OFDM for Near Line of Sight Operation

AES Encryption

108 Mbps Data Rate

High Power Radio for 10+ Miles

Integrated Antenna, Small-Form Factor Chassis

Power-over-Ethernet for Easy Installation

SKYWAYâ 5000 Series

User's Guide

1. Introduction

Congratulations on your purchase of Solectek's SKYWAY 5000 Series Bridge/Router, a feature rich, best-in-class wireless solution. This User's Guide will describe the operation of your SKYWAY 5000 unit in detail.

SYSTEM FEATURES

- Based on field proven OFDM modulation allowing near line-of-sight deployment and strong immunity to interference and multi-path problems.
- Data rates from 6 Mbps to 108 Mbps
- High power radio (400mW) and improved radio sensitivity for best-in-class link ranges – over 10 miles with only 1 foot panel antenna
- Power over Ethernet (POE) for easy cabling with a single outdoor CAT5 cable.
- All-in-one integrated enclosure that houses everything, including antenna, radio, amplifier, and POE module. Mount one thing and you are done.
- Latest AES encryption on board to provide the strongest security ad ultimate data protection.
- Client access control via MAC address filtering

Package Contents

- SKYWAY client unit
  - 5100 Short range
  - 5300 Mid Range
  - 5500 Long Range
- 24VDC Power Supply
- Power over Ethernet injector (the receiver is integrated inside the SkyWay unit).
- CD-ROM containing documentation
- Registration Card
- Warranty and Compliance Card

NOTE: CAT5 Ethernet cable is not included in the package. UV -protected Ethernet cables for outdoor use can be purchased from Solectek in a variety of different length up to 300 feet. Also, a short Ethernet cable between the PC and the POE injector is necessary for unit configuration. Please contact Solectek Sales for details on purchasing Ethernet cables.

System Requirements

- Two CAT 5 UTP cables – straight cable if connecting to a hub/switch, cross-over cable if connecting to a PC.
- A computer running TCP/IP over Ethernet.

- A SkyWay 5000 Series base unit (5600 or 5700) for a live testing of the multipoint wireless network.

2. System Configuration

A. CONNECTING THE SKYWAY UNIT FOR CONFIGURATION

The following diagram explains the connection so that you can access the user interface for configuration
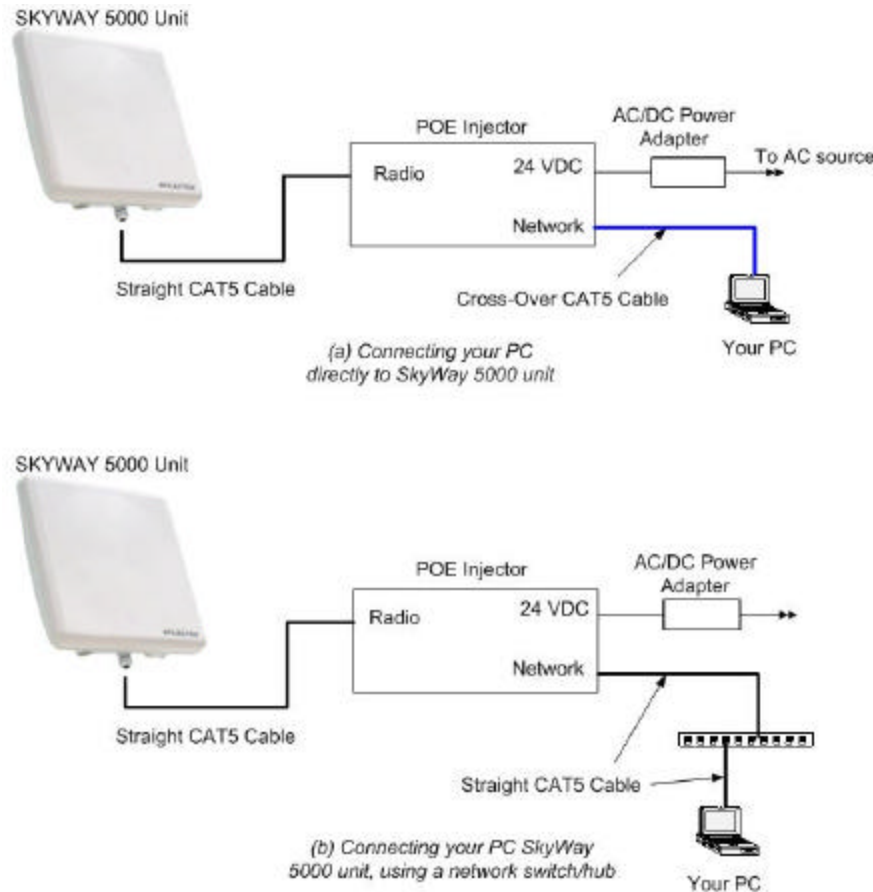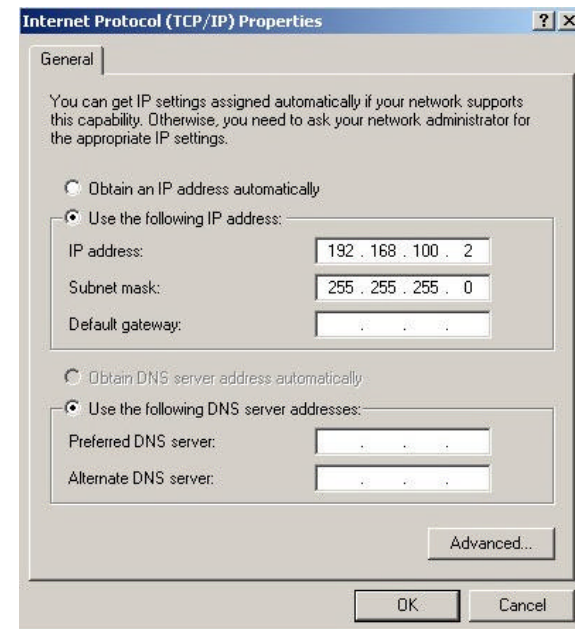

