



FCC ID : U88GRS-1923DC-SPR

ATTACHMENT J.

- Operational Description -

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Report No. : HCT-RF09-0621

1/1

Repeater

INSTALLATION GUIDE





Ver. 1.0

GRS-1923D-SPR

GS Teletech Inc.

Version 1.0 • June 2009

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.

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Revision History

Date	Version	Changes
06/2009	Original	

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.

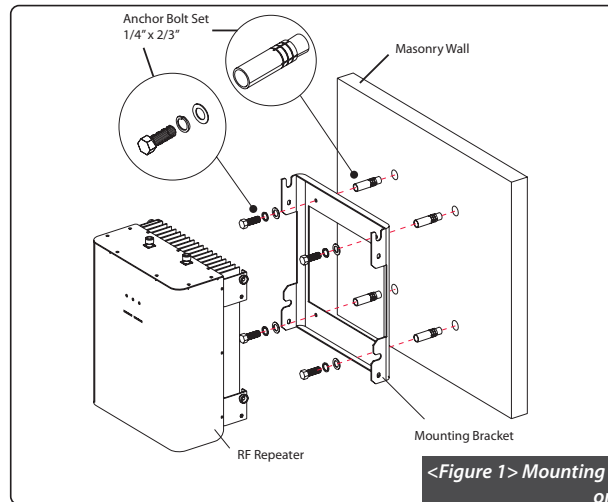
! CAUTION: THIS REPEATER IS FOR INDOOR USE ONLY AND SHOULD BE LOCATED INSIDE OF BUILDING.

! 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.

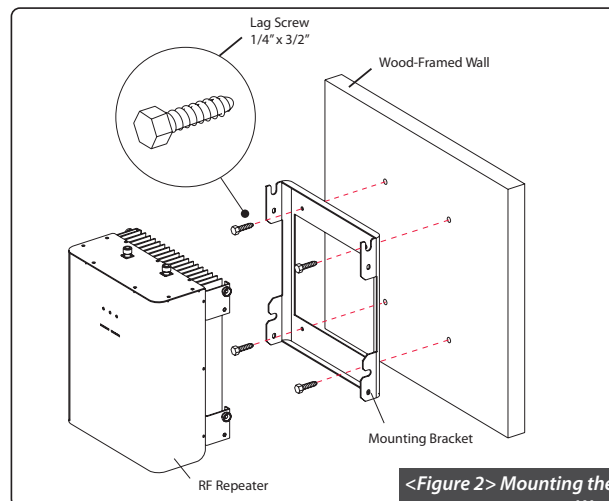


<Figure 1> Mounting the Repeater on a Masonry Wall

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 screw heads.
4. Thread a lag screw at the positions marked in step 1.

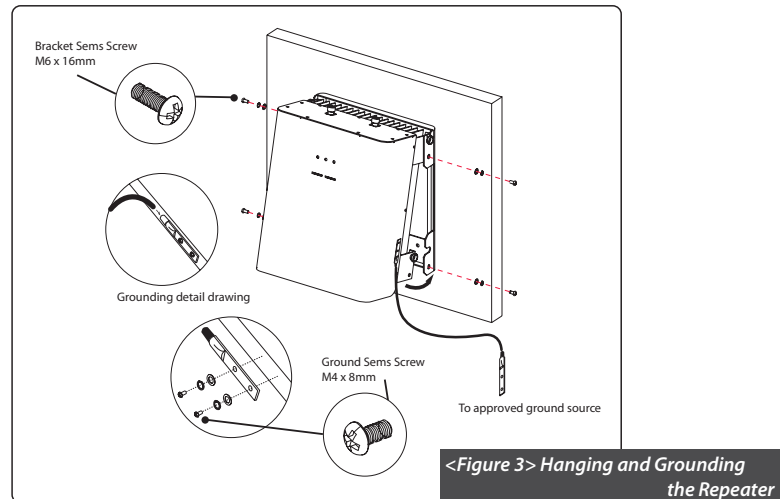


<Figure 2> Mounting the Repeater on a Wood-Framed Wall

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.



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.

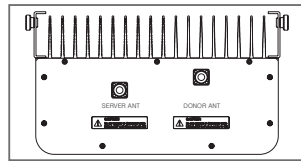
Cable Connections

- Connect Donor and Server Antennas



CAUTION

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



<Figure 5> ANT Ports



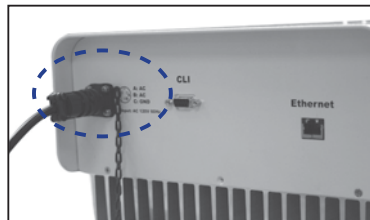
<Figure 7> Server ANT Port Connection



<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

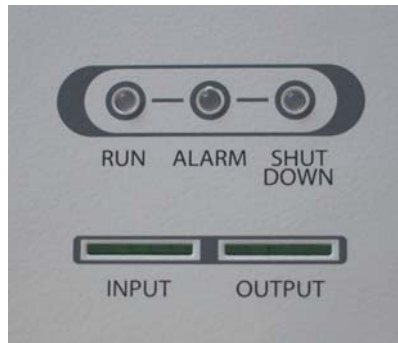
LED Indicators

- 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 23dBm

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

Output Power Signal

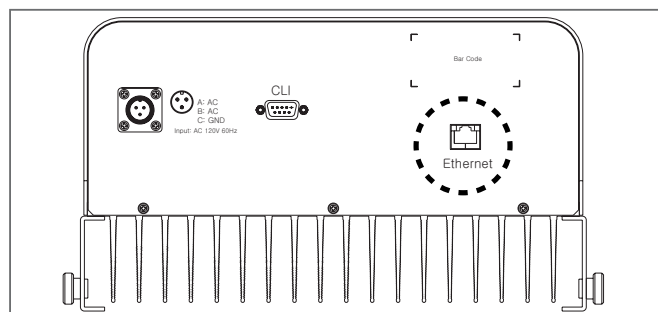
- Please note the number of LED bars for input indicates signal strength level.
- The tables below indicate the output signal levels.

CDMA 23dBm

Less than +14dBm	LED 1bar
+15dBm ~ +16dBm	LED 2 bars
+17dBm ~ +18dBm	LED 3 bars
+19dBm ~ +21dBm	LED 4 bars
More than +22dBm	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.

