

## **ATTACHMENT E.**

### **- USER MANUAL -**

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# Repeater




## INSTALLATION GUIDE

Ver. 0.2

**GRS-1930R-SPR**

**GS Teletech Inc.**

## Contents of Box

Contents	Picture	Quantity	Contents	Picture	Quantity
Repeater		1EA	Ground Cable 6.6ft (2m)		1EA
Mounting Bracket		1EA	Ground Sems Screw M4 x 8mm		4EA
CD which Contains User Manual Ver 1.0 and Installation Guide Ver 1.0		1EA	Bracket Sems Screw M6 x 16mm		4EA
Ethernet Cable 6.6ft (2m)		1EA	Lag Screw 1/4" x 3/2"		4EA
Power Cord 10ft (3m)		1EA	Anchor Bolt Set 1/4" x 3/2"		4EA

**The images for the User Interface in this publication may vary from the repeater's depending on its S/W Version.**

## **Copyright**

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## **Revision History**

Date	Version	Changes
05/2010	Draft	

## **Certification**

UL/FCC: This equipment complies with UL and FCC

## Warnings and Hazards

### **WARNING! ELECTRIC SHOCK**

Opening the BDA (bi-directional amplifier) could result in electric shock and may cause severe injury.

### **WARNING! EXPOSURE TO RF**

Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC rules for human exposure. Visit the FCC website at <http://www.fcc.gov/oet/rfsafety> to learn more about the effects of exposure to RF electromagnetic fields.

### **WARNING! DAMAGE TO EQUIPMENT**

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

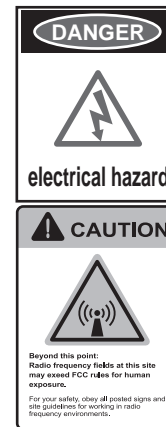
### **RF EXPOSURE & ANTENNA PLACEMENT**

Actual separation distance is determined upon gain of antenna used.

Please maintain a minimum safe distance of at least 8inch while operating near the donor and the server antennas. Also, the donor antenna needs to be mounted outdoors on a permanent structure.

### **WARRANTY**

Opening or tampering the BDA will void all warranties.



**CAUTION:** REPEATER SHOULD BE INSTALLED AS CLOSE AS POSSIBLE TO POWER SOURCE.



**CAUTION:** THIS REPEATER IS FOR INDOOR USE ONLY AND SHOULD BE LOCATED INSIDE OF BUILDING.

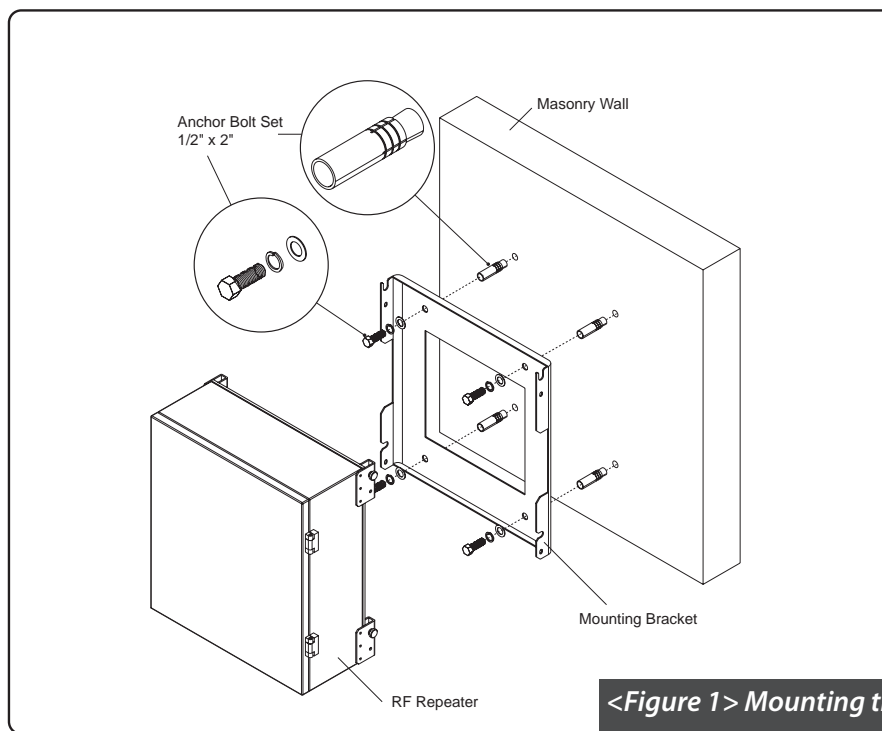


**CAUTION:** RISK OF EXPLOSION IF BATTERY ON CONTROLLER BOARD IS REPLACED WITH AN INCORRECT TYPE.

# Mounting Repeater

## Masonry Wall

1. Using a pencil, mark the location of each of the mounting bracket's four mounting holes on the wall.
2. Drill holes in the wall at the locations marked in step 1.
3. Set the anchors in the wall using a hammer.
4. Locate the four mounting bolts and place a lock washer and flat washer on each bolt.
5. Place the mounting bracket over the four holes with anchors, making sure that the washers are on the repeater side of the mounting bracket. Tighten bolts until secure.

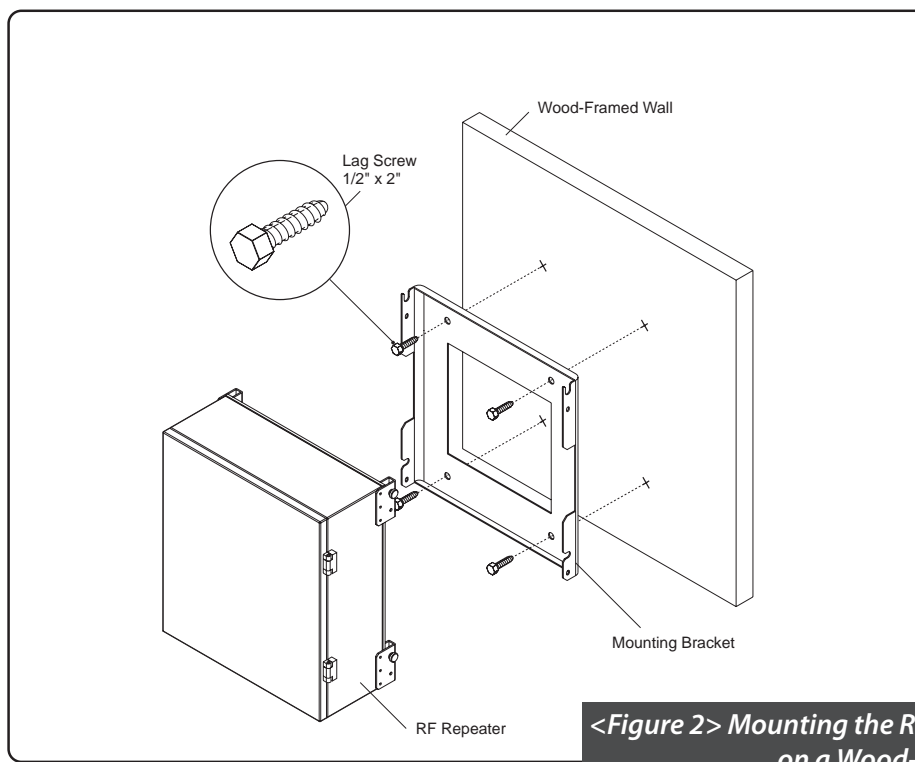


**<Figure 1> Mounting the Repeater  
on a Masonry Wall**

# Mounting Repeater

## Wood-Framed Wall

1. It is recommended to first attach a sheet of plywood to the wall. The sheet of plywood should be anchored to the studs in the wall.
2. Using a pencil, mark the location for each of the mounting bracket's four mounting holes on the plywood.
3. Place the mounting bracket over the four lag screws heads.
4. Thread a lag screw at the positions marked in step 1.



