

iPECS

WIT-400HE

Installation Manual

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Mar. 15-2012



REVISION HISTORY

ISSUE	DATE	BY	REMARK
0.9A	Mar. 15 2012	Wireless Part	Preliminary Release
<u>0.9A</u>	<u>Mar. 20.2012</u>	<u>Jongmin Choi</u>	<u>Update s/w upgrade process and system registration.</u>

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PREFACE

The main objective of this document is to provide an instruction for proper installation of WIT-400HE. Mechanical feature is simply described and operation condition is precisely addressed to prevent the WIT-400HE from malfunctioning by environmental reason. In advance of the environmental consideration, please refer to this document it will help an installer in setting up basic circumstance for normal operation of the WIT-400HE.

Safety Instructions

WARNING! To reduce the possibility of electric shock, do not expose your phone to high humidity areas, such as the bathroom, swimming pool, etc.

Always store your phone away from heat. Never store your phone in settings that may expose it to temperatures less than 32°F or greater than 104°F, such as outside during a snow storm or in your car on a hot day. Exposure to excessive cold or heat will result in malfunction, damage and/or catastrophic failure.

Be careful when using your phone near other electronic devices. RF emissions from your mobile phone may affect inadequately shielded electronic equipment nearby. You should consult with manufacturers of any personal medical devices, such as pacemakers and hearing aides, to determine if they are susceptible to interference from your mobile phone. Turn off your phone in a medical facility or at a gas station. Never place your phone in a microwave oven as this will cause the battery to explode.

IMPORTANT! Please read the IEC SAFETY INFORMATION before using your phone.

Safety Information

Please read and observe the following information for the safe and proper use of your phone and to prevent any unanticipated damage by accident. Also, keep the user's manual in an accessible place at all times after reading it.

- ◆ Unplug the power cord and charger during a lightning storm to avoid electric shock or fire.
- ◆ Do not use your phone in high explosive areas, as the phone may influence high frequency devices.
- ◆ Do not put your phone in a place subject to excessive dust, and be careful to keep the minimum required distance between the power cord and heat sources.
- ◆ Unplug the power cord prior to cleaning your phone, and clean the power plug pin when it is dirty.
- ◆ Do not damage the power cord by bending, twisting, pulling, or heating. Do not use the plug if it is loose, as it may cause fire or electric shock.
- ◆ Hold the power cord plug firmly to plug and unplug the power cord. Ensure the plug is firmly connected. If it is not firmly connected, it may cause excessive heat or fire.
- ◆ Do not place any heavy item on the power cord. Do not allow the power cord to be crimped, as it may cause fire or electric shock.
- ◆ Be careful not to let the battery contacts touch metal conductors such as a necklace or coins. When shorted, it may cause an explosion.
- ◆ Do not disassemble or allow heavy impact to the battery as it may cause electric shock, short-circuit, and fire. Store the battery in a place out of reach of children.
- ◆ Using a damaged battery or placing a battery in your mouth, may cause serious injury.
- ◆ Do not place items with a magnetic strip, such as a credit card, phone card, bank book and a subway ticket, near your phone. The magnetism of the phone may damage the data stored in the magnetic strip.
- ◆ Do not hold or let the antenna come in contact with your body during a call.
- ◆ Talking on your phone for a long period of time may reduce the call quality due to heat generated during use.
- ◆ Do not allow excessive vibration or impact to the phone.
- ◆ When you do not use the phone for a long period time, store it in a safe area with the power cord unplugged.

1. Getting Started






1.1 Options & Basic Enclosure

Cautions

- ◆ Using the phone near receiving equipment (i.e., TV or radio) may cause interference.
- ◆ Keep your phone in a safe place when not in use.
- ◆ Only use the batteries, antennas, and chargers provided by LG-Ericsson. Using unauthorized accessories could void your warranty.
- ◆ Only authorized personnel should service the phone and its accessories. Faulty installation or service may result in accidents and consequently void the warranty.
- ◆ Do not hold the antenna while the phone is in use.
- ◆ Do not use the phone in designated no cellular phone use areas.
- ◆ Do not expose the phone to high temperature or humidity.
- ◆ Avoid getting your phone wet. If the phone gets wet, turn the power off immediately and remove the battery. If the phone is non-functional, return it to the dealer for service.
- ◆ Avoid shock or impact to the phone.

Basic Enclosures:

Unpacking the box, customer will see the following items.

<p>1) WIT-400HE Phone</p>		<p>WIT-400HE WiFi Phone. You should be able to find MAC address tag at the back side of the phone.</p>
<p>2) Rechargeable battery</p>		<p>Rechargeable battery. LG-Ericsson logo should be displayed.</p>
<p>3) Travel adaptor/ Power cable</p>		<p>The one end is plugged into power tab, the other one is slotted into WIT-400HE Jack.</p>
<p>4) Handstrap</p>		
<p>5) Ear Microphone</p>		<p>In the cable of ear-microphone, there is a remote control button. It is useful for hands-free way operation.</p>

6) User manual	http://www.lgericsson.com/ > Download > Manual-MPR
7) Desktop Holder	 Desktop holder will be provided.
8) Unit Label	

Options:

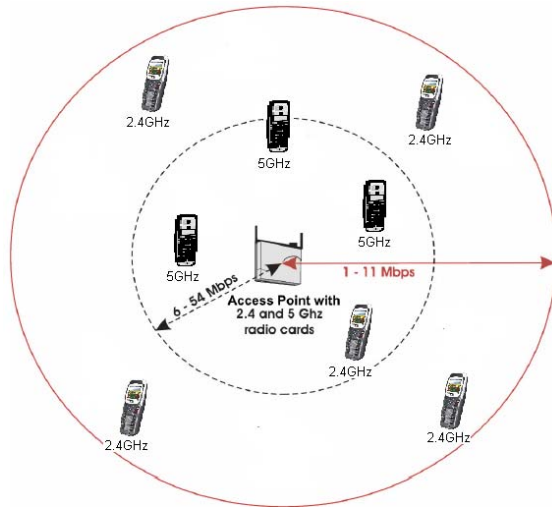
User need to purchase desktop holder with additional payment.

1) USB cable	
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If you find the trademark of LG-Ericsson on the rechargeable battery, the delivery is strictly confirmed by LG-Ericsson Co.Ltd.

1.2 Wireless Network Cell

Fundamental topology of the IEEE 802.11b/g based wireless networking is the overlapped concatenation of more than two cell ranges. The following figure shows the example of a cell area.



The WIT-400HE is only 802.11b/g compliant, its maximum frequency is 2.4GHz and 54 Mbps maximum bandwidth. **For more detail information of cell planning, please refer to the manual of AP.**

1.3 Access Point

The following is a list of APs that have been made an imperative experimentation with the WIT-400HE and the result.