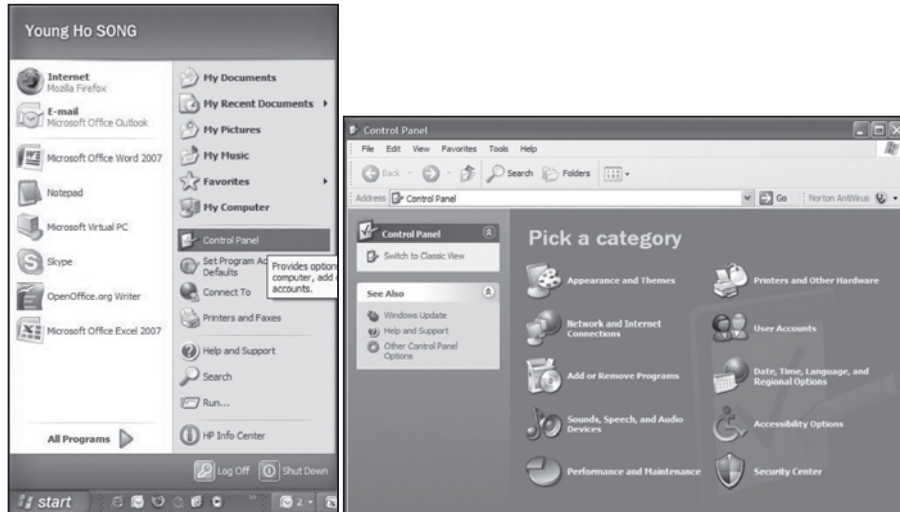


<Figure 12> CDMA 23 Ethernet Port Display

Connecting to Web UI

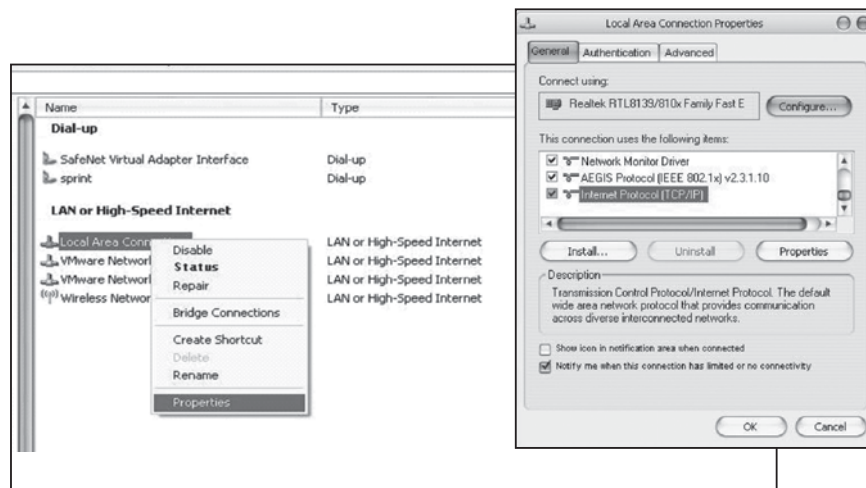
1. Start-> Control Panel-> Network and Internet Connections

CAUTION
 Disable wireless connections and remove wireless broadband card.

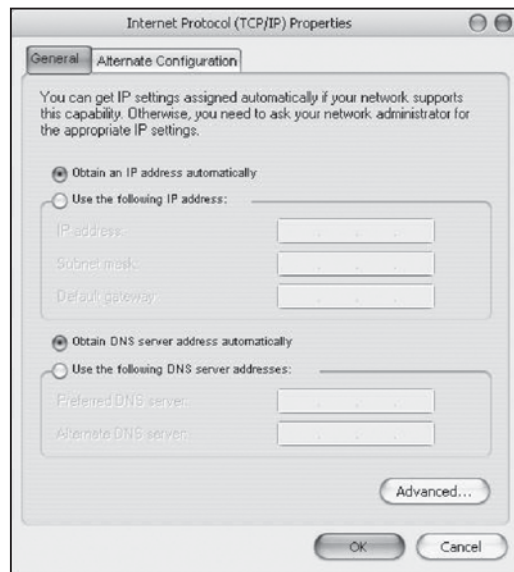


Connecting to Web UI

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



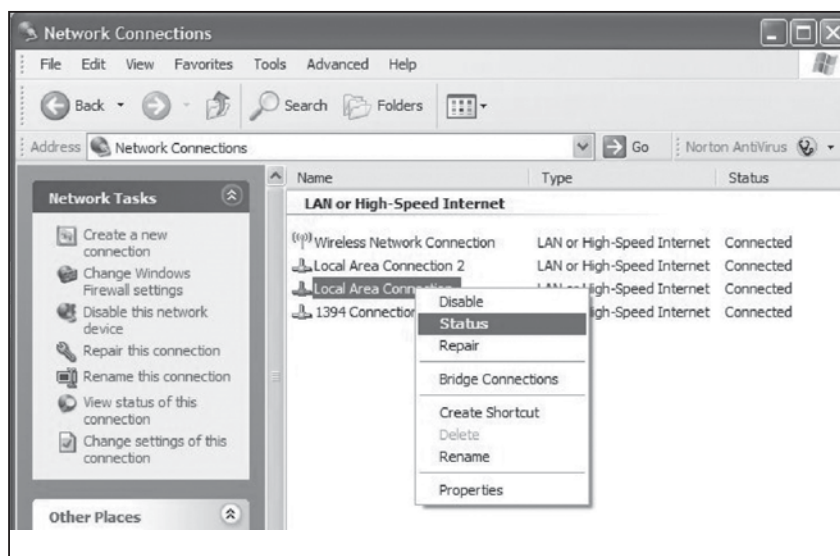
On General Tab



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

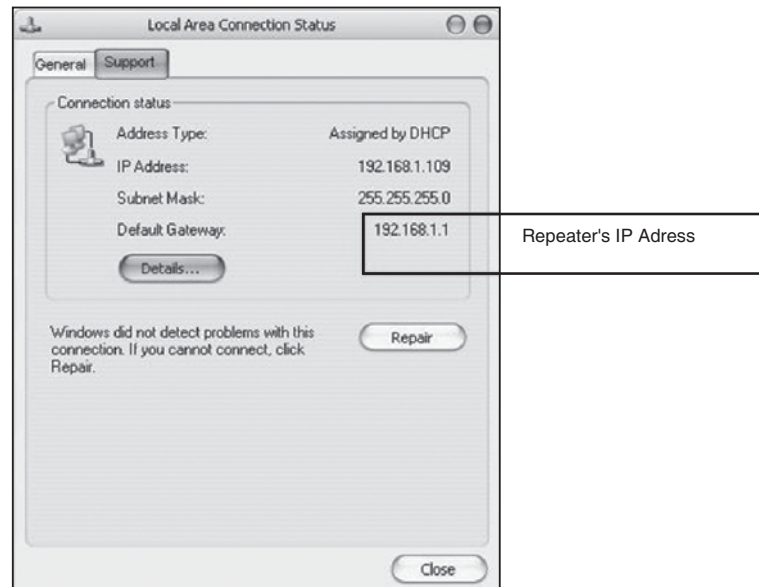
8. Right click Local Area Connections and choose Status



Verify Assigned IP Address

9. Click on "Support" tab.

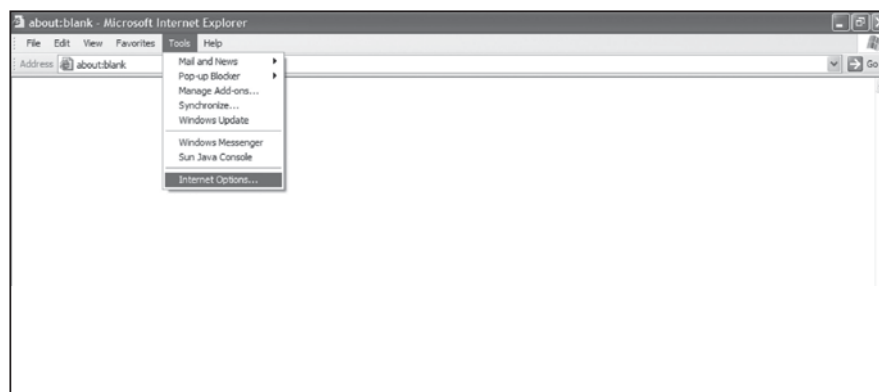
10. Verify assigned Default Gateway at local connection. *(If IP address is not assigned, please click repair.)*