**<Figure 2> Mounting the Repeater  
on a Wood-Framed Wall**

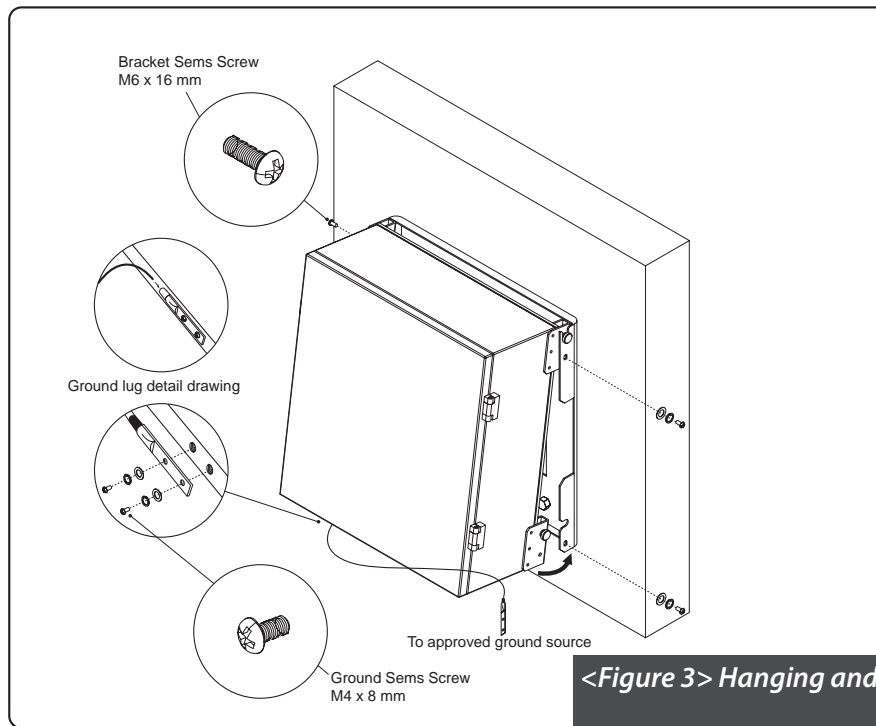
## Hanging and Grounding

1. Hang the Repeater from the mounting bracket.
2. Locate the four Bracket Sems Screws with installed washers. Tighten bolts until secure.
3. Locate the ground lug on the underside(or side) of the repeater.
4. Crimp the ground cable to the ground lug.
5. Route the free end of the ground cable to an approved(per local code or practice) ground source.



### CAUTION

*Ground cable must be properly grounded to provide both EMI and voltage surge protection for the repeater.*



**<Figure 3> Hanging and Grounding  
the Repeater**



## Position Antenna

- Customer specifications should be followed for positioning the antennas properly.



*<Figure 4> An installer is directing Donor Antenna to nearby BTS to receive strong input signal.*

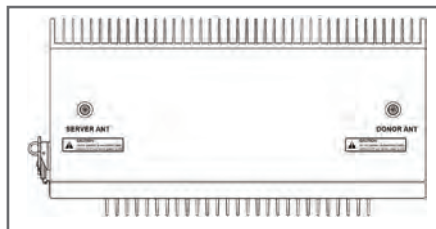
## Cable Connections

- Connect Donor and Server Antennas

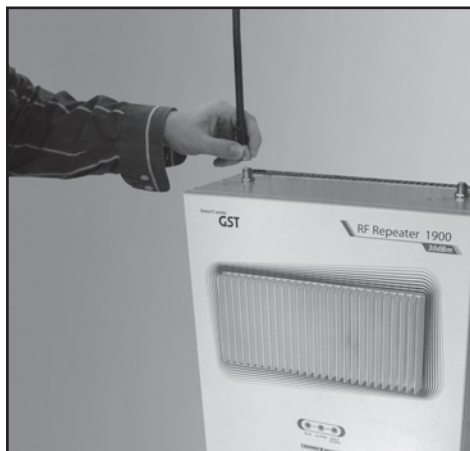


### CAUTION

*Do not connect or disconnect cable from ANT port when power is ON*



<Figure 5> ANT Ports



<Figure 7> Server ANT Port Connection



<Figure 8> Donor ANT Port Connection

## Connecting Power Cable and LED Light Verification

- Connect Power Cable



<Figure 9> AC Power Port Connection



<Figure 10> Verification of LED Lights

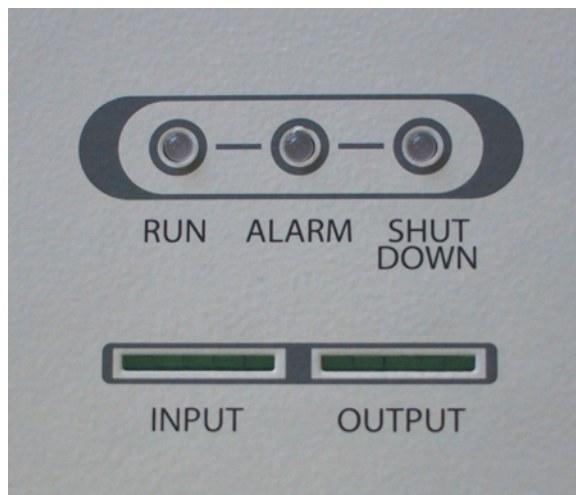
## LED Indicators

- The LED's on the repeater will light up and should change to green.

RUN LED : Green light ON

ALARM LED : Green light is normal status, Red light is alarm status

SHUT DOWN LED : Green light is normal status, Red light is shutdown status



*<Figure 11> Front LED Display*

# Input Power Signal

- Please note the number of LED bars for input indicates signal strength level.
- The tables below indicate the input signal levels.

## *CDMA 30dBm*

Less than ~ -86dBm	LED 1 bar
-85dBm ~ -70dBm	LED 2 bars
-69dBm ~ -54dBm	LED 3 bars
-53dBm ~ -41dBm	LED 4 bars
More than -40dBm	LED 5 bars

## Output Power Signal

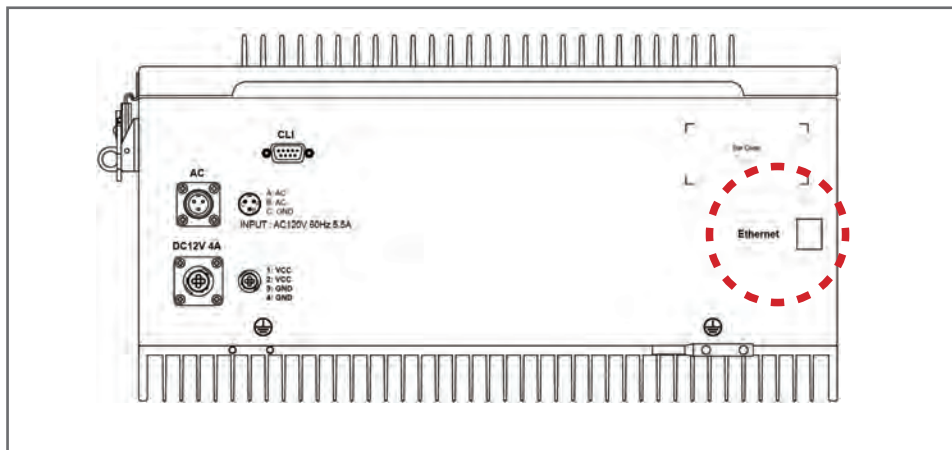
- Please note the number of LED bars for input indicates signal strength level.
- The tables below indicate the output signal levels.

### *CDMA 30dBm*

Less than +9dBm	LED 1bar
+10dBm ~ +14dBm	LED 2 bars
+15dBm ~ +19dBm	LED 3 bars
+20dBm ~ +24dBm	LED 4 bars
More than +25dBm	LED 5 bars

## Web UI

- Before connecting to repeater, disable wireless networking functions and remove wireless broadband card.
- Connect Ethernet Crossover cable from repeater to laptop.



