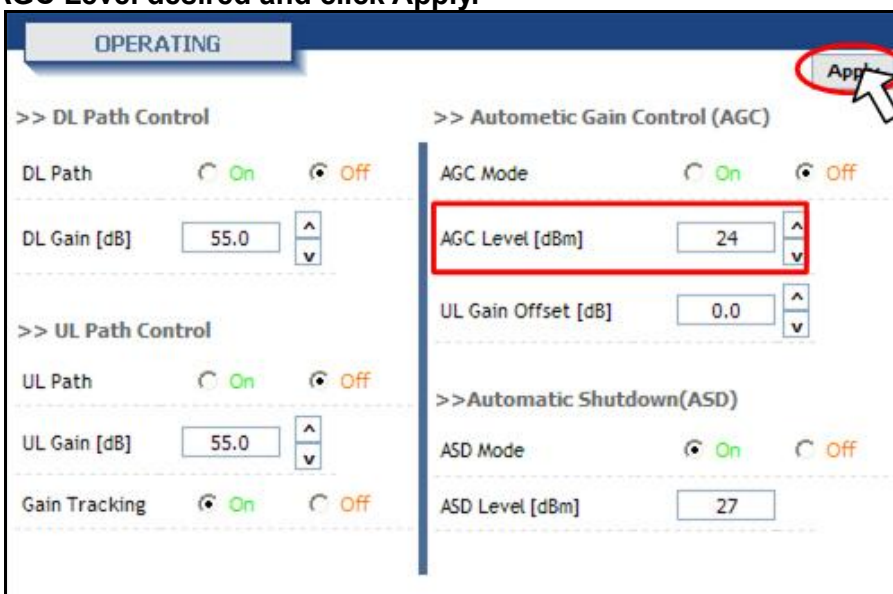
5.6.2.1. AGC Level 24dBm

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



	Down-Link	Up-Link	Band Width(MHz)
<input checked="" type="checkbox"/> 1st	1940.00	1860.00	18.75
<input checked="" type="checkbox"/> 2nd	1962.50	1882.50	18.75
<input checked="" type="checkbox"/> 3rd	1985.00	1905.00	18.75

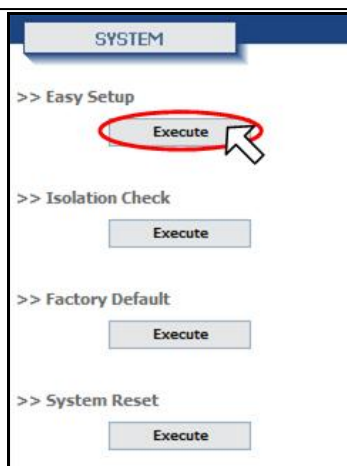
Step 2. Input AGC Level desired and click Apply.



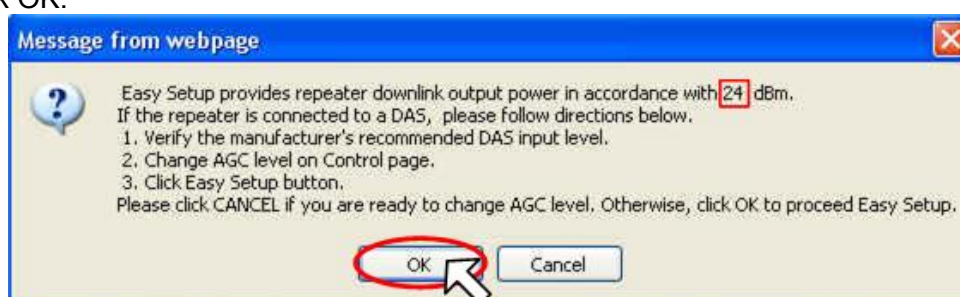
Step 3. Easy Setup proceeds to:

- Data Initial execution
- Isolation Test executed
- 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 Execute 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 \geq -71dBm

SYSTEM

>> Repeater Information

Repeater S/N	APEX1924201100001
Web Version	1.0.00
FW Version	1.0.00
Latitude	12.3095
Longitude	46.7802

>> Band Information

Normal

Fc[DL]	Fc[UL]	BW
1940.00	1860.00	1st 18.75MHz
1962.50	1882.50	2nd 18.75MHz
1985.00	1905.00	3rd 18.75MHz

OPERATING

>> DL Path Monitor

ON

DL Input Power	-71.1
DL Output Power	24.1
DL Gain	95.0

>> UL Path Monitor

ON

UL Input Power	-88.3
UL Output Power	4.4
UL Gain	95.0

>> Isolation Status

Isolation Level	110.0
Available Gain	95.0

ALARM

>> Alarm Information

DL Input Power
DL Output Power
UL Output Power
DL Return Loss
DC Current
Temperature
ASD