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



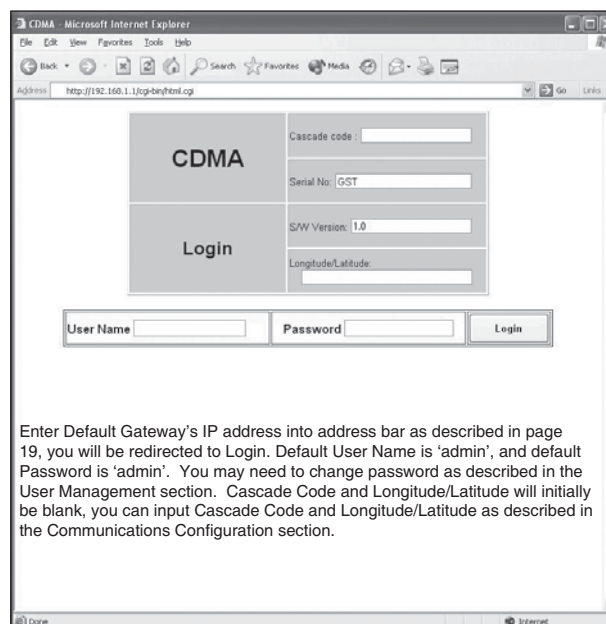
Browser History Options

On the "General" tab, in the "Temporary Internet files" section:

2. Click "Delete Cookies..."
3. Click "Delete Files..."
4. Click "Apply"
5. Click "OK"



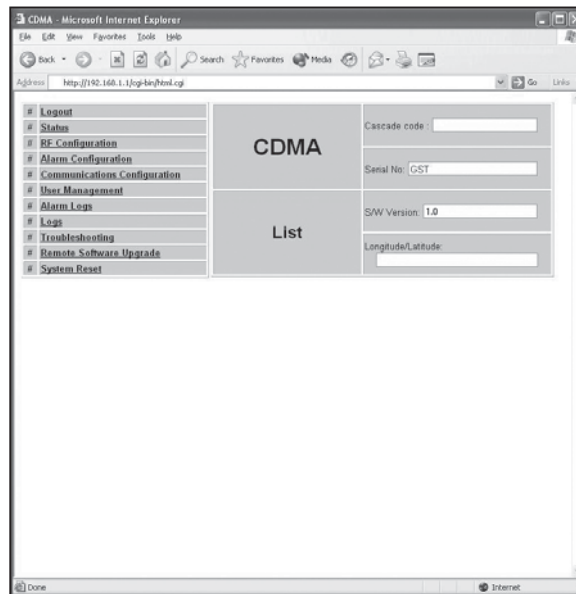
Login Screen



Enter Default Gateway's IP address into address bar as described in page 19, 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 the Communications Configuration section.

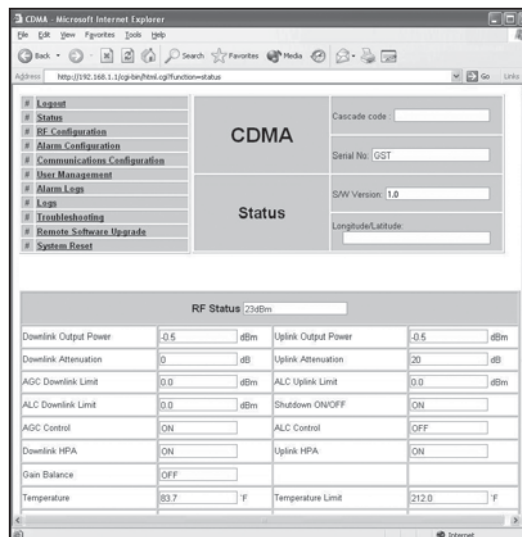
List Menu

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



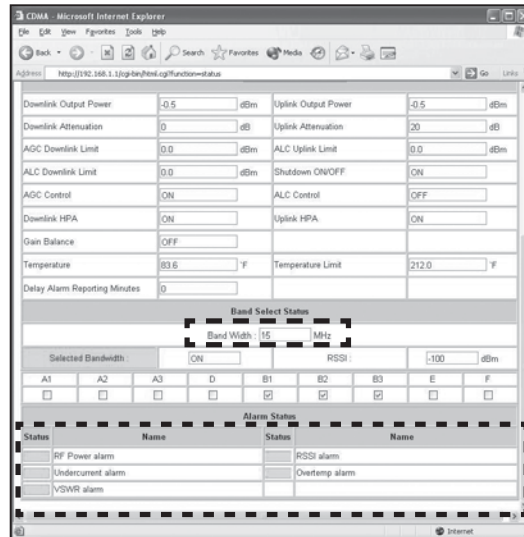
Status Menu

- 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.



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.



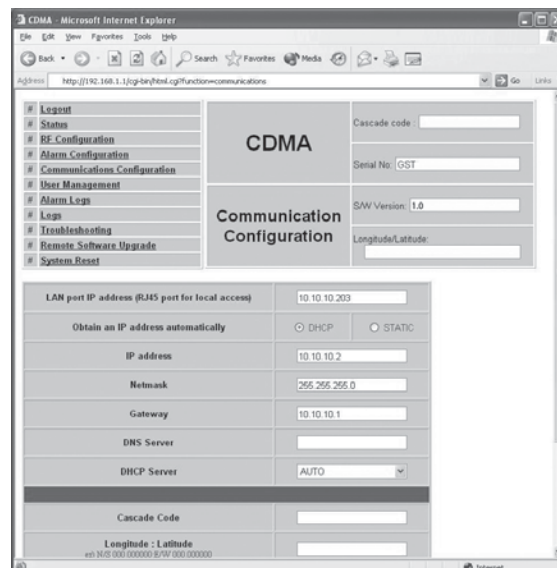
Under normal operating conditions the Alarm Status color in the Status page is green.

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.

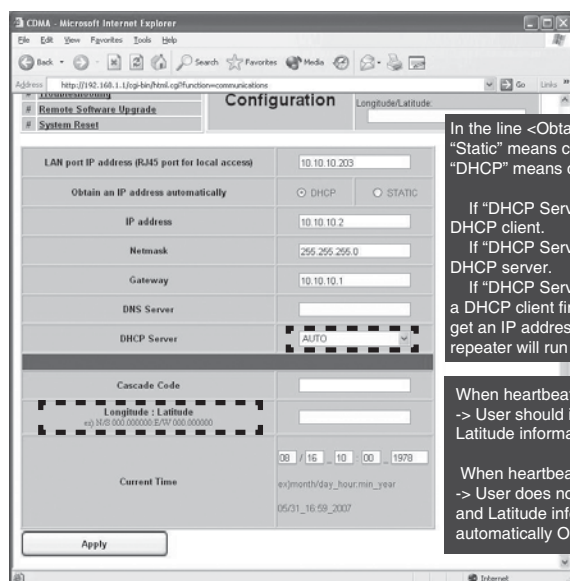
Communications Configuration Menu

- 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.



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.



In the line <Obtain IP address automatically> "Static" means connection using a fixed IP. "DHCP" means connection using DHCP, where

If "DHCP Server" is "OFF", then the repeater will run as a DHCP client.

If "DHCP Server" is "ON", then the repeater will run as a DHCP server.