*<Figure 12> CDMA 30 Ethernet Port Display*

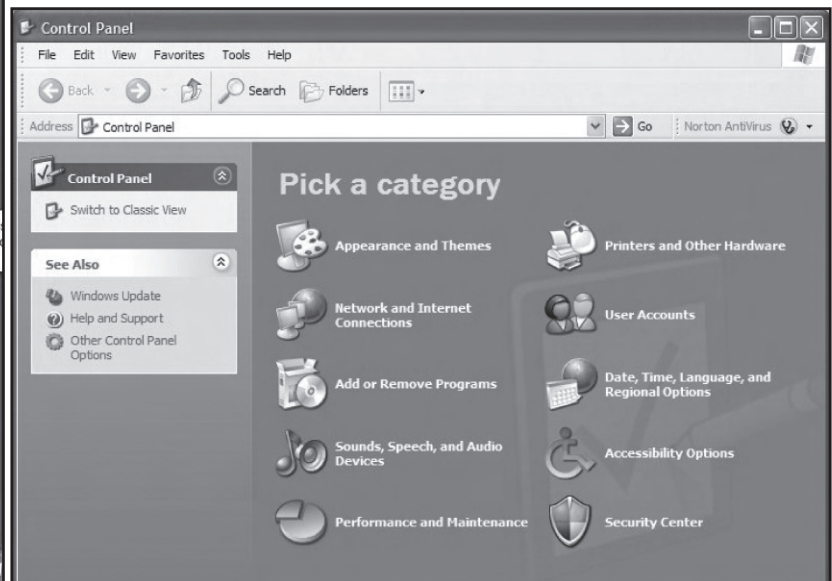
# Connecting to Web UI

1. Start-> Control Panel-> Network and Internet Connections



## CAUTION

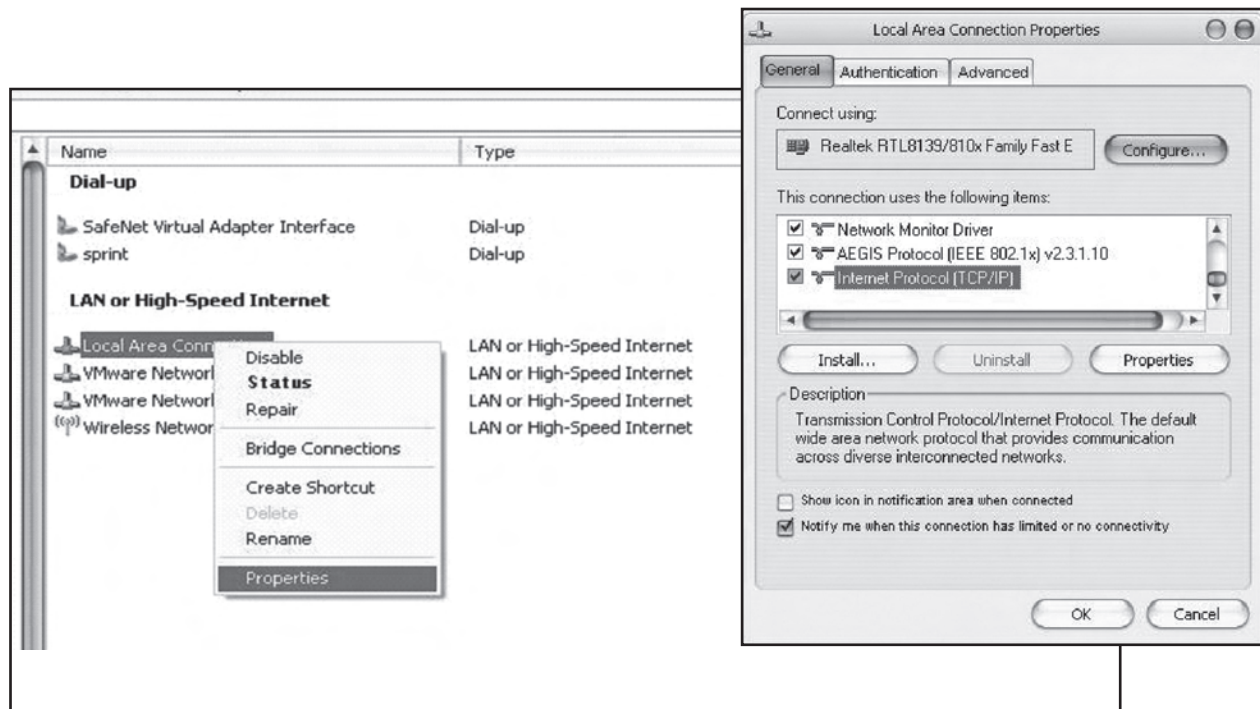
*Disable wireless connections and remove wireless broadband card.*



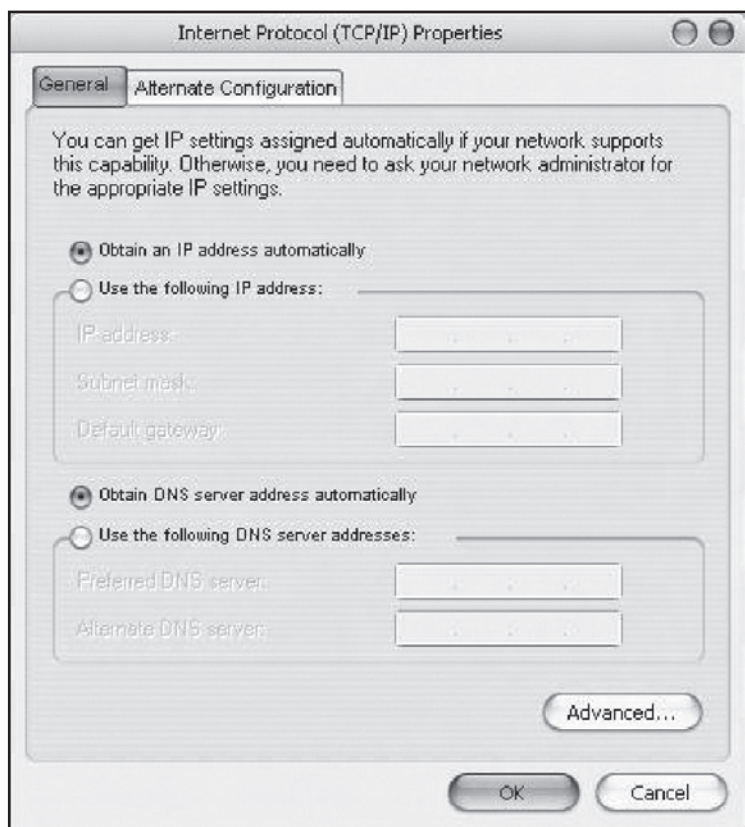


## Connecting to Web UI

2. Right click Local Area Connections and choose Properties
  - If your laptop is displaying multiple LAN's, verify which one is used for repeater connection.
3. Click Internet Protocol (TCP/IP) on General Tab and click Properties



## On General Tab



4. Choose “Obtain IP address automatically”

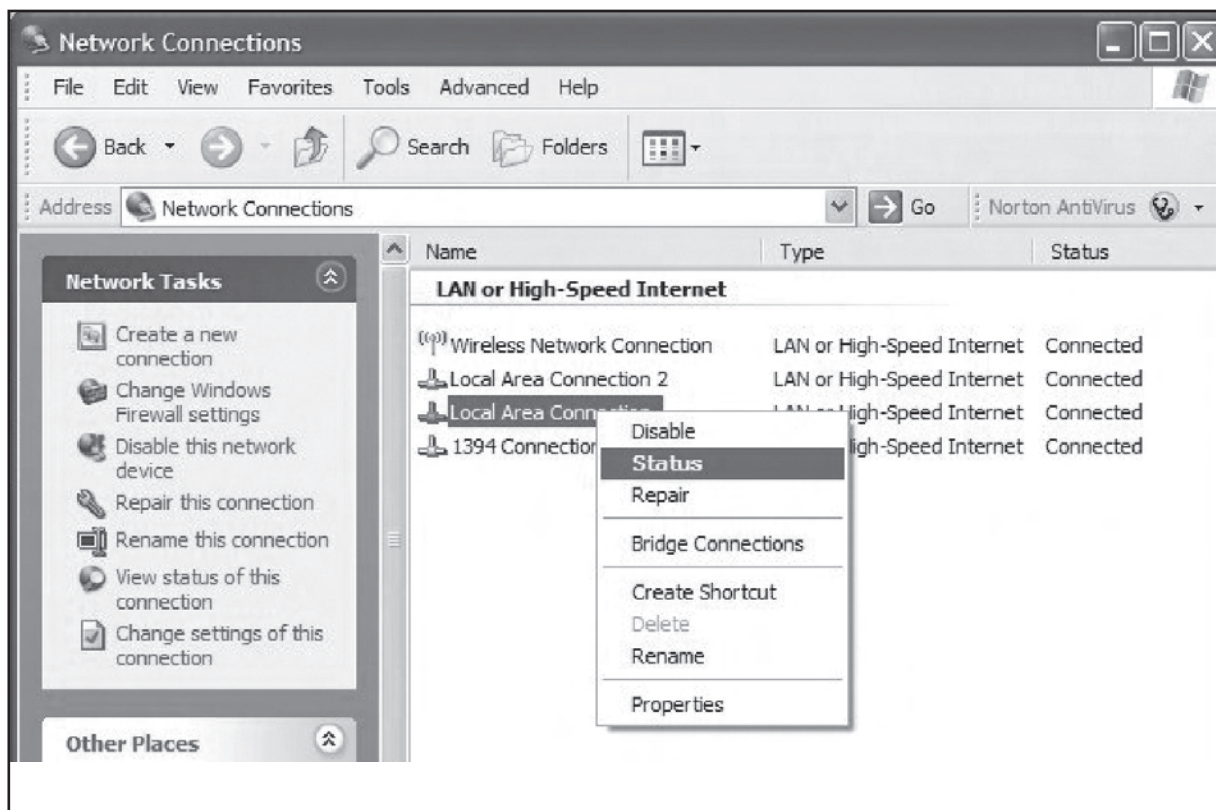
5. Choose “Obtain DNS server address automatically”