Rank	AP	Max retry counter	Simultaneous Call	Reject after Full Assoc	Roaming	Multiple SSID	Power control	WPA
Best	Cisco – AP1231G	O	12	X	O	O	O	O
Good	Cisco – AP1121G	O	10	X	O	O	O	O

❑ Max retry counter : It's the maximum retry counter of data packet from AP to client. If the retry counter of a packet exceeds the limit, the packet is discarded. If the AP don't support max retry counter, it can make network busy by excessive retransmit when a user goes to out-of-range in conversation.

When the receiving packet rate is very low during 10 seconds, WIT-400HE disconnects the call to prevent excessive retransmit of packets.

❑ The simultaneous calls are estimated in idle network configuration, so it can be decreased by the network condition. When the AP is commonly used for data and voice, the bandwidth for voice call will be decreased. If you use overlapping channels, radio frequency interference can occur, which leads to connectivity issues and in poor throughput.

❑ Reject after Full Assoc. : This feature support to restrict the number of association simultaneously for load balancing.

❑ Roaming : It means that the call in conversation is not disconnected when it reams to other AP. To support seamless roaming, the signal range of each AP should be overlapped.

If you need to use roaming feature, we strongly recommend Cisco AP. The other APs above support roaming but they are unstable. We received report that the phone is muted sometimes after roaming with

Linksys AP. We found that sometime the AP doesn't send packets after roaming in our laboratory investigation.

O : We strongly recommend.

Δ : It supports roaming feature, but it's unstable or not verified enough.

X : It doesn't support roaming feature.

- Multiple SSID : The AP supports multiple SSID.
- AP TX Power Control : It can control the signal range of AP. It's very important to install multiple APs in small area. The frequency of adjacent APs is overlapped too much, you can decrease the transmit power to reduce the interference of radio frequency.
- WPA : It make wireless network more securely protected. It authenticates with the server and changes the encryption key dynamically.
- IPOne AP is made in Korea.

Note: In case using AP supported 802.11n, we recommend Cisco Aironet 1250 Series AP. However, you must reconsider cell plan include because of the characteristics of 802.11n MIMO AP. We recommend you contact the Access Point technical support team

1.3.1 Which one is better

Depending on the internal implementation of IEEE802.11b/g protocol inside of the APs, roaming across two contiguous regions may be affected. Cisco is currently showing most optimized seamless roaming. **CISCO APs are strongly recommended to customers. IPOne is estimated that it's less than CISCO but it performed good as we can recommend. Other APs did work well in low traffic, but it's unstable in high voice traffic, more than 8 calls simultaneously. Other APs also don't support transmit power control.**

If you need to use multiple APs, we strongly recommend Cisco AP. The other APs are unstable for the roaming feature.

The most important thing to select AP is the environment of the site to install. The number of simultaneous voice call should be considered carefully to support stable voice quality. We also recommend that the association number of an AP doesn't exceed 30 clients to prevent poor voice quality.

We can suggest as follows in each conditions.

- (1) 20 ~ 30 clients in an AP (less than 12 calls simultaneously)
 - A. Cisco-AP1231G
- (2) 10 ~ 20 clients in an AP (less than 10 calls simultaneously)
 - A. Cisco-AP1231G
 - B. Cisco-AP1121G
- (3) Less than 10 clients in an AP (less than 8 calls simultaneously)
 - A. Cisco-AP1121G

1.3.2 How to set up multiple APs

Our recommendation is that one AP(Access Point) is used for one cell area. If you would install more than two APs for a cell, we recommend you to use the same SSID for each AP. And the APs should have different RF channel far away than 5 channels each other. For example, AP1 has RF channel 1, then AP2 should have RF channel 6. If the RF channel number of the APs is overlapped near within 5 channels, the retransmission for data communication may be increased. As the result of this the standby time of WIT-400HE may be decreased and the voice quality will be very poor. So, you should check this carefully.

If you want to increase the capacity of wireless network by increasing APs, you need to control the transmit power level of APs not to overlap too much. If the radio frequency is overlapped too much, it can decrease the throughput of the APs.

Please refer to “6. Cell Planning” chapter to get the detail information for installing multiple APs

1.3.3 Recommended AP specification for WIT-400HE

There are many kinds of Access Point in the world. To recommend proper Access Point for WIT-400HE, LG-Ericsson specified as the following. An Access point has more satisfied item, it is better to WIT-400HE. When you purchase an AP, you'd better to refer to this list.

No	Item	Description
1	802.11 b/g	802.11 b/g should be supported
2	Simultaneous call	Minimum 4 simultaneous calls should be supported
3	Reject access when full traffic	It can be adjusted in the admin program
4	Max retry counter	It can be set in the admin program or should not be transmitted
5	Continuous call	Long term call(longer 12 hours) should be supported
6	Roaming within same kind of AP	Seamless handover/roaming should be supported
7	Traffic distance	Longer than 200 meters
8	Antenna diversity	More than 2 antennas
9	AP manager	AP manager can some configuration like channel, SSID, WEP key, and so on.
10	WDS	Wireless Distribution System should be supported
11	External antenna	Connector type should be supported
12	European CE Type Approval	CE should be approved for European market
13	USA UL Type Approval	UL should be approved for USA market
14	USA FCC Type Approval	FCC should be approved for USA market
15	Canada CSA Type Approval	CSA should be approved for Canada market
16	Korea MIC Type Approval	MIC should be approved for Korea market
17	WiFi certification	WiFi should be certified for mutual compatibility
18	RF power control	Fixed power and auto power should be supported
19	DHCP, NAT	DHCP and NAT should be supported
20	Price	Low price
21	QoS	Voice packet should be handled with high priority

1.4 iPECS System

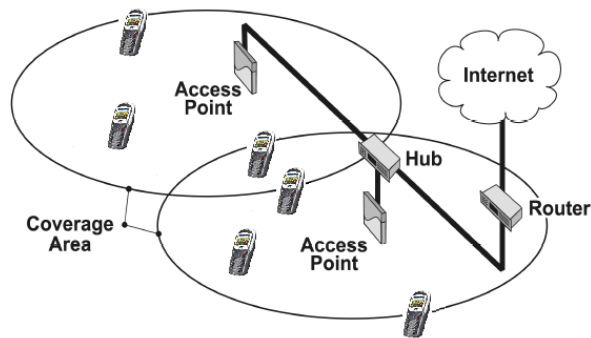
The iPECS System is a call controller of the WIT-400HE. WIT-400HE can be registered within a same LAN subnet or other subnet which is routed to the system network.

2. Wireless Environment Setup

This section describes AP(Access Point) configuration for normal operation of WIT-400HE. The AP should be plugged into a switch/hub for connectivity with the subnet of office.