- Power on your SKYWAY 5000:
  1. Connect your SKYWAY and POE injector with an Ethernet cable.
  2. Connect your PC to the POE injector using (a) crossover Ethernet cable or (b) straight cable and a hub/switch.

  3. Power on the POE injector using the supplied AC to 24V DC adapter.

B. SET UP YOUR COMPUTER'S TCP/IP PROPERTIES

Open *networking properties* in your Windows OS. Find the TCP/IP setup window of your **wired Ethernet adapter**. The details on how to set the IP address of your computer's Ethernet adapter are different, depending on Windows versions (95/95/2000/Me/XP). Please consult your Windows OS documentation. Shown below is the Windows 2000 TCP/IP Properties. Set the IP addresses to the following values.

Ethernet's IP Address:	192.168.0.2
Subnet Mask:	255.255.255.0

C. LOG-IN TO YOUR SKYWAY

- Connect your computer and SKYWAY 5000 unit using an Ethernet cable. Use a straight CAT 5 cable if a network hub/switch is used or use a cross-over cable if a computer is directed connect to the SKYWAY 5000 unit.
- Start a Web Browser on your computer (such as Netscape Navigator or Microsoft Explorer).
- At the URL line, type in the following: http://192.168.0.1 to access the **Status** screen below.

This screen can be referred back later for a summary view of the status of your SKYWAY 5000 unit. At the initial boot-up out of the box, only the factory default values should be displayed.

- Click on the **login** menu option located in the navy-blue left menu bar. The following screen should appear.

- Type in **solectek** for the username and **solectek** for the password. You can change the password later once you are in the interface screens. Click start and you will see the left menu bar changed to the following.

g

C. CONFIGURING THE BASIC SKYWAY 5000 PROPERTIES

- Click the **Configuration** menu option in the left menu bar to access the following screen:

Configuration

System Name: Sub001

LAN

IP Address:	192	.168	.0	.226
Subnet Mask:	255	.255	.255	.0
Default Gateway:	0	.0	.0	.0

Wireless

Radio Spectrum Bandwidth: Normal ▾

Press the 'Select' button below before you proceed with the selection of Radio Frequency and Data Rate!

Select

Radio Frequency (MHz): 5805 ▾
Data Rate (Mbps): 36 ▾

Update   **Clear**

- System name

  This is a description of the unit for convenience. This is not related to the identification of the unit on your local area network.

- IP properties (LAN)

  - **IP Address**: This is the IP address of the unit.

  - **Subnet Mask**: This is the subnet mask of the unit.

  - **Default Gateway**: the default gateway of the unit.