6 . Click “OK” to close Properties

7. Click “OK” to close Properties

# Connecting to Web UI

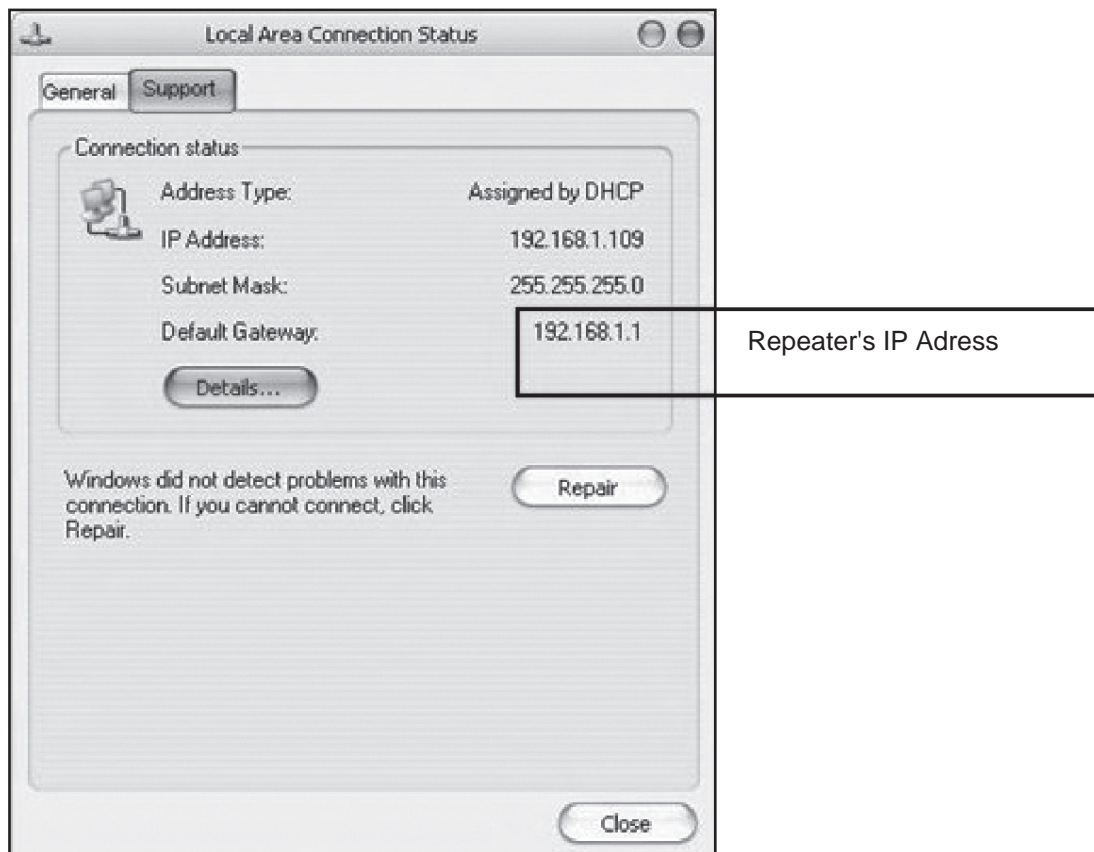
8. Right click Local Area Connections and choose Status



## Verify Assigned IP Address

9. Click on “Support” tab.

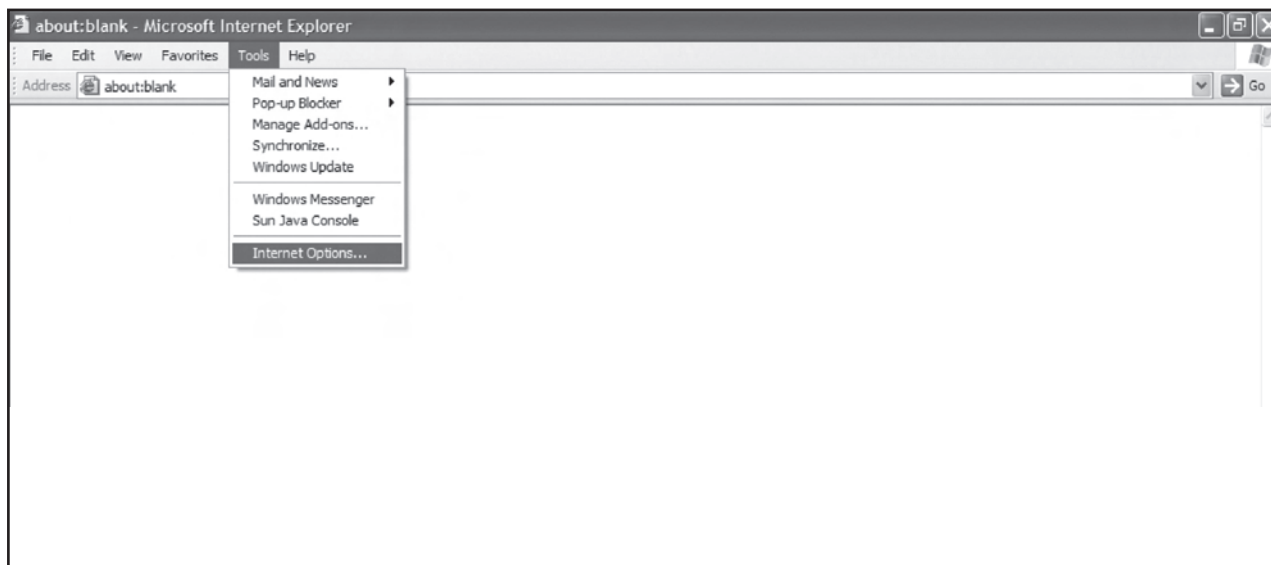
10. Verify assigned Default Gateway at local connection. *(If IP address is not assigned, please click repair.)*



# Internet Explorer Option Settings

- If you experience difficulties navigating between pages in the repeater, delete cookies and internet files.
- Proceed step by step as indicated in the following slides to delete all temporary internet files and records.

