

CoverCell25K/100K700

Technician's Operational Manual & Installation Guide

Ver. 1.0

GS Teletech Inc.

Contents of Box(A)

| Contents | Picture | Quantity | Contents | Picture | Quantity |
|------------------------------|---------|----------|---------------------------------|---------|----------|
| Repeater | | 1EA | Ground Cable 6.6ft (2m) | | 1EA |
| Mounting Bracket | | 1EA | Ground Sems Screw M4 x 8mm | | 4EA |
| Installation Guide CD | | 1EA | Bracket Sems Screw M6 x 16mm | | 4EA |
| Ethernet Cable 6.6ft (2m) | | 1EA | Lag Screw 1/2" x 2" | | 4EA |
| Power Cord 6.6ft (2m) | | 1EA | Anchor Bolt Set 1/2" x 2" | | 4EA |
| Registration Form | | 1EA | | | |

Contents of Box(B)_Option

| Contents | Picture | Quantity | Contents | Picture | Quantity |
|--|---|----------|--|---|----------|
| RF Cable 33ft(10m) |  | 1EA | ANT Pole Set |  | 1Set |
| RF Cable 66ft(20m) |  | 1EA | | | |
| Donor ANT |  | 1EA | Cable Clamp |  | 12EA |
| Coverage ANT |  | 1EA | (+)FH Tapping Screw for Clamp $\varnothing 4 \times 25mm$ |  | 24EA |
| Cable Tie |  | 12EA | Universal Filter Kit |  | 1EA |
| Wide Band 2way Splitter (300MHz - 2.5GHz) |  | 1EA | | | |

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 |
|---------|---------|----------|
| 09/2010 | 1.0 | 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 8 inch while operating near the donor and the server antennas.

Also, the donor antenna needs to be mounted outdoors on a permanent structure.

WARRANTY

Unauthorized opening or tampering the BDA will void all warranties.

One-year Warranty will start when the ownership of CoverCell25K/100K700 is transferring.

!**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.

!**CAUTION:** DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

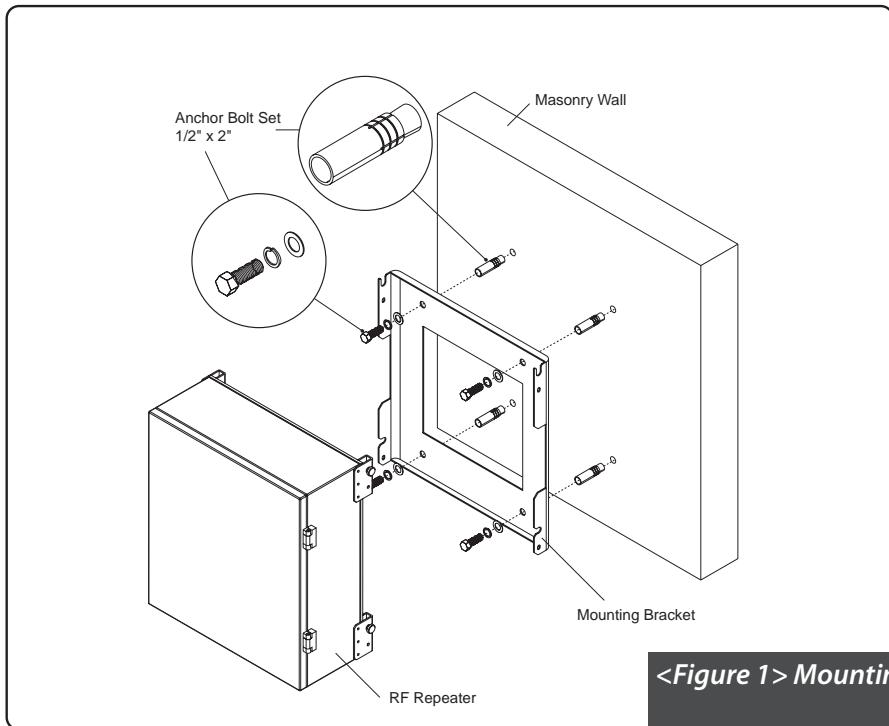
System Specification

| ITEM | LTE | |
|------------------------------------|--|--|
| | Downlink | Uplink |
| Frequency Range (MHz) | Upper C: 746 - 757 | Upper C: 776 - 787 |
| | Lower A: 728 - 734 | Lower A: 698 - 704 |
| | Lower B: 734 - 740 | Lower B: 704 - 710 |
| Bandwidth | | Upper Band : 11MHz/Total Lower Band : 6MHz/Band |
| Gain/Adjust Range (Repeater) | 25K | 59dB - 79dB/30dB |
| | 100K | 65dB - 85dB/30dB |
| Output Power | 25K | 24dBm |
| | 100K | 30dBm |
| Waveform Quality (EVM) (Stability) | 8% @ CPL 15dB | 12.5% @ CPL 15dB |
| Noise Figure | 7dB (Prefer 5dB) @ Maximum Gain | |
| System Delay | 6us (Prefer 3us) | |
| VSWR | 1.5 : 1 | |
| Function | Automatic Gain Balance | |
| Out-of-Band Emissions | A,B,C : 43+10logP-100kHz/30kHz | A,B : 43+10logP-100kHz/30kHz C : 43+10logP |
| Single Tone Interference | \leq Input CW -40dBm (Operating band +/- 1MHz) | |

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.

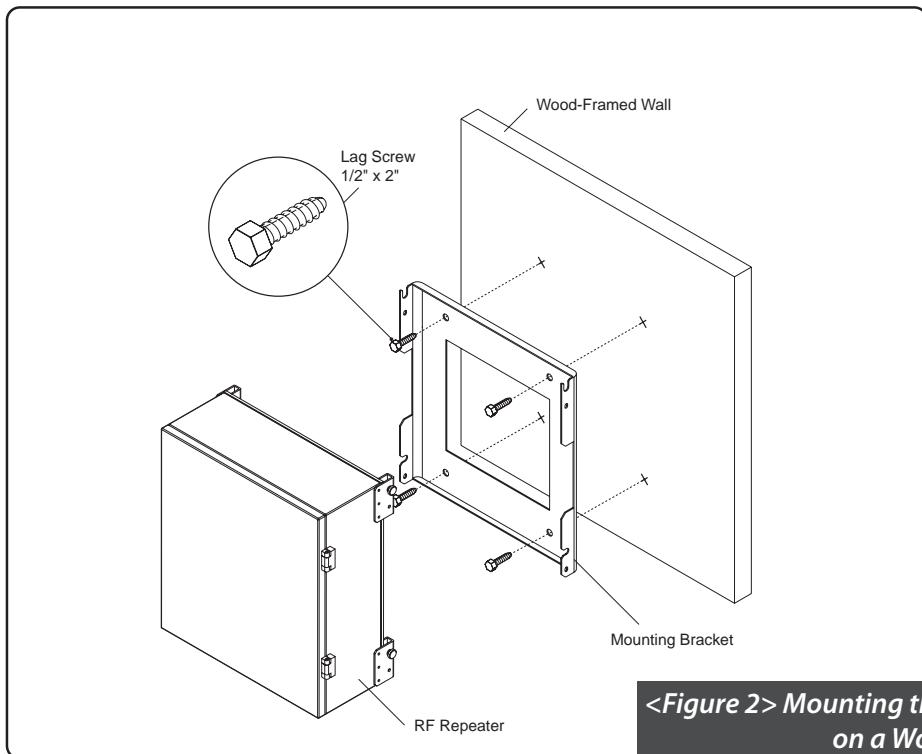


*<Figure 1> Mounting the Repeater
on a Masonry Wall*

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 2.



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

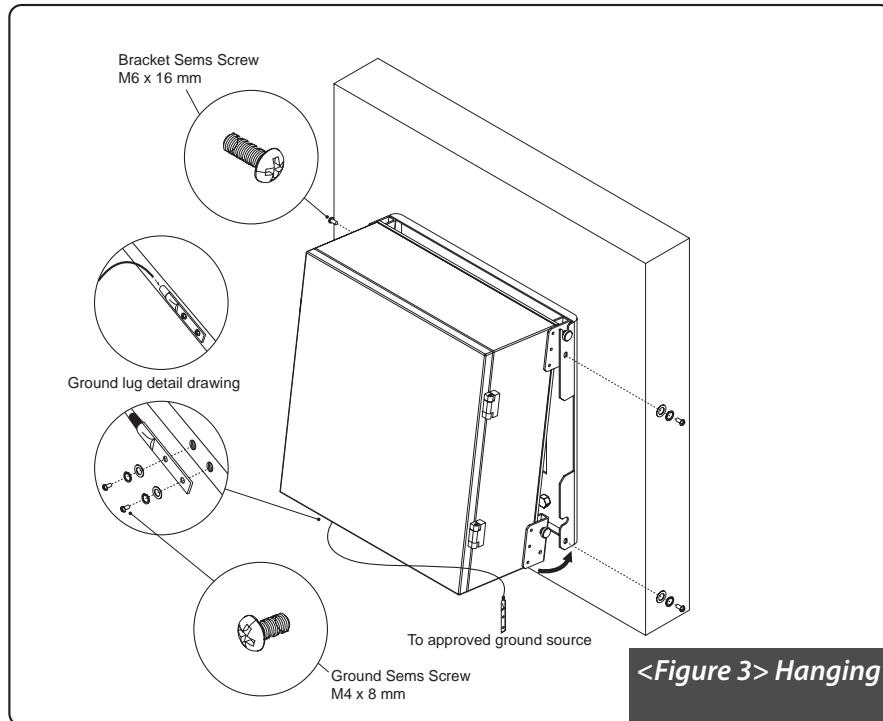
Hanging and Grounding

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.



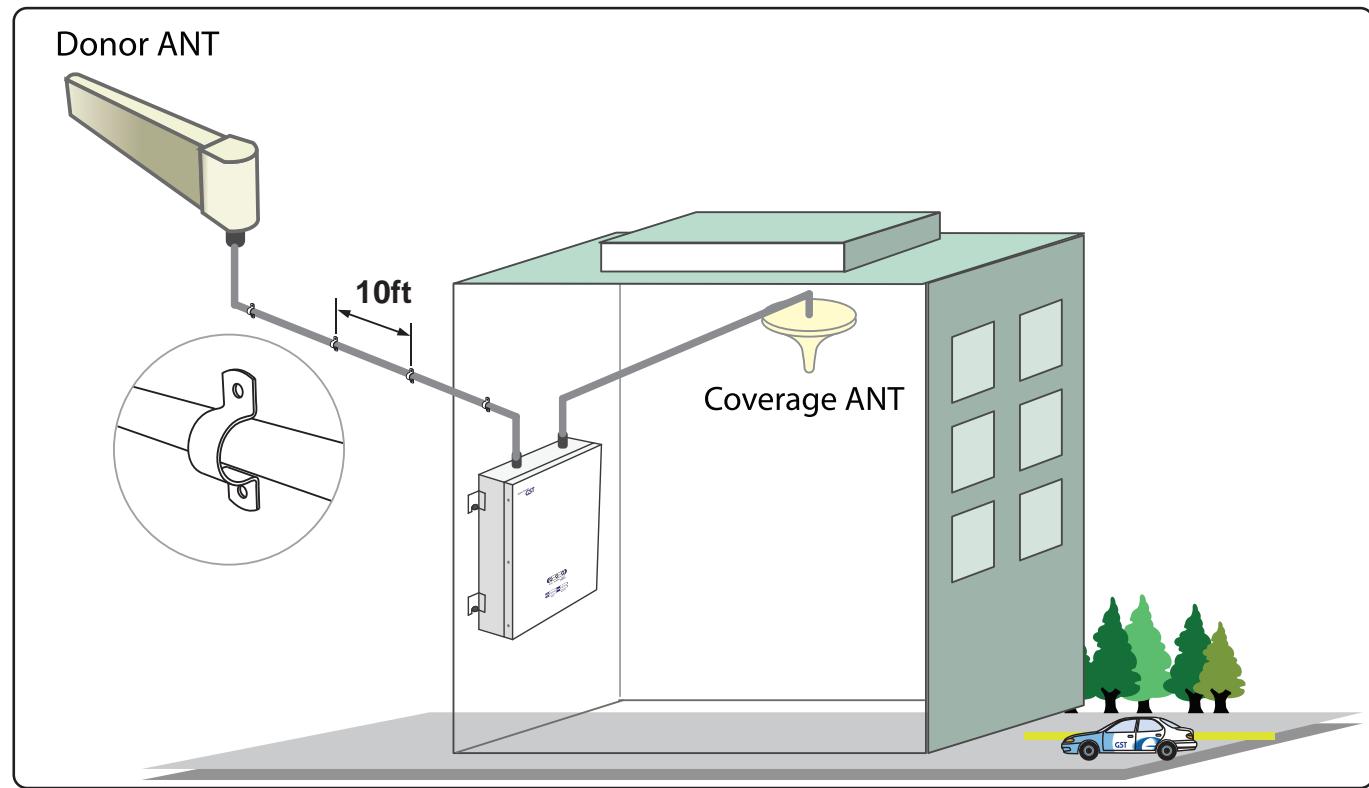
CAUTION

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



<Figure 3> Hanging and Grounding the Repeater

Mounting Coverage & Donor ANT



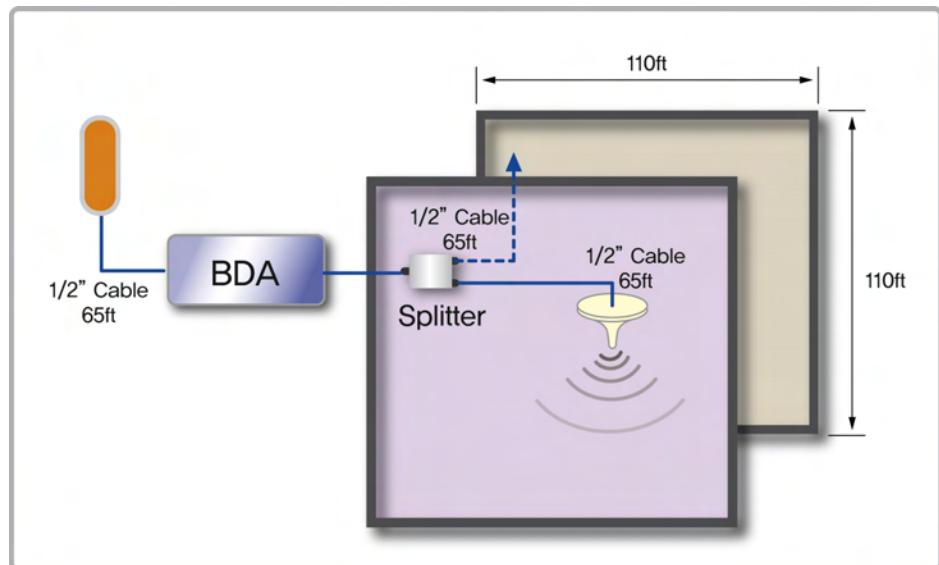
Coverage

- Common Condition

1. System Output Power -> LTE : 0dBm/FA @ pilot
2. Mobile Input Power : -90dBm/FA @ pilot
3. Donor Antenna Gain -> LTE : 8dBi
4. Coverage Antenna -> Common : 2dBi