If you change any of the parameters, click on the **Update** button to make the changes effective. You can also restore the previous setting by clicking on **Reset** button.

- Wireless properties

  - **Radio Spectrum Bandwidth**: There are two choices here: **Normal** (default setting) and **Wideband**. The following is the table for available radio frequency and data rate for each option

    If you change the Radio Spectrum bandwidth value, be sure to click the **Select** button just below.

NORMAL (20MHz)	
Frequency (MHz)	5735, 5755,5775,5795, 5815, 5845
Data Rate (Mbps)	54, 48, 36, 24, 18, 12, 6

WIDEBAND (40MHz)	
Frequency (MHz)	5745, 5785, 5825
Data Rate (Mbps)	108, 96, 72, 48, 36, 24, 12

  - **Radio Frequency (MHz)**: the center frequency of the selected frequency channel. In the Normal mode, each channel is 20 MHz wide. In the wideband mode, it is 40 MHz.

  - **Data Rate**: air transmission/receive data rates. Note that different data rates are available for normal and wideband modes, as detailed in the table above.

If you have edited any of the fields, click on the **Update** button on the bottom to write the changes into system memory. Clicking on the **Clear** button restores the original values before the changes.

4. Base Station Access Configuration
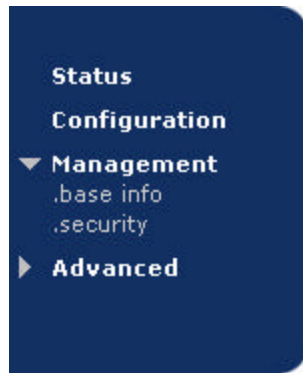
- In the above screen, click on the **Base info** menu option under the **Management** parent menu in the left menu bar to access the following screen:

You can add an authorized client by typing in the following information.

- **Base MAC**: This is the hardware MAC address of the base station that the client unit is intended to connect. This can be found in the user interface of the base station unit.

- **Description**: Type in any description that will easily identify the user of the base station with the above MAC address (e.g. main-street-branch).

  CAUTION: Descriptions must be a single word only. No spaces are allowed.

5. Monitoring Operation

The basic status of the unit can be seen in the Status screen as seen in the following screen.

` `

This screen displays current values for the field items displayed. Go to the **Configuration** screen if you would like to change any of these properties.

Three noteworthy items:

- **Operational For**: This is the time that the unit has been running. It will reset to zero if the unit is rebooted

- **MAC Address**: this is the MAC address of the unit. Clicking on the hyperlink will lead you to the wireless **Status** screen below.

- **Description/Base Station's MAC/ State**: If you have configured the base station, its desription and MAC address will show up here. You can click on the MAC address hyperlink to see its wireless **Status**, similar to the screen below.

Status

```
Station MAC: 00:09:5B:41:E9:76
Description: Base
Encryption:
      State: up
```

	Receive	Transmit
MSDU:	0	34304
Data:	0	34304
Multicast:	0	34304
Management:	0	0
Control:	0	0
Errors:	0	0

Detailed Receive Errors	
Discarded Frames:	0
Duplicate Frames:	0
CRC Errors:	0
PHY Errors:	0
DMA Errors:	0

Detailed Transmit Errors	
Discarded Frames:	0
Excessive Retries:	0
DMA Errors:	0

Back

Better explanations here::

- **Station MAC**: the MAC address of the unit
- **Description**: indicates the description you have given to the unit in the Configuration screen.
- **Encryption**: indicates whether encryption has been enabled.
- **State**: indicates the status of the radio operation.

- **MSDU**: Maximum Service Data Unit. Specifies the number fo packets sent and received by the unit.
- **Data/Control/Management**: Packets can be either data, control, management.

- **Discarded Frames**: Specifies the number of receive discarded frames.
- **Duplicate Frames**: Specifies the number of receive duplicate frames.
- **CRC Errors**: Specifies the number of receive CRC errors.
- **PHY Errors**: Specifies the number of receive PHY errors.
- **DMA Errors**: Specifies the number of receive DMA errors.
- **Excessive Retries**: Specifies the number of transmit excessive retries.