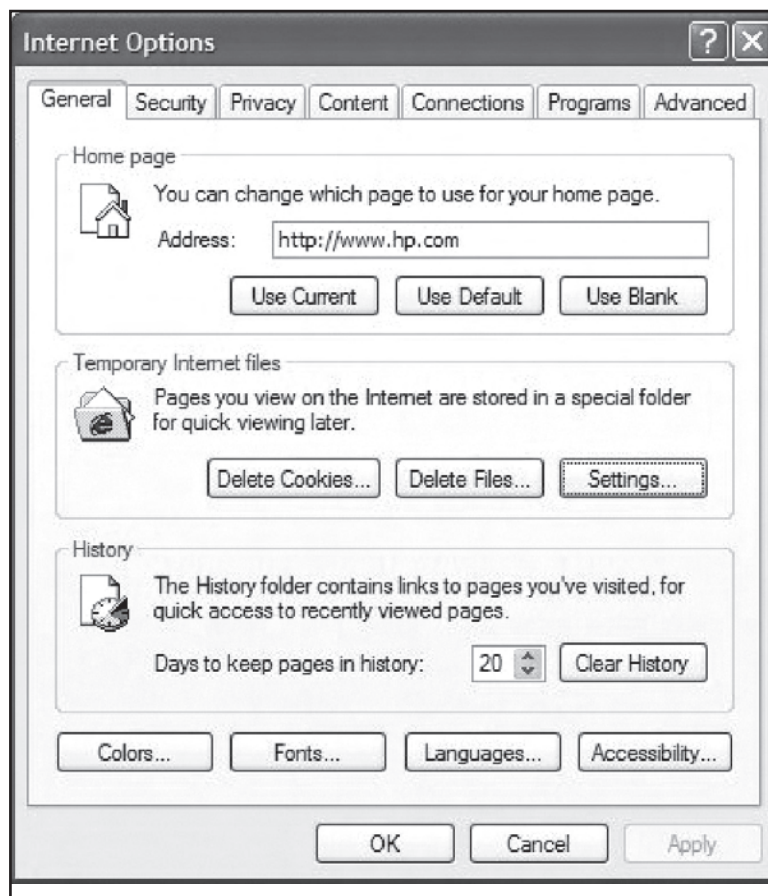
1. Open Internet Explorer -> Tools -> Internet Options



## Browser History Options

On the “General” tab, in the “Temporary Internet files” section:

2. Click “Delete Cookies...”
3. Click “Delete Files...”
4. Click “Apply”
5. Click “OK”



# Login Screen

The screenshot shows a Microsoft Internet Explorer window titled "CDMA - Microsoft Internet Explorer". The address bar contains the URL "http://192.168.1.1/cgi-bin/html.cgi", which is highlighted with a red rectangle. The main content area displays a login form with the following elements:

- A large gray box on the left containing the text "CDMA" and "Login".
- Form fields on the right:
  - Cascade code :
  - Serial No:
  - S/W Version:
  - Longitude/Latitude:
- A login section at the bottom with two input fields and a button:
  - User Name:  (highlighted with a red rectangle)
  - Password:  (highlighted with a red rectangle)
  - Login button

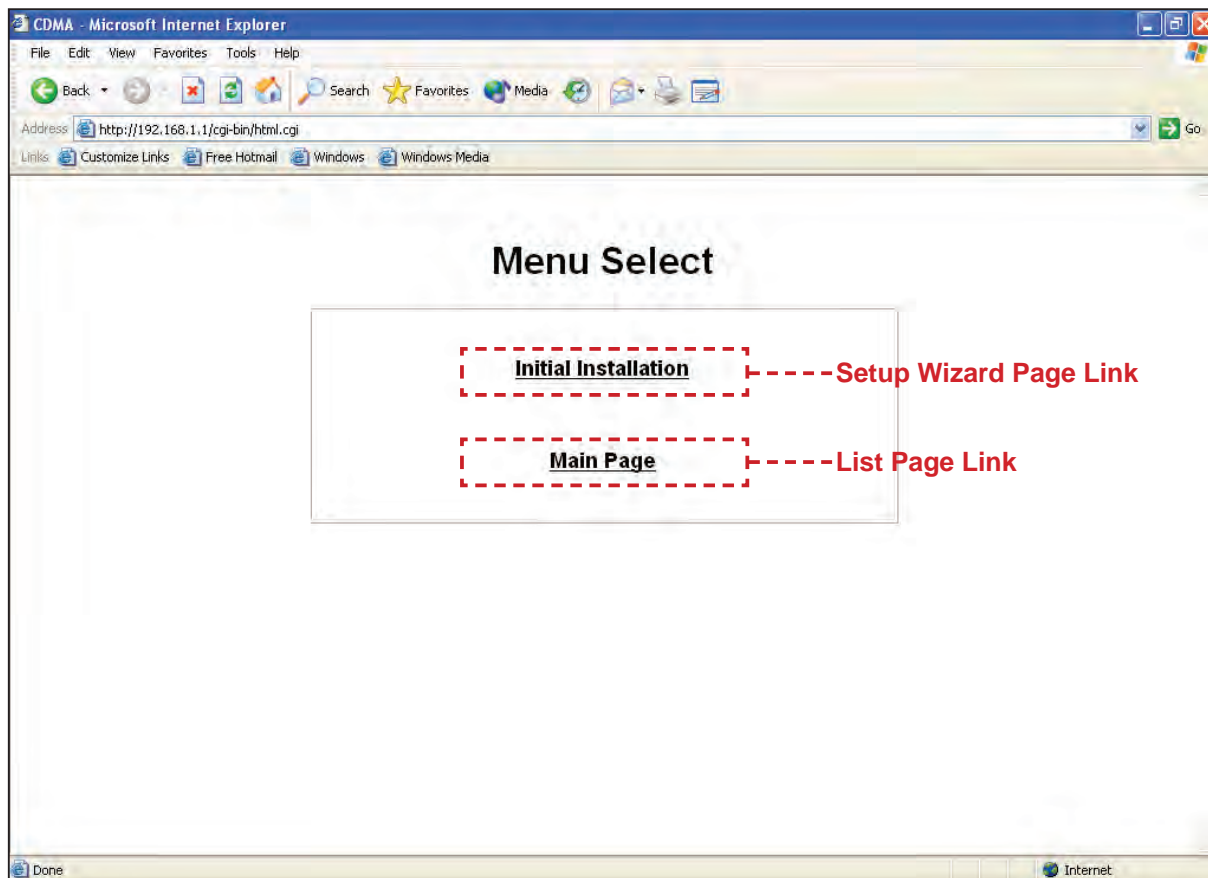
The status bar at the bottom shows "Done" and "Internet".

Enter Default Gateway's IP address into address bar as previously described, you will be redirected to Login. Default User Name is 'admin', and default Password is 'admin'. You may need to change password as described in the User Management section. Cascade code and Longitude/Latitude will initially be blank, you can input Cascade code and Longitude/Latitude as described in 'Communications Configuration Menu' page.



# Menu Select

- After you log in, you can see menu Select page.





# Setup Wizard

The screenshot shows a Microsoft Internet Explorer window titled "CDMA - Microsoft Internet Explorer". The address bar displays "http://192.168.1.1/cgi-bin/html.cgi?function=setup\_wizard\_com". The page content features the title "Setup Wizard" and a form titled "Cascade Code & Longitude / Latitude". The form has two input fields: "Cascade Code" with the value "GST00" and "Longitude : Latitude" with the value "N 38.91889;W 94.65784". Below the fields are "Apply" and "Skip" buttons. The status bar at the bottom shows "Done" and "Internet".