- SUBURBAN

5. LTE : 1 channel -> 9dBm/total @ EIRP



$$\text{Path Loss} = 32.44 + 20\log[\text{Frequency}] + 20\log[\text{Distance(km)}] + \text{Indoor Loss}$$

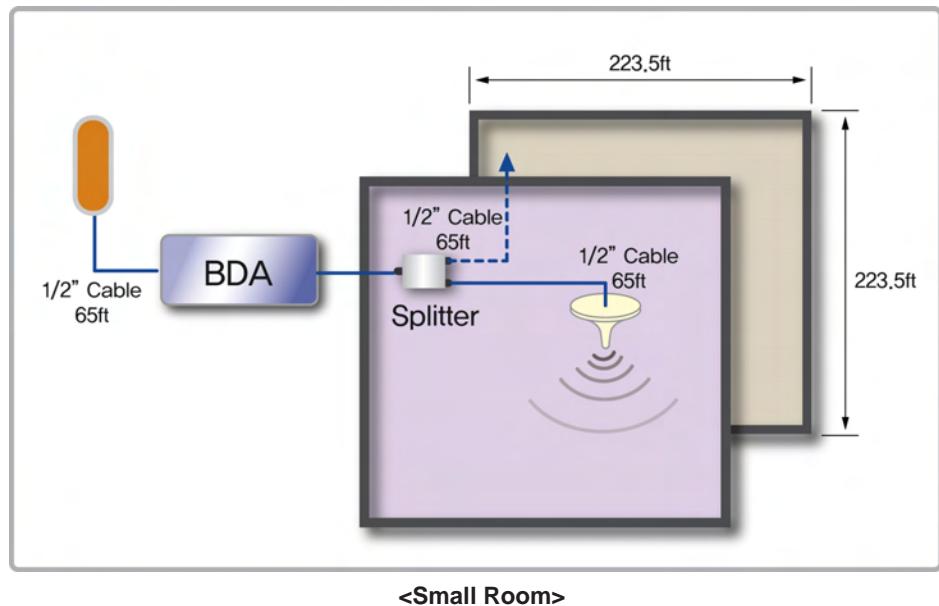
Coverage

- Common Condition

1. System Output Power -> LTE : 6dBm/FA @ pilot
2. Mobile Input Power : -90dBm/FA @ pilot
3. Donor Antenna Gain -> LTE : 8dBi
4. Coverage Antenna -> Common : 2dBi

- SUBURBAN

5. LTE : 1 channel -> 15dBm/total @ EIRP

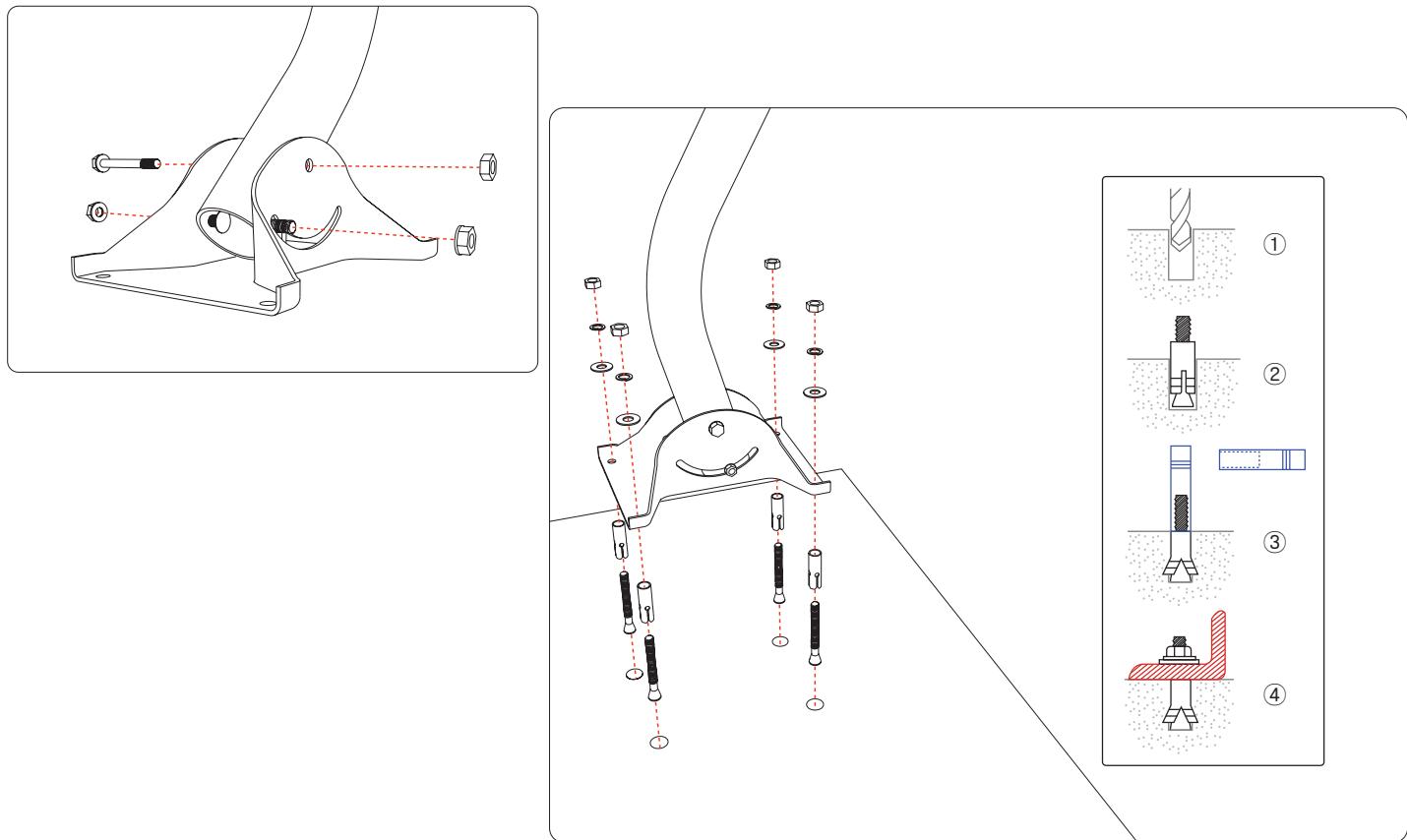


<Small Room>

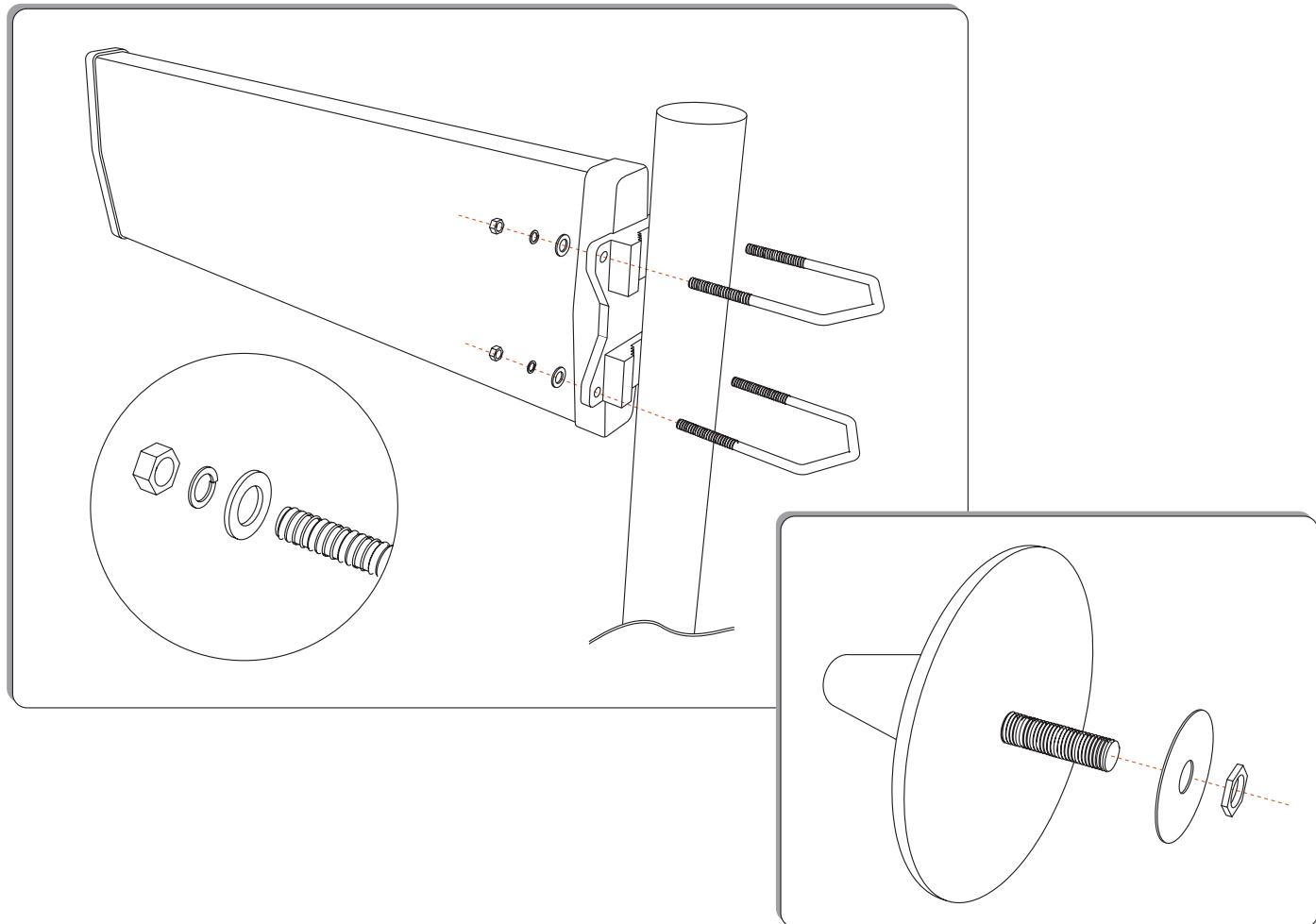
$$\text{Path Loss} = 32.44 + 20\log[\text{Frequency}] + 20\log[\text{Distance(km)}] + \text{Indoor Loss}$$

Mounting Donor & Coverage ANT

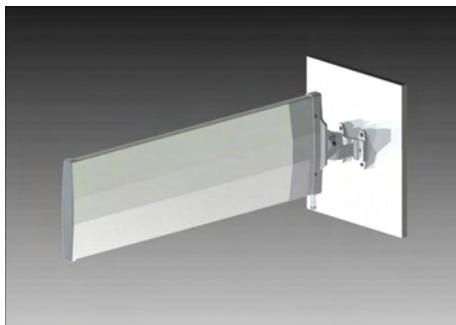
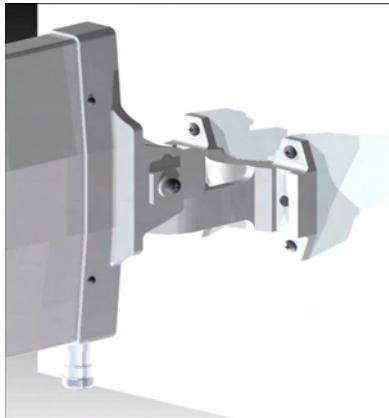
Mounting Donor ANT Pole



Mounting Donor & Coverage ANT



Mounting Type



<Pole Mount>

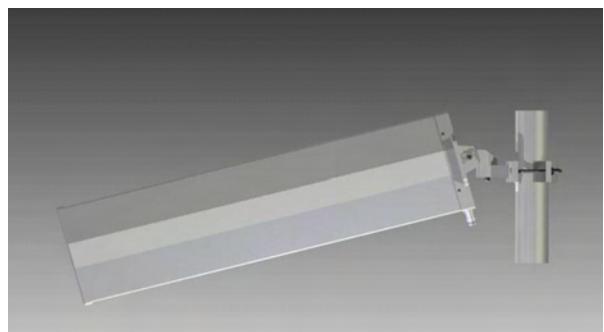
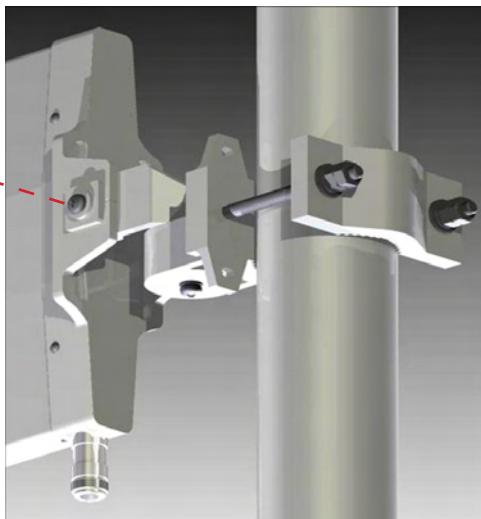
<Wall Mount>

