Tri-Band RF REPEATER USER MANUAL

Version 1.0

2007

Lists of Contents

- Lists of Figures -

- Lists of Tables -

1. Overviews

The Tri-Band RF repeater is a iDEN-CDMA integrated RF repeater for in-building use that uses a frequency band of iDEN and CDMA.

This is a iDEN, CDMA integrated RF repeater that is ideal and economical to the customers who want communication range expansion without reducing performance as a RF relay type by installing a repeater inside of buildings using iDEN and CDMA networks or parking lots in the electric wave shade region, etc.

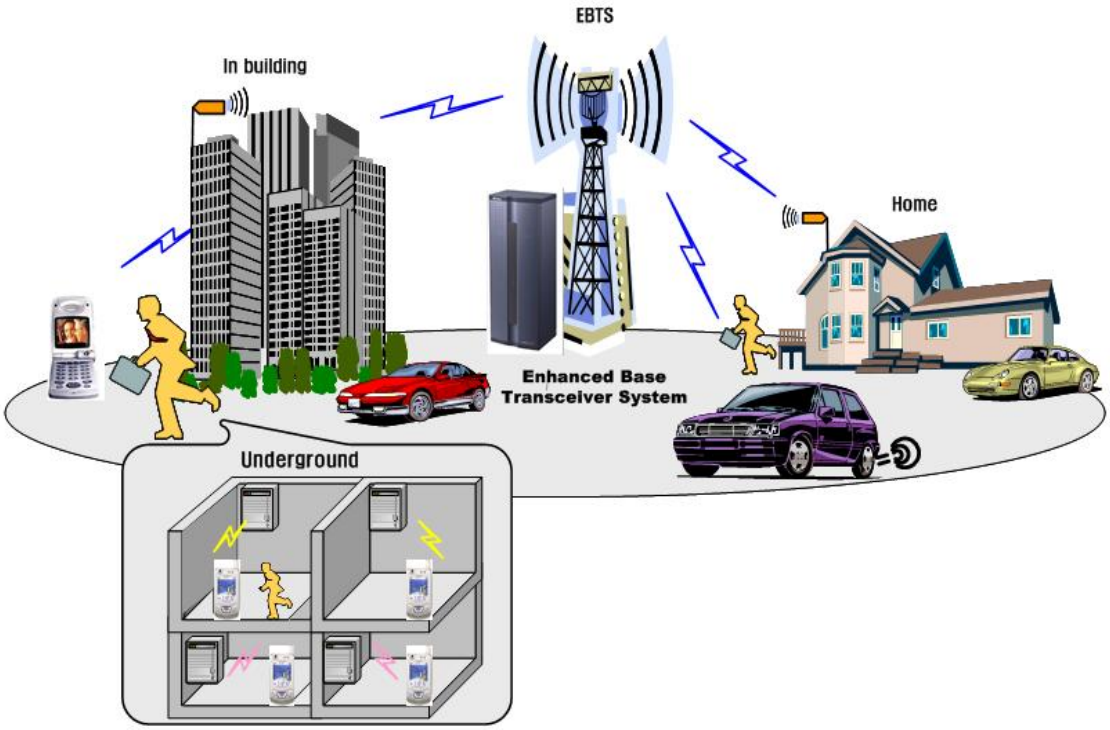
The Tri-Band RF repeater is designed to be elastically applied to any frequency of iDEN band, and the frequency selection level of the frequency bandwidth to service of the Down Link and Up Link through 1 Up/Down converter module is excellent and minimizes interference in other signals.

Besides, this is designed to enable users to select their desired band(a maximum of 20MHz) in the CDMA 65MHz band.

The CCD of the Tri-Band RF repeater has a local repeater control function to continuously manage and control repeaters for stable services of repeaters installed at the site and a remote repeater control function to support remote monitoring and control using an intensive monitoring system for repeaters.

The Tri-Band RF repeater is interlocked with an intensive monitoring system of Tri-Band repeaters using a modem in order to be interlocked with an intensive monitoring system of iDEN and CDMA repeaters.

The basic structure of a Tri-Band RF repeater is such that 1 output port is supported to 1 input port. The inside of a repeater is divided into a block for iDEN and a block for CDMA, and the DL(Down Link) Converter and UL(Up Link) Converter for iDEN and CDMA are composed as one module respectively for optimum size and high efficiency. Besides, this is composed of PSU(Power Supply Unit), Filter, CCD module, and PAU(Power Amplifier Unit).



<Fig. 1 > Configuration of Tri-Band Network

2. Components

2.1 Packing List

No	Description	Quantity	Remark
1	Tri-Band Repeater	1	
2	AC Power Cable	1	
3	Ground Cable	1	
4	Bolts to fix the holder	4	
5	KEY	2	
6	CD	1	Manual

<Table 1 > Packing List

<Fig. 2 > Components of Tri-Band Repeater

2.2 System Quick View

<Fig. 3 > Front & Back View of Tri-Band Repeater

<Fig. 4 > Side View of Tri-Band Repeater

<Fig. 5 > Bottom View of Tri-Band Repeater

2.2 Warning and Hazards

WARNING! ELECTRIC SHOCK

Danger of electric shock!
Switch off while(it is) maintained and inspected!

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 www.fcc.gov/oet/rfsafety to learn more about the effects of exposure to RF electromagnetic fields.

RF EXPOSURE & ANTENNA PLACEMENT

Actual separation distance is determined upon gain of antenna used.
Please maintain a minimum safe distance of at least 20 cm whi le operating near the donor and the service antennas. Also, th e donor antenna needs to be mounted outdoors on a permane

FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the F CC Rules. These limits are designed to provide reasonable prot ection against harmful interference when the equipment is oper ated in a commercial environment. This equipment generates, u ses, and can radiate radio frequency energy and, if not installe d and used in accordance with the instruction manual, may ca use harmful interference to radio communications.
Operation of this equipment in a residential area is likely to ca use harmful interference in which case the user will be require d to correct the interference at own expense.

Warning!

This equipment generates or uses radio frequency energy.
Changes or modifications to this equipment may cause harmf ul interference unless the modifications are expressly approve d in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modi fication is made.

3. Features and Specification of System

3.1 Electrical Specification

Item		Specification	Remark
Frequency Range	800 MHz	Downlink : 851~874 MHz Uplink : 806~824 MHz	25kHz Step
	900 MHz	Downlink : 935~940 MHz Uplink : 896~901 MHz	25kHz Step
	1900 MHz	Downlink : 1930~1995 MHz Uplink : 1850~1915 MHz	Total : 65MHz
Amplifier Gain / Output Power per channel		65dB / 25dBm	iDEN
		80dB / 24dBm	CDMA
Input Level		-15 ~ -40dBm / Total	iDEN
		-16 ~ -56dBm / Total	CDMA
Ripple		± 1.25dB	iDEN, CDMA
Gain Control Range		25 dB(1dB/Step±0.5dB or less)	iDEN
		40 dB(1dB/Step±0.5dB or less)	CDMA
Roll offs		Δ65 dBc or more	@Band Edge± 500 KHz (iDEN)
		Δ50 dBc or more	@Band Edge± 1.625 MHz (CDMA)
Downlink Adjacent Power	1 carrier	25KHz : 50dBc 50KHz : 55dBc 500KHz : 55dBc 1MHz, 2MHz : 55dBc	iDEN
	8carriers	25KHz : 47dBc 50KHz : 52dBc 500KHz : 52dBc 1MHz, 2MHz : 52dBc	
900MHz Intermodulation		1870~1880MHz/-105dBm	900MHz only
Spurious RF Emission		-13dBm or less	
Propagation Delay		8us or less	iDEN
		13us or less	CDMA
Up Link Noise Figure		5dB or less @ Max. Gain	iDEN
		12dB or less @ Min. Gain	
		4.5dB or less @ Max. Gain	CDMA

	12dB or less @ Min. Gain	
VSWR	1.5 : 1	
Input/output connector	N-Type (Female)	
Input/output impedance	50Ω	
Power	108 ~ 127 VAC, 60Hz	※Option -40 to -60VDC 20 to 30 VDC

<Table 2 > System Features

3.2 Mechanical Specification

Item	Specification
Cabinet	Indoor Type
RF Connector Type(IN/OUT)	N-Type Female
Dimension(H*W*D)	580*420*261 mm
Weight	31.2Kg

<Table 3 > Figure and Function

3.3 Environment Specification

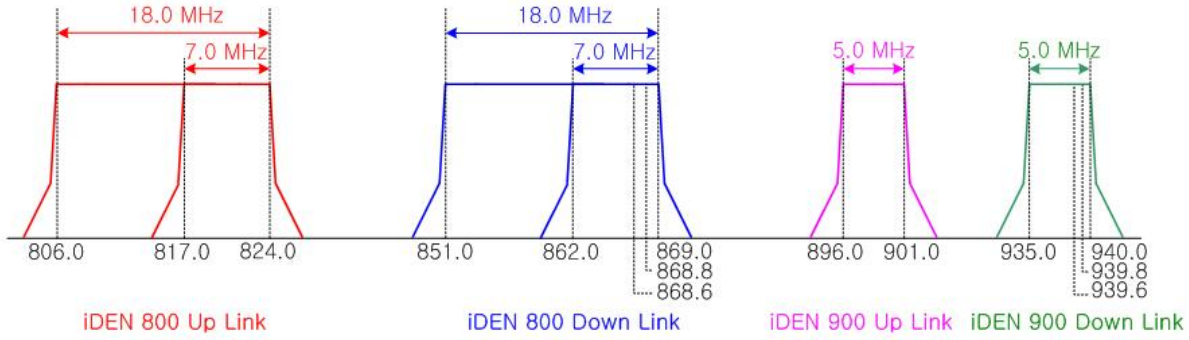
Item	Specification	Remark
Working temperature/ working humidity	-10℃ ~ 50℃ / 5 % ~ 95%	Temperature and humidity around cabinets
Power	108 ~ 127 VAC, 60Hz	※Option -40 to -60VDC 20 to 30 VDC