2.1 Basic IEEE 802.11b/g network diagram

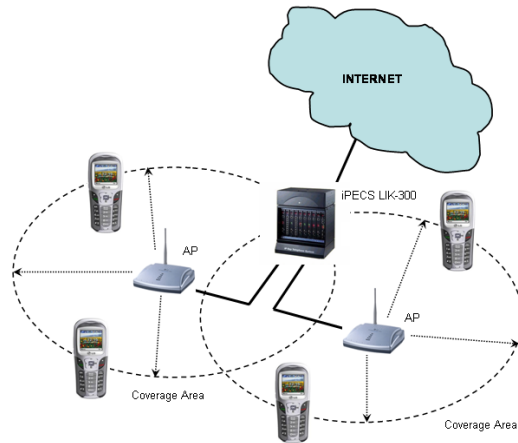
The following figure exhibits network infrastructure of 802.11b/g compliant network diagram.



APs are connected to a HUB in subnet, since WIT-400HE is able to access the Internet. The iPECS LIK and WIT-400HE system work on top of this context.

2.2 Where iPECS System is positioned in the 802.11b/g network.

The following is a basic configuration of IEEE802.11b/g environment to enable WIT-400HE and the iPECS System.



- (1) WIT-400HE / AP:
 - IEEE 802.11b/g network
 - SSID / DTIM interval configuration within AP
- (2) AP / iPECS LIK:
 - Direct connection : AP PoE of iPECS System
 - Indirect connection : AP HUB PoE of iPECS System

2.3 AP Configuration

Depending on vendors of AP, the following two parameters should be carefully set up.

2.3.1 SSID

SSID is for authentication use. An AP can have an arbitrary SSID value for example "wireless". In this case, WIT-400HE with "wireless" SSID can communicate with that AP. It is important to use accurate SSID on both WIT-400HE and AP.

Recommendation)

- (1) If you are free of security, please just use one SSID for all APs and WIT-400HE.
- (2) If you are using WIT-400HE in a wireless environment with predetermined SSID, please change the SSID of your WIT-400HE.

2.3.2 DTIM (Delivery Traffic Indication Message ~~Data Traffic Indication Map~~) & Beacon

DTIM is related to an interval of packet transmission. By an inherent nature of the iPECS LIK, WIT-400HE frequently uses multicast message for the communication with the iPECS LIK. The delivery of multicast

message is affected by the DTIM parameter.

Beacon is an indication of packets buffered in AP which are to be delivered to each wireless station, WIT-400HE. The information of **DTIM** is contained in a beacon message. Therefore, DTIM configuration can be affected by the beacon interval. The following is illustrating the relationship of beacon and DTIM:

WIT-400HE

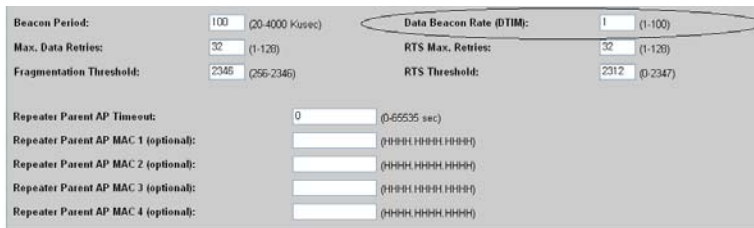
Recommendation)

- (1) **DTIM should be less than 200 msec.**
- (2) If AP doesn't support DTIM configuration, more special care needs to be taken for Beacon interval setup. Otherwise, Use the smallest DTIM interval that AP can support.

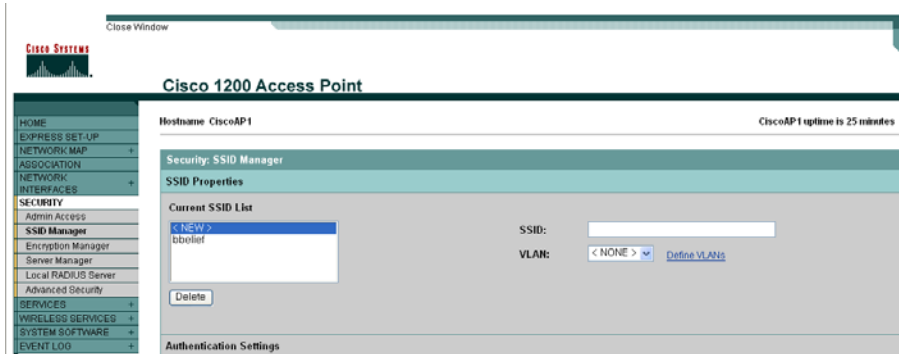
2.3.3 Configuration

This section enumerates how you set up both SSID and DTIM in AP.

Cisco



- (1) Open a page “**Network Interfaces > Settings**” . You can see a edit box “**DTIM**”.
- (2) Enter **3**.



- (3) Open a page “**Security > SSID Manager**” . You can see a edit box “**SSID**” .
- (4) Enter your SSID.

3. S/W Upgrade

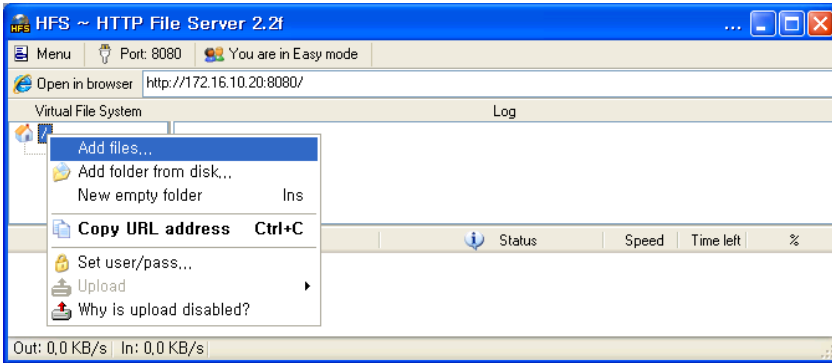
WIT-400HE can be upgraded via USB or WLAN.

3.1 Network configuration for upgrade

1. Connect PC LAN port to the network.
2. Connect WIT-400HE to wireless network.

3.2 WEB Server Settings

1. Create “C:\WIT400H” directory and copy HTTP File Server (hfs.exe) to the directory
2. Run hfs.exe
3. Add file to upgrade



4. New image file is added

Server Port #

S/W image file

3.3 Starting Upgrade

1. When WIT-400HE is boot up completely, connect USB cable or WLAN network.
2. Press “*1475963#” + “Send” button.
3. Select “3. S/W Upgrade” and set the server IP, port and file name.