Vertical Tilt

Vertical Beam Width

35 Deg

Bolt

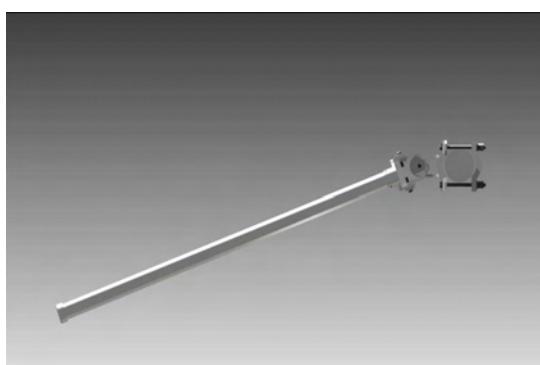
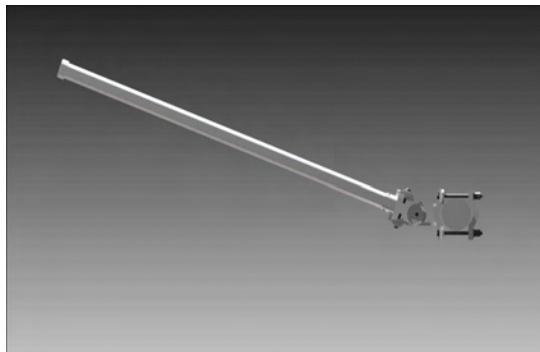
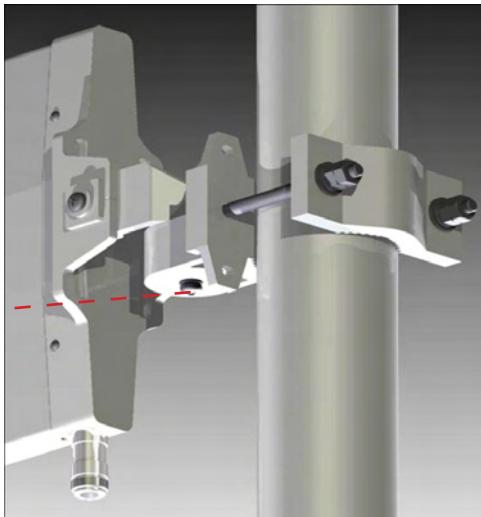


Horizontal Tilt

Horizontal Beam Width

90 Deg

Bolt



Mounting Coverage & Donor ANT

| Item | Remark |
|--------------|--|
| Donor ANT | <ul style="list-style-type: none">(1) Setting the direction of Donor Antenna(2) A donor antenna needs to be located in a place which maintains maximum receiving signal levels and attains highest Ec/Io values from BTS.(3) It is recommended that the antenna needs to be protected by placing it under the protection angle from a lightening rod.(4) A donor antenna needs to be away from high pressure and high frequency facilities. When installing a donor antenna, it needs open spaces at least more than 180 degree.(5) To get enough isolation between a donor antenna and a coverage antenna, those antennas needs to be away from each other. |
| Coverage ANT | <ul style="list-style-type: none">(1) Choosing an efficient emitting place – It is recommended that the antenna should not be blocked by objects.(2) For signal quality, the cable length needs to be as short as possible.(3) The antenna needs to be away from other radio frequency radiating objects such as other antennas, and CCTV equipment. |

Warning: In order to avoid the possibility of exceeding the FCC radio frequency exposure limits,

human proximity to the antenna should not be less than 40cm during normal operation.

The gain of the antenna is 8 dBi.

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 Coverage Antenna



CAUTION

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



<Figure 5> ANT Ports



<Figure 6> DONOR ANT Port Connection



<Figure 7> Coverage ANT Port Connection

Connecting Power Cable and LED Light Verification

- Connect Power Cable



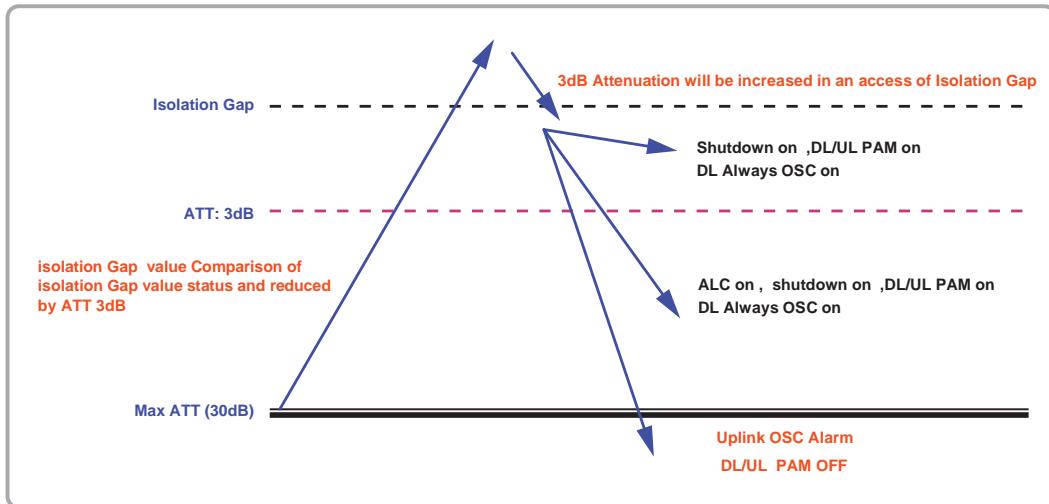
<Figure 9> AC Power Port Connection



<Figure 10> Verification of LED Lights

- When turning on the repeater, AGS (Auto Gain Setup) is automatically activated, which shows LED indicators are turned on one by one.
- After all the LEDs are on, AGS is complete.
- Please verify that all the LEDs are indicating proper input and output levels.

AGS Algorithm description



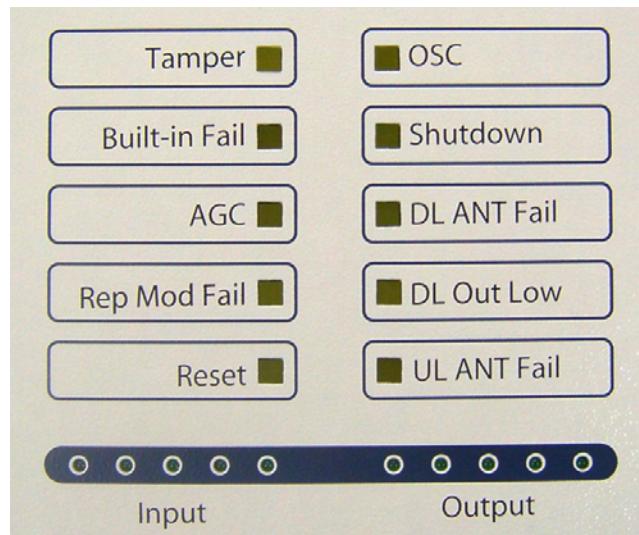
Oscillation can be reduced in case that 3dB Attenuation is increased in an excess of Isolation Gap
ATT status value : 0~2.5dB (Shutdown on , DL/UL PAM on, DL Always OSC on)
3dB~30dB (ALC on ,shutdown on , DL/UL PAM on, DL Always OSC on)
Over 30dB (uplink OSC Alarm , DL/UL PAM off)

References

1. Isolation Check in initial set up or Reset
2. Monitoring Oscillation comparing to minimum/maximum Noise Floor level
3. When Oscillation occurred, repeater attempts to stabilize Isolation through Gain control function
4. Shutdown repeater when Oscillation still occurs in Minimum Gain
5. Automatic Recovery Algorithm conversion after Shutdown status

LED Indicators

| LED Status | Remark | Application Status |
|---------------|---------------------------|--------------------|
| Tamper | Tamper | Enable |
| Built-in Fail | Built-in test fail | Enable |
| AGC | AGC Active | Enable |
| Rep Mod Fail | Replaceable module fail | Enable |
| Reset | Reset engaged | Enable |
| OSC | OSC detected | Enable |
| Shutdown | Shutdown | Enable |
| DL ANT Fail | Donor ANT circuit fail | Enable |
| DL Out Low | Donor Power too low | Enable |
| UL ANT Fail | Coverage ANT circuit fail | Enable |



<Figure 11> Front LED Display

Input /Output Power Signal

- Please note the number of LED bars indicates the RSSI signal strength level at the Donor & Coverage ANT port.

The tables below indicate the levels.

< Input >

| | |
|--------------------|------------|
| Less than -75dBm | LED 1bar |
| -74.5dBm ~ -70dBm | LED 2 bars |
| -69.5dBm ~ -65dBm | LED 3 bars |
| -64.5dBm ~ -60dBm | LED 4 bars |
| More than -59.5dBm | LED 5 bars |

< Output >

| | |
|-------------------|------------|
| Less than +4.5dBm | LED 1bar |
| +5dBm ~ +9.5dBm | LED 2 bars |
| +10dBm ~ +14.5dBm | LED 3 bars |
| +15dBm ~ +19.5dBm | LED 4 bars |
| More than +20dBm | LED 5 bars |

Web UI

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



<Figure 12> WAN Port Display

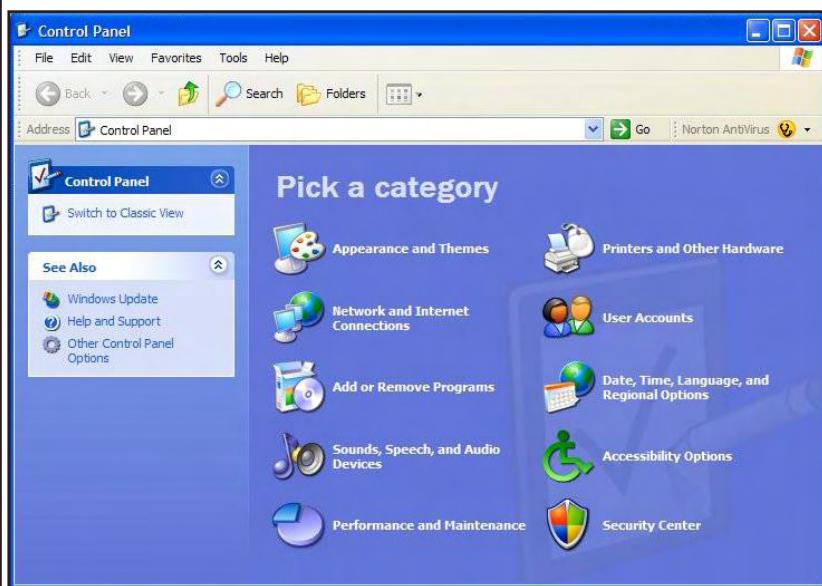
Connecting to Web UI

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



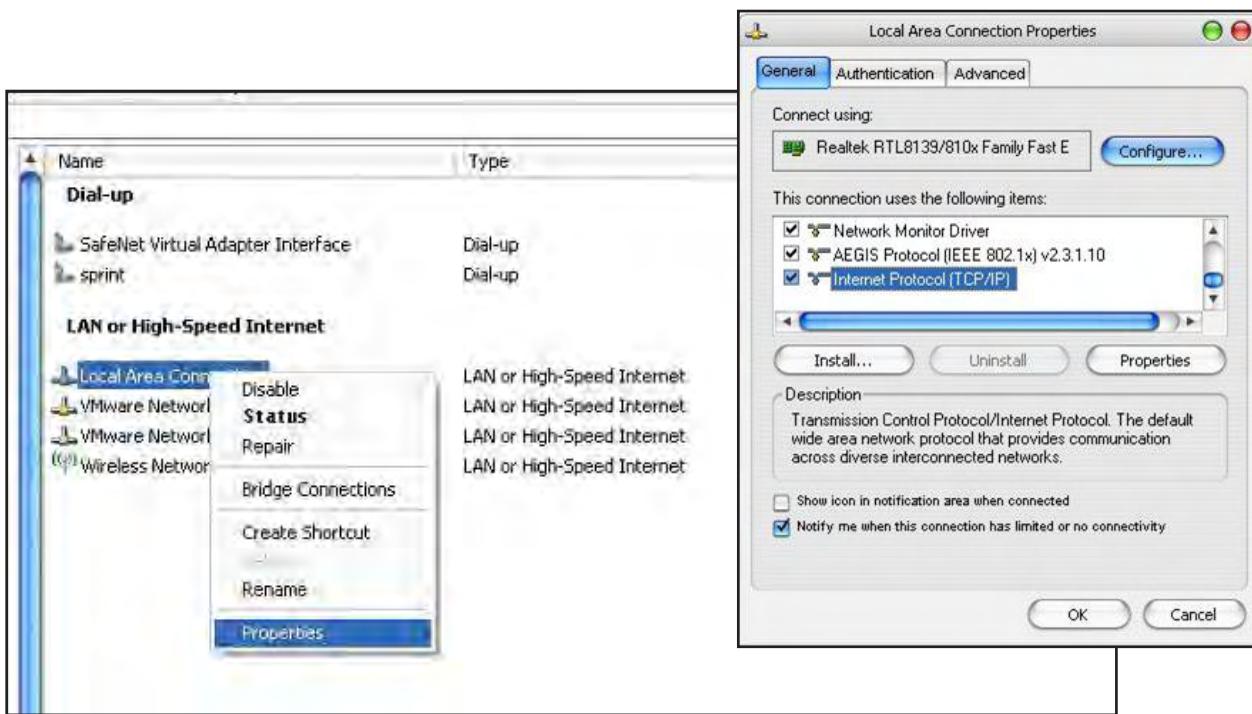
CAUTION

Disable wireless connections and remove wireless broadband card.