<Table 4 > Environmental specifications

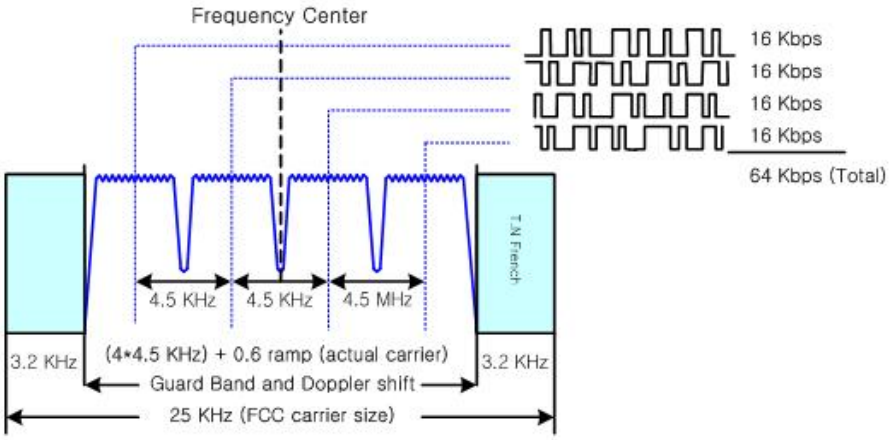
3.4 Frequency used

Item		Specification	Remark
Down Link	800 MHz	851 ~ 869 MHz	25kHz Step
		862 ~ 869 MHz	25kHz Step
	900 MHz	935 ~ 940 MHz	25kHz Step
Up Link	800 MHz	806 ~ 824 MHz	25kHz Step
		817 ~ 824 MHz	25kHz Step
	900 MHz	896 ~ 901 MHz	25kHz Step

<Table 5 > iDEN Frequency



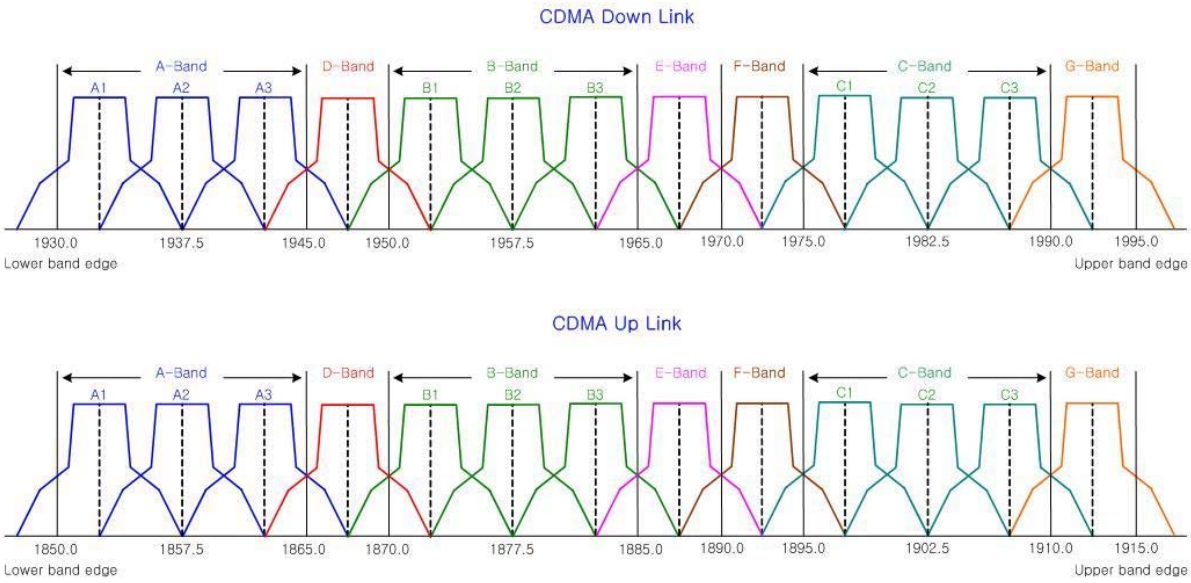
<Fig. 6 > iDEN Frequency



<Fig. 7 > Features of iDEN Carrier

Item		Specification	Remark
Down Link	A	1930.625 ~ 1944.375 MHz	BW :13.75 MHz
	D	1945.625 ~ 1949.375 MHz	BW : 3.75 MHz
	B	1950.625 ~ 1964.375 MHz	BW :13.75 MHz
	E	1965.625 ~ 1969.375 MHz	BW : 3.75 MHz
	F	1970.625 ~ 1974.375 MHz	
	C	1975.625 ~ 1989.375 MHz	BW :13.75 MHz
	G	1990.625 ~ 1994.375 MHz	BW : 3.75 MHz
Up Link	A	1850.625 ~ 1864.375 MHz	BW :13.75 MHz
	D	1865.625 ~ 1869.375 MHz	BW : 3.75 MHz
	B	1870.625 ~ 1884.375 MHz	BW :13.75 MHz
	E	1885.625 ~ 1889.375 MHz	BW : 3.75 MHz
	F	1890.625 ~ 1894.375 MHz	
	C	1895.625 ~ 1909.375 MHz	BW :13.75 MHz
	G	1910.625 ~ 1914.375 MHz	BW : 3.75 MHz