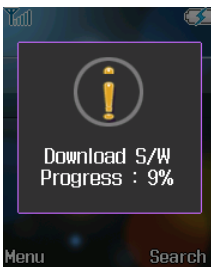
- 1) Server IP: IP address of Web Server
- 2) Server Port: Web Server Port#
- 3) File Name: New S/W image of WIT-400HE

4. When you select "DOWN LOAD", popup will be displayed. Press "YES" to start upgrade.

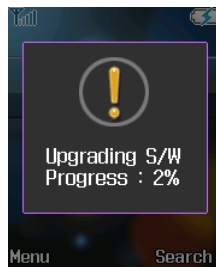


5. The process has three steps as follows.

- 1) 1st step : S/W download
- 2) 2nd step : apply new S/W to the flash
- 3) 3rd step : reboot after upgrade



<Download>

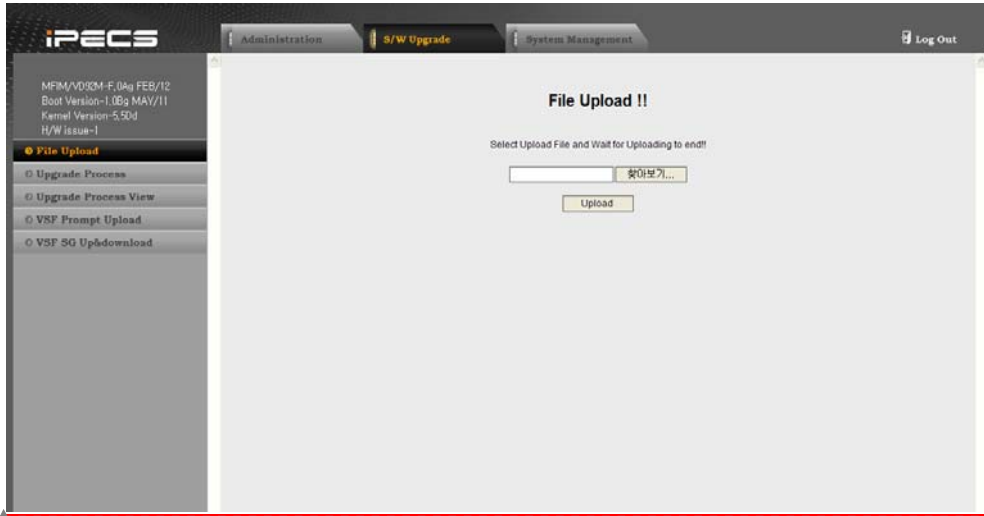


<Upgrade>

3.4 S/W Upgrading via MFIM

WIT-400HE could be updated on MFIM web admin same as IP Phone upgrade process.

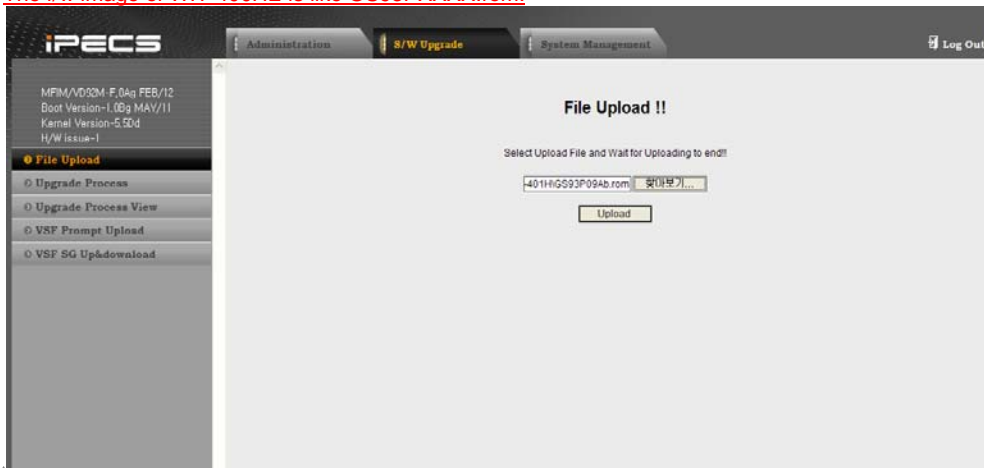
1. Open File Upload menu in MFIM web admin.



서식 있음: 글꼴: (영어) Arial

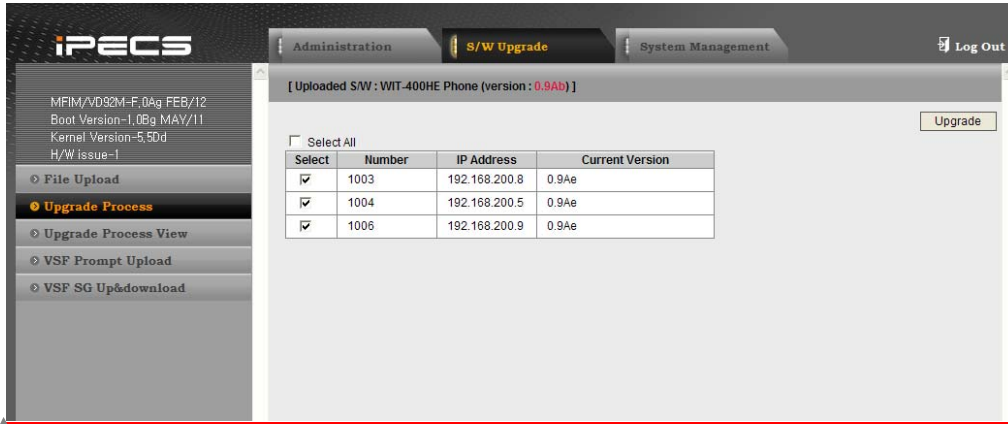
2. Upload WIT-400HE f/w to MFIM.

The f/w image of WIT-400HE is like GS93PXXXX.rom.