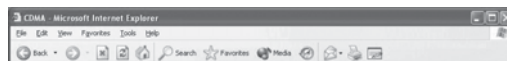
If "DHCP Server" is "AUTO", then the repeater will run as a DHCP client first, and then in case the repeater cannot get an IP address from an external DHCP server, the repeater will run as a DHCP server.

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.



RF Configuration Menu FAQ's

• What is the relationship between AGC (Auto Gain Control) and ALC (Auto Limit Control)?

ALC is for custom installations, and AGC is automatically used when AGS is turned on which is for normal installations. If the repeater is having difficulties with isolation check, or if you want to "power down" the repeater ALC should be manually set. Attenuation may also be added for reducing power levels. ALC also provides optional U/L and D/L settings.

- The relationship between AGC and ALC is that they both will control the output power, but in different ways. AGC will take priority over ALC, meaning if AGC is on, ALC cannot be used.
- If you want to use the ALC function, AGC should be turned off.
- The difference is that ALC will reduce max gain by the set value even if the input signal decreases. AGC will limit the total output power to a set value while still allowing the repeater to fluctuate to max gain if input signal gets weaker.

• What does the Shutdown ON/OFF control?

- An internal wave-detection is checking the noise level. If the repeater cannot secure isolation it will go through a process of turning itself off, and turning back on while doing isolation checking.
- If it is impossible for the repeater to secure isolation after 30 minutes, the repeater will shut down and stay shutdown. The items that may automatically require the repeater to shut down are:
-> VSWR Alarm, Over Power Alarm, and Over Input Alarm

• What is Gain Balance Control?

- Gain Balance Control will always keep the UL and DL ATT the same while using AGC. GBC should always be left on to prevent damage to BTS while using AGC.
- This is used for BTS to cell phone power control.

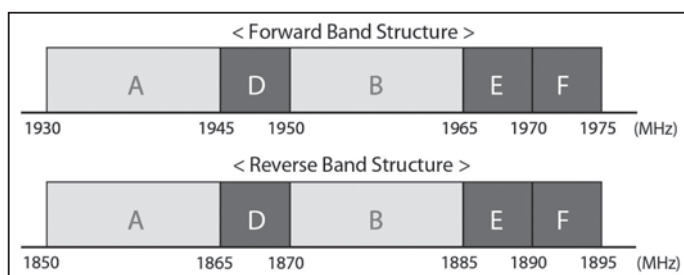
RF Configuration Menu

- This table is for reference only and not critical for installation.

-> CDMA Band Selection Algorithm

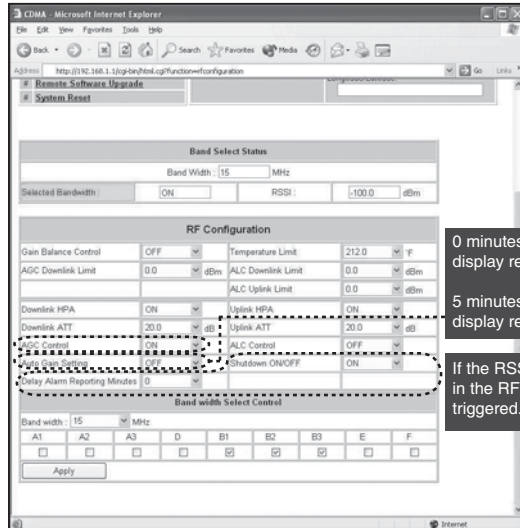
ITEM	BANDWIDTH	NOTE
Band Select	5MHz	Any of these bandwidths from A to E can be chosen
	10MHz	
	15MHz	
	20MHz	
	5MHz + 5MHz	
	5MHz + 5MHz + 5MHz	
	10MHz + 5MHz	
	15MHz + 5MHz	

• CDMA Band Structure



RF Configuration Menu

- The default values in various fields will differ with different models of CDMA Repeaters.
- After the desired bandwidth and block are selected, proceed with following steps:
 - > For normal setup, GST recommends using the Auto Gain Setting.
 - > User may configure Gain and secure Isolation by switching Auto Gain Setting to "ON".
 - > Click "Apply".



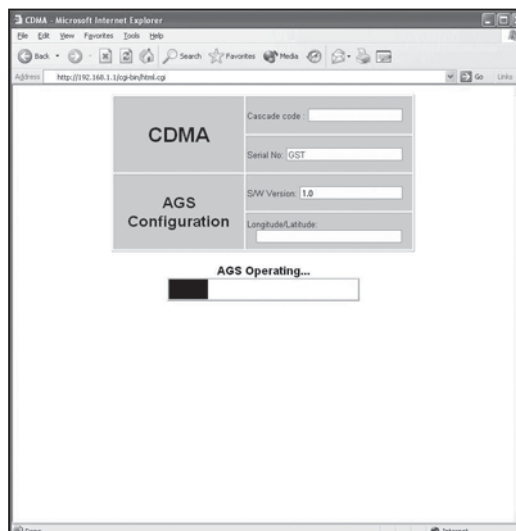
0 minutes means that alarms will be reported and will display red status within 10 seconds.

5 minutes means that alarms will be reported and will display red status after 5 minutes.

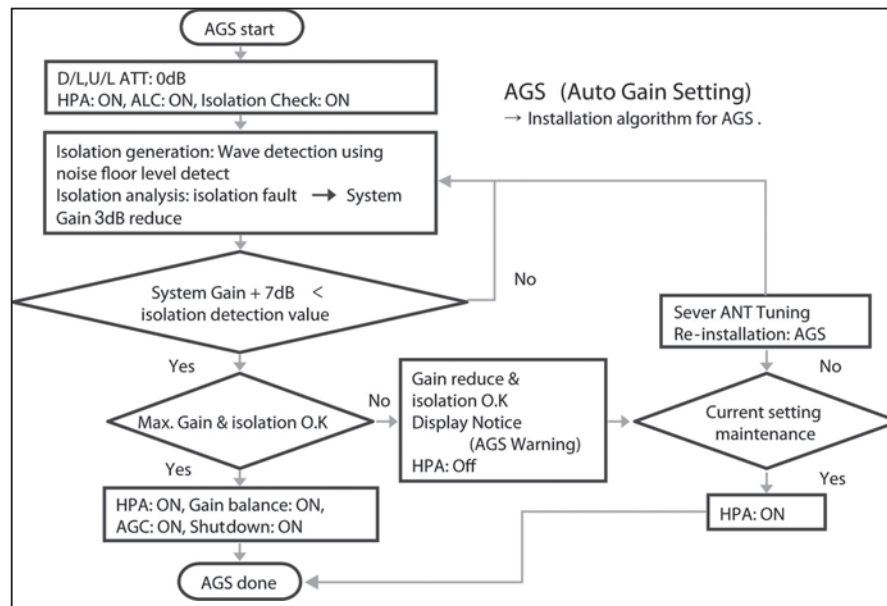
If the RSSI value is 8dBm lower than the "RSSI limit" in the RF Configuration page, a low-input alarm can be triggered.