Normal

Fail

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

SYSTEM	OPERATING	ALARM													
>> Repeater Information <table border="1"> <tr><td>Repeater S/N</td><td>APEX1924201100001</td></tr> <tr><td>Web Version</td><td>1.0.00</td></tr> <tr><td>FW Version</td><td>1.0.00</td></tr> <tr><td>Latitude</td><td>12.3095</td></tr> <tr><td>Longitude</td><td>46.7802</td></tr> </table>			Repeater S/N	APEX1924201100001	Web Version	1.0.00	FW Version	1.0.00	Latitude	12.3095	Longitude	46.7802			
Repeater S/N	APEX1924201100001														
Web Version	1.0.00														
FW Version	1.0.00														
Latitude	12.3095														
Longitude	46.7802														
>> Band Information Normal <table border="1"> <thead> <tr> <th>Fc[DL]</th> <th>Fc[UL]</th> <th>BW</th> </tr> </thead> <tbody> <tr> <td>1940.00</td> <td>1860.00</td> <td>1st 18.75MHz</td> </tr> <tr> <td>1962.50</td> <td>1882.50</td> <td>2nd 18.75MHz</td> </tr> <tr> <td>1985.00</td> <td>1905.00</td> <td>3rd 18.75MHz</td> </tr> </tbody> </table>			Fc[DL]	Fc[UL]	BW	1940.00	1860.00	1st 18.75MHz	1962.50	1882.50	2nd 18.75MHz	1985.00	1905.00	3rd 18.75MHz	
Fc[DL]	Fc[UL]	BW													
1940.00	1860.00	1st 18.75MHz													
1962.50	1882.50	2nd 18.75MHz													
1985.00	1905.00	3rd 18.75MHz													
>> DL Path Monitor ON <table border="1"> <tr><td>DL Input Power</td><td>-63.8</td></tr> <tr><td>DL Output Power</td><td>23.8</td></tr> <tr><td>DL Gain</td><td>87.0</td></tr> </table>		DL Input Power	-63.8	DL Output Power	23.8	DL Gain	87.0	>> Alarm Information <table border="1"> <tr><td>DL Input Power</td></tr> <tr><td>DL Output Power</td></tr> <tr><td>UL Output Power</td></tr> <tr><td>DL Return Loss</td></tr> <tr><td>DC Current</td></tr> <tr><td>Temperature</td></tr> <tr><td>ASD</td></tr> </table>	DL Input Power	DL Output Power	UL Output Power	DL Return Loss	DC Current	Temperature	ASD
DL Input Power	-63.8														
DL Output Power	23.8														
DL Gain	87.0														
DL Input Power															
DL Output Power															
UL Output Power															
DL Return Loss															
DC Current															
Temperature															
ASD															
>> UL Path Monitor ON <table border="1"> <tr><td>UL Input Power</td><td>-88.8</td></tr> <tr><td>UL Output Power</td><td>--</td></tr> <tr><td>UL Gain</td><td>87.0</td></tr> </table>		UL Input Power	-88.8	UL Output Power	--	UL Gain	87.0								
UL Input Power	-88.8														
UL Output Power	--														
UL Gain	87.0														
>> Isolation Status <table border="1"> <tr><td>Isolation Level</td><td>110.0</td></tr> <tr><td>Available Gain</td><td>95.0</td></tr> </table>		Isolation Level	110.0	Available Gain	95.0										
Isolation Level	110.0														
Available Gain	95.0														
Normal Fail															

5.6.2.2. AGC Level 20dBm

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

SYSTEM	OPERATING
>> Easy Setup <div style="border: 1px solid red; border-radius: 50%; padding: 2px; display: inline-block;">Execute</div>	>> DL Path Control DL Path On Off DL Gain [dB] <input type="text" value="55.0"/>
>> Isolation Check <div>Execute</div>	>> UL Path Control UL Path On Off UL Gain [dB] <input type="text" value="55.0"/> Gain Tracking On Off
>> Factory Default <div>Execute</div>	>> Automatic Gain Control (AGC) AGC Mode On Off AGC Level [dBm] <div style="border: 1px solid red; padding: 2px;">20</div> UL Gain Offset [dB] <input type="text" value="0.0"/>
>> System Reset <div>Execute</div>	>> Automatic Shutdown(ASD) ASD Mode On Off ASD Level [dBm] <input type="text" value="27"/> <div style="text-align: right;"><div>Apply</div></div>

Step 2. Click OK.

Message from webpage

Easy Setup provides repeater downlink output power in accordance with 20 dBm. If the repeater is connected to a DAS, please follow directions below.

1. Verify the manufacturer's recommended DAS input level.
2. Change AGC level on Control page.
3. Click Easy Setup button.

Please click CANCEL if you are ready to change AGC level. Otherwise, click OK to proceed Easy Setup.

OK

Cancel

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


SYSTEM	OPERATING	ALARM																																													
<div>>> Repeater Information</div> <table><tr><td>Repeater S/N</td><td>APEX1924201100001</td></tr><tr><td>Web Version</td><td>1.0.00</td></tr><tr><td>FW Version</td><td>1.0.00</td></tr><tr><td>Latitude</td><td>12.3095</td></tr><tr><td>Longitude</td><td>46.7802</td></tr></table> <div>>> Band Information</div> <div>Normal</div> <table><tr><th>Fc[DL]</th><th>Fc[UL]</th><th>BW</th></tr><tr><td>1940.00</td><td>1860.00</td><td>1st 18.75MHz</td></tr><tr><td>1962.50</td><td>1882.50</td><td>2nd 18.75MHz</td></tr><tr><td>1985.00</td><td>1905.00</td><td>3rd 18.75MHz</td></tr></table>	Repeater S/N	APEX1924201100001	Web Version	1.0.00	FW Version	1.0.00	Latitude	12.3095	Longitude	46.7802	Fc[DL]	Fc[UL]	BW	1940.00	1860.00	1st 18.75MHz	1962.50	1882.50	2nd 18.75MHz	1985.00	1905.00	3rd 18.75MHz	<div>>> DL Path Monitor</div> <div>ON</div> <table><tr><td>DL Input Power</td><td>-70.9</td></tr><tr><td>DL Output Power</td><td>20.0</td></tr><tr><td>DL Gain</td><td>90.5</td></tr></table> <div>>> UL Path Monitor</div> <div>ON</div> <table><tr><td>UL Input Power</td><td>-89.8</td></tr><tr><td>UL Output Power</td><td>--</td></tr><tr><td>UL Gain</td><td>90.5</td></tr></table> <div>>> Isolation Status</div> <table><tr><td>Isolation Level</td><td>110.0</td></tr><tr><td>Available Gain</td><td>95.0</td></tr></table>	DL Input Power	-70.9	DL Output Power	20.0	DL Gain	90.5	UL Input Power	-89.8	UL Output Power	--	UL Gain	90.5	Isolation Level	110.0	Available Gain	95.0	<div>>> Alarm Information</div> <table><tr><td>DL Input Power</td></tr><tr><td>DL Output Power</td></tr><tr><td>UL Output Power</td></tr><tr><td>DL Return Loss</td></tr><tr><td>DC Current</td></tr><tr><td>Temperature</td></tr><tr><td>ASD</td></tr></table>	DL Input Power	DL Output Power	UL Output Power	DL Return Loss	DC Current	Temperature	ASD
Repeater S/N	APEX1924201100001																																														
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UL Input Power	-89.8																																														
UL Output Power	--																																														
UL Gain	90.5																																														
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DL Return Loss																																															
DC Current																																															
Temperature																																															
ASD																																															
<div><div></div>Normal<div></div>Fail</div>																																															

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.