6. Changing Your Password

- Click on the **Password** menu option under the **Advanced** parent menu in the left menu bar to access the following screen:

Change Password

```
User name: admin

Enter New Password: *****
Confirm New Password: *****
          Change    Clear
```
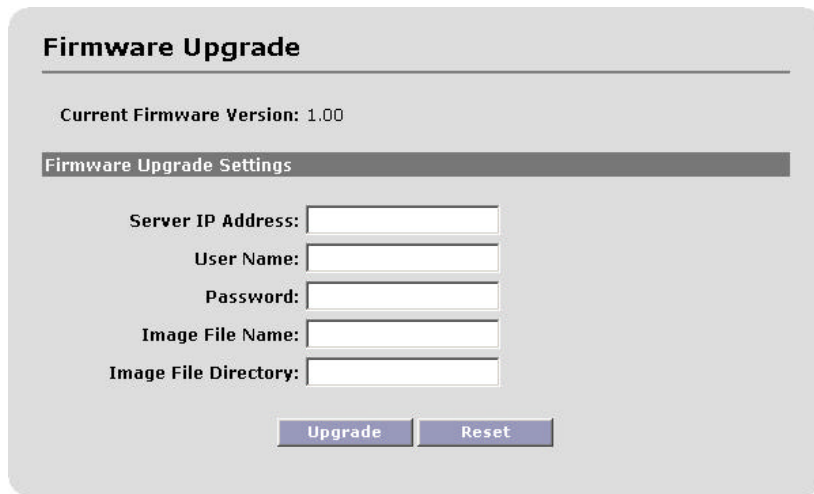
- **Remote Management for HTTP**

  - **User Name**: This item is fixed to **admin**, and is not user changeable.

  - **Password**: User selected password.

    Note: Please keep this password safe in your records. For your convenience you can write down the password in Appendix C.

  - **Confirm Password**: Used to validate user password and protect you from mistyping your new password.

Click the **Change** button to activate your new password.

7. Upgrading the Software

NOTE: **You need to install an FTP server program on your computer in order to carry out the following upgrade procedure.** You can use an FTP program of your choice if you are familiar with such programs. In case you do not have an access to one, Solectek has included FileZilla, an FTP server program, on the installation CD. For details on the configuration of this application, please refer to the document called FTP-Guide.pdf included on the CD.

- Click on the **Upgrade** menu option under the **Advanced** parent menu to see the following screen:

Firmware Upgrade

Current Firmware Version: 1.00

Firmware Upgrade Settings

Server IP Address: [ ]
User Name: [ ]
Password: [ ]
Image File Name: [ ]
Image File Directory: [ ]

[Upgrade]   [Reset]

There may be newer software releases from Solectek from time to time. If you would like to upgrade your unit, first obtain the new file from Solectek. The current version will be posted on Solectek's website.

Check to see if the current version available from Solectek is a newer version than the one current installed on your SKYWAY 5000.

Save the new software file in a directory of your computer you can easily access. For convenience, you may prefer to use the same computer that you use to access the SKYWAY 5000 user interface, since the computer already has been configured to be on the same network as the SKYWAY 5000.

- **Software Version Check**

- **Server IP Address**: The address of the computer that stores the upgrade software file.

- **User Name**: User name used to login onto the upgrade FTP server. For convenience, you may want to use **anonymous** login.

- **User Password**: Password used to login onto the upgrade FTP server.

- **Image File Name**: The name of the binary file to be loaded onto your SKYWAY 5000 unit.

- **Image File Directory**: Directory path to find the software upgrade file on the FTP server,

  NOTE: This path name is relative to the root path of the FTP server.

Once you checked that the version is displayed correctly, click on the **Upgrade** button. The upgrade should take less than a minute, and the unit will automatically reboot once the upgrade is complete.

You will see the following reboot message once the unit starts a reboot process.

WARNING: **Do not power down or unplug the unit during the upgrade process.**

8. System Reboot

At times, you may want to reboot the unit for various reasons. This feature may be convenient if the unit is mounted at a hard-to-reach location or when you want to remotely reboot the unit without physically having to go to the site.