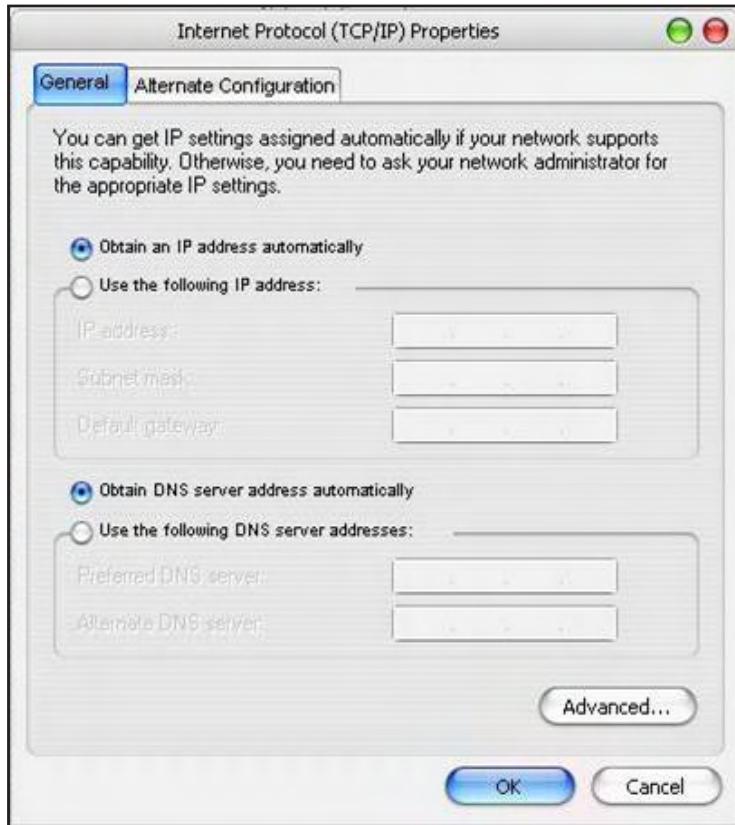


Connecting to Web UI

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



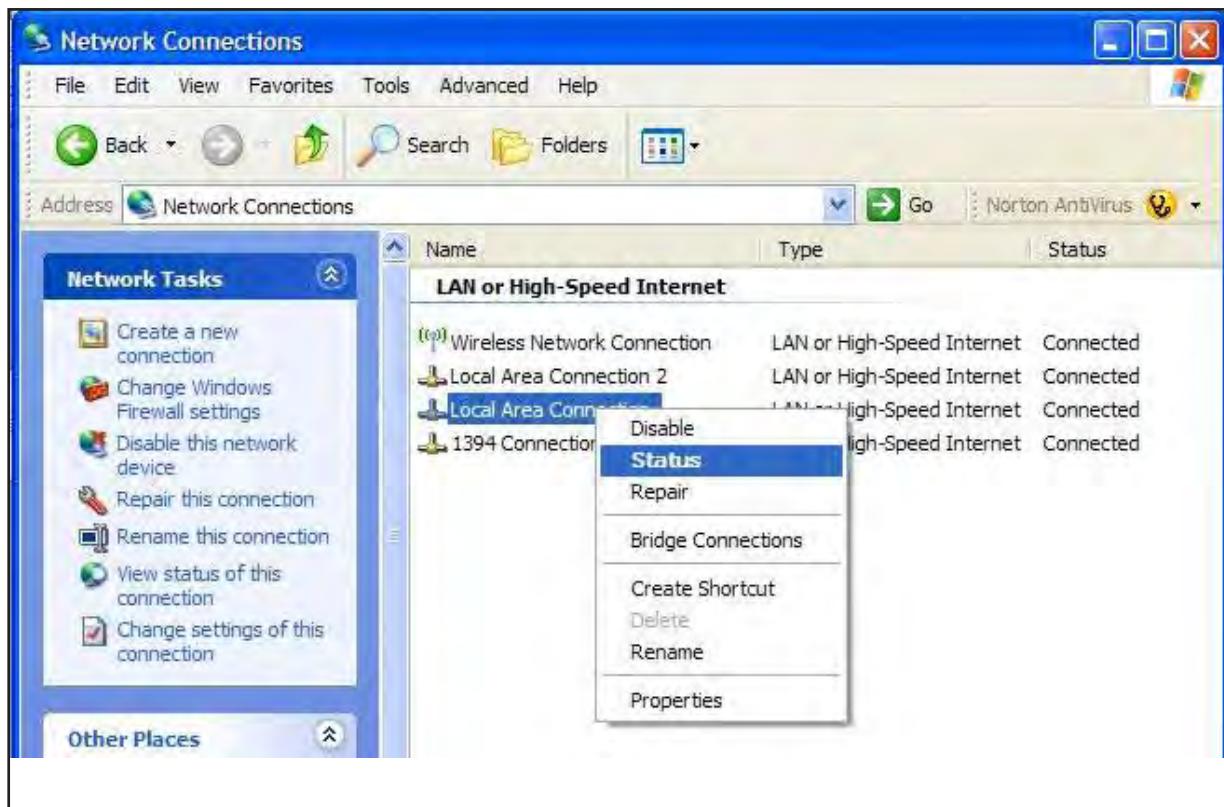
On General Tab



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

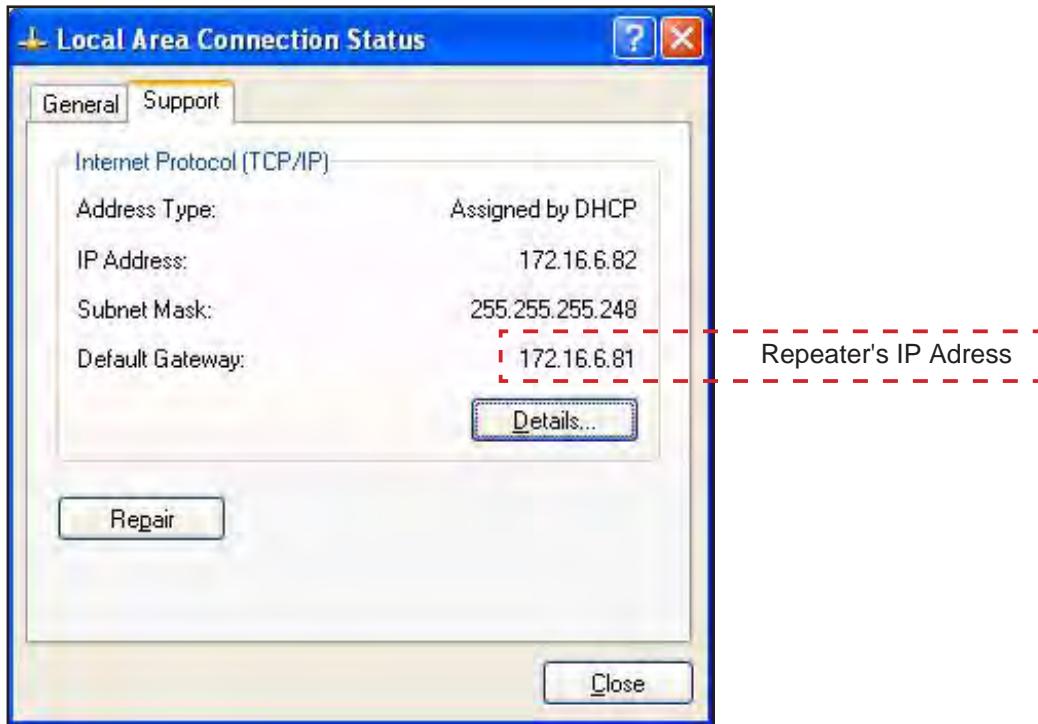
Connecting to Web UI

8. Right click Local Area Connections and choose Status



Verify Assigned IP Address

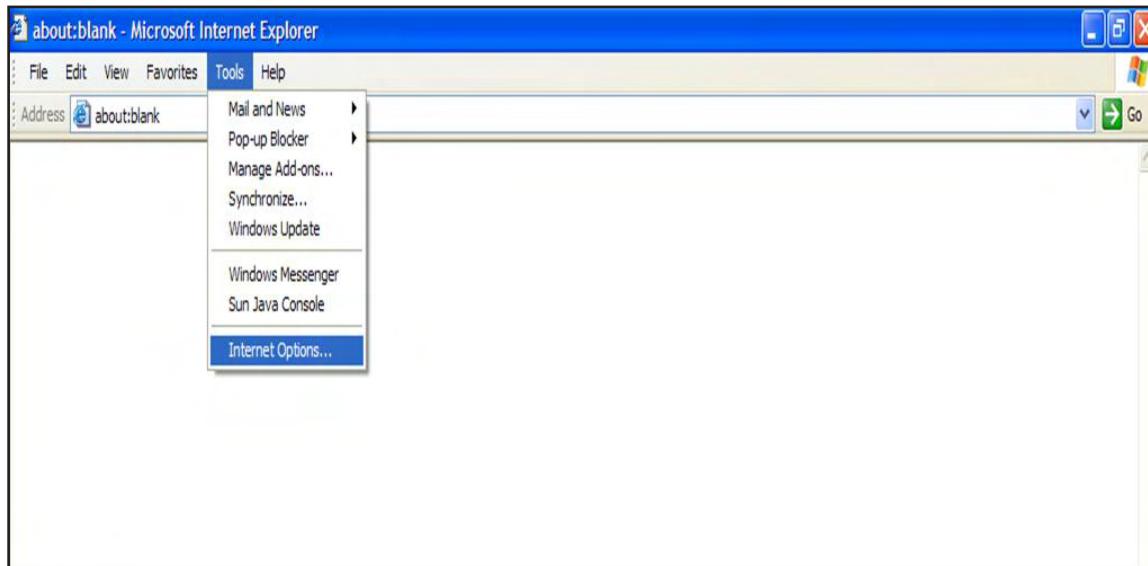
9. Click on "Support" tab.
10. Verify assigned Default Gateway at local connection. (*If IP address is not assigned, please click repair.*)
11. Close all windows when finished.



Internet Explorer Option Settings

- 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



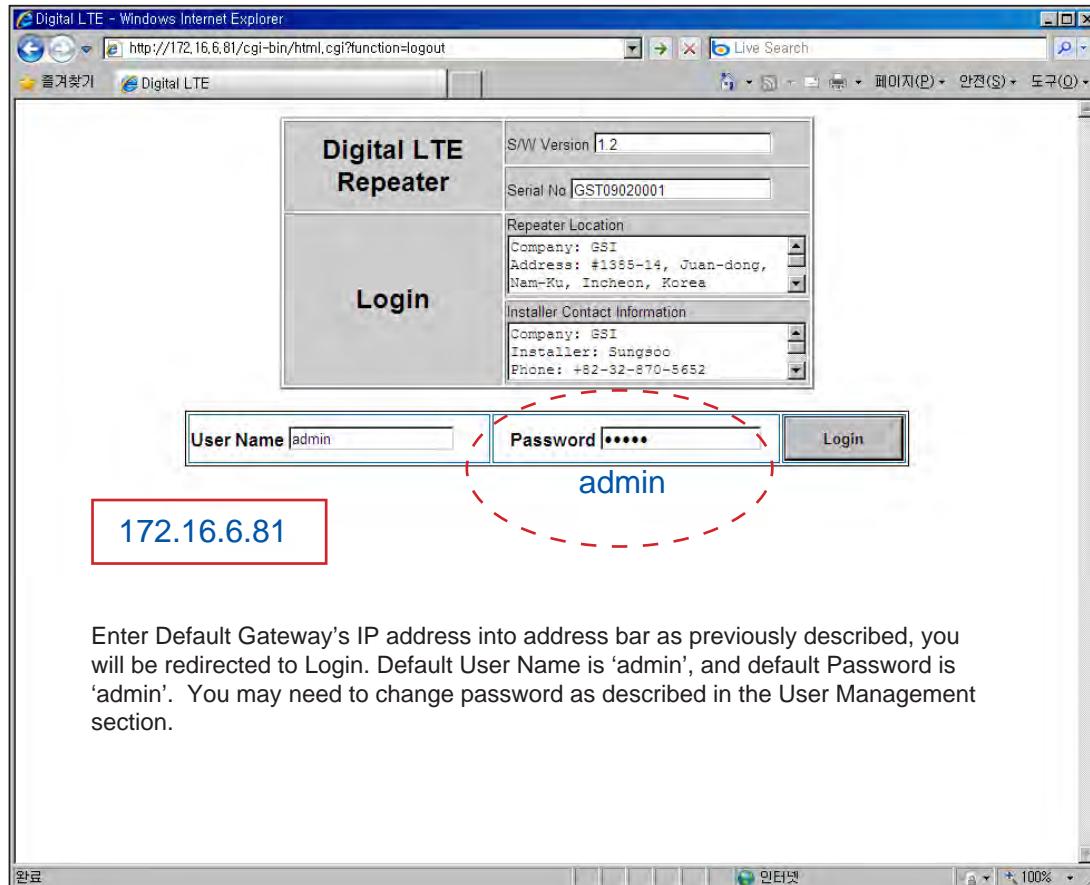
Browser History Options

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

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



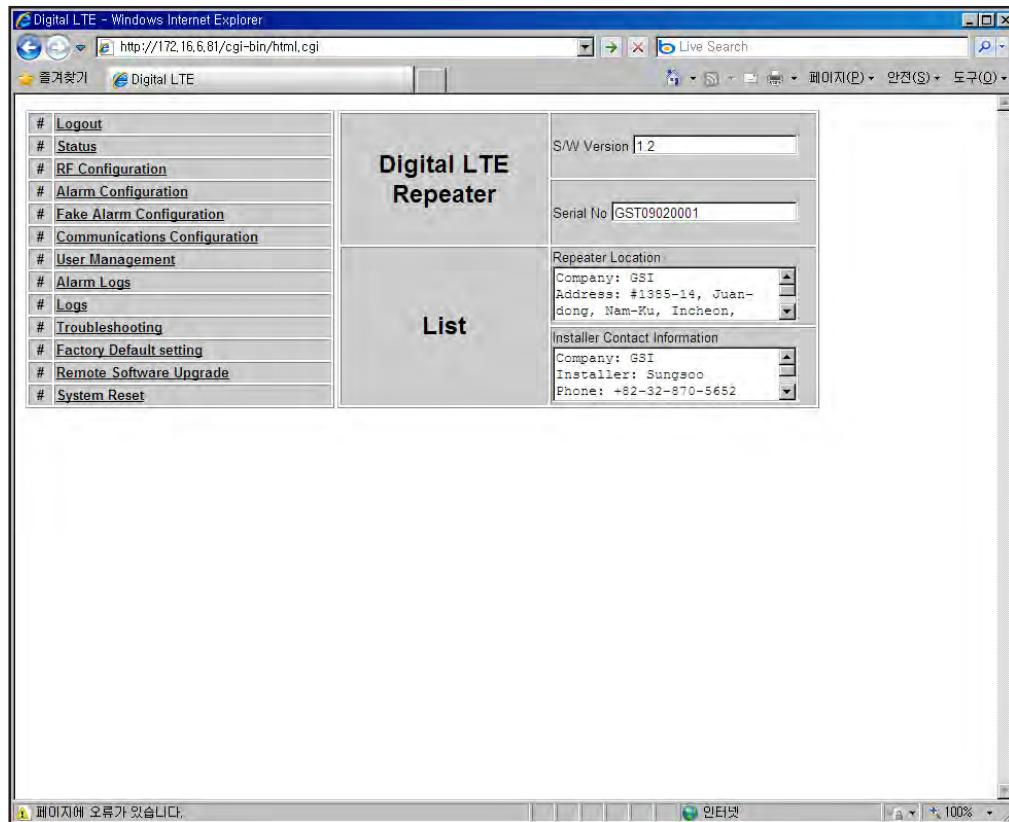
Login Screen



Enter Default Gateway's IP address into address bar as 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.