RF Configuration Menu

- After setting AGS to ON and clicking Apply, the screen below will be displayed while AGS is initializing.
- After AGS is completed, click "Click Result".
The equipment will set AGC, Gain Balance and HPA "ON", and then provide normal service.
If automatic setup works you will see the Status page. (ALC "Off ")

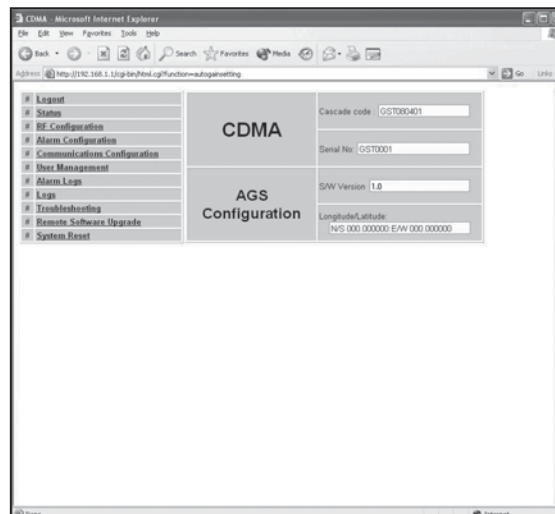


AGS Flow Chart



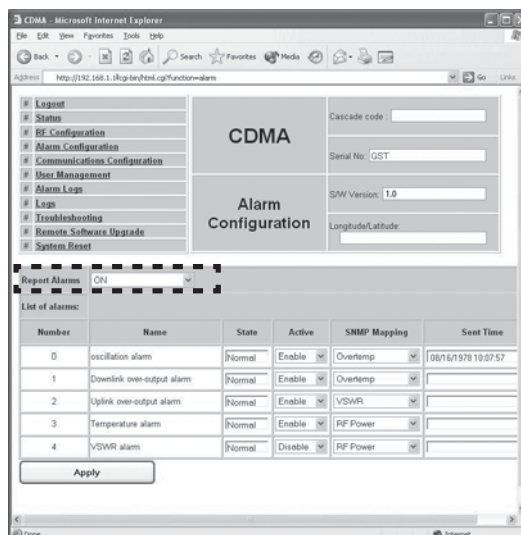
RF Configuration Menu

- If AGS process fails, it is most likely one of 3 issues:
-> 1st) too weak input signal, 2nd) too strong input signal, or 3rd) the Donor and Service antennas are too close to each other. To resolve, antenna tuning is required.
- In case of 24dBm, if isolation is below Gain +7dB, i.e. 87dBc, this warning will be displayed.
- In case of 30dBm, if isolation is below Gain +7dB, i.e. 97dBc, this warning will be displayed.
- In case of 37dBm, if isolation is below Gain +7dB, i.e. 102dBc, this warning will be displayed.



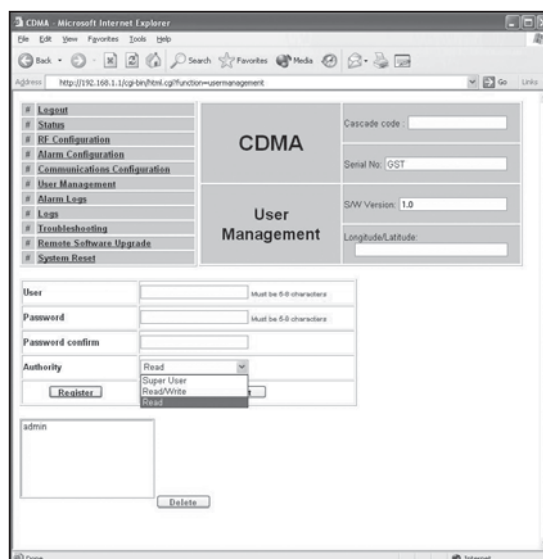
Alarm Configuration Menu

- Click Alarm Configuration link.
- In case that Report Alarms is OFF, all alarms will be disabled.
In case that Report Alarms is ON, you can enable and disable individual alarms.



Alarm Configuration Menu

- 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.
- Low Output and Low Input alarms for the unselected channels should be set to "Disable".

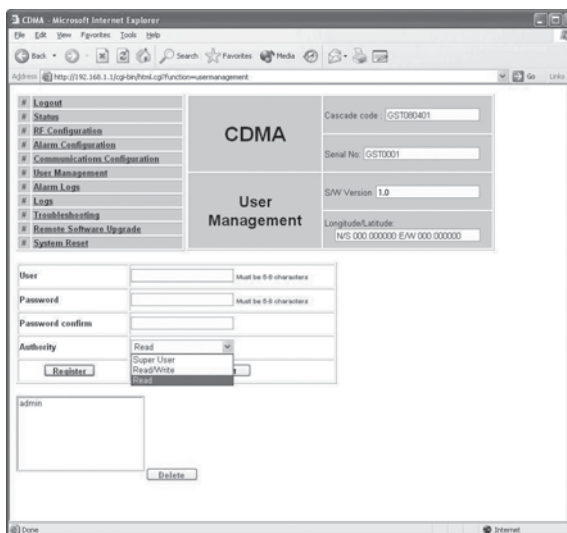


User Management Menu

- Click on the User Management link.
- On this page you can create and delete users, change passwords, and assign authorities to individual users.
- Read will only all the user to view information on the menu pages, but cannot make any changes.
- Read/Write Authority means that the user can view and change various values.
- Super User is very similar to an Administrator account.

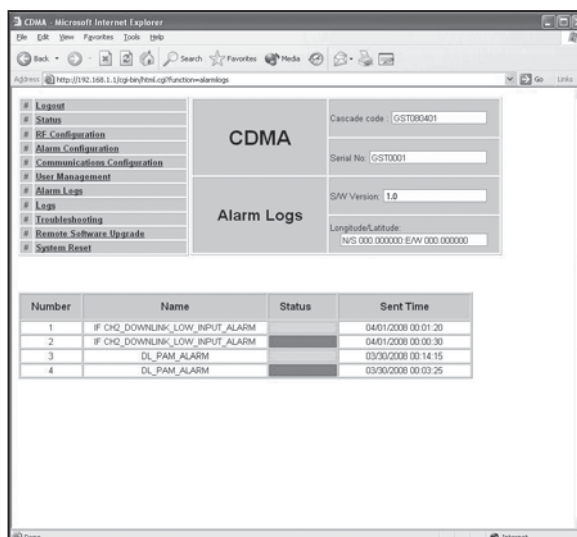


CAUTION
DO NOT DELETE 'admin'



Alarm Logs

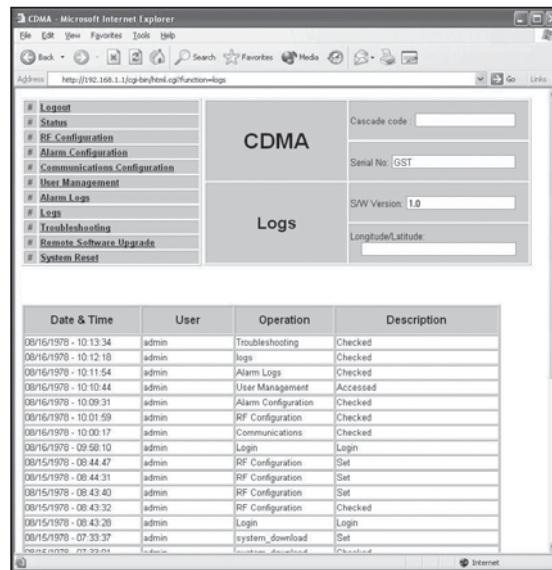
- Click on the Alarm Logs link.
- You can see a history of reported and reset Alarms.
When an alarm is reported, the name and time of the alarm is displayed along with it's current status.
Red color means that the alarm is reported, and green color means that the alarm has returned to normal status.
- After an Alarm condition lasts for the "Delay Alarm Reporting Minutes" set in RF Configuration page, the Alarm will be reported.