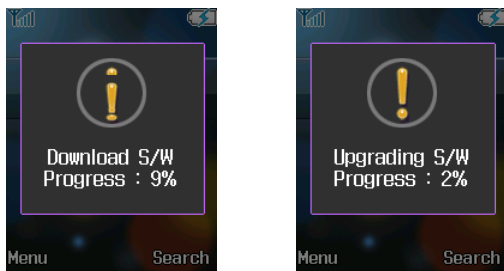
서식 있음: 글꼴: (영어) Arial

3. Select extension number to upgrade and press upgrade button to start.



서식 있음: 글꼴: (영어) Arial

4. WIT-400HE will start downloading f/w and upgrading s/w.



<Download>

<Upgrade>

4. Debug Data Transfer and Diag Data Transfer

4.1 Debug Data Transfer

4.1.1 Check Debug Setting

- 1) Run windows "command prompt"
- 2) Move to the directory "c:\WIT-400H", where "wit400trace.exe" exists.
 - You can change to any other directory.
- 3) Try "ping" to the IP address of WIT-400HE.
 - If replies, go to next step.
 - If not, check the network configuration of PC and WIT-400HE.

```
C:\WIT-400H>ping 172.16.10.2
Pinging 172.16.10.2 with 32 bytes of data:
Reply from 172.16.10.2: bytes=32 time=11ms TTL=64
```

- 4) Run "wit400trace.exe"
 - If TCP port 3490 is not available, you can change as "wit400trace.exe [TCP port #]".
 - Ex) wit400trace.exe 5000

```
C:\WIT-400H>
C:\WIT-400H>wit400trace.exe
WIT-400H Trace Server (v0.1) (Jun 10 2009 16:49:42)
Waiting client connection (port:3490)...Ctrl+C to stop.
```

4.1.2 Sending Debug Data from WIT-400HE

- 1) Press "**1478621#" + "Send" key
- 2) Set the level for debugging
 - Block Name : each block name
 - Mode On/Off: the debug type
 - Debug Level : each debug level

- 3) Press "OK" to set debug.
- 4) Press "Send"(Soft Right Menu) to send debug information.
 - Server IP : PC IP address which wit400trace.exe is running.
 - Server TCP Port : TCP port of the application
- 5) Press "Send"(OK) to send
 - It takes around 20 seconds to get the data.
 - If it fails, check the network configuration of PC and WIT-400HE.
 - If WLAN of WIT-400HE is not connected, you can use USB cable.

4.2 Starting Diag. Server of WIT-400HE

4.2.1 Check Diag Setting

- 1) Run windows "command prompt"
- 2) Move to the directory "c:\WIT-400H", where "wit400h_diag.exe" exists.
 - You can change to any other directory.
- 3) Try "ping" to the IP address of WIT-400HE.
 - If replies, go to next step.
 - If not, check the network configuration of PC and WIT-400HE.

```
C:\WIT-400H>ping 172.16.10.2

Pinging 172.16.10.2 with 32 bytes of data:

Reply from 172.16.10.2: bytes=32 time=11ms TTL=64
```

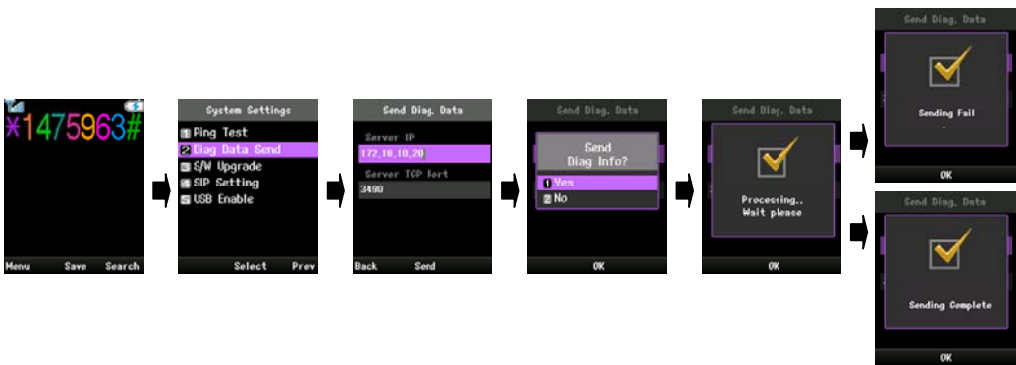
- 4) Run "wit400h_diag.exe"
 - If TCP port 3490 is not available, you can change as "wit400h_diag.exe [TCP port #]".
 - Ex) wit400h_diag.exe 5000

```
C:\WIT-400H>wit400h_diag.exe
WIT-400H Diag Server (v0.1) <Jun 25 2009 10:26:12>

Waiting client connection (port:3490)...Ctrl+C to stop.
```

4.2.2 Sending Diag. Data from WIT-400HE

- 1) Press "*14723698#" + "Send" key
- 2) Put the PC IP & Port# on the menu
 - Server IP : PC IP address which wit400h_diag.exe is running.
 - Server TCP Port : TCP port of the application
- 3) Press "OK" to send
 - It takes around 20 seconds to get the data.
 - If it fails, check the network configuration of PC and WIT-400HE.
 - If WLAN of WIT-400HE is not connected, you can use USB cable.



4.2.3 Getting Diag. Data on the PC

- 1) The diag. data will be received from the phone

```

C:\WIT-400H>wit400h_diag.exe
WIT-400H Diag Server (v0.1) <Jun 25 2009 10:26:12>

Waiting client connection (port:3490)...Ctrl+C to stop.

server: got connection from 172.16.10.2
Waiting to receive data...
File size : 3 KByte
Received  : 100%
Save File : wit400h_tel_5011_00.txt

```

2) You can get the diag. data on the directory which wit400h_diag.exe is running.

4.2.4 Diag. Sample Data

```

=====
Diag information for WIT-400HE (TEL:111)
=====

```

<< AP SCAN LIST >>

```

-30 |00:11:95:D0:F3:D0|6|WIT-400HE|off|0001|NONE|NONE|NONE|
-43 |0A:0E:DC:2A:0F:B2|3|test|on|0531|WPA Version 1|TKIP | TKIP |
-43 |06:0E:DC:2A:0F:B2|3|test|on|0531|IEEE 802.11i/WPA2 Version 1|TKIP | CCMP TKIP |
-47 |00:0F:66:D8:1A:04|6|WIT400H|on|0011|WPA Version 1|TKIP | TKIP |

```

<< WLAN CONNECTION INFO >>

```

wlan0    Marvell 88W8618  ESSID:"WIT-400HE"
         Mode:Managed  Channel:6  Access Point: 00:11:95:D0:F3:D0
         Bit Rate=54 Mb/s
         RTS thr:off   Fragment thr:off
         Encryption key:off
         Link Signal level:-32 dBm  Noise level:-89 dBm
         Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:0
         Tx excessive retries:0  Invalid misc:0  Missed beacon:0

```

<< LAN CONNECTION INFO >>

```

wlan0    Link encap:Ethernet  HWaddr 00:47:5A:11:22:3A
         inet addr:192.168.131.119  Bcast:192.168.131.255  Mask:255.255.255.0
         UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:314214 errors:0 dropped:0 overruns:0 frame:0
         TX packets:9082 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:32

```

RX bytes:27521982 (26.2 MiB) TX bytes:9622734 (9.1 MiB)
Interrupt:10 Base address:0xa000

<< PING TEST RESULT TO SYSTEM >>

PING 192.168.123.100 (192.168.123.100): 56 data bytes
64 bytes from 192.168.123.100: seq=0 ttl=127 time=23.590 ms
64 bytes from 192.168.123.100: seq=1 ttl=127 time=8.909 ms
64 bytes from 192.168.123.100: seq=2 ttl=127 time=5.482 ms