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

				Status	Control	Network	Alarm History	File Update	
<div>APEX</div> <div>Tech Support : 1-888-317-8766</div> <div>Cascade Code : APEX</div> <div>04 / 14 / 2011 15 : 09 : 29</div> <div>APEX1924</div> <div></div> <div></div> <div></div> <div></div>				SYSTEM		OPERATING		ALARM	
				>> Repeater Information		>> DL Path Monitor OFF		>> Alarm Information	
				Repeater S/N APEX1924201100001		DL Input Power --		DL Input Power	
				Web Version 1.0.00		DL Output Power --		DL Output Power	
				FW Version 1.0.00		DL Gain 55.0		UL Output Power	
Latitude 12.3095		>> UL Path Monitor OFF		DL Return Loss					
Longitude 46.7802		UL Input Power --		DC Current					
>> Band Information Normal		UL Output Power --		Temperature					
Fc[DL] Fc[UL] BW		UL Gain 55.0		ASD					
1940.00 1860.00 1st 18.75MHz		>> Isolation Status							
1962.50 1882.50 2nd 18.75MHz		Isolation Level 110.0							
1985.00 1905.00 3rd 18.75MHz		Available Gain 95.0							

<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 power 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.

>> Alarm History

Issue Time	Alarm Information
2011/04/11 15:55:58	Repeater 1 - APEX1924 : Current Normal
2011/04/11 15:55:58	Repeater 1 - APEX1924 : Temperature Normal
2011/04/11 15:53:01	Repeater 1 - APEX1924 : Current Alarm
2011/04/11 15:53:01	Repeater 1 - APEX1924 : Temperature Alarm
2011/04/11 15:52:32	Repeater 1 - APEX1924 : DL Output Power Normal
2011/04/11 15:48:17	Repeater 1 - APEX1924 : DL Output Power Alarm
2011/04/11 15:48:13	Repeater 1 - APEX1924 : DL Output Power Normal
2011/04/11 15:48:11	Repeater 1 - APEX1924 : DL Output Power Alarm
2011/04/11 15:48:08	Repeater 1 - APEX1924 : DL Output Power Normal
2011/04/11 15:48:05	Repeater 1 - APEX1924 : DL Output Power Alarm
2011/04/11 15:48:02	Repeater 1 - APEX1924 : DL Output Power Normal
2011/04/11 15:47:59	Repeater 1 - APEX1924 : DL Output Power Alarm

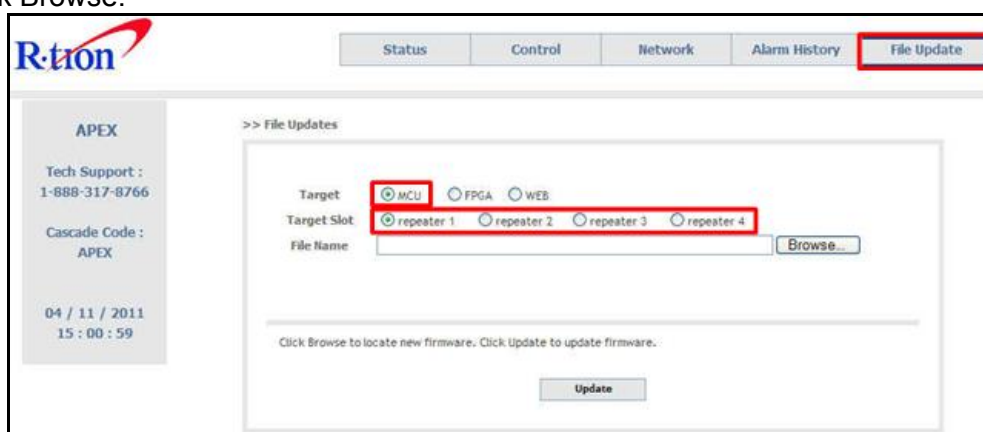
Alarm Request Delete

For corrective action please refer to 6. Troubleshooting section.