Cascade Code & Longitude / Latitude	
Cascade Code	GST00
Longitude : Latitude N 38.91889;W 94.65784	N 38.91889;W 94.65784
<input type="button" value="Apply"/> <input type="button" value="Skip"/>	

# Setup Wizard

CDMA - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Mail Print

Address <http://192.168.1.1/cgi-bin/html.cgi> Go

Links Customize Links Free Hotmail Windows Windows Media

## Setup Wizard CDMA

**Band width & BlockSelect Control**

3.75 MHz

A1				A2				A3				D			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
B1				B2				B3				E			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800
F				C1				C2				C3			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
825	850	875	900	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	1200
G															
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>													
1225	1250	1275													

Apply

Done Internet

# Setup Wizard

CDMA - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Mail Print

Address <http://192.168.1.1/cgi-bin/html.cgi> Go

Links Customize Links Free Hotmail Windows Windows Media

### Band width & BlockSelect Control

3.75 MHz

A1				A2				A3				D			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
B1				B2				B3				E			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800
F				C1				C2				C3			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
825	850	875	900	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	1200
G															
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>													
1225	1250	1275													

### Antenna Setting Control

Antenna only (AGS Setting)

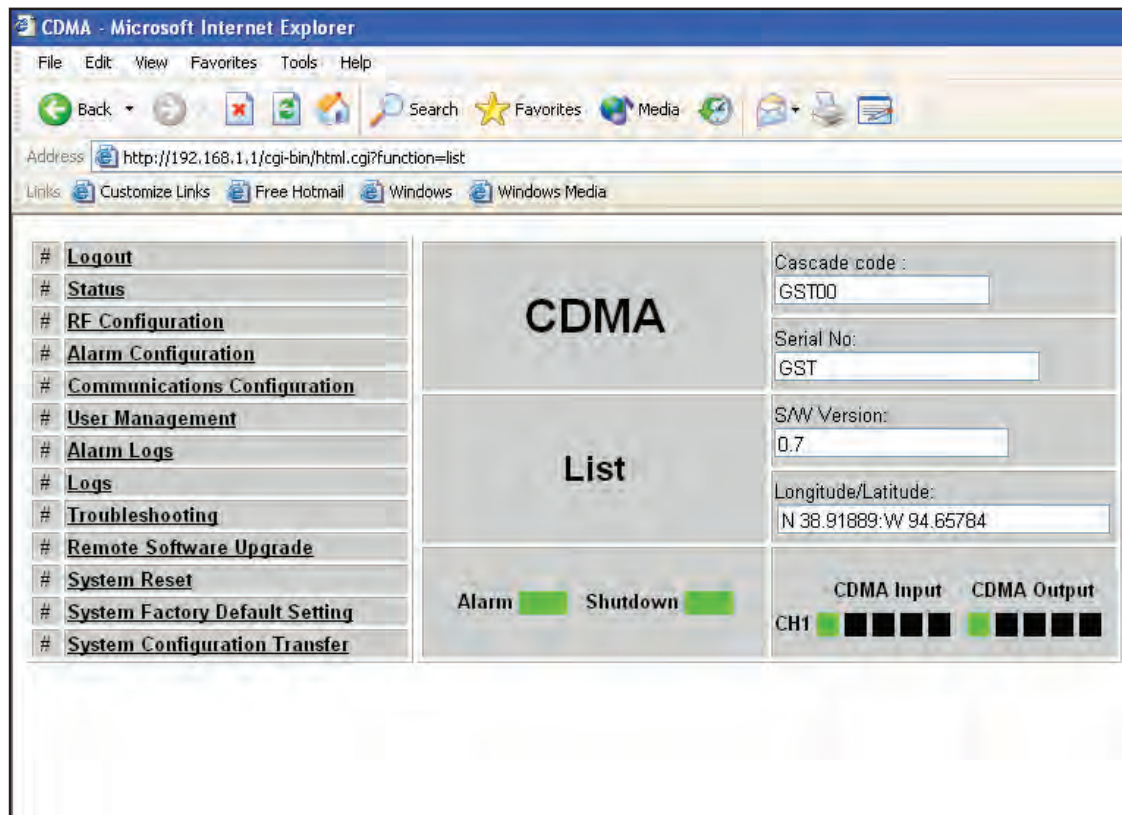
Antenna only (AGS Setting)  
 DAS (ALC downlink limit 7 dbm Setting)  
 DAS (ALC downlink limit Maximum Setting)  
 Not Use (HPA OFF)

Apply

Done Internet

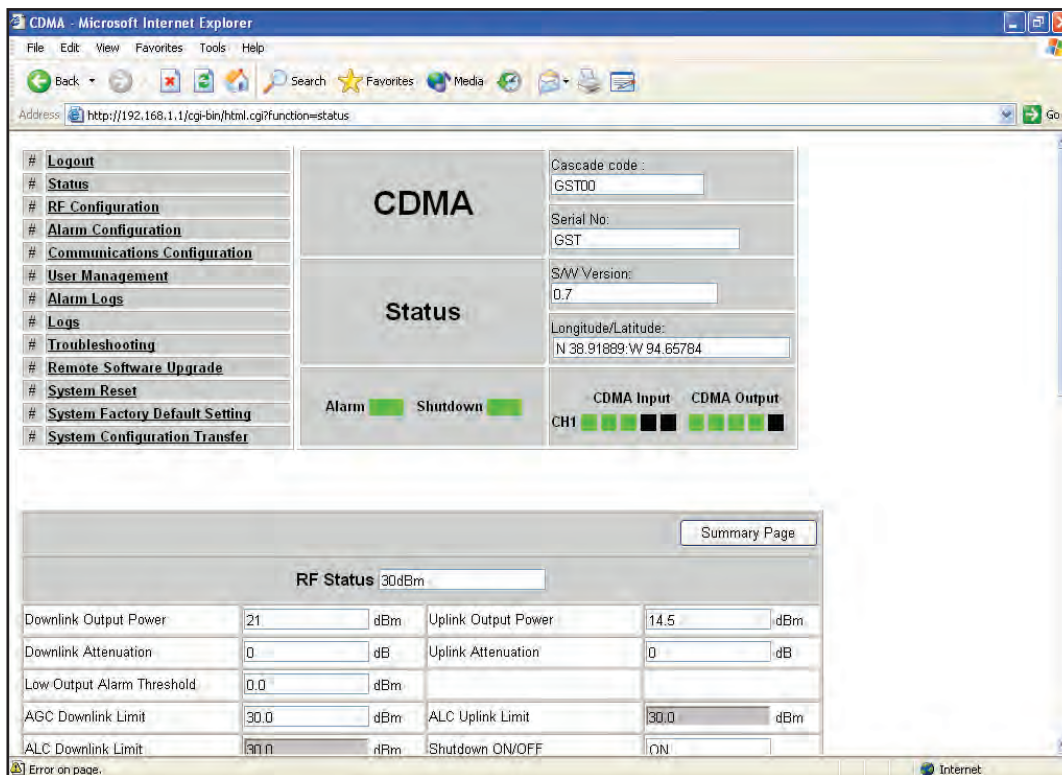
## List Menu

- After you log in, you can see menu pages on the left and information about the repeater on the right.



# Status Menu

- Default D/L and U/L are set at minimum Gain.
- The default values in various fields will differ with different models of CDMA Repeaters.
- In order to view other pages, you can click the desired link on the top left side of the page.



CDMA - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Reload Home Search Favorites Media

Address <http://192.168.1.1/cgi-bin/html.cgi?function=status> Go

# Logout  
 # Status  
 # RF Configuration  
 # Alarm Configuration  
 # Communications Configuration  
 # User Management  
 # Alarm Logs  
 # Logs  
 # Troubleshooting  
 # Remote Software Upgrade  
 # System Reset  
 # System Factory Default Setting  
 # System Configuration Transfer