--- 192.168.123.100 ping statistics ---

3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 5.482/12.660/23.590 ms

<< TRACE DATA >>

5. Cell Planning

5.1 Access Point Requirements

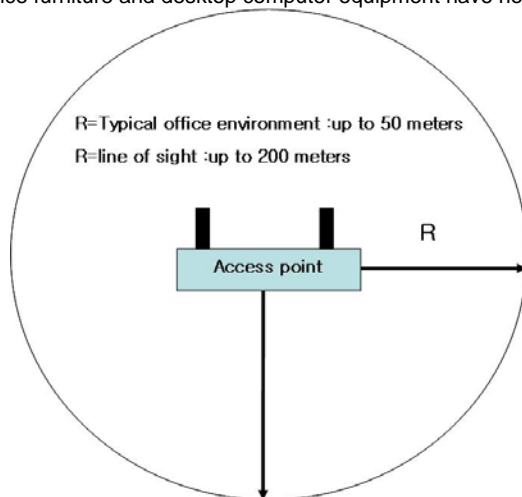
To determine the number of Access Point in a system, you should consider Access Point broadcast range.

5.2 Access Point Range

In a typical office environment, each Access Point has a broadcast range of 50 meters and supports an area of 8,000 square meters, but a broadcast range depends entirely upon office environment. Where the absence of any obstruction provides perfect line of sight conditions between the Access Point and wireless terminal users and if there are no atmospheric limitations, the range may increase to 200 meters. If you want to use AP supported 802.11b/g/n mixed mode, this range may decrease to 100 meters because of the characteristics of AP.

The following Access Point broadcast ranges can be used as a rough guide to plan the Access Point positions:

- In line of sight, the b/g Access Point has a range of up to 200m(open area).
- In hall, the Access Point has a range of 40-70m.
- In buildings, the Access Point has a range of about 25-40m. It assumes that walls are made of light brick, plasterboard or wallboard with metal frames. Normal electrical wiring, central heating pipes, office furniture and desktop computer equipment have no significant effect.



<Figure .1> Access Point Service Area

5.3 Access Point Positioning

The radio coverage area that a single AP provides is not sufficient to serve the entire WLAN in many

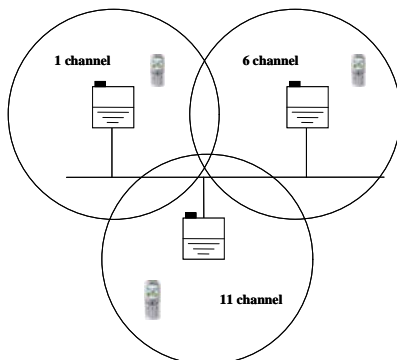
situations. The solution is to increase the radio coverage area.

A. RF channel Specification

The IEEE 802.11 b/g standard establishes several requirements for the RF transmission characteristics of an 802.11 radio. These channels have a center frequency separation of only 5 MHz and an overall channel bandwidth (or frequency occupation) of 22MHz. So it has overlapping channels for each channel as shown in figure below. This is true for 802.11b products running 1, 2, 5.5, or 11 Mbps as well as the newer 802.11g products running up to 54 Mbps.

B. Channel Allocation and cell planning

When planning a WLAN cell, you should ensure that the channels that the adjacent APs use are non-overlapping. Non-overlapping channels are frequency bands that do not have a frequency that is common to each other. For example in the 2.4GHz range there are three channels that are non-overlapping (channels 1, 6 and 11). Therefore, when you deploy a secondary AP to extend the Radio coverage, you can use the channel 1 for the first AP, channel 6 for the next adjacent AP and channel 11 for the third AP as shown in figure below and then start with channel 1. If you use overlapping channels, radio frequency interference can occur, which leads to connectivity issues and in poor throughput. Also, you should ensure that you do not place the APs too close each other. Too many APs in the same vicinity create radio congestion and RF interference that can reduce data throughput. A careful site survey can determine the best placement of APs for maximum radio coverage and optimized throughput.



C. QoS Service

If you have an AP which could be made editable QoS service, it could support good voice quality during the terminal's handover to enable QoS service. By making voice priority high, it lower the number of mute in voice during it. As below, there is a method how to setup QoS in Cisco AP.

1. QoS Service

You could select QoS service in wireless IP phone.

2. QoS Policies > Advanced

You could enable "QoS Element" and "WiFi Multimedia".

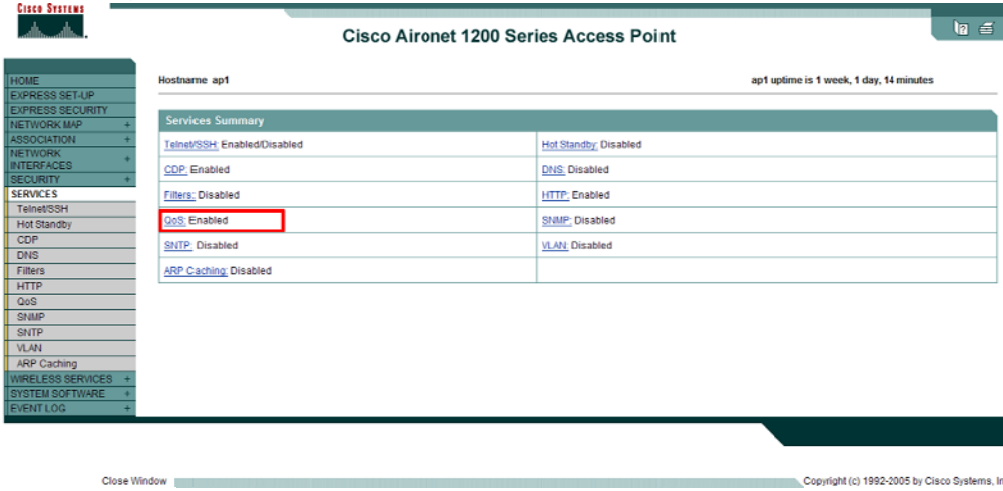
3. QoS Policies > Radio-802.11g Access Categories

You could enable "Background(CoS 1-2)", "Best Effort(CoS0,3)" and "Voice(CoS6-7)".

4. QoS Policies > Create/Edit, Apply policies

After you could create QoS policies, you will adjust it in the interface/VLANs.

5. QoS : Enables

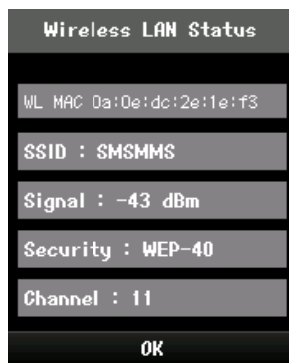


5.4 RSSI Monitoring

This function helps that the dealer can install access point instrument. The RSSI (Received Signal Strength Indicator) level of an access point of which the wireless terminal is locked is displayed as dBm value on the LCD.