<Table 6 > CDMA Frequency

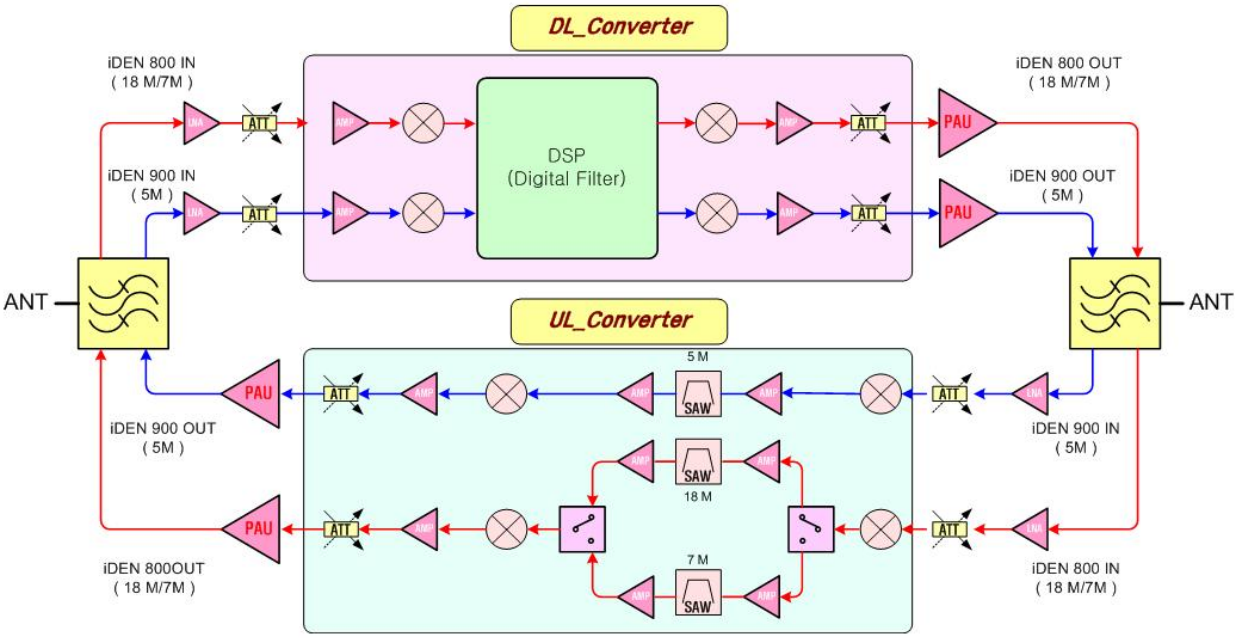


<Fig. 8 > CDMA Frequency

4. System Block Diagram

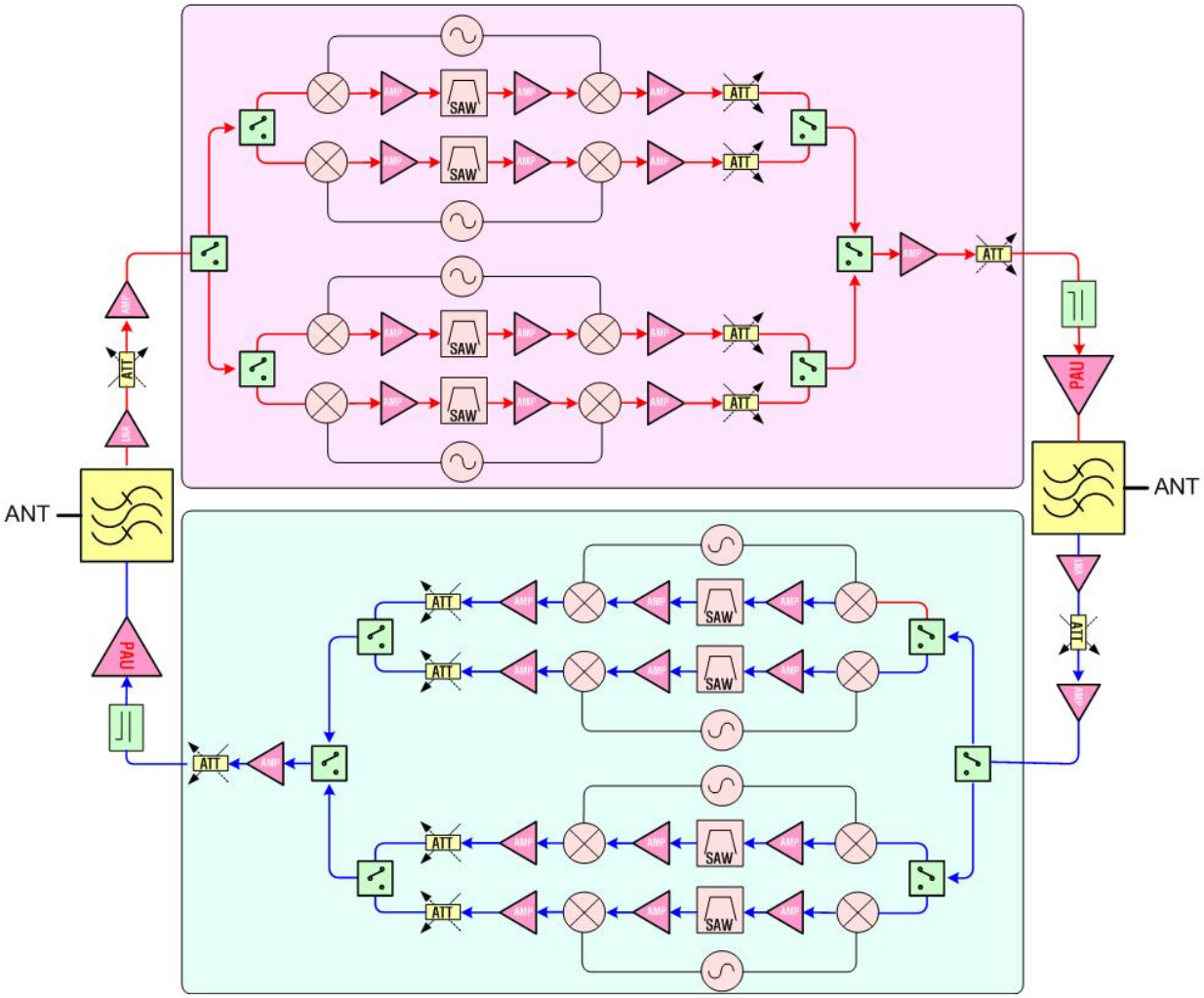
4.1 Block Diagram

4.1.1 iDEN Part Block Diagram



<Fig. 9 > iDEN Part Block Diagram

4.1.2 CDMA Part Block Diagram



<Fig. 10 > CDMA Part Block Diagram

4.2 Block Diagram description

This was realized in one body type available in both of an iDEN frequency band and a CDMA frequency band with a filter of cavity type and has only the iDEN frequency band and CDMA frequency band to service pass selectively after securing isolation between the Down Link and UP Link enough while other bands are removed because, of the base station(EBTS) signals of the iDEN and CDMA received through antenna, only the desired bands are made to pass selectively since it is connected to the donor ANT of repeaters.

The up/down converter modules of the Tri-Band RF repeater were realized for iDEN and CDMA respectively. The Up/Down Converter Module for iDEN is composed of a down converter and up converter from the filter to the PAU input in the down link and up link of repeaters and a digital filter of the variable bandwidth. Besides, the same structure is composed in a pair in order to handle two bands such as a 900M band and a 800M band.

The up/down converter of the down link was realized as a digital filter through a conversion and A/D conversion from the base station(EBTS) signals inputted through the LNA part to the IF frequency (62.5MHz).

The up/down converter of the Up Link was made to take a Roll Off characteristic using a SAW filter by converting the RF signal of the terminal inputted through the LNA into the IF frequency(70MHz)l, differently from the down link.

And, the up/down converter module for CDMA is divided into 1 path of 20MHz bandwidth and 3 paths of 5MHz bandwidth using a SAW filter by converting the signals inputted through the LNA into the IF frequency(140MHz).

This minimizes influence on other signals, removes spurious waves, and improves separation levels by suppressing neighboring signals using a digital filter and SAW filter.

The signals passing through the Up/Down Converter are inputted as a PAU module for iDEN and CDMA respectively, so as to amplify the iDEN signals and CDMA signals to a proper output level, pass through a filter realized with an iDEN frequency band and a CDMA frequency band in one body type, and then be discharged through ANT.

5. System Overview

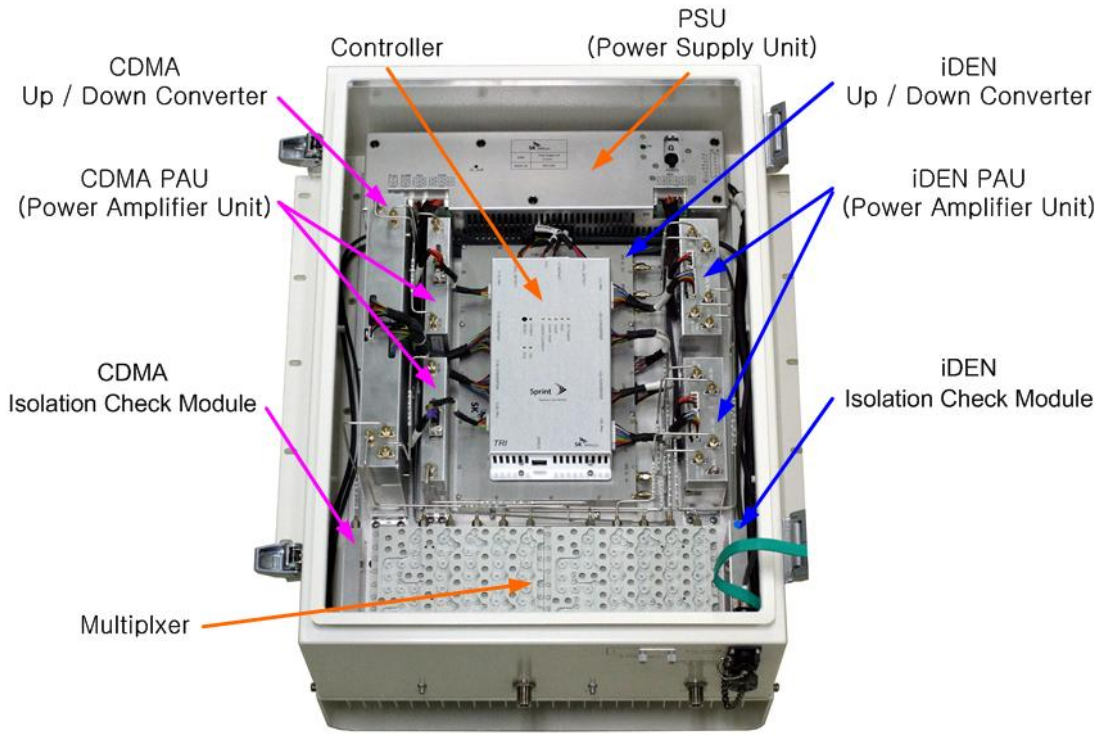
5.1 Construction and Features of System

The Tri-Band RF repeater was arranged so that operators may efficiently utilize composition modules when composing and operating the iDEN service network and the CDMA service network jointly.

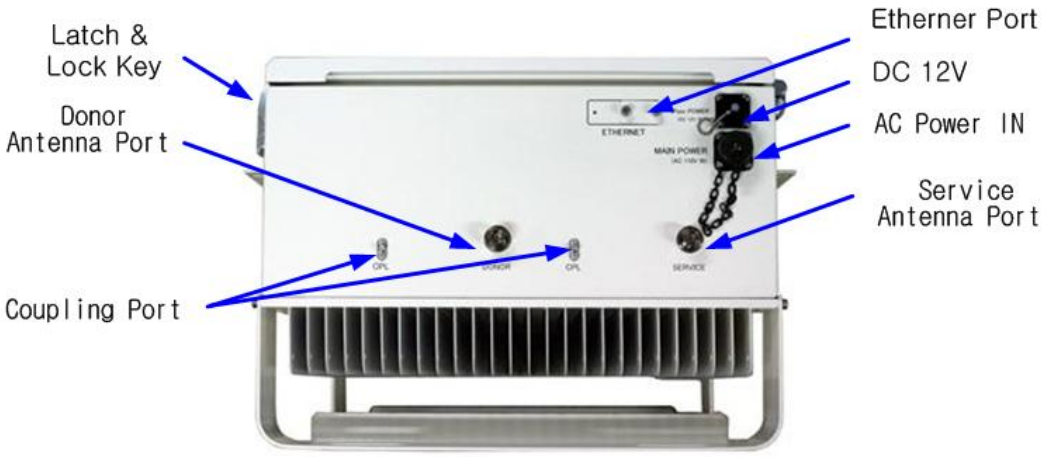
The Tri-Band RF Repeater is basically installed by wall, and if required it is constructed to be installed on 19 inch Rack. And the earth terminal is attached to the bottom of the repeater for earth.

The CCD of the Tri-Band RF repeater has a local repeater control function to continuously manage and control repeaters for stable services of repeaters installed at the site and a remote repeater control function to support remote monitoring and control using an intensive monitoring system for repeaters.

The basic structure of a Tri-Band RF repeater is such that 1 output port is supported to 1 input port. The inside of a repeater is divided into a block for iDEN and a block for CDMA, and the DL(Down Link) Converter and UL(Up Link) Converter for iDEN and CDMA are composed as one module respectively for optimum size and high efficiency. Besides, this is composed of PSU(Power Supply Unit), Filter, controller, and PAU(Power Amplifier Unit).



<Fig. 11 > Internal Configuration of Tri-Band Repeater



<Fig. 12> Tri-Band Repeater Connector

5.1.1 PSU (Power Supply Unit)

With AC power input for A/D or D/D conversion it is used to supply safe direct current power to each device equipped with active degauss, using main active degauss for industrial or equivalent semi-conducts to satisfy every electrical features with strong nature.
Its power takes AC 108-127V input to convert to DC 3.8V, DC 7V, DC 12V and DC 27V for use.

5.1.2 Controller

The controller consists of RCB(RF Control Board) and NCB(Network Control Board) to monitor and control the state of each module of Tri-Band repeater.
RCU(RF Control Unit) is linked to GUI through DEBUG port to collect the inspected information of modules and control.
NCB(Network Control Board) enables upper NMS(Ethernet) communication through RJ-45 port to inspect and control the state. It has LED to show the state in NCB(Network Control Board)'s front to easily confirm the abnormal condition of Module.
Since the controller is run by exchangeable batteries, when exchanged in a wrong form, it may explode and used batteries must be safely disposed.

※ Caution
It may explode when exchanged in a wrong from.
Dispose the used batteries according to the direction of manufacturer.

(1) LED

a. RF POWER	: On alarming Red light, On normal running Green LED
b. RSSI	: On alarming Red light, On normal running Green LED
c. VSWR	: On alarming Red light, On normal running Green LED
d. OVER TEMP	: On alarming Red light, On normal running Green LED
e. UNDER CURRENT	: On alarming Red light, On normal running Green LED
f. POWER	: On power admitted Green light, On normal communication Green blinking.
h. RESET	: Controller Reset Button
i. TXD	: On Data transmitting with Web GUI connected Green blinking
j. RXD	: On Data receiving with Web GUI connected Green blinking

5.1.3 Up / Down Converter

Up/Down Converter modules of the Tri-Band RF repeater were realized for iDEN and CDMA respectively. The Up/Down Converter Module for iDEN is composed of a down converter and up converter from the filter to the PAU input in the down link and up link of repeaters and a digital filter of the variable bandwidth. Besides, the same structure is composed in a pair in order to handle two bands such as a 900M band and a 800M band.