List Menu

- After you log in, you can see various menu page links related to the equipment.



Setup Wizard

- Menu Select Page after logging
- Click “Initial Installation” for Setup Wizard phase
- Waiting Time: Real-time

Menu Select

Initial Installation

Main Page

Setup Wizard

- Repeater Location setting
- Click “Apply” for updating
- Click “Skip” without any renewal
- Waiting Time: Real-time

Setup Wizard

| Repeater Location | |
|--|---|
| Company | GSI |
| Address | #1385-14, Juan-dong, Nam-Ku, Incheon, Korea |
| City, State, Zip | Incheon, Korea, 402-200 |
| <input type="button" value="Apply"/> <input type="button" value="Skip"/> | |

Setup Wizard

- Installer Contact Information setting
- Click “Apply” for updating
- Click “Skip” without any modification
- Waiting Time: Real-time

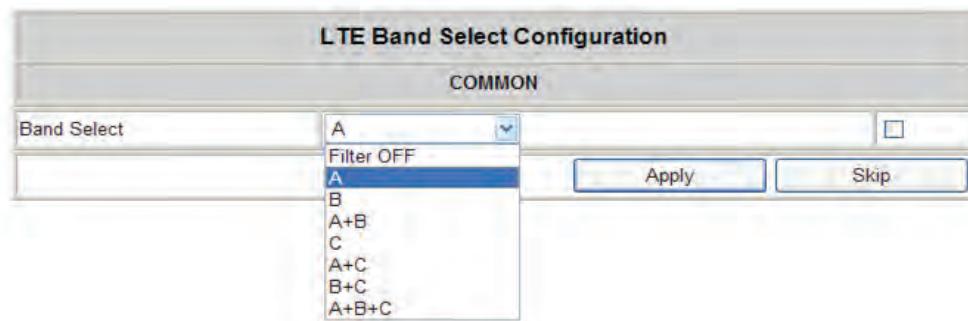
Setup Wizard

| Installer Contact Information | |
|--|----------------------------|
| Company | GSI |
| Installer | Sungsoo Lee |
| Phone | +82-32-870-5652 |
| E-Mail | ssleedev@gseinstrument.com |
| <input type="button" value="Apply"/> <input type="button" value="Skip"/> | |

Setup Wizard

- LTE Band Select Configuration setting
- Click “Apply” for updating
- Click “Skip” without any modification
- Waiting Time: Real-time

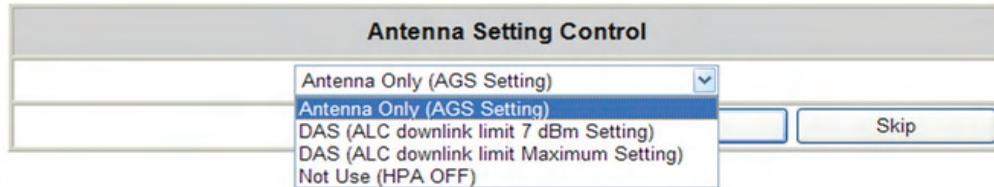
Setup Wizard



Setup Wizard

- Antenna Setting Control setting
- Click “Apply” for updating
- Click “Skip” without any modification
- Waiting Time: Real-time

Setup Wizard



Setup Wizard

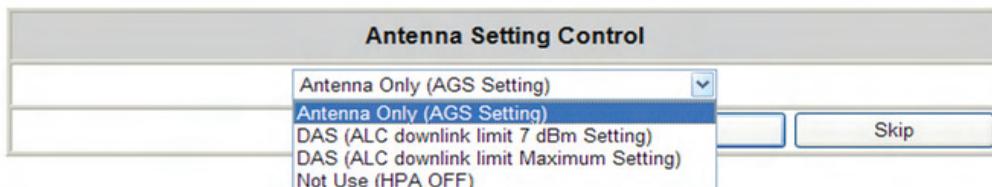
- Waiting (Operating) Time:
 - Typical: 3mins
 - Maximum: 5mins



CAUTION

Please make Path On when you run Setup Wizard if Path Off set

Setup Wizard



1. Antenna only (AGS setting) is for Auto Gain Setting to optimize this repeater for field conditions
 - a. Every limit level (AGC, Down/Uplink ALC) is normal (example : Standard output power)
 - b. Auto Gain Setting will run
2. DAS (ALC downlink Limit 7dBm Setting) option is used for connecting this repeater to DAS equipment (LGC DAS, Mobile Access DAS etc), and following condition should be controlled.
 - a. AGC turn Off
 - b. ALC turn On
 - c. Gain Balance turn Off
 - d. ALC downlink limit value set +7dBm
 - e. ALC uplink limit value set normal output power (example : Standard output power)
 - f. Shut down turn On
 - g. HPA turn On, If HPA turn off
 - h. delay alarm reporting time set 5 min
3. DAS (ALC downlink Limit Maximum Setting) option is used for connecting Passive DAS equipment, and 7dB downlink limit value is set as normal output power level
(Example: Standard output power)

Status Page

- Default D/L and U/L are set at minimum Gain.
- The default values in various fields will differ with different models of CoverCell25K/100K700 Repeaters.
- In order to view other pages, you can click the desired menu on the top-left corner of all pages.
- Changes can be made on the Status Page. This page is for checking the repeater's conditions and settings.

The screenshot shows a Windows Internet Explorer window displaying the 'Digital LTE - Windows Internet Explorer' status page. The URL is <http://172.16.6.81/cgi-bin/html.cgi?function=status>. The page has a left sidebar with navigation links and a main content area divided into sections: 'Digital LTE Repeater' (containing S/W Version, Serial No, Repeater Location, and Installer Contact Information), 'Status' (containing Repeater Location and Installer Contact Information), and 'RF Status' (containing COMMON, Downlink, and Uplink sections). The 'COMMON' section includes fields for Temperature, Temperature Lower Limit, Shutdown ON/OFF, AGS ON/OFF, Path ON/OFF, Gain Balance ON/OFF, and Gain Balance Offset. The 'Downlink' section includes RSSI Power and Output Power fields. The 'Uplink' section includes Output Power and AGC On/Off fields. A status bar at the bottom right shows '인터넷' and '100%'.

Digital LTE Repeater

S/W Version 1.2

Serial No GST09020001

Repeater Location

Company: GS1
Address: #1355-14, Juan-dong, Nam-Ku, Incheon,

Installer Contact Information

Company: GS1
Installer: Sungsoo
Phone: +82-32-570-5652

Status

RF Status

COMMON

| | | | | | |
|-------------------------|------|----|-------------------------|-------|------|
| Temperature | 62.6 | °F | Temperature Upper Limit | 185.0 | °F |
| Temperature Lower Limit | 10.4 | °F | Alarm Delay | ON | |
| Shutdown ON/OFF | ON | | Always Isolation ON/OFF | OFF | |
| AGS ON/OFF | OFF | | Band Select | A | Band |
| Path ON/OFF | OFF | | | | |
| Gain Balance ON/OFF | OFF | | Gain Balance Offset | 0.0 | dB |

Downlink

Uplink

| | | | | | |
|--------------|-----|-----|--------------|-----|-----|
| RSSI Power | -20 | dBm | | | |
| Output Power | 3.5 | dBm | Output Power | -20 | dBm |
| AGC On/Off | ON | | | | |

Status Page

- When an alarm goes off, the color of Status turns red.

The screenshot shows a Windows Internet Explorer window displaying the 'Digital LTE - Windows Internet Explorer' status page. The URL is <http://172.16.6.81/cgi-bin/html.cgi?function=status>. The page contains several tables and sections related to system status and alarms.

Band Gain Offset:

| | | | | | |
|---------------------|-----|----|---------------------|-----|----|
| B Band Gain Offset | 0.0 | dB | B Band Gain Offset | 0.0 | dB |
| C Band Gain Offset | 0.0 | dB | C Band Gain Offset | 0.0 | dB |
| AB Band Gain Offset | 0.0 | dB | AB Band Gain Offset | 0.0 | dB |

Alarm Status:

| | |
|------------------------|-----|
| Fake Alarm Mode ON/OFF | OFF |
|------------------------|-----|

COMMON Alarms:

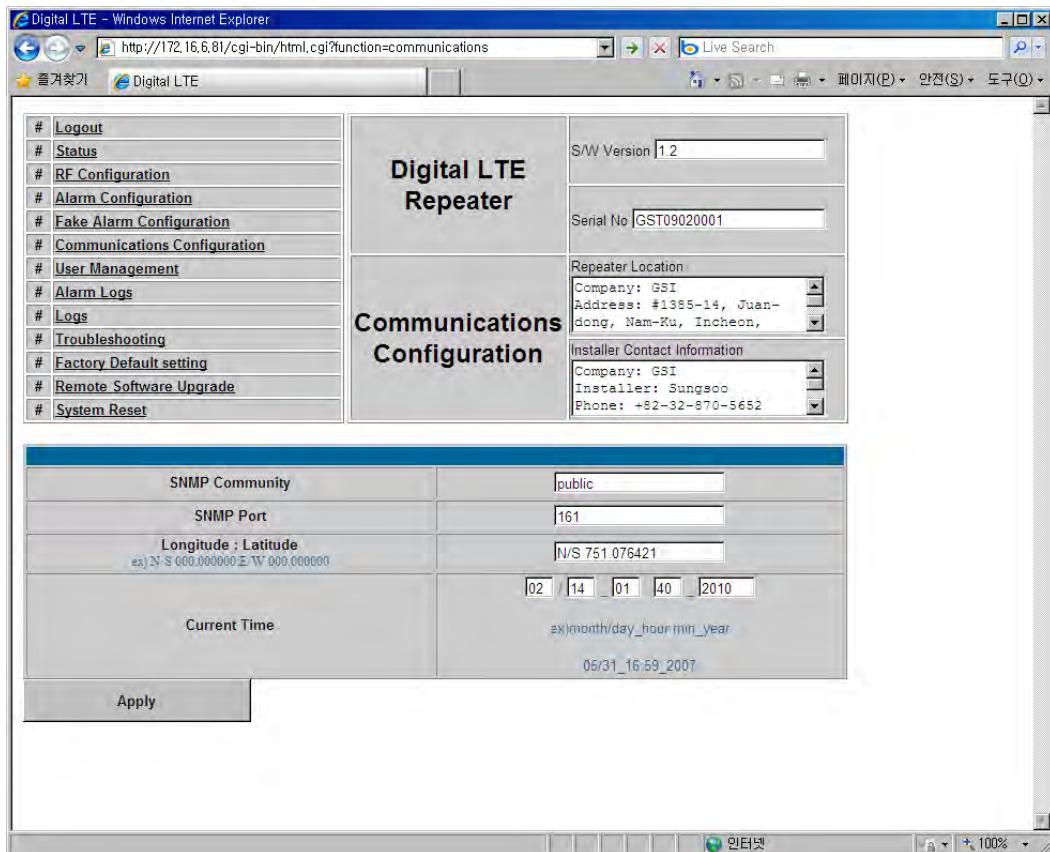
| Status | Name | Status | Name |
|--------|-------------------------|--------|----------------------------------|
| Green | Temperature Lower Limit | Green | Temperature Upper Limit |
| Green | Tamper Detected | Green | Power Supply Out Of Range |
| Green | Communication Failure | Green | Field Replaceable Module Failure |
| Green | Reset Alarm | Green | Manual Shutdown Alarm |
| Green | Heartbeat | | |

Downlink and Uplink Alarms:

| Downlink | | Uplink | |
|----------|---|--------|--|
| Status | Name | Status | Name |
| Green | Low Isolation | Green | Oscillation Detected |
| Green | Donor Power Too High/Low | Green | Power At Coverage Port Too High |
| Green | Synthesizer Failure | Green | Synthesizer Failure |
| Green | Hardware Failure | Green | Hardware Failure |
| Green | Software Failure | Green | Software Failure |
| Green | Spurious Emissions Out Of Specification | Green | Out of band Emissions Out Of Specification |
| Green | Interferer Power Exceeded | | |
| Green | VSWR Alarm | Green | VSWR Alarm |

Communications Configuration

- Click on the Communications Configuration link.