Notes : For better voice quality, limit of -75dBm is recommended.

- Press **Menu** button.
- Select **8.Settings**.
- Select **6.Wireless LAN Status**.
- Technician Main Menu is displayed on the LCD.
- (The RSSI value is displayed on the LCD and the value is updated periodically.)



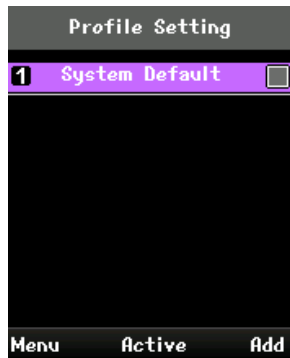
<Figure .2> SITE SURVEY displayed on the LCD

**RSSI Check
(-75dBm)**

[Figure 3. Cell Boundary Map AP1 & AP 2]

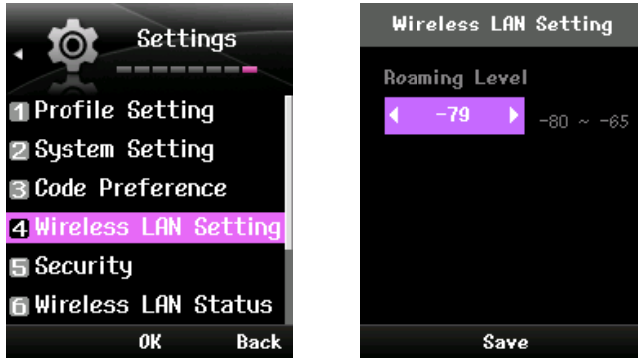
5.5 Handover

Handover feature is supported in default profile which is the first profile in profile setting menu. Profile name and SSID of default profile is initialized “System Default” in Fig.4 . The default profile cannot be deleted and can be edited. If you want to use this feature, you must edit the default profile include SSID, security, network interface and so on.



[Figure 4. Default profile supported handover feature]

Roaming level can be set from -80 dBm to -65 dBm. This level may be changed according to cell planning. The following Fig.5 is the method of setting roaming level. If you press the save button, wireless interface is restarted.



[Figure 5. Setting roaming level]

Handover is executed when signal level is 10dBm above the noise level (normally signal level is -75dBm ~ -80 dBm)

5.6 Tuning Points

1. AP Transmit Power level.

If there's heavy traffic in small area, you may need to install more APs to disperse the calls. In this case you need to make the cell smaller by decreasing the transmit power level not to interfere the adjacent APs. So you can install more APs in the area.

2. AP Fragmentation threshold

You can define the maximum frame size that the AP can send at one time. If the data is larger than the AP fragmentation threshold, it will be divided by the size. In the heavy traffic environment larger packet is more easily missed in the wireless network and then the retransmission makes busier the network. So you can reduce the retransmission by decreasing the fragmentation threshold. In case of Cisco AP it can be adjusted from 2,346 to 512.

3. AP retry limit

This is the count of the AP retransmission when it fails to send packet. If the count is too large it makes the network busier. The voice packets should be transmitted on real time, it's more important than the reliability. By decreasing the retry count the load of the AP will be decreased and then it can transmit packet faster.

For example when the user moves to out-of-range in conversation, the AP will retransmit voice packet. If the retry count is too large, it'll influence to the other calls.

7. QoS Checkl ist

After you finish the installation of the system and AP, please check the voice quality by the following items. If you find any problem on the following list, you can improve QoS by the trouble shooting guide of each case.

No.	Check list	Trouble shooting guide
1	Can you make 8 calls at the same time without voice break? (The AP should guarantee 8 calls simultaneously)	<ul style="list-style-type: none"> - Review the cell planning - Check the channel of the adjacent APs. It should be separated more than 5 channels between adjacent APs. - If the AP is not in the recommended list, please compare with the recommended one. - If the above solution doesn't improve the voice quality, please change codec type to G.729 in system admin.
2	Can you make long time call with good voice condition?	<ul style="list-style-type: none"> - Review the cell planning - Check the channel of the adjacent APs. It should be separated more than 5 channels between adjacent APs.
3	Can you talk across the roaming area? (WIT-400HE guarantees roaming time less than 500ms in well designed WLAN network.)	<ul style="list-style-type: none"> - Review the cell planning. The adjacent cell is overlapped enough? - Check the AP support seamless roaming. We don't guarantee if it's not the recommended one.
4	Can you talk without voice break moving in the office?	<ul style="list-style-type: none"> - Review the cell planning. The APs cover all the area that you are moving? .- Check the AP connected with the phone.
5	Can you talk comfortable with the outside subscriber?	<ul style="list-style-type: none"> - Check the trunk status of the system. - If volume is too low, you can adjust gain in the system admin.

6. iPECS LIK Setup

6.1 MFIM S/W Version

WIT-400HE is recognized as IPKTS phone type in MFIM in iPECS LIK can be registered without any license.

Note) iPECS LIK 50/100/300 support WIT-400HE, and iPECS LIK 600/1200 need to install VOIM board additionally.

6.2 WIT-400HE Registration

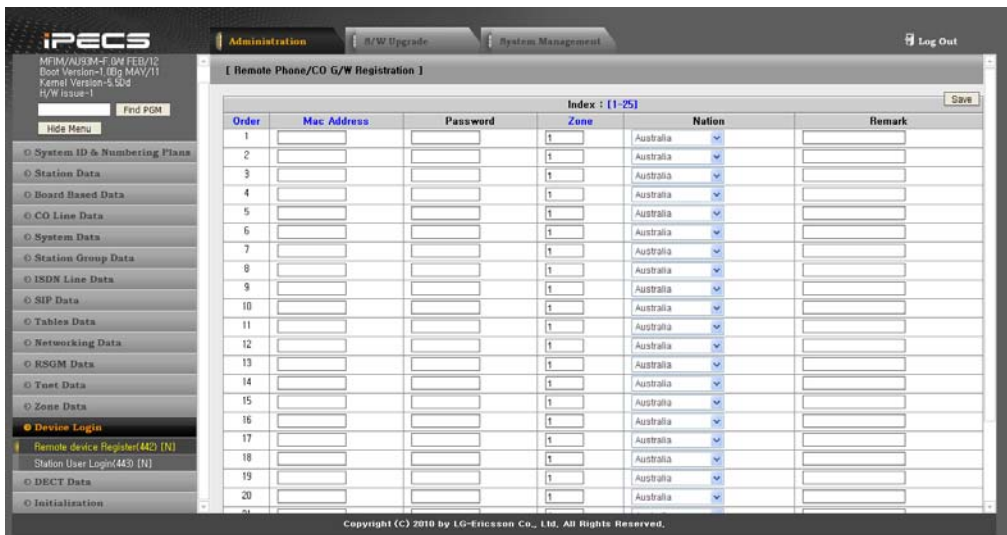
WIT-400HE is recognized as one of the iPECS phone by iPECS MFIM. The registration can be completed by two modes like the LIP phone.