Number	Name	Status	Sent Time
1	IF CH2_DOWNLINK_LOW_INPUT_ALARM		04/01/2009 00:01:20
2	IF CH2_DOWNLINK_LOW_INPUT_ALARM		04/01/2009 00:00:30
3	DL_PAM_ALARM		03/30/2009 00:14:15
4	DL_PAM_ALARM		03/30/2009 00:03:25

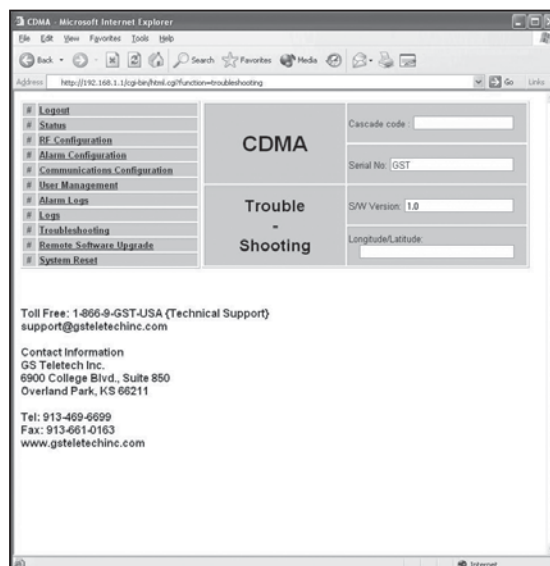
Logs

- Click on the Alarm Logs link.
- You can see Alarm Logs regarding Web UI operation. Logs will maintain a history of up to 30 operations.



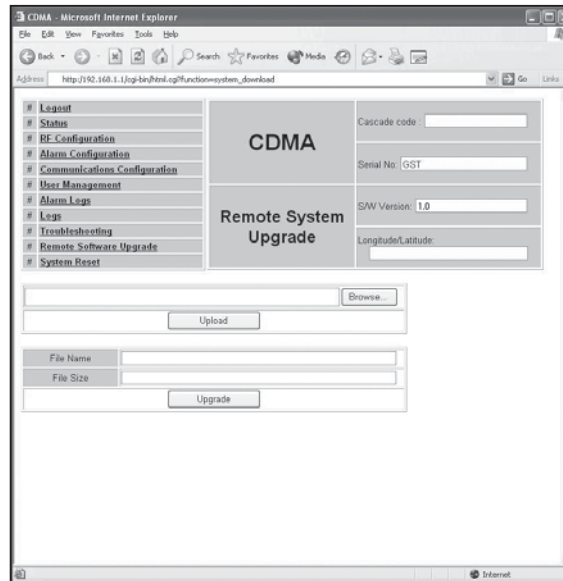
Troubleshooting

- Click on the Troubleshooting link.
- You can refer to this page for a general troubleshooting guide.
- In case that screen resolution is 1024 x 768, you may need to use scroll bars to view all.



Software Upgrade

- Click on the Remote Software Upgrade link.
- In case that software upgrade is needed, you should use this page.
- Click Browse button to select the file to upgrade from the laptop.



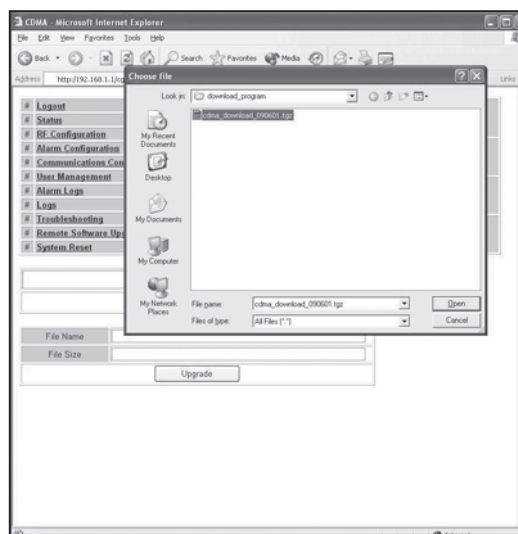
Software Upgrade

- Choose the file to upgrade provided by GST.
- After you choose the file, you should click "upload" to send the file from your laptop to the repeater.



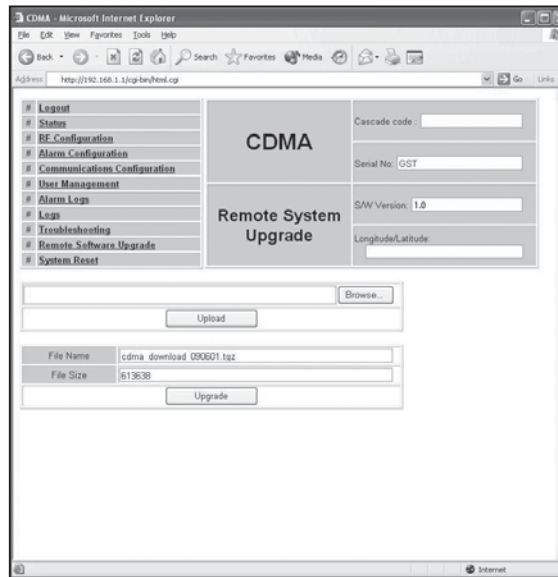
CAUTION

Be careful not to unplug the crossover Ethernet cable during software upgrade.



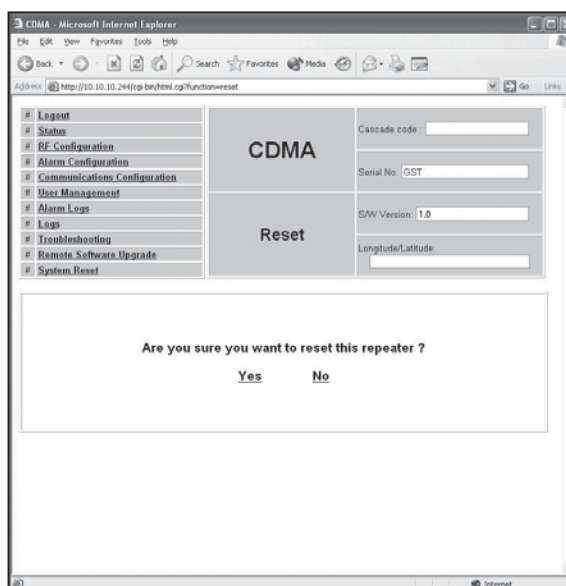
Software Upgrade

- After uploading is finished, verify that the File Name and the File Size is correct, then click "Upgrade" button. The lights on the repeater will change color during upgrade which will take about 2 minutes for the upgrade to initialize. The lights will go back to normal when upgrade is done.
- User may then be prompted to log back into the Repeater.



System Reset

- Click 'No' to return to the 'List' menu.
- Click 'Yes' to reset the repeater via a soft-boot. This will not change any of the current settings.