- Click on the **Reboot** menu option under the **Advanced** parent menu of the left menu bar to access he following screen:
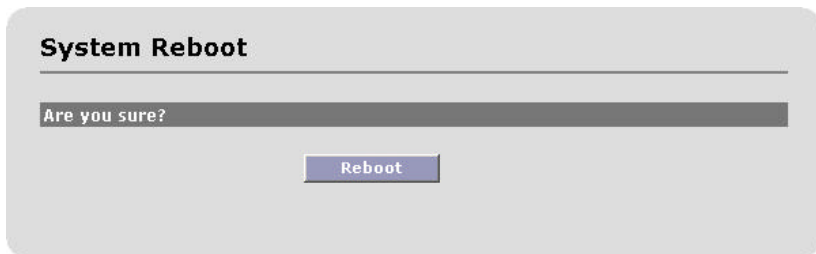
Click on the **Reboot** button to reset/reboot. The reboot process will take approximately 30 seconds. Once the rebooting is done, you can use the **Click Here** button below to access the user interface again.
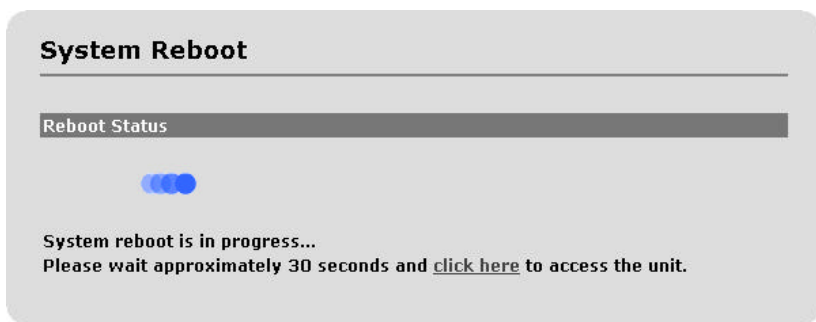
Appendices

Appendix A

Factory Default Values

The following table details the factory default values. These are the values that will be set initially at the factory or when you reset the configuration database.

WIRELESS	
Radio Spectrum bandwidth	normal
Channel	5805
Transmission Rate	36 Mbps

LAN	
IP Address	192.168.0.1
Subnet Mask	255.255.255.0

Appendix B

Troubleshooting Guide

1. *Can't get a wireless connection with a client unit.*

- Make sure that the client is added to the authorization list by typing in its MAC address in the **Add Station** section.
- Make sure that the distance between the base and client units is within the specified system range. A quick check of the signal strength and quality indicators can help asses a marginal RF link. Poor indicator response may be due to the following reasons:
    - Your link distance has exceeded the unit's capability: Review your link budget to make sure that the system is able to handle the distance. Use GPS devices to accurately determine the link distance first. If you are unsure about the link budget, you may contact Solectek Technical Support for help.
    - Antenna misalignment: your antennas need to be aligned correctly at each others bore site for you to get the best results in signal strength.
    - Radio interference: The radio activity in the environment is too strong and may interfere with your signals. You may try to determine the source by using a spectrum analyzer and a directional antenna.

2. Can't access the SKYWAY 5000 over Ethernet from my PC.

- Make sure the Ethernet connection is properly established.
- Make sure that the right IP address is used. Please refer to Section 2: **System Configuration** for setting up the right IP addresses for your PC and SKYWAY 5000 unit.

3. Can't access the Internet through the SKYWAY 5000 unit.

- First, make sure that the wireless connection is established. Good RF conditions need to be established between the units' radios. MAC address of the other unit needs to be correctly typed in at both the base and sub units.
- From a PC on the client unit side, pings the IP address of the SKYWAY 5000. If this does not work, the wireless may still not be properly established or the LAN IP setting is not correctly set between the SKYWAY 5000 and client.
- Ping a known IP address on the Internet, such as Yahoo's IP address, 66.218.71.81. (From the DOS prompt command line, type "ping 66.218.71.81"). If this does not work, you have a problem getting out to the Internet. Make sure that the IP setting is set correctly between the SKYWAY 5000 and the surrounding IP network. Check with your IT administrator or ISP to see if the Internet connection is up and running.
- If you can ping an Internet IP address, but still cannot browse the Internet, make sure the DNS is set correctly on your network. Check with your IT administrator or ISP for proper DNS setting for your wireless network.

Appendix C

For your records please record following items about your unit and keep it safe in your records:

Username and Password:	
Encryption key:	

NOTE: Changes or modifications not expressly approved by Solectek could void the user's authority to operate the equipment.

SKYWAY, and Solectek are a registered trademark of Solectek Corporation. HyperTerminal is the trademark of Hilgraeve, Inc. Windows is the trademark of Microsoft Corp.