RF Configuration

- Click the RF Configuration link.
- This menu is where installer will actually configure the Repeater.
- You can change various RF values of the equipment on this page.

Digital LTE - Windows Internet Explorer
http://172.16.6.81/cgi-bin/html.cgi?function=rfconfiguration

★ 즐겨찾기 Digital LTE

Logout
Status
RF Configuration
Alarm Configuration
Fake Alarm Configuration
Communications Configuration
User Management
Alarm Logs
Logs
Troubleshooting
Factory Default setting
Remote Software Upgrade
System Reset

Digital LTE Repeater

S/W Version 1.2
Serial No GST09020001

RF Configuration

Repeater Location
Company: GS1
Address: #1385-14, Juan-dong, Nam-Ku, Incheon,

Installer Contact Information
Company: GS1
Installer: Sungsoo
Phone: +82-32-870-5652

COMMON

| | | | | | | | |
|-------------------------|-------|--------------------------|--------------------------|------------------------|------|--------------------------|--------------------------|
| Temperature Up Limit | 185.0 | °F | <input type="checkbox"/> | Temperature Down Limit | 10.4 | °F | <input type="checkbox"/> |
| Alarm delay ON/OFF | ON | <input type="checkbox"/> | <input type="checkbox"/> | Shutdown ON/OFF | ON | <input type="checkbox"/> | <input type="checkbox"/> |
| Always Isolation ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> | AGS ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> |
| Band Select | A | <input type="checkbox"/> | <input type="checkbox"/> | PATH ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> |
| Gain Balance ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> | Gain Balance Offset | 0.0 | dB | <input type="checkbox"/> |

Downlink **Uplink**

| | | | | | | | |
|--------------------|------|--------------------------|--------------------------|--------------------|------|--------------------------|--------------------------|
| AGC ON/OFF | ON | <input type="checkbox"/> | <input type="checkbox"/> | ALC Limit Level | 20.0 | dBm | <input type="checkbox"/> |
| AGC Limit Level | 23.5 | dBm | <input type="checkbox"/> | ATT | 0.0 | dB | <input type="checkbox"/> |
| ATT | 0.0 | dB | <input type="checkbox"/> | PAM ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> |
| PAM ON/OFF | OFF | <input type="checkbox"/> | <input type="checkbox"/> | A Band Gain Offset | 0.0 | dB | <input type="checkbox"/> |
| A Band Gain Offset | 0.0 | dB | <input type="checkbox"/> | B Band Gain Offset | 0.0 | dB | <input type="checkbox"/> |
| B Band Gain Offset | 0.0 | dB | <input type="checkbox"/> | | | | |

인터넷 100%

RF Configuration

- 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.
- The default values in various fields will differ with different models of CoverCell25K/100K700 Repeaters.

Digital LTE - Windows Internet Explorer
http://172.16.6.81/cgi-bin/html.cgi?function=rfconfiguration

RF Configuration

COMMON

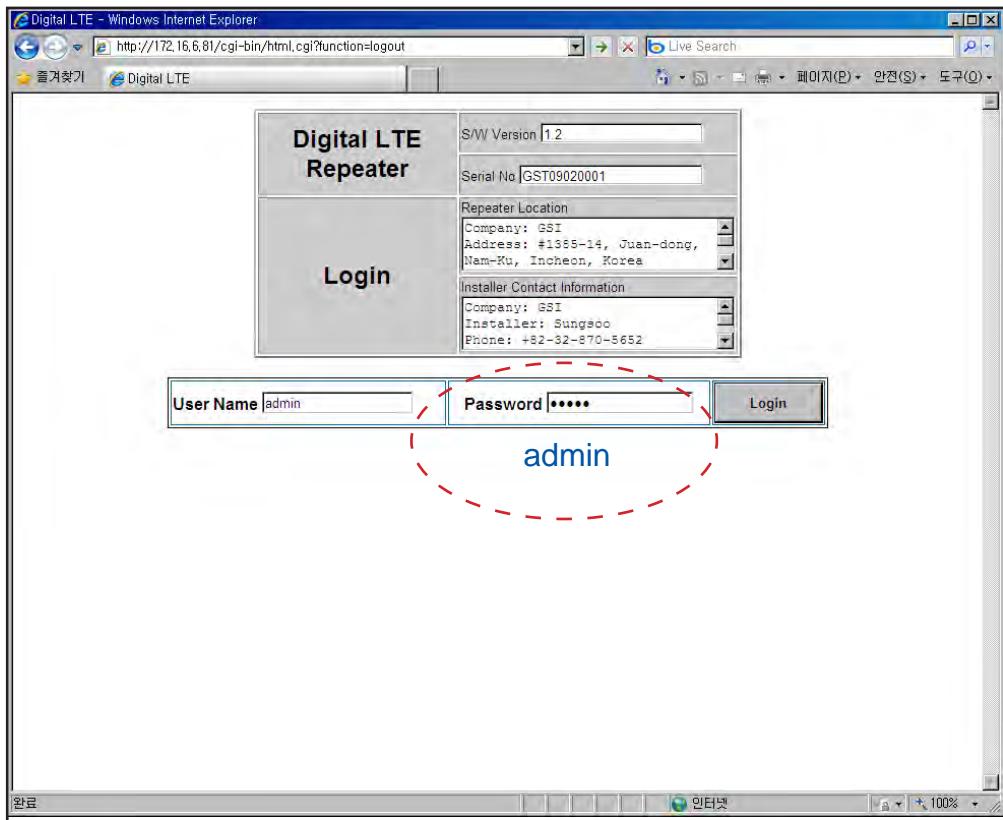
| | | | |
|-------------------------|----------|---|---------|
| Temperature Up Limit | 185.0 °F | <input type="checkbox"/> Temperature Down Limit | 10.4 °F |
| Alarm delay ON/OFF | ON | <input type="checkbox"/> Shutdown ON/OFF | ON |
| Always Isolation ON/OFF | OFF | <input type="checkbox"/> AGS ON/OFF | OFF |
| Band Select | A | <input type="checkbox"/> PATH ON/OFF | OFF |
| Gain Balance ON/OFF | OFF | <input type="checkbox"/> Gain Balance Offset | 0.0 dB |

Downlink Uplink

| | | | |
|---------------------|----------|--|----------|
| AGC ON/OFF | ON | <input type="checkbox"/> | |
| AGC Limit Level | 23.5 dBm | <input type="checkbox"/> ALC Limit Level | 20.0 dBm |
| ATT | 0.0 dB | <input type="checkbox"/> ATT | 0.0 dB |
| PAM ON/OFF | OFF | <input type="checkbox"/> PAM ON/OFF | OFF |
| A Band Gain Offset | 0.0 dB | <input type="checkbox"/> A Band Gain Offset | 0.0 dB |
| B Band Gain Offset | 0.0 dB | <input type="checkbox"/> B Band Gain Offset | 0.0 dB |
| C Band Gain Offset | 0.0 dB | <input type="checkbox"/> C Band Gain Offset | 0.0 dB |
| AB Band Gain Offset | 0.0 dB | <input type="checkbox"/> AB Band Gain Offset | 0.0 dB |

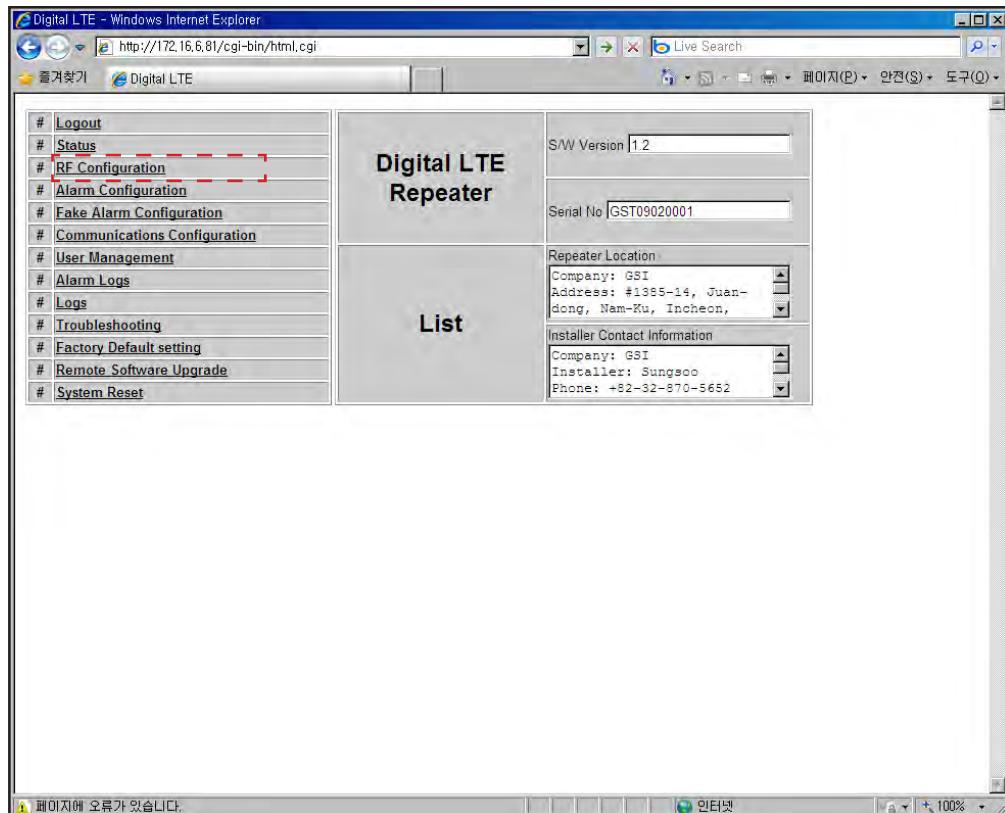
Bandwidth and Frequency Selection

1. Login as admin as above.



Bandwidth and Frequency Selection

2. Click RF configuration



Bandwidth and Frequency Selection

3. Choose Bandwidth and select bandwidth users want.

Depending on the bandwidth, the frequency will be set accordingly

The screenshot shows the 'RF Configuration' section of the Digital LTE software. The left sidebar lists various configuration options. The main area displays the 'Digital LTE Repeater' settings and the 'RF Configuration' parameters. The 'COMMON' tab is selected, showing fields for Temperature Up/Low Limit, Alarm delay ON/OFF, Always Isolation ON/OFF, Band Select (set to 'A'), Gain Balance ON/OFF (set to 'Filter OFF'), AGC ON/OFF, AGC Limit Level, ATT, PAM ON/OFF, A Band Gain Offset, and B Band Gain Offset. The 'Uplink' tab is also visible.

| COMMON | |
|-------------------------|------------|
| Temperature Up Limit | 185.0 °F |
| Alarm delay ON/OFF | ON |
| Always Isolation ON/OFF | OFF |
| Band Select | A |
| Gain Balance ON/OFF | Filter OFF |
| AGC ON/OFF | |
| AGC Limit Level | |
| ATT | 0.0 dB |
| PAM ON/OFF | OFF |
| A Band Gain Offset | 0.0 dB |
| B Band Gain Offset | 0.0 dB |

| Uplink | |
|------------------------|----------|
| Temperature Down Limit | 10.4 °F |
| Shutdown ON/OFF | ON |
| AGS ON/OFF | OFF |
| PATH ON/OFF | OFF |
| Gain Balance Offset | 0.0 dB |
| ALC Limit Level | 20.0 dBm |
| ATT | 0.0 dB |
| PAM ON/OFF | OFF |
| A Band Gain Offset | 0.0 dB |
| B Band Gain Offset | 0.0 dB |

Bandwidth and Frequency Selection

6. Click Apply if all the setting is done.

Please set AGS “ON”, CoverCell25K/100K700 will remember the status of AGS and perform AGS on rebooting.

Digital LTE - Windows Internet Explorer
http://172.16.6.81/cgi-bin/html.cgi?function=rconfiguration

RF Configuration

COMMON

| | | | |
|-------------------------|----------|------------------------|---------|
| Temperature Up Limit | 185.0 °F | Temperature Down Limit | 10.4 °F |
| Alarm delay ON/OFF | ON | Shutdown ON/OFF | ON |
| Always Isolation ON/OFF | OFF | AGS ON/OFF | OFF |
| Band Select | A | PATH ON/OFF | OFF |
| Gain Balance ON/OFF | OFF | Gain Balance Offset | 0.0 dB |

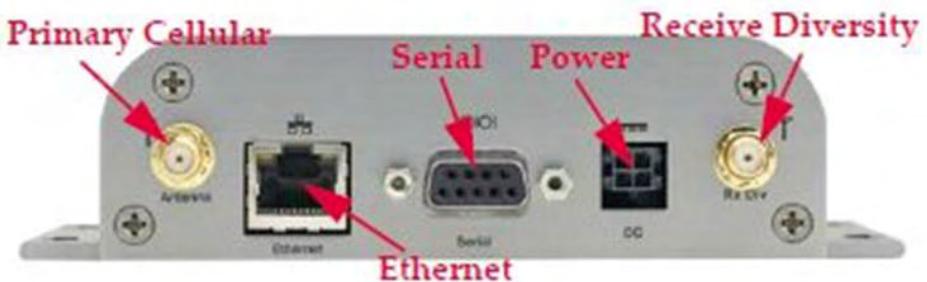
Downlink Uplink

| | | | | | |
|--------------------|--------|---------------------|----------|---------------------|----------|
| AGC ON/OFF | ON | AGC Limit Level | 23.5 dBm | ALC Limit Level | 20.0 dBm |
| ATT | 0.0 dB | PAM ON/OFF | OFF | ATT | 0.0 dB |
| A Band Gain Offset | 0.0 dB | A Band Gain Offset | 0.0 dB | B Band Gain Offset | 0.0 dB |
| B Band Gain Offset | 0.0 dB | C Band Gain Offset | 0.0 dB | C Band Gain Offset | 0.0 dB |
| C Band Gain Offset | 0.0 dB | AB Band Gain Offset | 0.0 dB | AB Band Gain Offset | 0.0 dB |

Apply

RavenX Setting

- RavenX is not supplied with Repeater and can be purchased separately from Kentrox.
- An antenna or antenna cable should be connected to “Primary Cellular” port in Figure 13.
- One end of an ethernet cable should be connected to “Ethernet” in Figure 1, the other end should be connected to WAN port in CoverCell25K/100K700.
- Power should be connected to “Power” in Figure 1. Power supply is provided with RavenX.
- RavenX will work with CoverCell25K/100K700 with its default setting.