Up/Down Converter of Down Lind converts EBTS signal input through LNA part to IF frequency(62.5MHz) and embodies Digital Filter as A/D conversion.

It takes Roll off nature with digital filter, minimized the impact of other signal by stopping nearby other band and other signal, removes spurious and improves degree of separation.

In addition, Up link unlike Down link converts Terminal's RF signal input through LNA to IF frequency(70MHz) to take roll off nature of SAW Filter, minimizes the impact of other signals by

restraining them to remove spurious and to improve degree of separation.

And, up/down converter module for CDMA is divided into 1 path of 20MHz bandwidth and 3 paths of 5MHz bandwidth by converting the base station(BTS) signals inputted through the LNA part into the IF frequency(140MHz).

Each divided signal minimizes influence on other signals, removes spurious waves, and improves separation levels by taking excellent Roll Off characteristics while passing through the IF SAW filter and intercepting neighboring other bands and other signals.

Up/Down Converter module for iDEN and CDMA suppresses leakage of local signals into the input terminal by inserting a band path filter on the front side of a mixer. The mixer minimizes IMD components of the system by applying elements having characteristics of high IP3 and minimizes influence on the next step by maintaining linearity. The base station(EBTS) signals converted into the IF frequency are recovered into the original frequency through the up converter.

Local stage for IF conversion is designed to minimize phase noises in order not to reduce quality(ρ value) of waveform that can take place during the conversion process of signals.

RF Block of Down Link Up/Down Converter as Down Link Gain Control Block phase performs AGC and ALC functions to protect devices on over-input of iDEN RF Repeater, and with the need of user it may turn On/Off the functions with automatic compensation function for gains on temperature of system.

5.1.4 Filter

This was realized in one body type available in both of an iDEN frequency band and a CDMA frequency band with a filter of cavity type and has only the iDEN frequency band and CDMA frequency band to service inputted to the LNA part after securing isolation between the Down Link and UP Link enough while other bands are removed because, of the base station(EBTS) signals of the iDEN and CDMA received through antenna, only the desired bands are made to pass selectively since it is connected to the donor ANT of repeaters. Beside, the backward direction(Up Link) minimizes the power of spurious wave discharge generated from PAU.

5.1.5 PAU(Power Amplifier Unit)

PAU considers Spurious features to apply degauss with credibility, endurance and high P1dB and inspects at all times output by linking to system's control part. So when main problem happens, it can be reported to upper level and if required by the user PAU move can be On/Off.
The PAU of the Tri-Band repeater is divided into ones for iDEN and CDMA, but the PAU for iDEN service is composed of the integrated modules of iDEN 800/900, and the PAU for CDMA service is composed of a single module.
Down Link PAU amplifies iDEN signal and CDMA signal to proper output level and supply Controller with VSWR information of output port and Repeater's output level.
Also detect its own temperature and supply Controller with Device failure to check normal operation state of Module.

5.1.6 Isolation Check Module

For the isolation check module for CDMA, the Down Link converter of the UP/DOWN converter module is coupled to become an input of the isolation check module. Such signals find the maximum value and minimum value by measuring a oscillation detection value while moving by 50KHz from -250KHz to +250KHz of oscillation check frequency within the module.
When the difference between the maximum value and minimum value is 2dB greater than the setting value, the gain is compensated as much as the difference, and when it is -2dB less than the setting value, the gain is compensated as much as -0.5dB. Isolation is monitored and controlled through such action.
The isolation check module for iDEN find the maximum value and minimum value by measuring the oscillation detection value while moving by 30KHz up to 798 ~ 799MHz of oscillation check frequency through channel scanning within a module.
When the difference between the maximum value and minimum value is 2dB greater than the setting value, the gain is compensated as much as the difference, and when it is -2dB less than the setting value, the gain is compensated as much as -0.5dB. Isolation is monitored and controlled through such action.

5.1.7 Cabinet

The cabinet of a repeater is made of an enclosure structure in order to enhance installation efficiency and minimize cabinet size. The heat radiating fins of a repeater were made to have excellent heat radiating effects by determining the length of heat radiating fins depending on the output capacity.

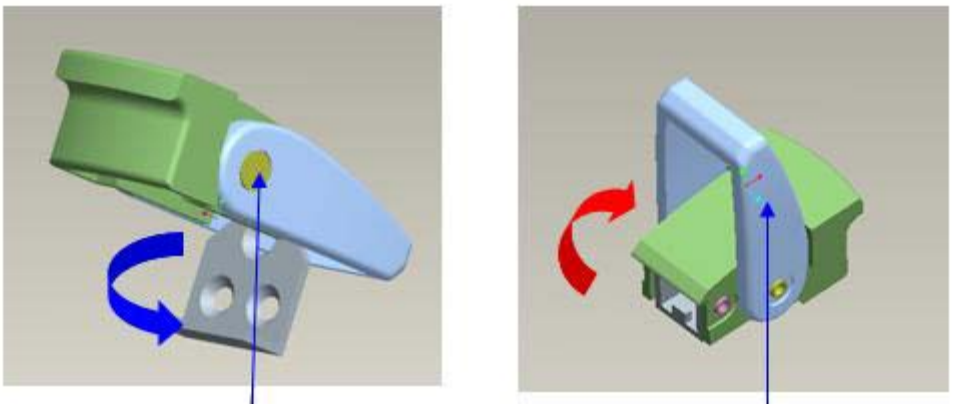
This is basically installed on the wall and has a structure to be installed on the 19 inch rack as necessary.

The rack of a repeater has 4 wall mount holes and was designed to put up with the weight of a repeater in case of wall installation.

(1) Latch

Latch is well sealed and locked to secure safety in which it can play a major role in preventing moisture and vibration.

With automatic lift function of Head, door is easy open and closed. Minimized Shaft's recess of Latch prevents shaking.

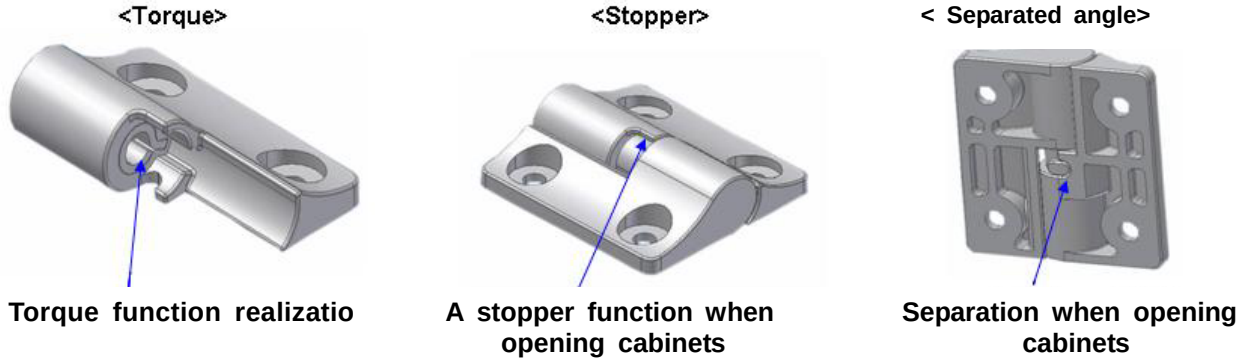


Strengthening Shaft hardness and recess **Automatic lift function of Head**

<Fig. 13 > Latch Structure

(2) Hinge

On assembling and maintaining cabinet it is designed to consider convenience and rapidity for its opening and closing, and it has 3 merits such as Torque, Stopper and Separation Angle function.



<Fig. 14 > Hinge Functions

A. Torque Function

With Torque function embodiment it prevents sudden door opening or closing to consider the operator's safety on assembling and operating.

B. Stopper Function

With Stopper function embodiment it keeps sudden door opening from damaging cabinet on maintaining after assembling and set up. The additional design for opening preventing groove has double safety structure for stopping function.

C. Separation Angle Function

Attached Notch to the center bottom of Hinge keeps separation on closing, and as opening in a certain angle(about 20-30 degree) Door and Body part of Cabinet may be separated.

5.2 Additional Functions

5.2.1 ALC Function

This is a function to have repeaters and base stations operated stably by preventing the repeater output from exceeding a set limit.

A. Handling Procedure

a. Switch ON/OFF ALC function set up through GUI.
b. When the down link output value is greater than the set level or 1.5dB less than that in case of CDMA or 1dB less than that in case of i-DEN, the difference shall be compensated.
c. When the up link output value is greater than the set level or 1.5dB less than that in case of CDMA or 1dB less than that in case of i-DEN, the difference shall be compensated.
d. Monitor output value of Down Link and Up Link every second.

B. Notes

a. Down Link and Up link are separately operated.
b. On oscillation check it does not operate.

5.2.2 Shutdown Function

When output of repeater exceeds set up limit, it is to function Shutdown for stable protection..

A. Handling Procedure

a. Operate when output value of Down Link and Up Link is 3dB(iDEN Shutdown Level) over ALC set up limit.
b. Inspect output for 5 seconds to find that 5 second output is operation condition. Then do PAU OFF to perform the first Shutdown move.
c. Perform PAU ON move 5 seconds after Shutdown move.
d. Inspect output for 4 seconds again after waiting for stable output for 1 second.
e. Perform c, d and e move for 3 times.
f. After 3rd move the PAU ON waiting time is 30 minutes. With Shutdown condition afterward, proceed complete Shutdown state.
g. On complete Shutdown state the user should directly switch the repeater OFF or

ON, or set up PAU ON to come out of complete Shutdown state.

B. Notes

a. Do not operate when ALC Operation set up is OFF.
b. Down Link and Up Ling are independently operated.