6.2.1 MFIM Setting

1) Set the Mac Address and Password for the WIT-400HE in Menu 442 (Station User Login).

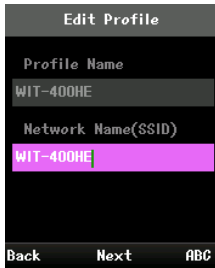
- Mac Address : mac address of WIT-400HE
- Password : password for authentication

Note) The password should be same with phone number in which MFIM is 5.0Xx as in the picture.

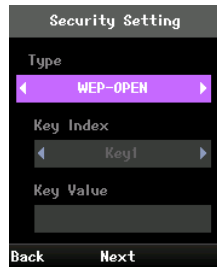
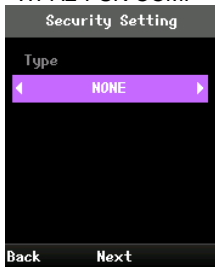


6.2.2 Profile Setting of WIT-400HE

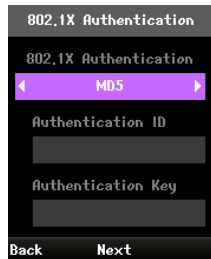
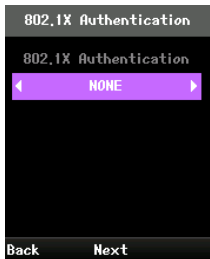
- (1) Press "AP Scanning" button on navigation up key in the idle status.
- (2) Select SSID and press "Add" to add profile.
- (3) Set Profile Name and Network Name (SSID) and press "Next".



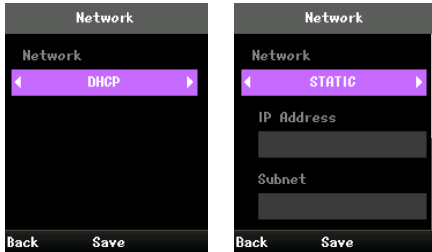
- (4) Set Encryption type and press "Next".
 - < Encryption type >
 - None
 - WEP-OPEN
 - WEP-SHARED
 - WPA-PSK-TKIP
 - WPA-PSK-CCMP
 - WPA2-PSK-TKIP
 - WPA2-PSK-CCMP



- (5) Set 802.1X type and press "Next".
 - <802.1X type >
 - None
 - MD5
 - TLS
 - TTLS
 - PEAP

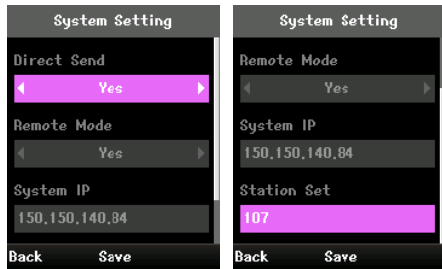


- (6) Set Network type and press "Save".
 <Network type>
 -DHCP
 -STATIC



6.2.3 System Setting of WIT-400HE

- (1) Set Registration Information at "**(MENU) > Settings > System Setting**".
 - Enter Security Code (Default : 0000)
 - Direct Send : Yes/No
 - Remote Mode : Yes/No
 - System IP: iPECS System IP address to register
 - Station Set : ~~the idle display for WIT-400HE~~ No need to define. It's only for iPECS-CM.
- (2) Press "Save" and "End" key to start registering to iPECS System



6.2.4 Trouble Shooting for Registering Fault

While WIT-400HE tries to register to system, the following error message could be displayed. If error message's displayed on the phone, you can solve the fault referring on the trouble shooting guide.

Popup message	Trouble shooting guide
Failed to scan AP	Scanning AP is failed. Try again and if it fails too, check the AP status.
Encryption key is not valid	The encryption key is not matched with AP's. Please check encryption key of WIT-400HE.
DHCP Failed	WIT-400HE didn't received response for the IP request. Please try again and if it fails too, check the DHCP server.
Static IP configure failed	The static IP is not valid. Please check the IP configuration.
Network connection fail	The registering is failed by network failure. Check the network status and IP configuration.
Out of range	WIT-400HE is off from signaling area. Please move to signaling area.
Disconnected by network failure	The signaling is failed by network failure. Please check network status.
IP is duplicated	Please check the IP is used in other device.

User Info not registered	The system setting data is not registered on the system. Please set the data to register, such as Direct Send ,Remote mode, System IP and so on.
Register failed. Please check user info	System responded error message on registering request. Please check System Setting information such as Direct Send ,Remote mode, System IP and so on.
Please check phone number	The phone number is not defined on the system. Please check the system login IDs on Menu 442.
Can't register to system	System responded error message on registering request. Please check the iPECS System 's Mac address and password.

7. iPECS CM Setup

7.1 CM Version

WIT-400HE is recognized as IPKTS phone type in iPECS CM. WIT-400HE can be registered without any license.

7.2 WIT-400HE Registration


7.2.1 iPECS CM Setting

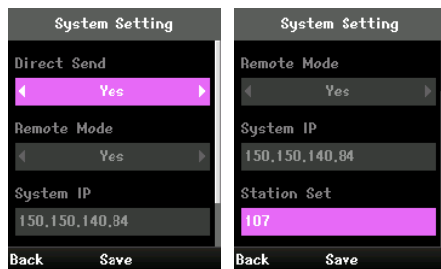
1) Set the Mac Address and Password for the WIT-400HE in Menu 442 (Station User Login).

- Mac Address : mac address of WIT-400HE
- Password : password for authentication

Note) The password should be same with phone number in which MFIM is 5.0Xx as in the picture.

7.2.2 System Setting of WIT-400HE

- (1) Set Registration Information at “ (MENU) > Settings > System Setting”.
 - Enter Security Code (Default : 0000)
 - Direct Send : Yes/No
 - Remote Mode : Yes/No
 - System IP: iPECS System IP address to register
 - Station Set : the WIT-400HE phone number(ID)
- (2) Press “Save” and “End” key to start registering to iPECS System



FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 0.5 centimeters between the radiator and your body.

RF du FCC d'exposition aux radiations: Cet équipement est conforme à l'exposition de la FCC rayonnements RF limites établies pour un environnement non contrôlé. Cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

Cet équipement doit être installé et utilisé avec une distance minimale de 0.5 centimètres entre le radiateur et votre corps.

IC

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.