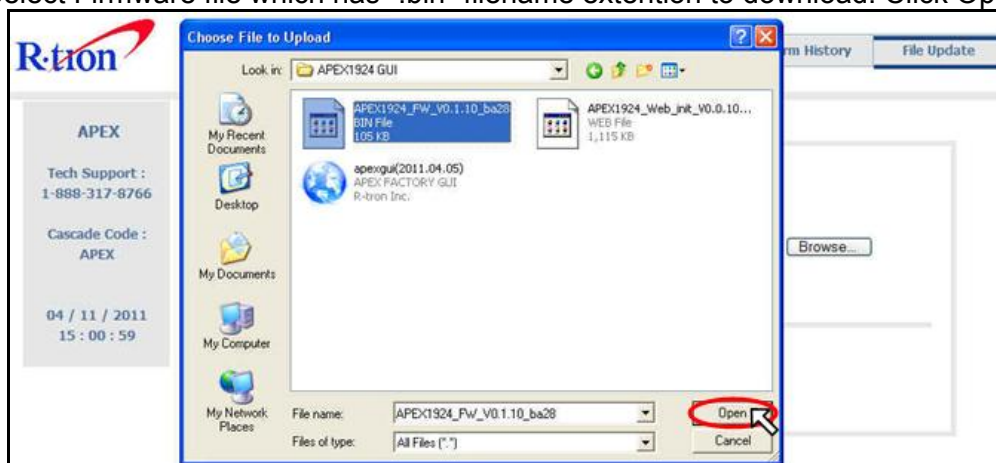
5.8. File Update

5.8.1. MCU Firmware Download

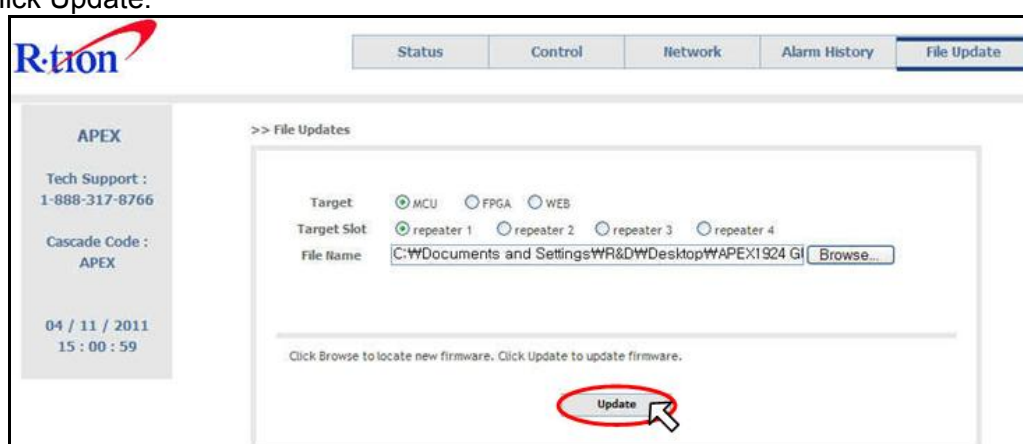
Step 1. Select MCU of Target and applicable repeater of Target Slot which you desire to download.
Click Browse.



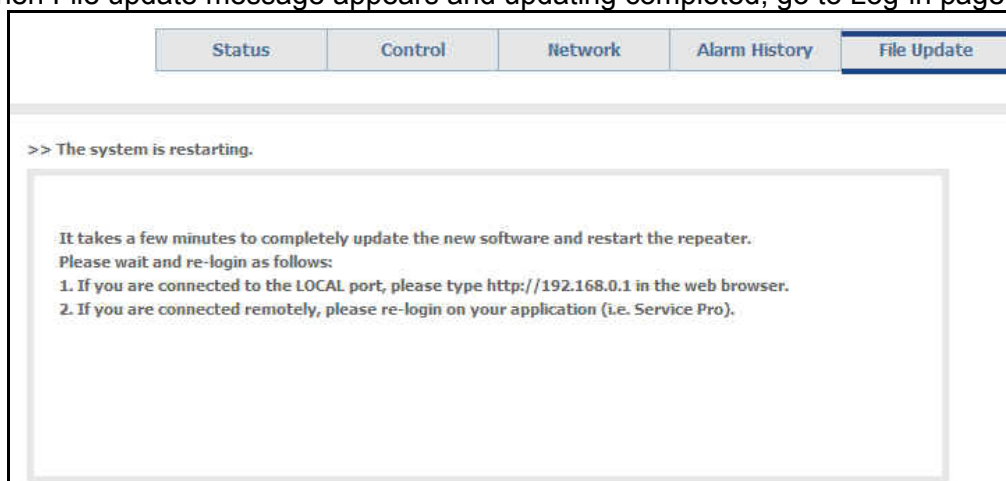
Step 2. Select Firmware file which has “.bin” filename extension to download. Click Open.

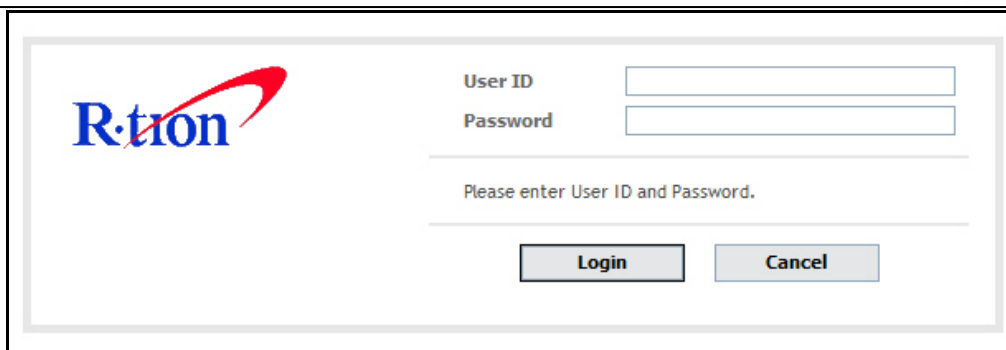


Step 3. Click Update.



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

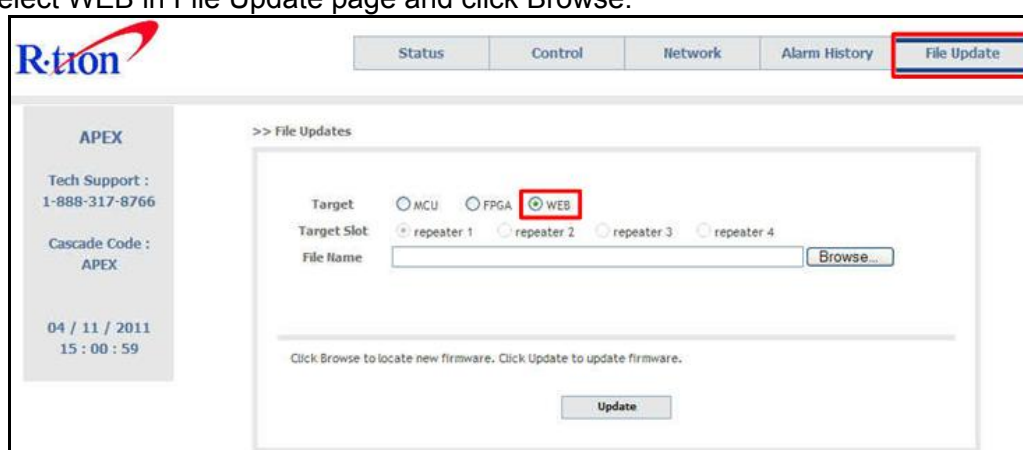




The login form features the R-tion logo on the left. On the right, there are two input fields labeled 'User ID' and 'Password'. Below these fields is a text prompt: 'Please enter User ID and Password.' At the bottom right, there are two buttons: 'Login' and 'Cancel'.