5.2.3 Oscillation Check Function

A. Handling Procedure

a. Switch ON/OFF oscillation check function with GUI.
b. Inspect the -250KHz ~ +250KHz section based on frequency in case of CDMA through channel scanning. Inspect the 798 ~ 799MHz section in case of i-DEN.
c. The isolation check module for CDMA measures the oscillation detection value while moving by 500KHz from -250KHz. In case of i-DEN, inspect the oscillation detection value while moving by 30KHz in the 798 ~ 799MHz frequency section.
d. Find the minimum and maximum value from values measured from c.
e. When the difference between the maximum value and minimum value is 2dB(iDEN 0dB) greater than the setting value, the gain is compensated as much as the difference.
f. When the difference between the maximum value and minimum value is -2dB(iDEN -1dB) less than the setting value, the gain is compensated as much as -0.5dB.

B. Notes

a. Do not operate while channel scan is operating.
b. When ALC is operating, gain correction value should not exceed ALC set up level.
c. When Up Link ALC operation is OFF, link Down Link Gain to operate.

5.2.4 Oscillation Shutdown Function

A. Handling Procedure

a. Operate when oscillation attenuation is over 30dB.
b. Switch all PAU OFF and start alarming.
c. Return PAU to original state after 10 seconds to perform oscillation check function.
d. On continuous Shutdown condition, try 3 times to enter complete Shutdown state afterward.
e. On complete Shutdown state the user should directly switch the repeater OFF or ON, or set up PAU ON to come out of complete Shutdown state.

B. Notes

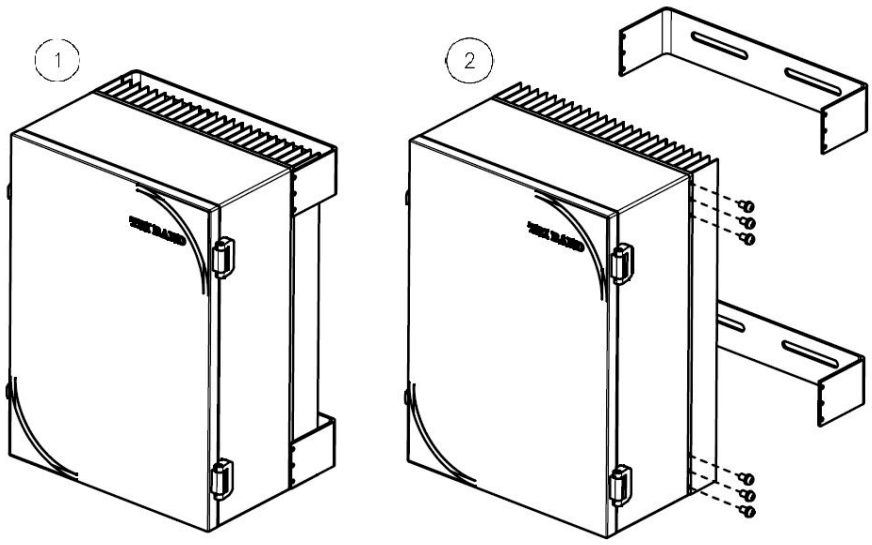
a. Operate when oscillation check function is ON only.

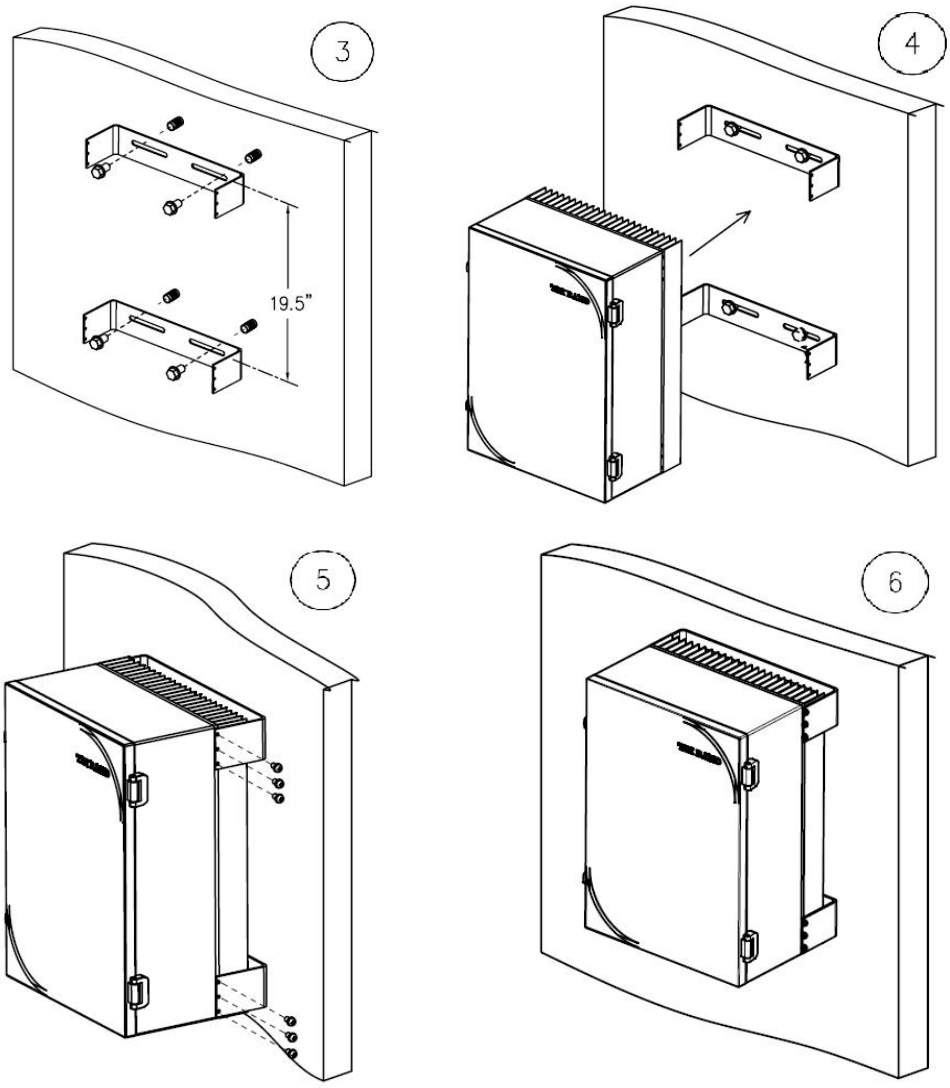
6. System Installation guide

The cabinet of a tri-band repeater is made of an enclosure structure in order to enhance installation efficiency and minimize cabinet size. The heat radiating fins of a repeater were made to have excellent heat radiating effects by determining the length of heat radiating fins depending on the output capacity.
This is basically installed on the wall and has a structure to be installed on the 19 inch rack as necessary.
The rack of a repeater has 4 wall mount holes and was designed to put up with the weight of a repeater in case of wall installation.

The procedures to install a Tri-Band repeater on a wall are as follows.

(1) Take Repeater out of package.
(2) Check the components of repeater to remove 12 screws assembled to bracket from the repeater.(6 per side).
(3) Use 4 anchor bolts to fix bracket to the wall.
(4) Check if bracket is safely installed to the wall.
(5) Bracket installed by wall has 2 Guard screws. Lightly life the repeater on 2 Guard screws to safely fix the other screw.
(6) Confirm if the Tri-Band repeater was installed on the wall bracket safely and strongly.





<Fig. 15 > Mounting Sequence of the Tri-Band Repeater

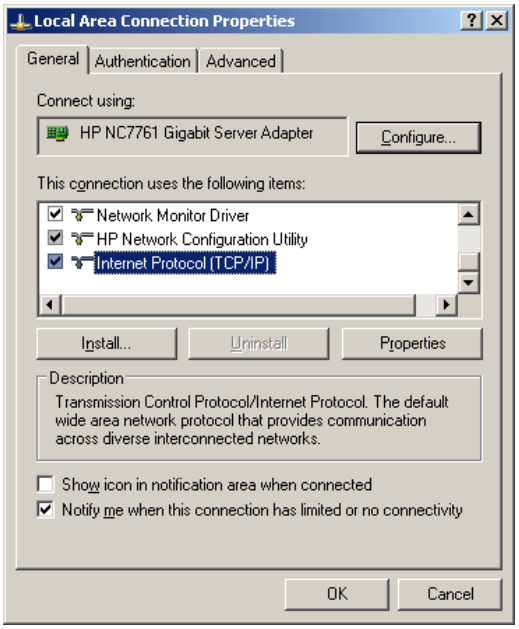
7. Web GUI Installation guide

7.1 Program Setup

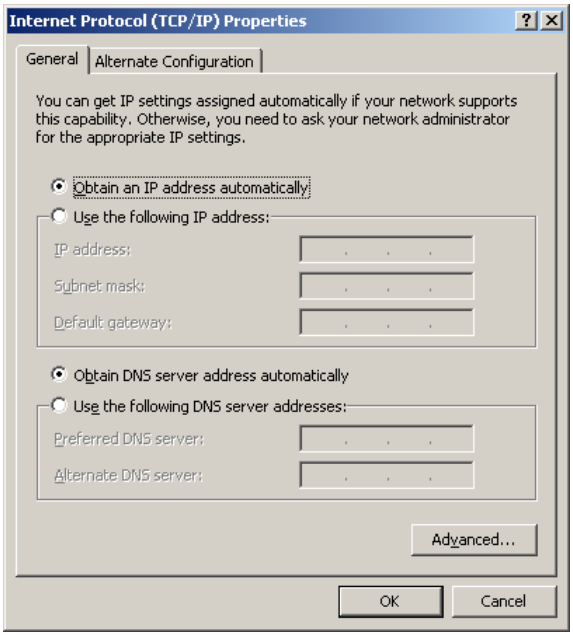
(1) The Ethernet Ports of Repeater and Laptop are linked through LAN Cable.

(2) LAN Cable is used as Cross Cable.

(3) As selecting the following picture, Laptop is automatically assigned IP from the repeater.