<Figure 13> RavenX Setting

- RavenX will work with CoverCell25K/100K700 with its default setting.

Alarm Configuration

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

The screenshot shows a Windows Internet Explorer window titled "Digital LTE - Windows Internet Explorer". The URL is <http://172.16.6.81/cgi-bin/html.cgi?function=alarm>. The main content area is titled "Digital LTE Repeater" and "Alarm Configuration". On the left, there is a vertical menu with the following items:

- # Logout
- # Status
- # RF Configuration
- # Alarm Configuration
- # Fake Alarm Configuration
- # Communications Configuration
- # User Management
- # Alarm Logs
- # Logs
- # Troubleshooting
- # Factory Default setting
- # Remote Software Upgrade
- # System Reset

Below the menu, there is a dropdown for "Report Alarms" set to "ON" and a "List of alarms:" field which is currently empty.

The main configuration area contains several input fields and tables:

- S/W Version: 1.2
- Serial No: GST09020001
- Repeater Location:
 - Company: GSI
 - Address: #1385-14, Juan-dong, Nam-Ku, Incheon,
- Installer Contact Information:
 - Company: GSI
 - Installer: Sungsoo
 - Phone: +82-32-870-5652
- SNMP Alarm table:

| COMMON | | | | | |
|--------|----------------------------------|--------|--------|--------------------------|----------------------------------|
| No | Name | State | Active | Last Triggered | SNMP Mapping |
| 0 | Tamper Detected | Alarm | Enable | Sun Feb 14 01:43:28 2010 | Tamper Detected |
| 1 | Power Supply Out Of Range | Normal | Enable | Sun Feb 14 01:38:23 2010 | Power Supply Out Of Range |
| 2 | Communication Failure | Normal | Enable | Sun Feb 14 01:38:23 2010 | Communication Failure |
| 3 | Field Replaceable Module Failure | Normal | Enable | Sun Feb 14 01:38:23 2010 | Field Replaceable Module Failure |
| 4 | Reset Alarm | Normal | Enable | Sun Feb 14 01:39:28 2010 | Reset Alarm |

Alarm Configuration

- In case that screen resolution is 1024 x 768, you may need to use scroll bars to view all. Changes will not be made effective until you click “Apply” button.

Digital LTE - Windows Internet Explorer
 http://172.16.6.81/cgi-bin/html.cgi?function=alarm

| | | | | | |
|----|--|--------|--------|--------------------------|--|
| 16 | Downlink Hardware Failure | Normal | Enable | Sun Feb 14 01:38:23 2010 | Downlink Hardware Failure |
| 17 | Downlink Software Failure | Alarm | Enable | Sun Feb 14 01:43:28 2010 | Downlink Software Failure |
| 18 | Downlink Spurious Emissions Out Of Specification | Normal | Enable | Sun Feb 14 01:38:23 2010 | Downlink Spurious Emissions Out Of Specification |
| 19 | Downlink Interferer Power Exceeded | Normal | Enable | Sun Feb 14 01:38:23 2010 | Downlink Interferer Power Exceeded |

General Alarm

| COMMON | | | | | |
|--------|-------------------------------|--------|--------|--------------------------|--------------|
| No | Name | State | Active | Last Triggered | SNMP Mapping |
| 20 | Temperature Upper Limit Alarm | Normal | Enable | Sun Feb 14 01:38:23 2010 | Not Used |
| 21 | Temperature Lower Limit Alarm | Normal | Enable | Sun Feb 14 01:38:23 2010 | Not Used |

| Uplink | | | | | |
|--------|------------|--------|--------|--------------------------|--------------|
| No | Name | State | Active | Last Triggered | SNMP Mapping |
| 22 | VSWR Alarm | Normal | Enable | Sun Feb 14 01:38:23 2010 | Not Used |

| Downlink | | | | | |
|----------|------------|--------|--------|--------------------------|--------------|
| No | Name | State | Active | Last Triggered | SNMP Mapping |
| 23 | VSWR Alarm | Normal | Enable | Sun Feb 14 01:38:23 2010 | Not Used |

Apply

Alarm List

| Category | Alarm |
|----------|-------------------------------|
| General | Tamper |
| | Power Supply out of range |
| | Communication |
| | Field replaceable module Fail |
| | Reset alarm |
| | Manual shutdown alarm |
| | Heart beat |
| Uplink | OSC detect |
| | Power at CVG port too high |
| | Synthesizer Fail |
| | Hardware Fail |
| | Software Fail |
| | Out of Band emission |
| | Donor power too high/low |
| Downlink | Low isolation |
| | Synthesizer Fail |
| | Hardware Fail |
| | Software Fail |
| | Spurious emission |
| | Interferer power exceed |

User Management

- Click on the User Management link.
- On this page you can create and delete users, change passwords, and assign authorities to individual users.
- Read/Write Authority means that the user can change various values.
- Super User is very similar to an Administrator account.



CAUTION

DO NOT DELETE 'admin'

Digital LTE - Windows Internet Explorer
http://172.16.6.81/cgi-bin/html.cgi?function=usermanagement

Logout Status RF Configuration Alarm Configuration Fake Alarm Configuration Communications Configuration User Management Alarm Logs Logs Troubleshooting Factory Default setting Remote Software Upgrade System Reset

Digital LTE Repeater S/W Version 1.2 Serial No GST09020001 Repeater Location Company: GSI Address: #1385-14, Juan-dong, Nam-Ku, Incheon, Installer Contact Information Company: GSI Installer: Sungsoo Phone: +82-32-870-5652

User Management

| | |
|---|---|
| User | <input type="text"/> Must be 6-8 characters |
| Password | <input type="password"/> Must be 6-8 characters |
| Password confirm | <input type="password"/> |
| Authority | Read |
| <input type="button" value="Register"/> | <input type="button" value="Reset"/> |

admin

인터넷 100% 54

The screenshot shows a Windows Internet Explorer window titled 'Digital LTE - Windows Internet Explorer'. The URL is 'http://172.16.6.81/cgi-bin/html.cgi?function=usermanagement'. On the left, there's a vertical menu with links like Logout, Status, RF Configuration, etc. The main area has two sections: 'Digital LTE Repeater' and 'User Management'. Under 'User Management', there's a registration form with fields for User (with validation 'Must be 6-8 characters'), Password (with validation 'Must be 6-8 characters'), and Password confirm. There's also a dropdown for Authority set to 'Read', and buttons for Register and Reset. Below the form is a list box containing the entry 'admin', with a Delete button next to it. The status bar at the bottom shows '인터넷' and '100%'.

Alarm Logs

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

The screenshot shows a Windows Internet Explorer window displaying the 'Digital LTE Repeater' configuration interface. The URL in the address bar is <http://172.16.6.81/cgi-bin/html.cgi?function=alarmlogs>. On the left, a vertical menu list includes: Logout, Status, RF Configuration, Alarm Configuration, Fake Alarm Configuration, Communications Configuration, User Management, Alarm Logs (which is highlighted in blue), Logs, Troubleshooting, Factory Default setting, Remote Software Upgrade, and System Reset. The main right panel has sections for 'Digital LTE Repeater' (S/W Version 1.2, Serial No GST09020001), 'Repeater Location' (Company: GSI, Address: #1385-14, Juan-dong, Nam-Ku, Incheon, Korea), and 'Installer Contact Information' (Company: GSI, Installer: Sungsoo, Phone: +82-32-870-5652). Below these is a button labeled 'Alarm log Clear'. At the bottom is a table titled 'Alarm Logs' with columns: Number, Name, Status, and Last Triggered. The table lists 10 entries:

| Number | Name | Status | Last Triggered |
|--------|--|--------|---------------------|
| 1 | Manual Shutdown Alarm | OK | 02/14/2010 01:44:12 |
| 2 | Manual Shutdown Alarm | OK | 02/14/2010 01:44:02 |
| 3 | Manual Shutdown Alarm | OK | 02/14/2010 01:43:52 |
| 4 | Manual Shutdown Alarm | OK | 02/14/2010 01:43:42 |
| 5 | Manual Shutdown Alarm | OK | 02/14/2010 01:43:31 |
| 6 | Downlink Donor Power Too High//Low | OK | 02/14/2010 01:43:28 |
| 7 | Tamper Detected | OK | 02/14/2010 01:43:28 |
| 8 | Reset Alarm | OK | 02/14/2010 01:39:28 |
| 9 | Uplink Software Failure | OK | 02/14/2010 01:38:28 |
| 10 | Uplink Power At Coverage Port Too High | OK | 02/14/2010 01:38:28 |

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.

The screenshot shows a Windows Internet Explorer window titled "Digital LTE - Windows Internet Explorer". The URL in the address bar is <http://172.16.6.81/cgi-bin/html.cgi?function=logs>. The page content is as follows:

Digital LTE Repeater

S/W Version: 1.2
Serial No: GST09020001

Logs

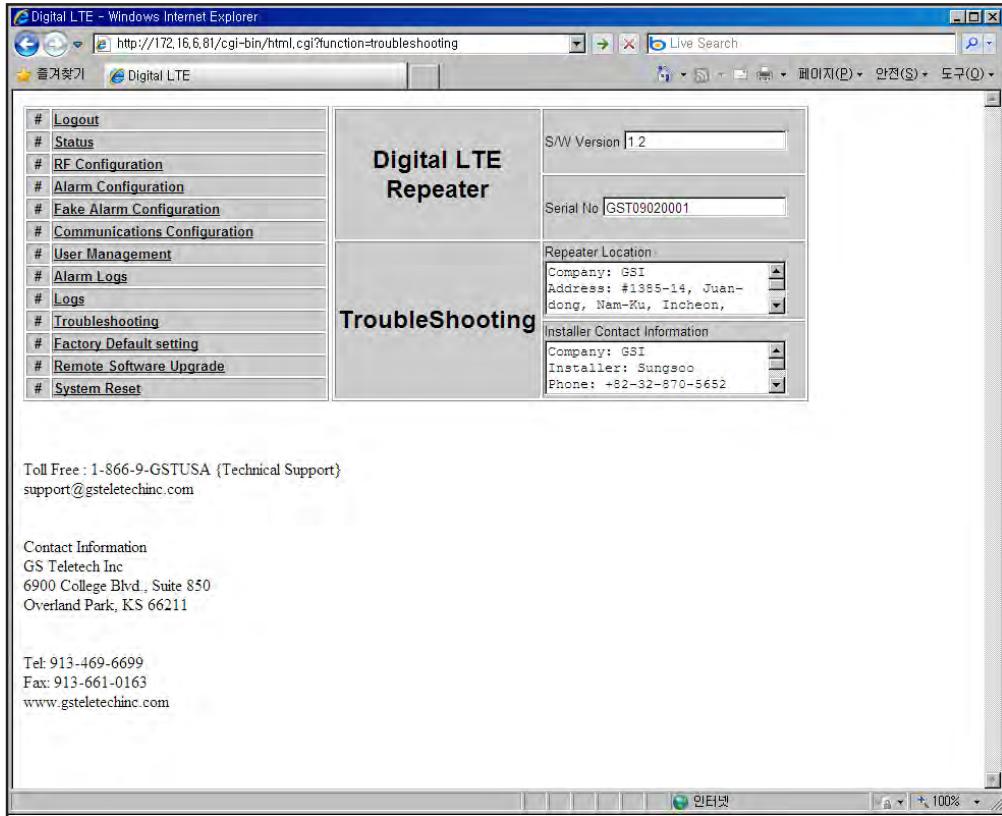
Repeater Location:
Company: GSI
Address: #1385-14, Juan-dong, Nam-Ku, Incheon,

Installer Contact Information:
Company: GSI
Installer: Sungsoo
Phone: +82-32-870-5652

| Date & Time | User | Operation | Description |
|-----------------------|-------|---------------------|-------------|
| 02/14/2010 - 01:49:47 | admin | Alarm Logs | Checked |
| 02/14/2010 - 01:49:24 | admin | User Management | Accessed |
| 02/14/2010 - 01:48:36 | admin | Alarm Configuration | Checked |
| 02/14/2010 - 01:43:40 | admin | RF Configuration | Checked |
| 02/14/2010 - 01:43:39 | admin | Login | Login |
| 02/14/2010 - 01:41:42 | admin | Logout | Logout |
| 02/14/2010 - 01:40:46 | admin | RF Configuration | Checked |
| 02/14/2010 - 01:40:19 | admin | Communications | Checked |
| 02/14/2010 - 01:40:17 | admin | Login | Login |
| 02/14/2010 - 01:38:00 | admin | Communications | Set |
| 02/14/2036 - 01:39:19 | admin | Troubleshooting | Checked |
| 02/14/2036 - 01:39:19 | admin | Troubleshooting | Checked |
| 02/14/2036 - 01:38:51 | admin | Communications | Checked |

Troubleshooting Guide

- 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.



Troubleshooting

- Please click “Main Page” on Menu Select Page after logging.