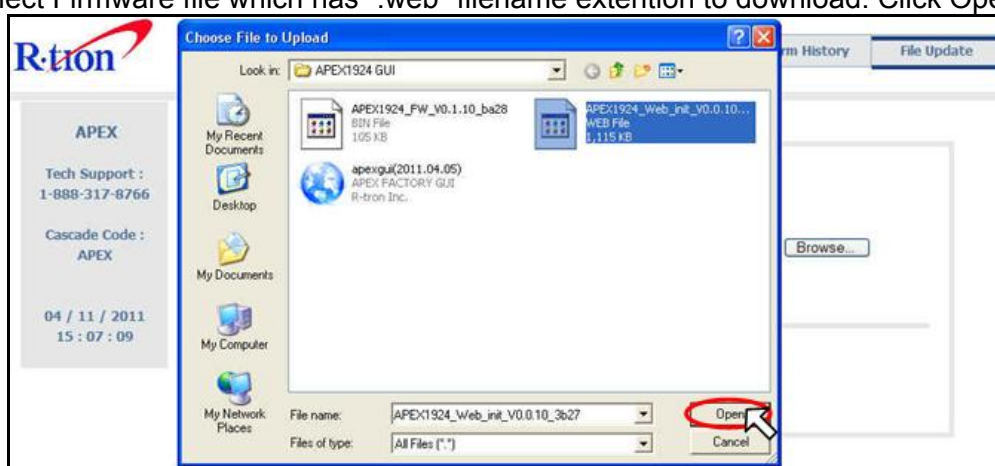
5.8.2. Web GUI Download

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



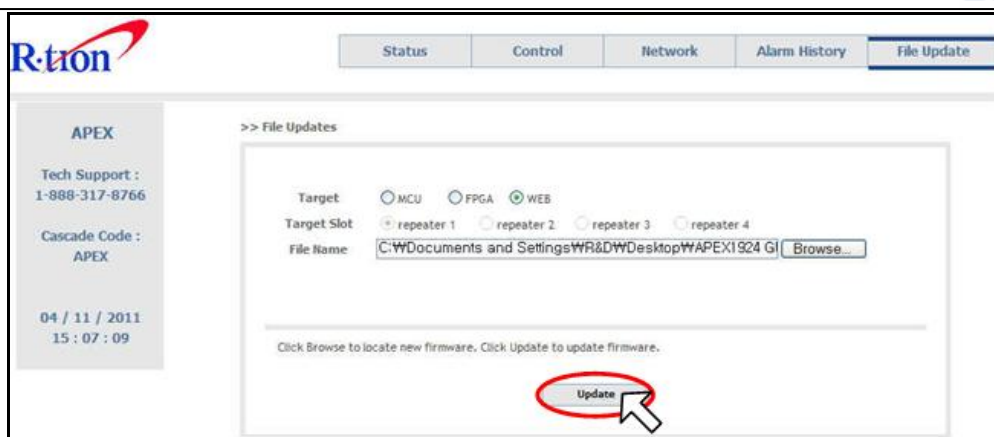
The 'File Update' page is shown with the 'File Update' tab selected in the top navigation bar. On the left, there is a sidebar with 'APEX' information, including tech support contact and a cascade code. The main area is titled '>> File Updates'. It contains a 'Target' section with radio buttons for 'MCU', 'FPGA', and 'WEB' (which is selected and highlighted with a red box). Below this is a 'Target Slot' section with radio buttons for 'repeater 1', 'repeater 2', 'repeater 3', and 'repeater 4'. A 'File Name' input field with a 'Browse...' button is also present. At the bottom, there is an 'Update' button and a note: 'Click Browse to locate new firmware. Click Update to update firmware.'