CLI (Command Line Interface)

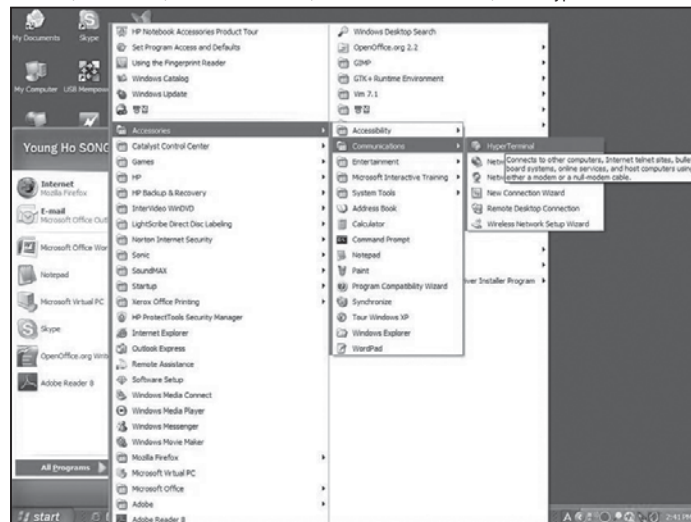
- In case that you cannot reach Web UI, you should use CLI.
You should connect the equipment's CLI port to your laptop's serial port using RS-232 cable.
In case that your laptop does not have a serial port, you may need to use USB to Serial conversion cable.



CAUTION

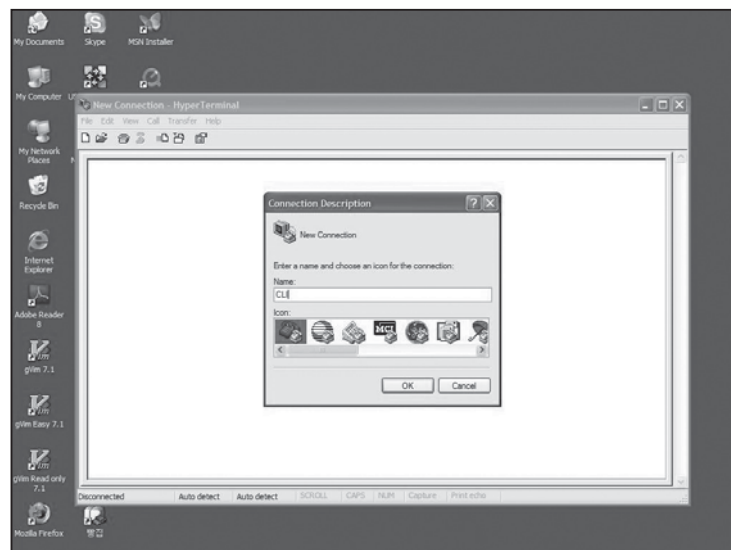
RS-232 cable or USB to Serial conversion cable is not provided with the equipment.
After connection, you can access CLI using HyperTerminal.

- To open HyperTerminal, click "Start", then "Accessories", then "Communications", then "HyperTerminal".



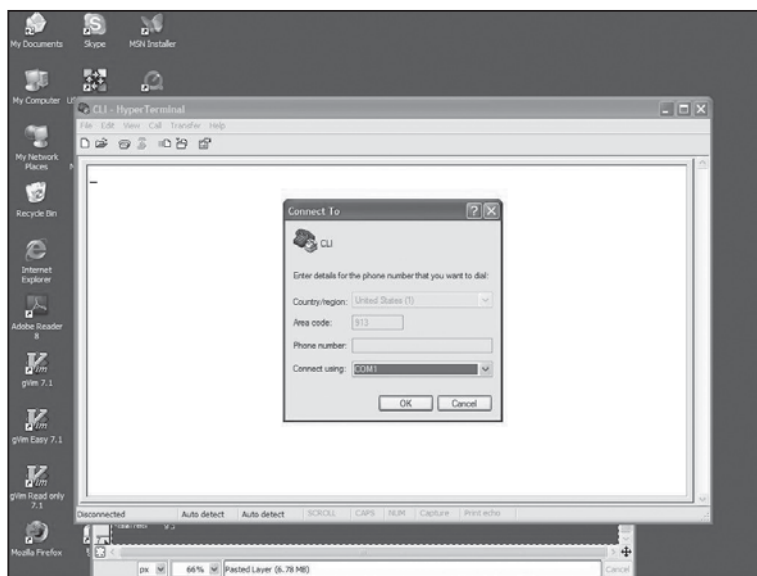
CLI

- To verify and/or change port number, open "Control Panel", then "System", then "Hardware Tab", then "Device Manager". Double click "Ports", then double click "Serial Cable" then click "Port Settings" tab, click "Advanced", in the COM Port drop down menu, select "COM 1", click "OK".
- After verification of port number, open HyperTerminal.
- Enter CLI.
- Click "OK".



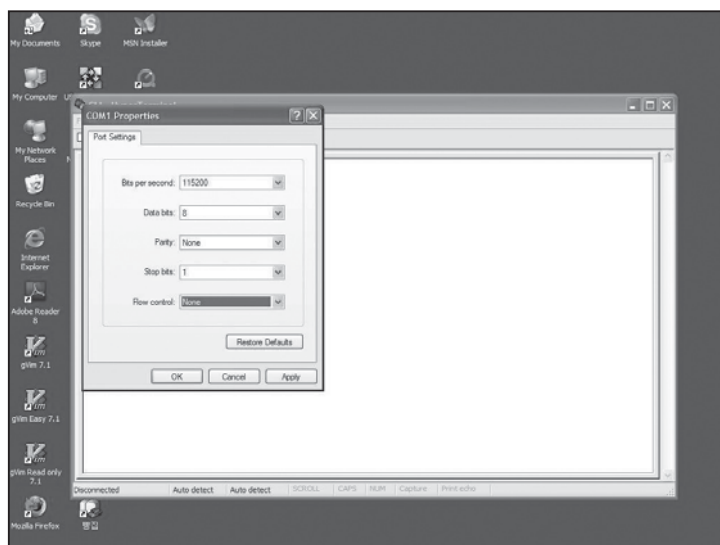
CLI

- In the “Connect using” drop-down menu, select “COM1”.
- Click “OK”.



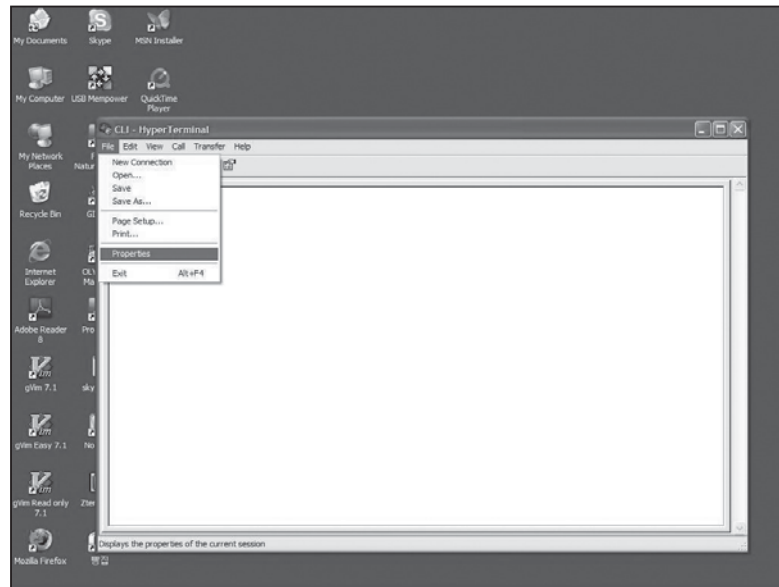
CLI

- “Bit per second” drop down menu, select “115200”.
- “Flow control” drop down menu, select “None”.
- Click “Apply”.
- Click “OK”.