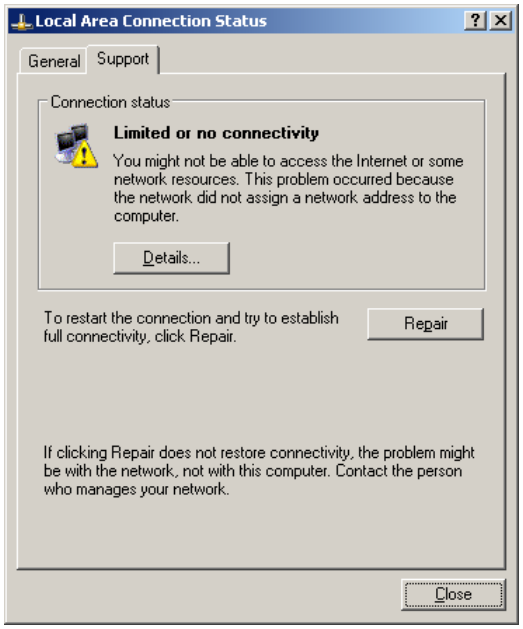


<Fig. 16 > Local Area Connection Properties

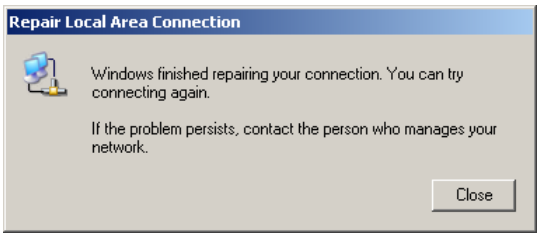


<Fig. 17 > Internet Protocol(TCP/IP) Properties

(4) When network is not linked in a certain time, select Repair on Support window to recover IP.



<Fig. 18 > Local Area Connection Status-1



<Fig. 19 > Local Area Connection Status-2

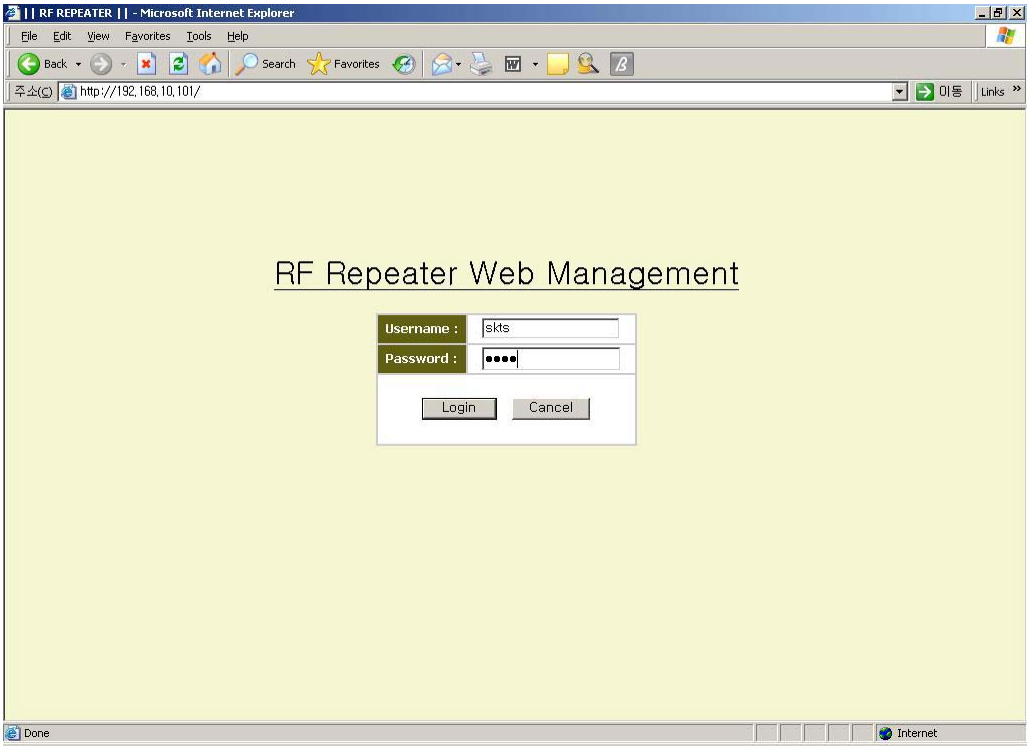
7.2 Web GUI Connection

(1) Input connection address on address window of Internet Explorer to access.

(2) The Connection address set up as the repeater is released is as follows;

http://192.168.10.101/

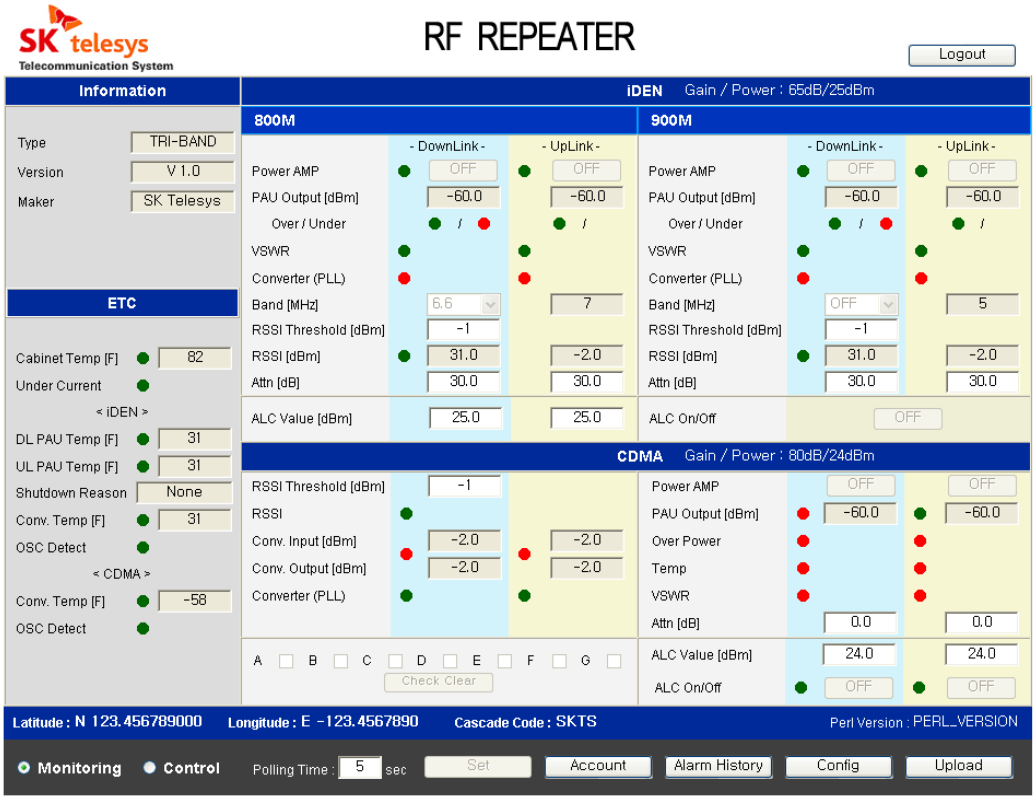
(3) As linked to the repeater, input Username and Password on Login screen as follows to click [Login].



<Fig. 20 > Web GUI Initial Screen

(4) Default Username & Password set up as the repeater is released are **skts** & **skts**.

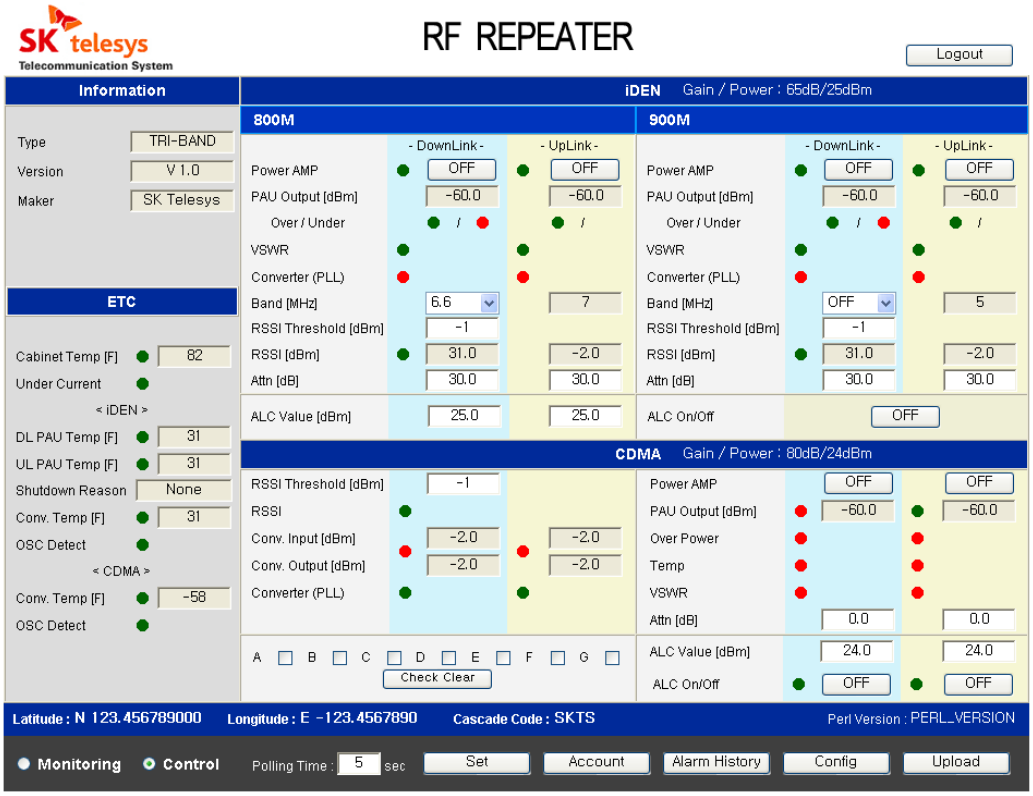
(5) As linked to Web GUI, the following screen appears.



<Fig. 21 > Monitoring Screen of Tri-Band Repeater State

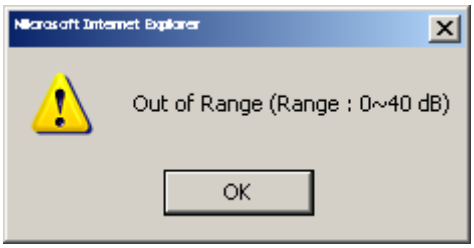
(6) After connected, reads the state from repeater system and updates on screen.

(7) As selecting Control at bottom of connection screen, it stops Polling and activates Set Button and controllable items to change into control mode to alter set up value.