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

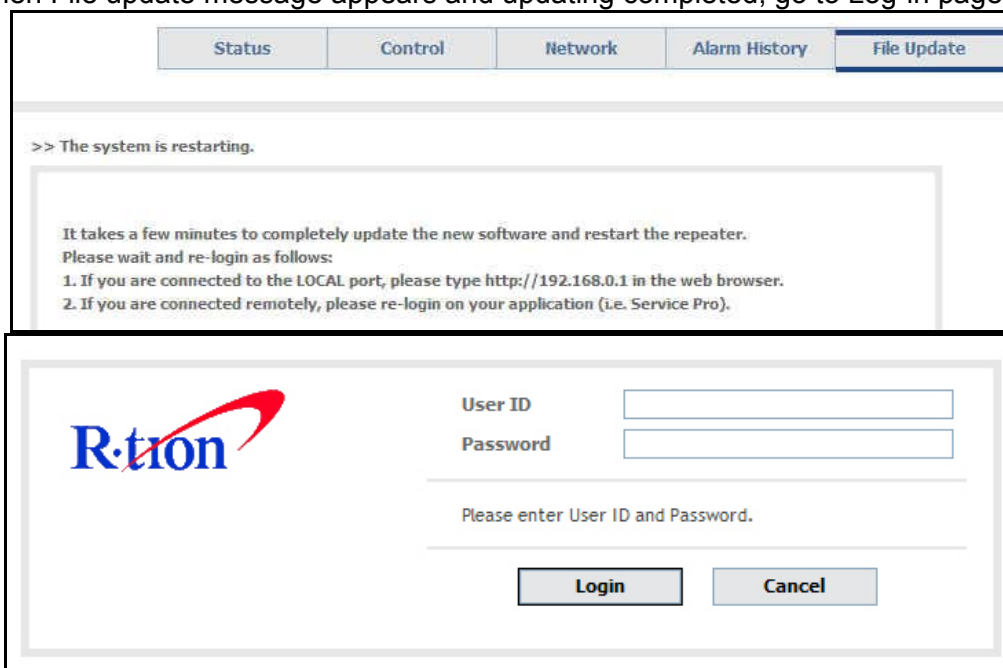


A 'Choose File to Upload' dialog box is open, showing the contents of the 'APEX1924 GUI' folder. The files listed include 'APEX1924_FW_V0.1.10_ba28', 'APEX1924_Web_init_V0.0.10...', and 'apexgui(2011.04.05)'. The file 'APEX1924_Web_init_V0.0.10...' is selected. The 'File name' field at the bottom shows 'APEX1924_Web_init_V0.0.10_3b27'. The 'Files of type' is set to 'All Files (*.*)'. The 'Open' button is highlighted with a red circle and a mouse cursor.

Step 3. Click Update.



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



5.9. Attachment

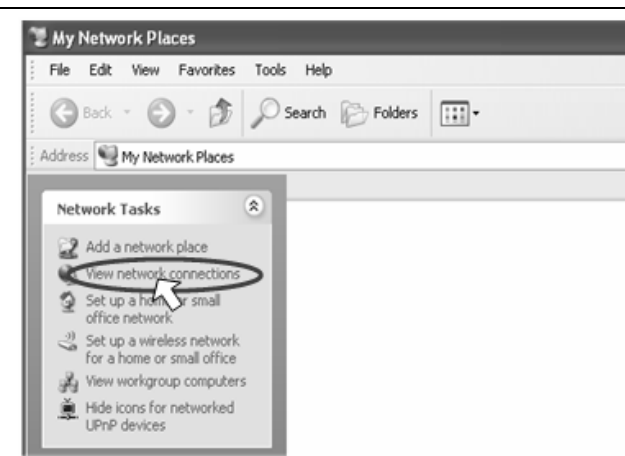
5.9.1. Internet Network Setting

5.9.1.1. Window XP

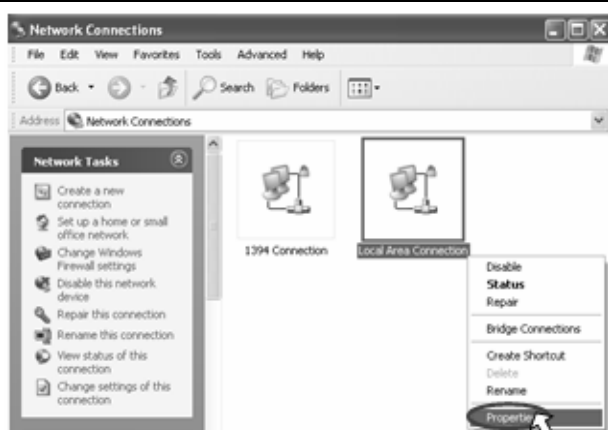
Step 1: Click the Start button and select My Network places.



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.



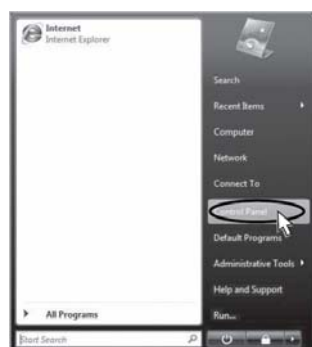
Step 5: Check Obtain an IP address automatically and click OK.



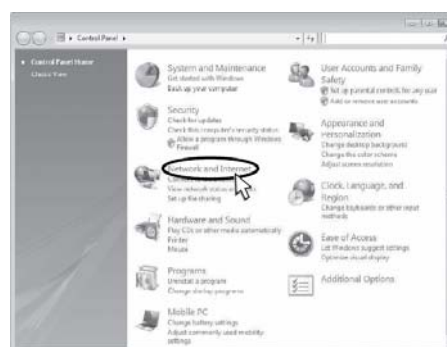
Step 6: Close all widows.

5.9.1.2. Windows Vista

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

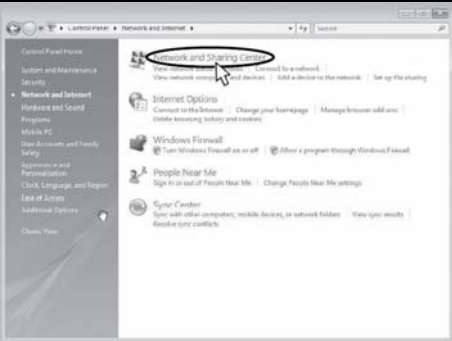
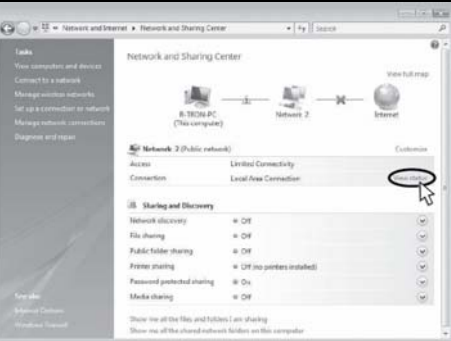

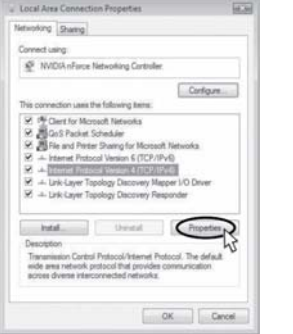



Step 2: Click Network and Internet



Step 3: Click Network and Sharing Center.