## CDMA Status

Cascade code : GST00

Serial No: GST

SAW Version: 0.7

Longitude/Latitude: N 38.91889; W 94.65784

Alarm ■ Shutdown ■

CDMA Input CDMA Output

CH1 ■ ■ ■ ■ ■ ■ ■ ■ ■

Summary Page

RF Status 30dBm

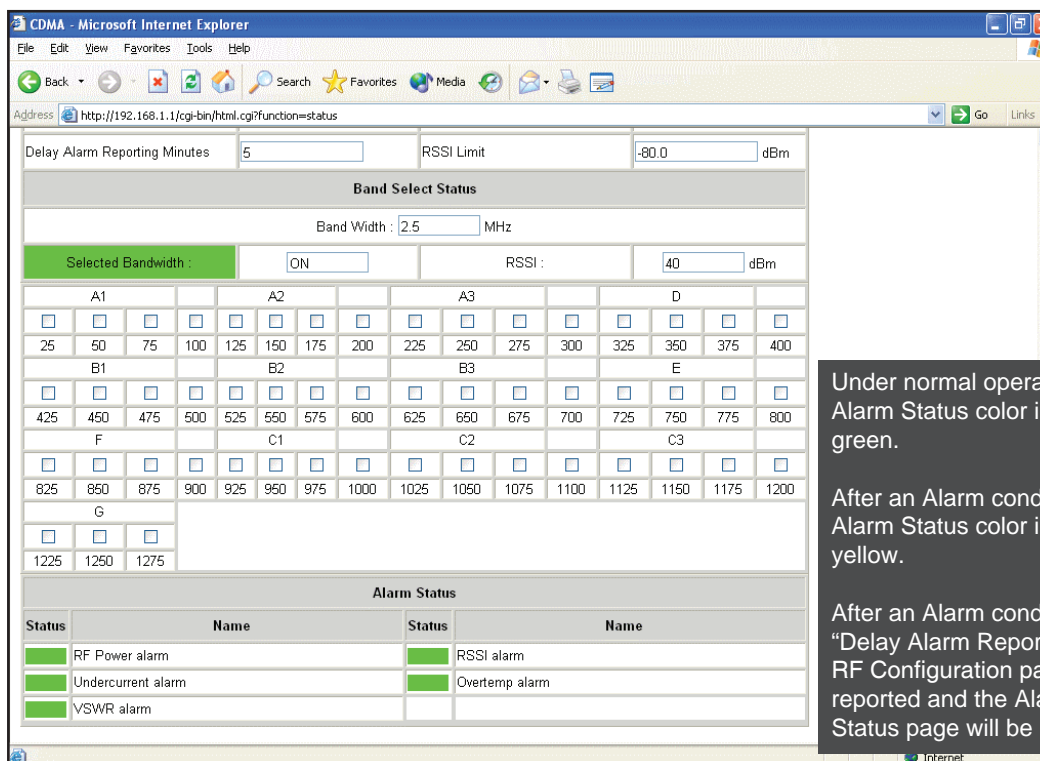
Downlink Output Power	<span style="border: 1px solid black; padding: 2px;">21</span>	dBm	Uplink Output Power	<span style="border: 1px solid black; padding: 2px;">14.5</span>	dBm
Downlink Attenuation	<span style="border: 1px solid black; padding: 2px;">0</span>	dB	Uplink Attenuation	<span style="border: 1px solid black; padding: 2px;">0</span>	dB
Low Output Alarm Threshold	<span style="border: 1px solid black; padding: 2px;">0.0</span>	dBm			
AGC Downlink Limit	<span style="border: 1px solid black; padding: 2px;">30.0</span>	dBm	ALC Uplink Limit	<span style="border: 1px solid black; padding: 2px;">30.0</span>	dBm
ALC Downlink Limit	<span style="border: 1px solid black; padding: 2px;">30.0</span>	dBm	Shutdown ON/OFF	<span style="border: 1px solid black; padding: 2px;">ON</span>	

Error on page.

Internet

# Band Select Status

- In case that screen resolution is 1024 x 768, you may need to use scroll bars to view all.
- This is where installer will verify status of the selected bandwidth and channels.
- In order to change alarm settings, click on Alarm Configuration link.



CDMA - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://192.168.1.1/cgi-bin/html.cgi?function=status Go Links

Delay Alarm Reporting Minutes 5 RSSI Limit -80.0 dBm

### Band Select Status

Band Width : 2.5 MHz

Selected Bandwidth : ON RSSI : 40 dBm

A1				A2				A3				D			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
B1				B2				B3				E			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800
F				C1				C2				C3			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
825	850	875	900	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	1200
G															
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>												
1225	1250	1275													

### Alarm Status

Status	Name	Status	Name
<input checked="" type="checkbox"/>	RF Power alarm	<input checked="" type="checkbox"/>	RSSI alarm
<input checked="" type="checkbox"/>	Undercurrent alarm	<input checked="" type="checkbox"/>	Overtemp alarm
<input checked="" type="checkbox"/>	VSWR alarm		

Under normal operating conditions the Alarm Status color in the Status page is green.

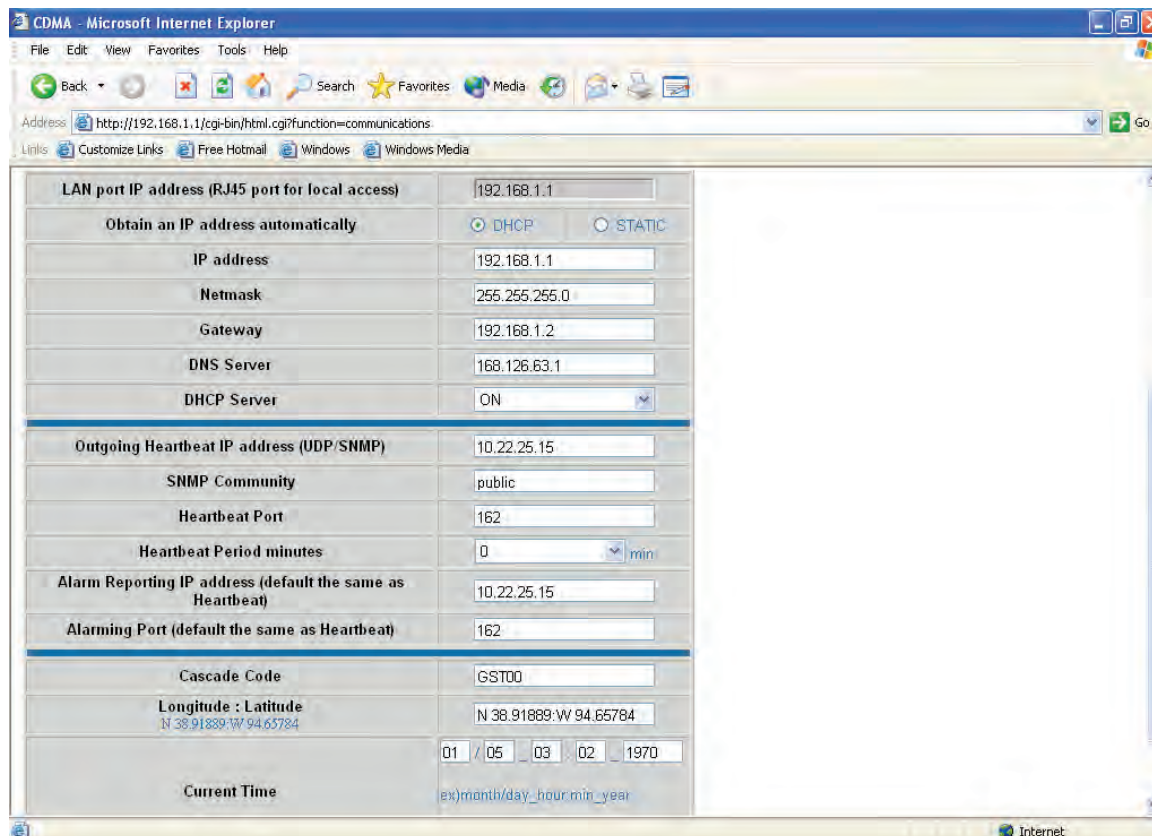
After an Alarm condition is triggered, the Alarm Status color in Status page will be yellow.

After an Alarm condition lasts for the "Delay Alarm Reporting Minutes" set in RF Configuration page, the Alarm will be reported and the Alarm Status color in the Status page will be red.