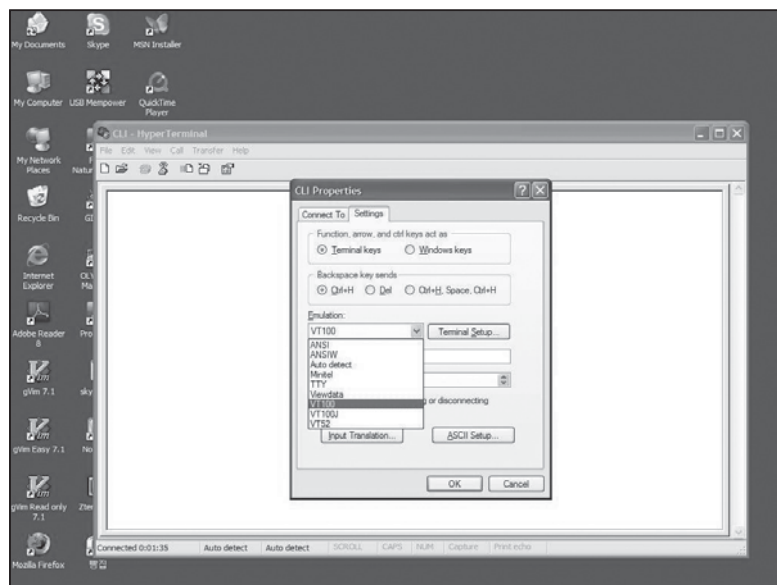
CLI

- Click "File", choose "Properties"



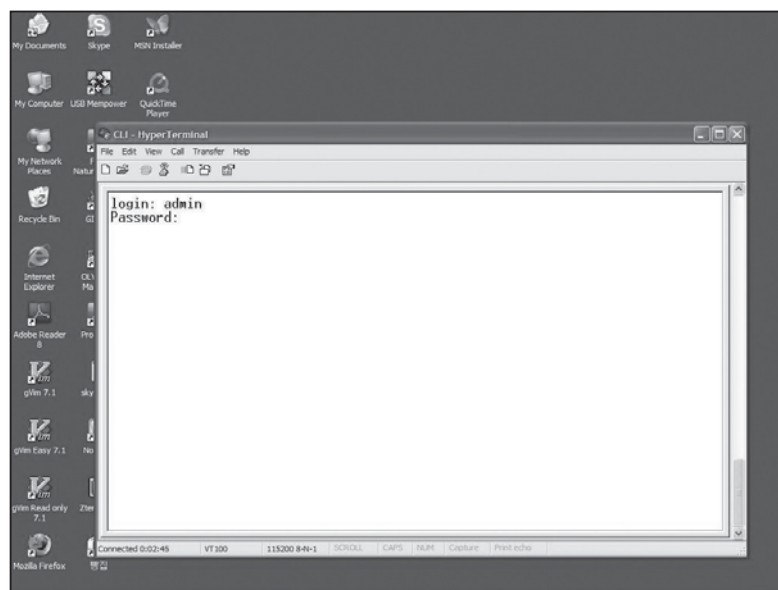
CLI

- On "Settings" tab
- "Emulation" drop down menu, select "VT100"
- Click "OK"



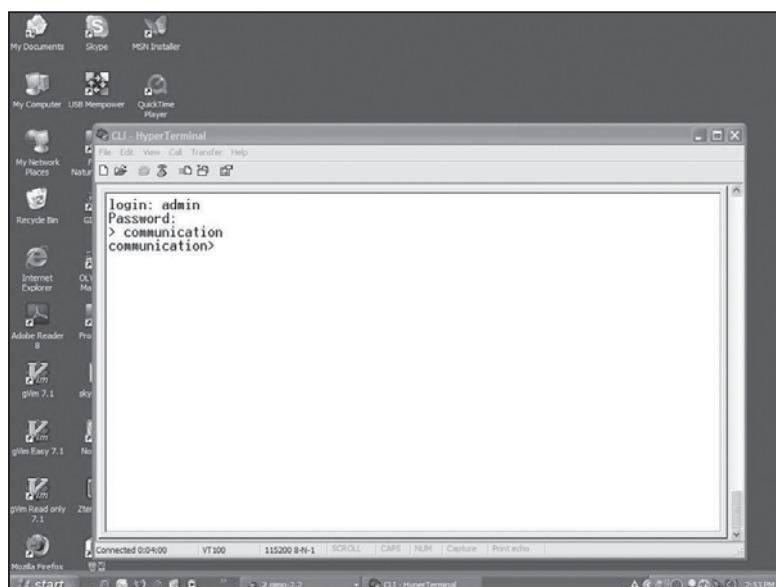
CLI

- In case that you cannot see login prompt, just press enter key several times.
Login is "admin" and Password is "admin".



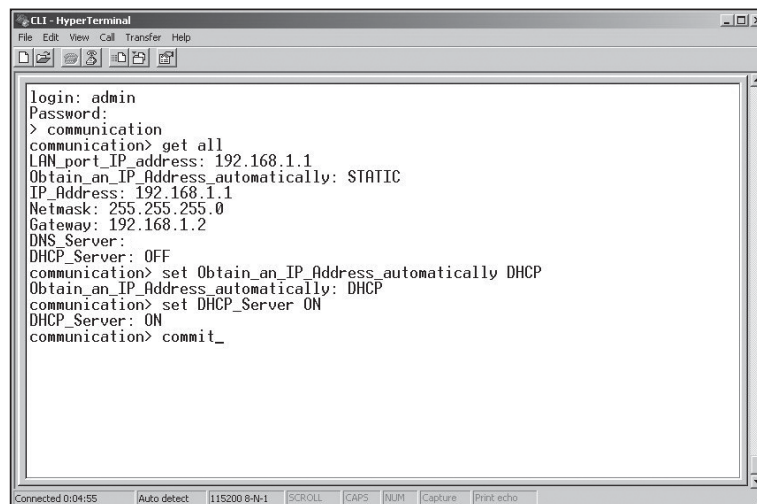
CLI

- In order to verify IP network configuration, you should type "communication".
- Press enter-key.



CLI

- In order to see values, you should type "get all", and then press the enter-key.
- You can use LAN_Port_IP_Address to access the Web UI as described on page 22.
- In case Obtain_an_IP_Address_automatically is STATIC or DHCP_Server is OFF, at the "communication>" prompt enter the following text:
 "set Obtain_an_IP_Address_automatically DHCP", then press the enter-key.
 "set DHCP_Server ON", then press the enter-key.
 "commit", then press the enter-key.



```

CLI - HyperTerminal
File Edit View Call Transfer Help
login: admin
Password:
> communication
communication> get all
LAN_port_IP_address: 192.168.1.1
Obtain_an_IP_address_automatically: STATIC
IP_Address: 192.168.1.1
Netmask: 255.255.255.0
Gateway: 192.168.1.2
DNS_Server:
DHCP_Server: OFF
communication> set Obtain_an_IP_Address_automatically DHCP
Obtain_an_IP_Address_automatically: DHCP
communication> set DHCP_Server ON
DHCP_Server: ON
communication> commit_
  
```

GST Technical Support

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Specifications and features of this installation guide are subject to change without notice or obligation.

Global IT Leader
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