Step 4: Click View status of Local Area Connection.

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

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 down

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

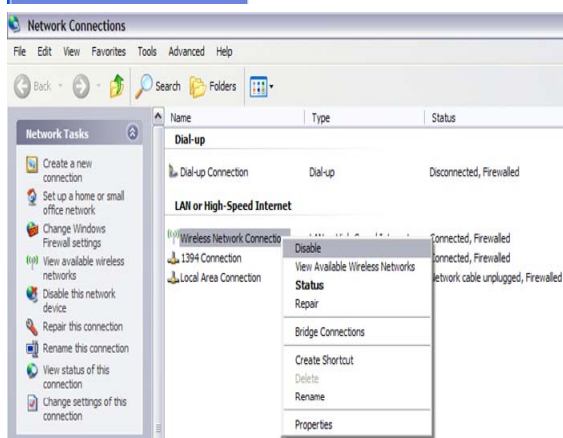
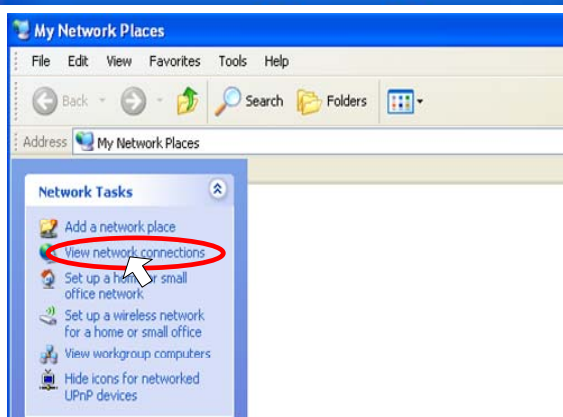
Problem	Check Point	Solution
General	DC Current	If the same alarm occurs after reset Power, request technical support.
	Temperature	Execute of System Reset (NCU) on Network Setup page. If the same alarm occurs request technical support.
	ASD	Check Isolation and DL/UL Input power.. This may be caused 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

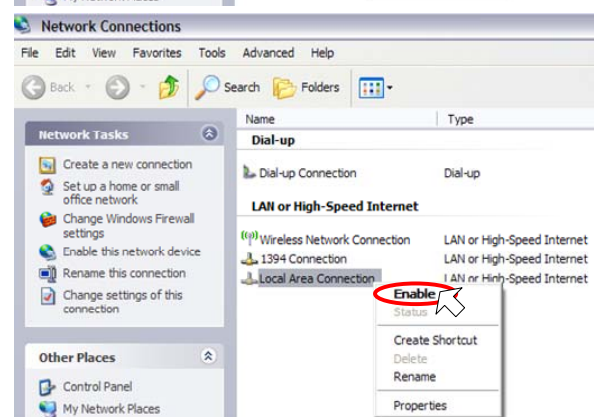
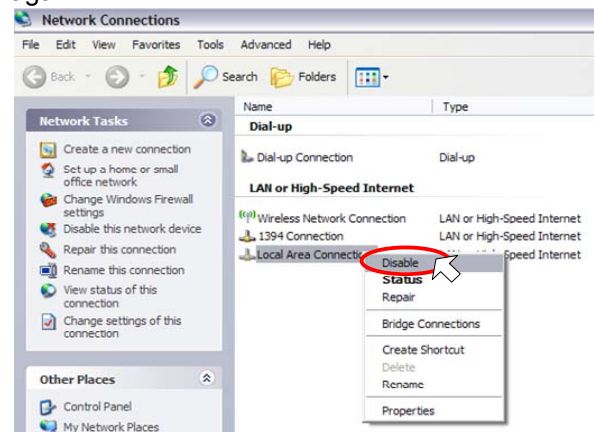
When you cannot login to the web GUI.

Solution

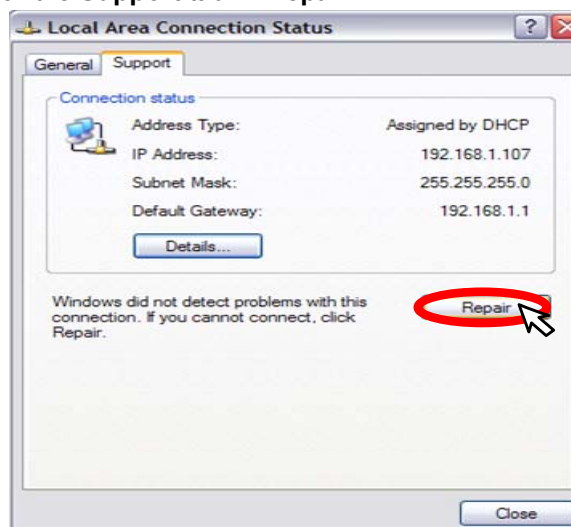
1. Click **My Network places** → **View network connections**. Right-click on the **Wireless Network Connection** and then click **Disable**.



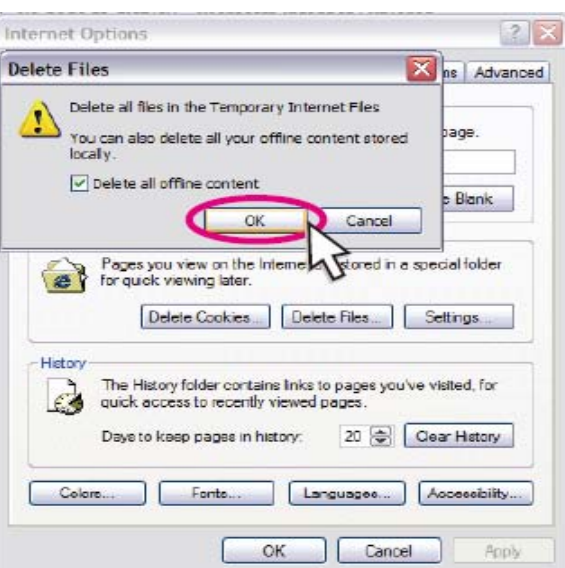
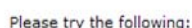
2. Right-click on the **Local Area Connection** and then click **Disable**. After clicking **Disable**, click **Enable** again.