# Communications Configuration Menu

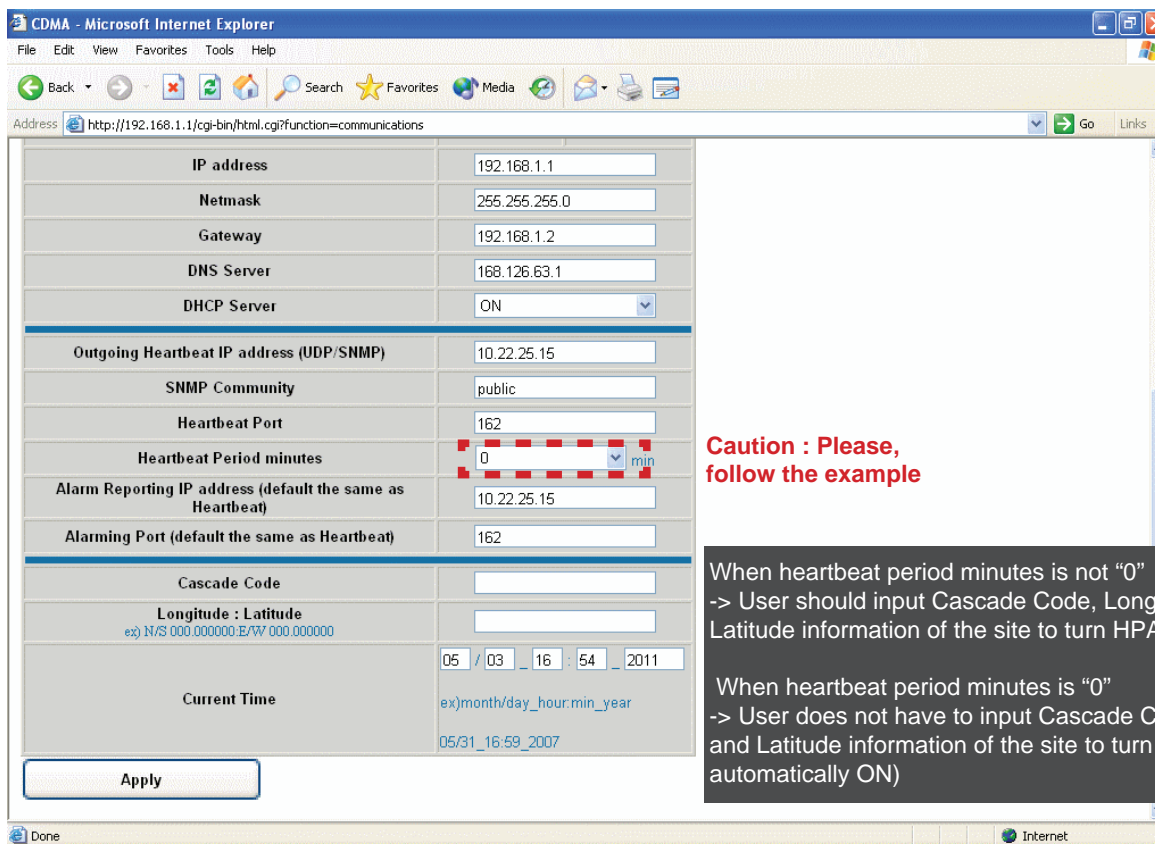
- Click on the Communications Configuration link.
- On this page you can change various values related to IP network.  
 Because Web UI is based on IP network, incorrect configuration may make it impossible to connect to Web UI.  
 In that case, you can troubleshoot as described in the Command Line Interface (CLI) section.



LAN port IP address (RJ45 port for local access)	192.168.1.1
Obtain an IP address automatically	<input checked="" type="radio"/> DHCP <input type="radio"/> STATIC
IP address	192.168.1.1
Netmask	255.255.255.0
Gateway	192.168.1.2
DNS Server	168.126.63.1
DHCP Server	ON
Outgoing Heartbeat IP address (UDP/SNMP)	10.22.25.15
SNMP Community	public
Heartbeat Port	162
Heartbeat Period minutes	0 min
Alarm Reporting IP address (default the same as Heartbeat)	10.22.25.15
Alarming Port (default the same as Heartbeat)	162
Cascade Code	GST00
Longitude : Latitude <small>N 38.91889 W 94.65784</small>	N 38.91889 W 94.65784
Current Time	01 / 05 / 03 / 02 / 1970 <small>ex) month/day_hour.min_year</small>

# Communications Configuration Menu

- In case that screen resolution is 1024 x 768, you may need to use scroll bars to view all.  
 The installer can input Cascade Code, change current time & date, and input Longitude and Latitude information.  
 Changes will not take effect until you click “Apply” button.



CDMA - Microsoft Internet Explorer

Address: <http://192.168.1.1/cgi-bin/html.cgi?function=communications>

IP address	192.168.1.1
Netmask	255.255.255.0
Gateway	192.168.1.2
DNS Server	168.126.63.1
DHCP Server	ON
Outgoing Heartbeat IP address (UDP/SNMP)	10.22.25.15
SNMP Community	public
Heartbeat Port	162
Heartbeat Period minutes	0 min
Alarm Reporting IP address (default the same as Heartbeat)	10.22.25.15
Alarming Port (default the same as Heartbeat)	162
Cascade Code	
Longitude : Latitude <small>ex) N/S 000.000000:E/W 000.000000</small>	
Current Time <small>ex) month/day_hour.min_year</small>	05 / 03 _ 16 54 _ 2011 05/31_16:59_2007

Apply

**Caution : Please,  
follow the example**

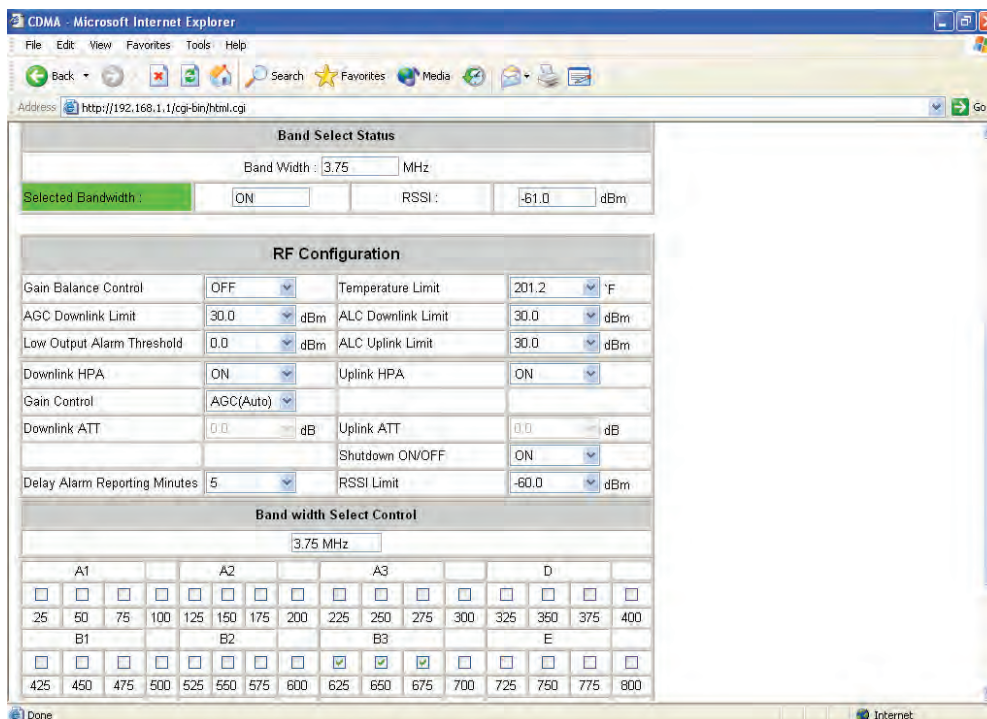
When heartbeat period minutes is not “0”  
 -> User should input Cascade Code, Longitude, and Latitude information of the site to turn HPA on

When heartbeat period minutes is “0”  
 -> User does not have to input Cascade Code, Longitude, and Latitude information of the site to turn HPA on. (HPA is automatically ON)



# RF Configuration Menu

- Click the RF Configuration link.
- You can change various RF values of the equipment on this page.
- In case that screen resolution is 1024 x 768, you may need to use scroll bars to view all.
- Changes will not take effect until you click “Apply” button.
- This menu is where installer will choose preferences for specific implementation.
- The default values in various fields will differ with different models of CDMA Repeaters.



**CDMA - Microsoft Internet Explorer**

File Edit View Favorites Tools Help

Address <http://192.168.1.1/cgi-bin/html.cgi>

**Band Select Status**

Band Width : 3.75 MHz

Selected Bandwidth : ☐ ON ☐ RSSI : -61.0 dBm

**RF Configuration**

Gain Balance Control	OFF	Temperature Limit	201.2 °F
AGC Downlink Limit	30.0 dBm	ALC Downlink Limit	30.0 dBm
Low Output Alarm Threshold	0.0 dBm	ALC Uplink Limit	30.0 dBm
Downlink HPA	ON	Uplink HPA	ON
Gain Control	AGC(Auto)		
Downlink ATT	0.0 dB	Uplink ATT	0.0 dB
		Shutdown ON/OFF	ON
Delay Alarm Reporting Minutes	5	RSSI Limit	-60.0 dBm

**Band width Select Control**

3.75 MHz

A1				A2				A3				D			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
B1				B2				B3				E			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800

Done Internet