Menu Select

[Initial Installation](#)

[Main Page](#)

Troubleshooting

- “Troubleshooting” Click



| | |
|------------------------------------|---|
| Temperature up limit alarm | 1. Check maximum temperature level 2. Check repeater's environment conditions |
| Temperature down limit alarm | 1. Check minimum temperature level 2. Check repeater's environment conditions |
| Voltage out range alarm | 1. Check data cable 2. Power supply replacement |
| Current out alarm | 1. Check data cable 2. Drive Unit replacement 3. Power supply replacement |
| Power supply alarm | 1. Check data cable 2. Power supply replacement |
| Signal not detect alarm | 1. Check input signal 2. Drive Unit replacement |
| Signal low alarm | 1. Check input signal 2. Drive Unit replacement |
| Out of band signal overdrive alarm | 1. ANT positioning 2. Drive Unit replacement |
| Isolation alarm | 1. Check setup level 2. Reboot repeater 3. Check setup ANT 4. NMS Unit replacement |
| Synthesize fail alarm | 1. Drive Unit replacement 2. NMS Unit replacement |
| Over output power | 1. Check setup level 2. Reset default values 3. Reboot repeater 4. NMS Unit replacement |
| VSWR alarm | 1. Reboot repeater 2. Check coverage ANT connection 3. Drive Unit replacement |

Troubleshooting

- **Temperature up limit alarm**

- Check maximum temperature level
- Check repeater's environment conditions

- **Temperature down limit alarm**

- Check minimum temperature level
- Check repeater's environment conditions

- **Voltage out range alarm**

- Check data cable
- Power supply replacement

- **Current out alarm**

- Check data cable
- Drive Unit replacement
- Power supply replacement

- **Power supply alarm**

- Check data cable
- Power supply replacement

- **Signal not detect alarm**

- Check input signal
- Drive Unit replacement

- **Signal low alarm**

- Check input signal
- Drive Unit replacement

Troubleshooting

- **Out of band signal overdrive alarm**

- ANT positioning
- Drive Unit replacement

- **Isolation alarm**

- Check setup level
- Reboot repeater
- Check setup ANT
- NMS Unit replacement

- **Synthesize fail alarm**

- Drive Unit replacement
- NMS Unit replacement

- **Over output power**

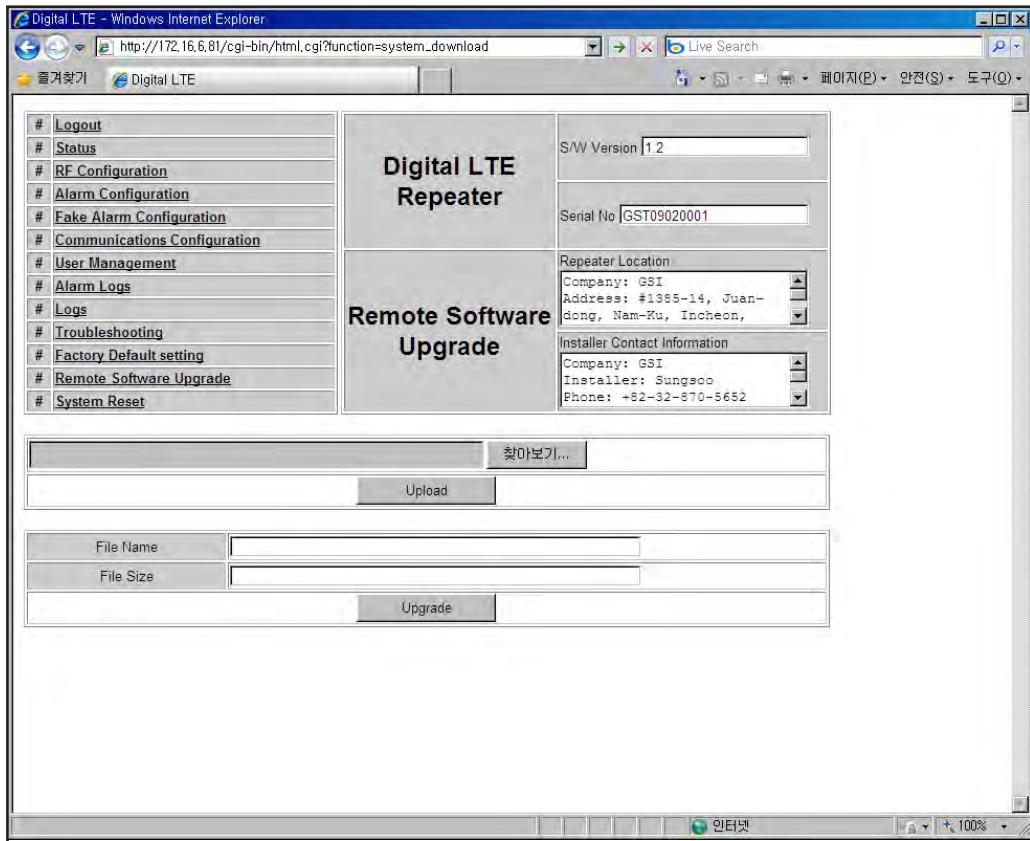
- Check setup level
- Reset default values
- Reboot repeater
- NMS Unit replacement

- **VSWR alarm**

- Reboot repeater
- Check coverage ANT connection
- Drive Unit replacement

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.



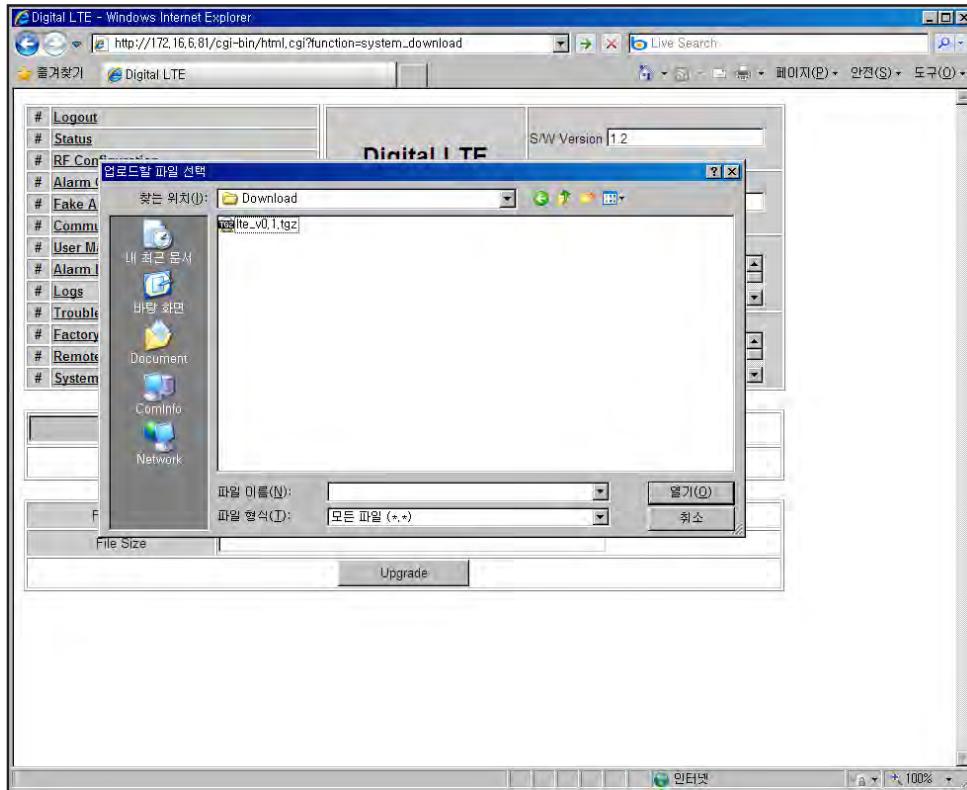
Software Upgrade

- 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.

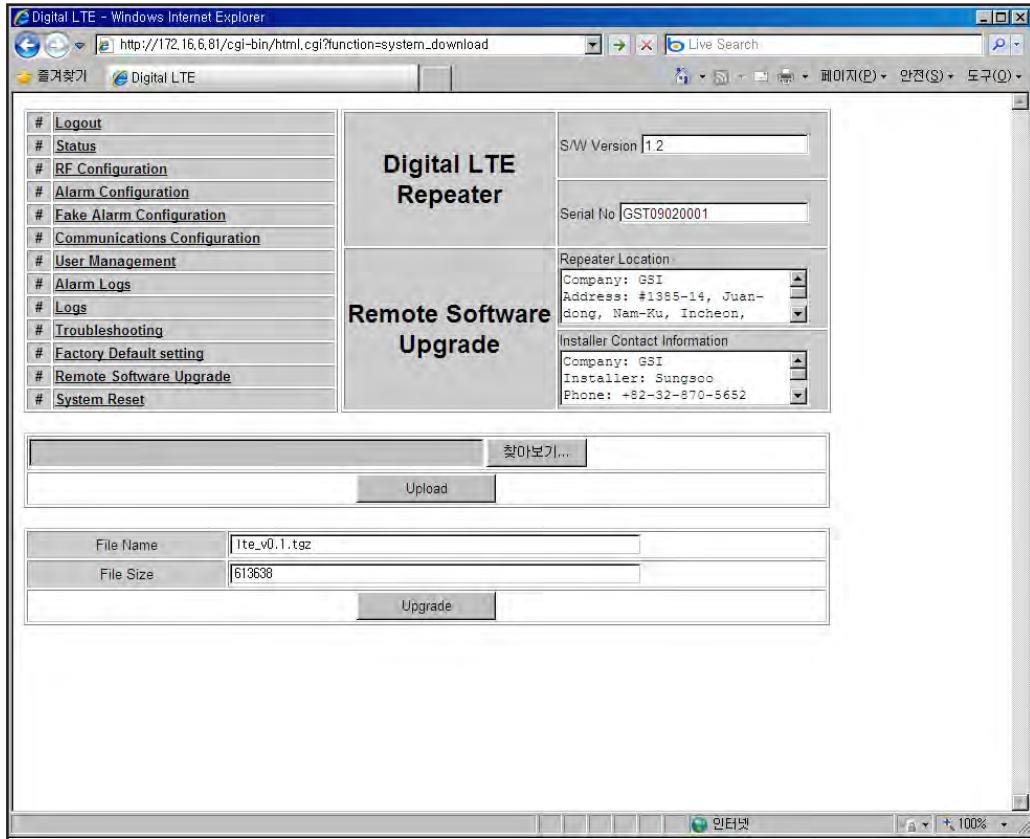
⚠ CAUTION

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



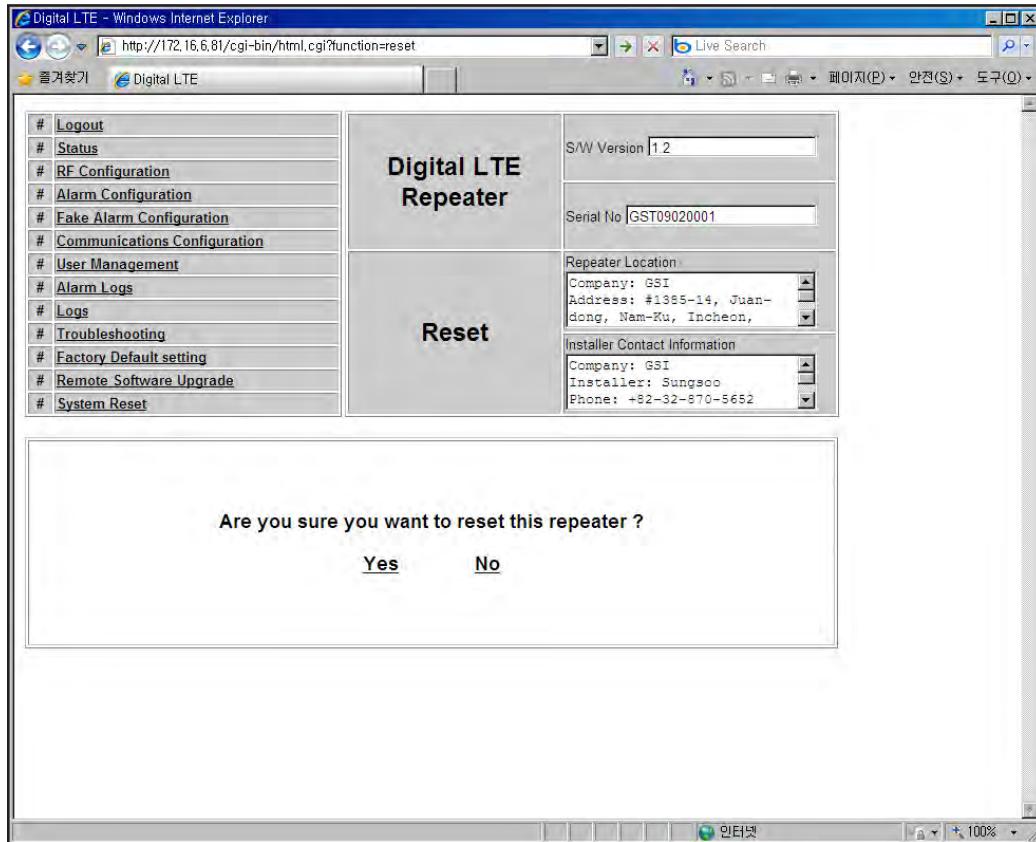
Software Upgrade

- After uploading is finished, verify that the File Name and the File Size is correct, click “Upgrade” button.
Installer should wait about 2 minutes for upgrade to initialize.
- User may then be prompted to log back into the Repeater.



System Reset

- A software reset is a “soft reboot” of the repeater.
To reset the software, click on ‘Software Reset’ and then click ‘Yes’ to reset the software.
- Resetting the software is a good way to clear current alarms.



GST Technical Support

Phone:

Toll Free: 1-866-9-GST-USA
Phone: 913-469-6699



Write:

GS Teletech Inc.
6900 College Boulevard, Suite 850
Overland Park, KS 66211, USA



Product Information and Technical Assistance:

www.gsteletechinc.com
support@gsteletechinc.com



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



Warning: Exposure to Radio Frequency Radiation The radiated output power of this device is far below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact during normal operation is minimized. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should not be less than 40cm during normal operation. The gain of the antenna is 8 dBi. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Global IT Leader
GST