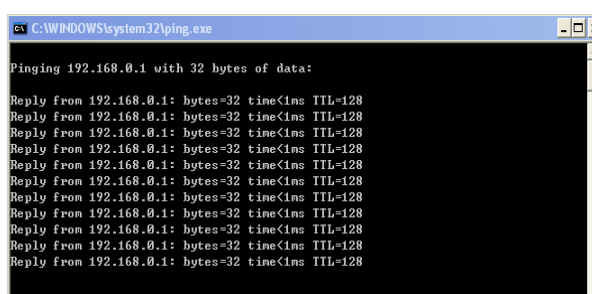
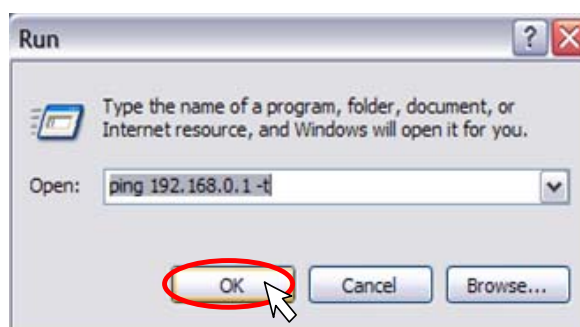
3. Double click the **Local Area Connection** and then click the **Support** tab → **Repair**.



Click **Delete Files** in the Temporary Internet files section.



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 μ s (max)	
	Filter set High	8 μ s (max)	
Spurious Emission		Section 24 and section 27 of FCC	
VSWR		1.4 : 1 (max)	
Impedance		50 Ω	

7.2 Environmental Specification

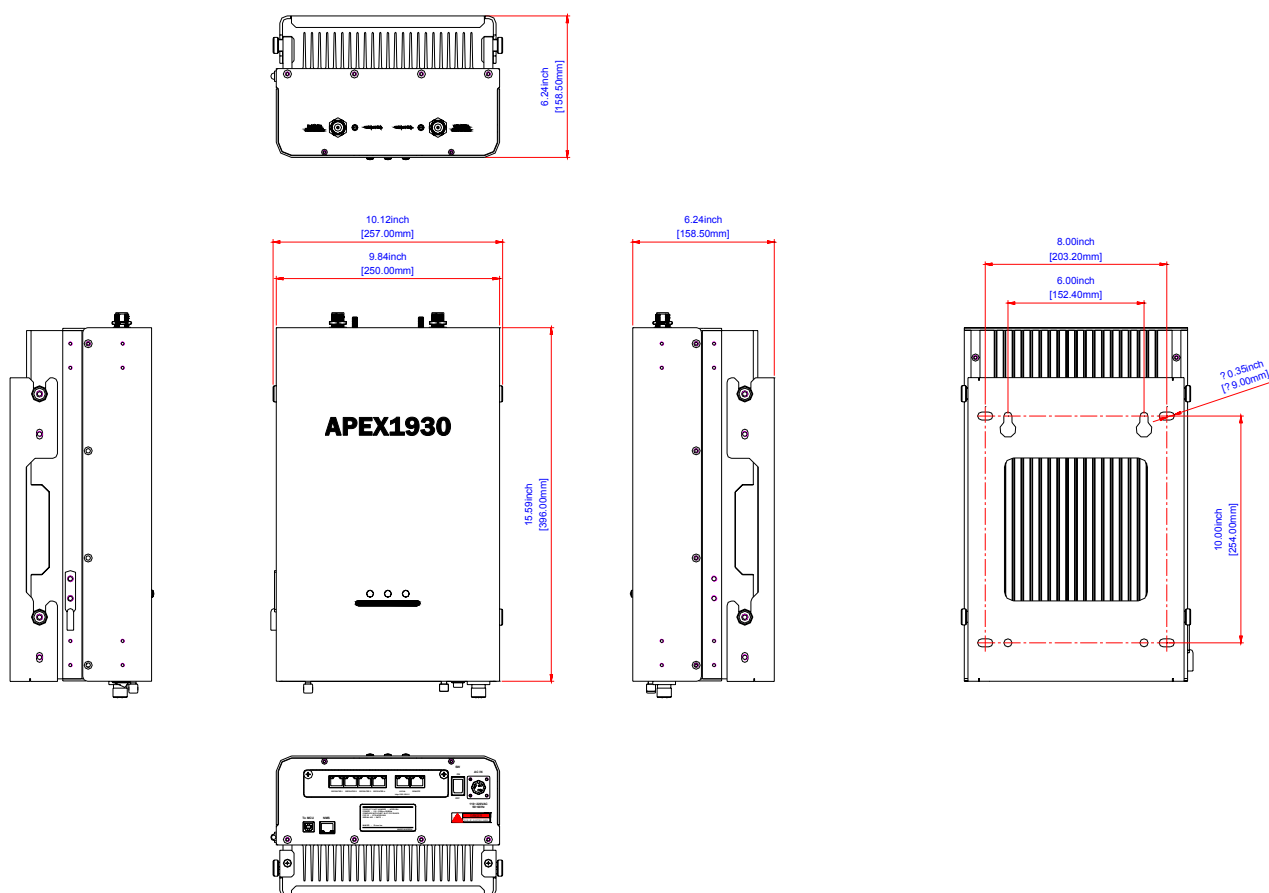
Parameter		Specification
Environmental	Operating Temp	-10°C~50°C (14°F~122°F)
	Humidity	20%~90%RH
	Cooling method	Convection.

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.