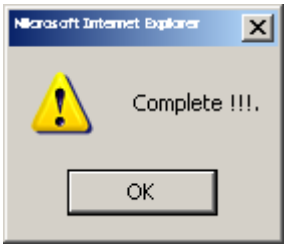
<Fig. 22 > Control Screen of Tri-Band Repeater State

(８) On changing set up value when the input range set by items is exceeded, warning window appears to return to the earlier value.



<Fig. 23 > Input Range Excess Message

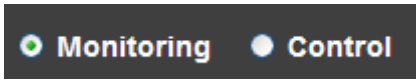
(９) After changing set up value, press Set button to transmit the changed data. When set up is completed, the message appears.



<Fig. 24 > Set Up Completion Message

7.3 Monitor/Control of Web GUI State

You can select Mode Select at bottom of main screen of Web GUI as follows and monitor and control the operation repeater.



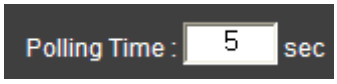
<Fig. 25 > Mode Select

(1) As selecting Monitoring Mode, it monitors the present state of repeater system.

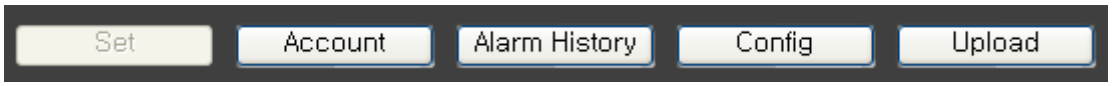
(2) As selection Control Mode, it stops Updating of repeater system and changes into controllable Mode.

(3) The basic Mode after connecting is Monitoring Mode, and after controlling repeater on Control Mode it automatically changes into Monitoring Mode.

(4) As for Monitoring Mode it is Polling period to update the state from system.
It may input between minimum 5 up to 60 seconds.



<Fig. 26 > Polling Time



<Fig. 27 > Function Button

Set : It activates on Control Mode. After changing set up value take down the control on system to change state.

Account : Manages User's information.

Alarm History : May show Alarm History Data on system.

Config : Reads and changes the parameter value affecting system connection.

Upload : Upload system program.

<Fig. 28 > Logout

Ends the present connection.

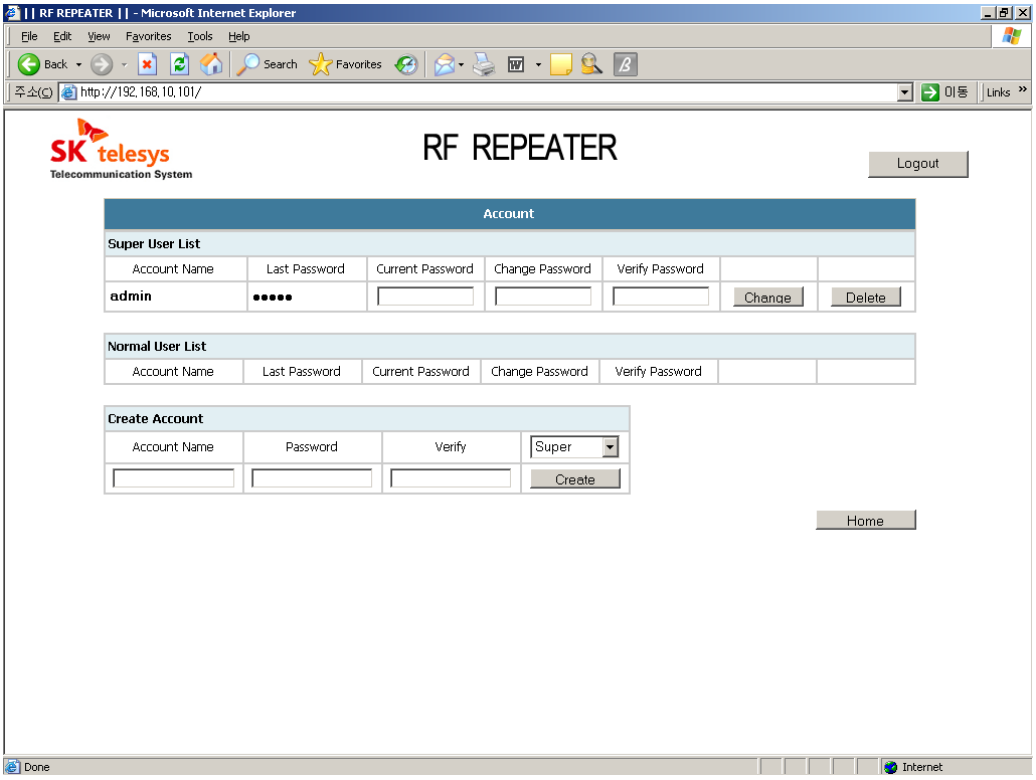
9.3.1 Account

It can register or delete the users accessible to Use Management page, and the grade of user is divided into Super user and Normal user.

Total maximum user's number available for registration is 4 for super user and 25 for normal user.

On shipment the Default Super User name & Password of repeater are **skts** & **skts**.

Press Home button to return to main screen.



<Fig. 29 > Account Page

9.3.2 User Registration

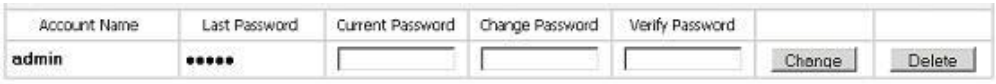
Select the right of User to register on Create Account Block at the bottom of Page, input User Name and Password to be registered as new and press Create Button to register.

<Fig. 30 > User Registration

9.3.3 Deletion and Change of User

Deletion of User is Super User's unique right. Press Delete button on the right of User List Block to delete. Deletion of Super User Name is possible only with input of Current Password. Deletion of Normal User is just available by pressing Delete button.

To change Password press Change button to apply after new Password input.

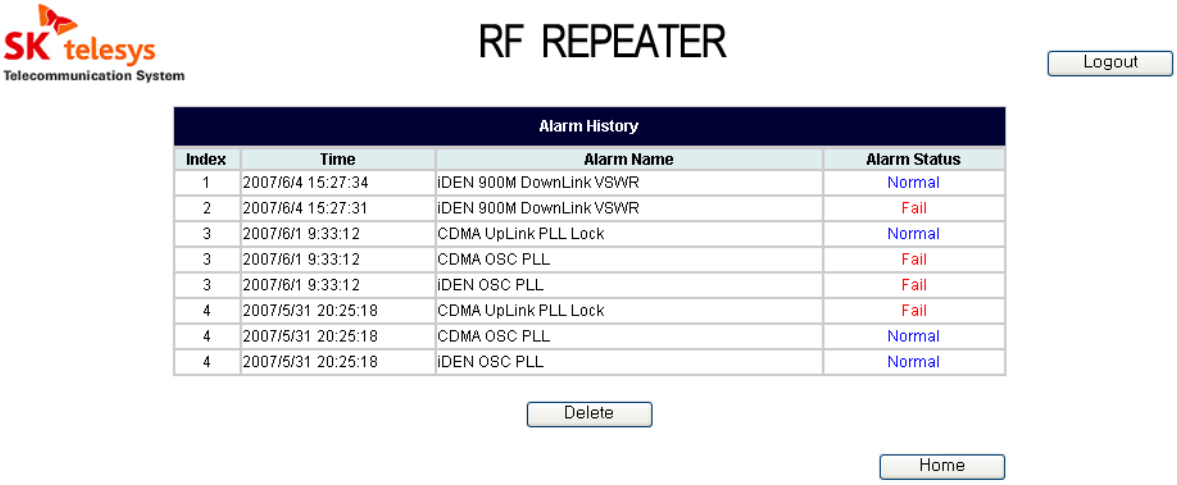


<Fig. 31 > Deletion and Change of User

9.3.4 Alarm History

Alarm details stored in system can be seen, which shows the occurrence time of alarm, its occurrence and release.

Alarm History can be seen up to Index 50.



<Fig. 32 > Alarm History

Press Delete button at the bottom to delete alarm details stored, and the deleted alarm details can not be restored.

Press Home button to return to main screen.

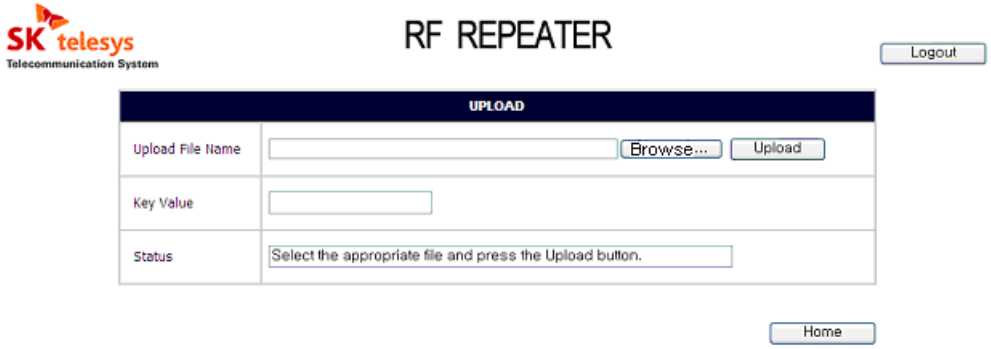
9.3.5 Config

It shows basic connection information required to connection and system's construction information, and the initial set up value on shipment is as follows;

<Fig. 33 > Configuration Information of System

9.3.6 Up Load

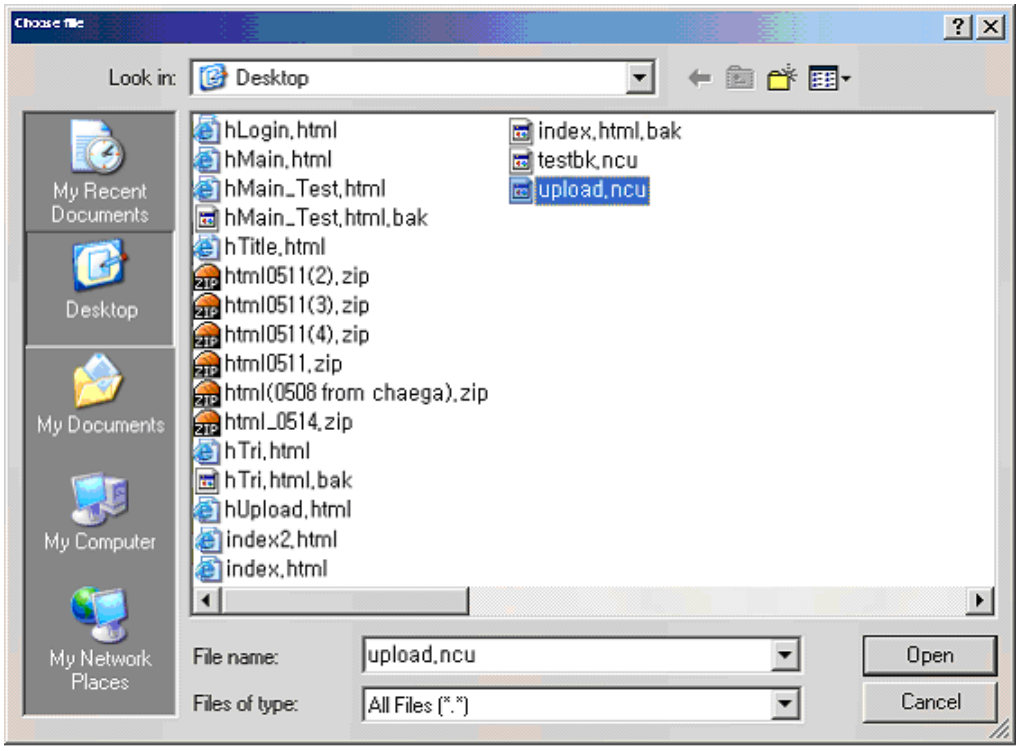
Upload Page is necessary to Upgrade the system program.



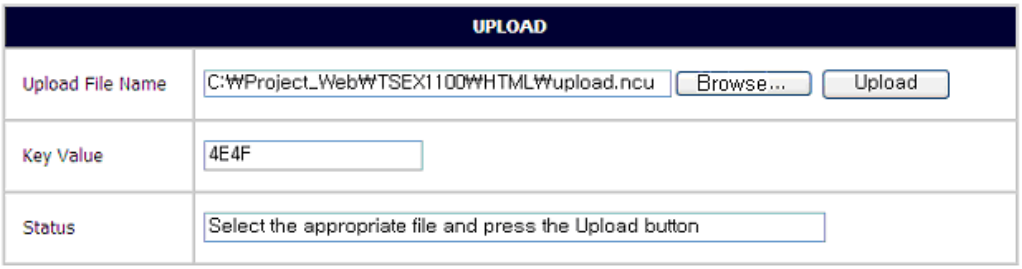
<Fig. 34 > Upload Page

Click [Search] button to select the file for Uploading on Popup window.

Controller of repeater comprises Network Control Board and Repeater Control Board, and each Board's Upload file is divided into SKTSNCB_vxx**.ncu** and SKTSRCB_x_vx.x.xx**.rcu.**



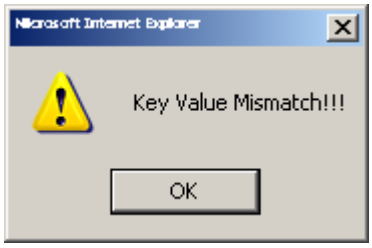
<Fig. 35 > File Selection



<Fig. 36 > Upload Arrangement

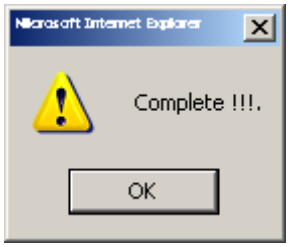
As the selected file path is seen, input Key Value provided and press Upload button to Upgrade system.

If Key Value is different by files and inaccurate, Upload is impossible.



<Fig. 37 > Key Value Error

On completion of Upload, the following message appears and system is automatically rebooted. On rebutting connection is not available, after rebooted normal connection is available.



<Fig. 38 > Upload Completion

8. Maintenance Guide

8.1 Confirmation of System Components

For normal operation of equipment the following should be confirmed on installation.

A. Confirm whether the repeater's exterior would be deformed by damaged package of repeater on delivery.
B. Confirm that the components of equipment accord and that installation place satisfies temperature and humidity for operation of equipment defined on the product's specification.
C. Confirm the input signal condition of equipment defined on the product's specification.
D. Confirm that the state of cable and connector is good.
E. Confirm that the state of bracket of repeater is good.

8.2 Cautions on System Installation

In order for dangerous events not to occur on installation of repeater, the provided guidance should be followed.
Especially power codes are permanent connection typed so that easily accessible power switch on/off device should be equipped at indoor service wires with outlets easily accessible to repeater.

Order	Description	Cautions
1	Donor ANT welding and feeder installation. Service ANT or LCX equipped	• Cable should be installed without exterior damage. • Protect connection parts like connector with insulation tape to prevent humidity. • Install feeder to minimize environment influence.
2	Installation of Antenna for Donor	• Strongly fixed for local wind velocity to prevent antenna's direction from bending after installation
3	Power cable and RF cable arrangement	• Prevent cable from damaging by crooking or stretching.

9. System Set Up and Inspection

9.1 Items to be checked for Opening

A. Confirm AC 108 ~ 127 VAC common use power and power cable.
B. Check if Donor RF input signal from exterior is at normal level.

※ Caution

When system operates without input signal confirmed, over-input may cause serious damage on amplifying degauss because of saturation of output. Therefore, after checking input signal level by equipment and ALC ON state(on shipment ALC ON) operate equipment.

C. Put 108 ~ 127 VAC into power connector of equipment to switch ON.
D. Check Alarm LED blinking state of GUI or Repeater's front board through lap top.
E. When it is judged that Down Link RF input signal from exterior is normal, switch OFF the Repeater to connect ANT feed and Service ANT to Input/Output Port of Repeater and switch ON again.

※ Caution

Conclude carefully lest Down Link and Up Link Port be reversed.

9.2 Items to be check after opening

A. Check Alarm LED blinking of repeater to confirm abnormality.
B. Confirm RF input/output value's normality with GUI.
C. About 10 minutes after switching ON the repeater measure Down Link and Up Link Output Spurious feature of repeater by using spectrum harmonic analyzer of Coupling terminal to confirm normality of operation.
D. After normal operation of repeater measure calling quality of service area by terminal or measurer to optimize wave environment to see if wave shade area or calling inability area is present comparing to the before opening condition.

9.3 Failure and Inspection

9.3.1 Inspection of Repeater

On routine or emergency service of repeater the following orders should be taken to check its failure.

A. Check RF input/output level and LED of repeater using Web GUI. On routine service check calling quality with terminal or measurer, or on emergency service the following should be taken even if RF input/out level of repeater on Web GUI is normal.
B. Connect link harmonic analyzer to test terminal of repeater to confirm output state.
C. Use Coupling port to check output value.
D. Check if the output value of repeater obtained by harmonic analyzer agrees with actual out put value of repeater.
E. Check input level of repeater when the output value of repeater obtained by harmonic analyzer does not agree with actual output value of repeater.
F. When input level is not same as the one on installation time showing distinct difference, check antenna welding state and feeder's installation state.
G. If the output value of repeater is abnormal as comparing input level to operation gains of repeater, switch ON/OFF the repeater to check the output state with harmonic analyzer. On severe failure immediately replace with spare parts to supply normal service.

9.3.2 Facility Inspection

On routine Inspection and service failure the following parts and items are needed to be i nspected.

Inspection Parts	Inspection Items	Remark
Donor Antenna & Service Antenna	Inspect the malfunction of Antenna's welding, received signal's intensity of donor antenna and RSSI value.	
Feeder, Leakage Coaxial Cable	Inspect whether feeder or leakage coaxial cable may be cut or damaged.	
Connector, Distributor	Inspect whether connector's linking part or cable may be flooded, or whether each linking part is firmly fastened.	
Power Incoming Part	Confirm that common terminal box for 108 ~ 127 VAC is not leaked.	

10. Warranty and Repair Policy

10.1 General Warranty

This product carries a Standard Warranty period of five (5) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

10.2 Limitations of Warranty

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product. SK Telesys Corp. may elect which remedy or combination of remedies to provide in its sole discretion. SK Telesys Corp. shall have a reasonable time after determining that a defective product exists to repair or replace the problem unit. SK Telesys Corp. warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

10.3 Limitation of Damages

The liability for any defective product shall in no event exceed the purchase price for the defective product.

10.4 No Consequential Damages

SK Telesys Corp. has no liability for general, consequential, incidental or special damages.

10.5 Additional Limitation on Warranty

SK Telesys Corp. standard warranty does not cover products which have been received improperly packaged, altered, or physically damaged. For example, broken warranty seal, labels exhibiting tampering, physically abused SK Telesys Corp. Proprietary Document Page 27 of 31 iDEN RF Repeater User Manual enclosure, broken pins on connectors, any modifications made without SK Telesys Corp. authorization, will void all warranty.

10.6 Return Material Authorization (RMA)

No product may be returned directly to SK Telesys Corp. without first getting an approval from SK Telesys Corp. If it is determined that the product may be defective, you will be given an RMA number and instructions in how to return the product. An unauthorized return, i.e., one for which an RMA number has not been issued, will be returned to you at your expense. Authorized returns are to be shipped to the address on the RMA in an approved shipping container. You will be given our courier information. It is suggested that the original box and packaging materials should be kept if an occasion arises where a defective product needs to be shipped back to SK Telesys Corp. To request an RMA, please call 888-758-7002 or send an email to service@sktelesys.com.

11. Contact Information

Maker	SK telesys
Korea Office Address	SK Telesys Co., Ltd 12-13F, Naewei Bldg.6, Eulgiro-2Ga, Jung-Gu, Seoul 100-844, Korea Homepage: www.sktelesys.com
US Office Address	SK Telesys Corp. 12750 center court drive suite #400, Cerritos, CA 90703
Staff in charge of sales	Kap Soo, Park, Director Phone: 562-207-1924, Fax: 562-207-1925 Email: kapspark@sktelesys.com
Service contact in US	Email : service@sktelesys.com Phone: 888-758-7002
Staff in charge of R&D	Jae-Hyung Kim, Manager Phone: 82-31-786-5625, Email: kjhyung@sktelesys.com