



ECO-Sign User Manual

Rev. 1.0

July, 2011

PERVASIVE DISPLAYS

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I. Introduction

1. What is the ECO-Sign Solution?

The ECO-Sign solution is a green, eco-friendly and low power signage solution which includes e-Paper devices with ZigBee wireless gateways and software.

The ECO-Sign has ultra-low power consumption and provides wireless updates of the display. With no wires and rechargeable batteries the ECO-Sign is easy to install and is a perfect solution for office or factory automation, electronic shelf labels, e-Signage/e-POP, logistic or container applications.

The included software has a powerful template designer and the built in scheduler provides an easy remote management tool. The solution is characterized by the following features:

- (1) **Slim & Light:** Fewer parts, simple electronics, no thermal concerns and less mechanical challenges.
- (2) **Active Matrix TFT:** Built in active-matrix electrophoretic display.
- (3) **Paper Like:** It is reflective, has a very wide viewing angle and excellent contrast.
- (4) **Rechargeable Battery:** 1 year operating time on a single charge.
- (5) **Wireless:** Without any power cord and network cables, the content can be updated wirelessly and controlled remotely.
- (6) **Ultra Low Power Consumption:** It is very energy efficient and allows you to define when the device sleeps or wakes up.
- (7) **Color:** It also provides area color for color requirements.
- (8) **Secure:** No OS, so impervious to hacker & virus. 128 bits AES (16 Bytes) security.
- (9) **Lower Content Cost:** Simple and straightforward. No need for computing power or memory overhead.
- (10) **Low Maintenance:** Light and Thin, easy to install and repair, less installation overhead.

2. ZigBee Wireless Technology

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard for Wireless Personal Area Networks (WPANs). The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking and is designed for wireless controls and sensors.

ZigBee has two modes of operation: Active, also called WakeUp, and Sleep mode. In the active mode the device is communicating with other nodes in the network. In sleep mode the radio is turned off and the system enters power saving mode. The user can configure the interval of both states.

ZigBee operates in the industrial, scientific and medical (ISM) radio bands; 868 MHz in Europe, 915 MHz in the USA and Australia, and 2.4 GHz in most jurisdictions worldwide.

	2.4GHz	868MHz	915MHz
Band	ISM		ISM
Coverage	Worldwide	Europe	US
Modulation	QPSK	BPSK	BPSK
Channel	16	1	10
Data Rate	250K bps	20K bps	40K bps

The ECO-Sign uses ZigBee 2.4GHz.

3. ZigBee Topologies

A ZigBee network can adopt one of three topologies: Star, Tree or Mesh.

(1) **Star Topology**

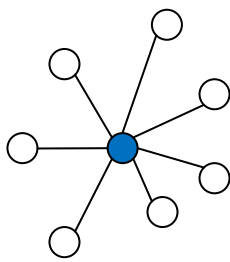
A Star network has a central node, which is linked to all other nodes in the network. All messages travel via the central node.

(2) **Tree Topology**

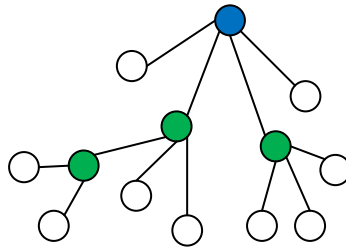
A Tree network has a top node with a branch/leaf structure below. To reach its destination, a message travels up the tree (as far as necessary) and then down the tree.

(3) **Mesh Topology**

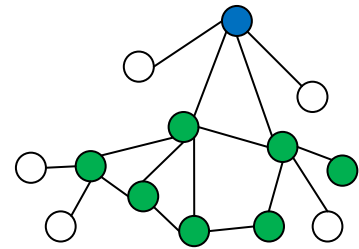
A Mesh network has a tree-like structure in which some leaves are directly linked. Messages can travel across the tree, when a suitable route is available.



Star



Tree



Mesh

● : Coordinator ● : Router ○ : End-Device

4. Node Types

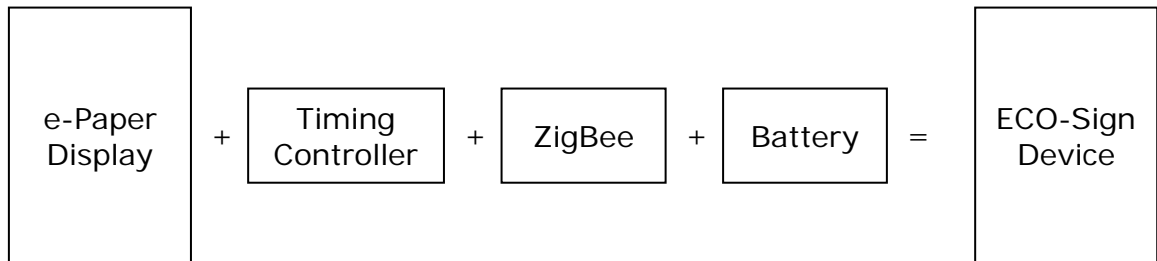
The ZigBee standard has the capacity to address up to 65,535 nodes in a single network. There are three different types of nodes in a ZigBee network:

- (1) **ZigBee Coordinator:** The most capable device, the coordinator forms the root of the network tree and might bridge to other networks. It is the device that started the network originally and is able to store information about the network, including acting as the Trust Center & repository for security keys. In the above illustration the ZigBee Coordinator is color-coded in blue.
- (2) **ZigBee Router:** As well as running an application function, a router can act as an intermediate node, passing messages from source to destination. ZigBee Routers are color coded in green.
- (3) **ZigBee End Device:** It's equal to our ECO-Sign Device. ECO-Sign Device contains just enough functionality to talk to the parent node (either the Coordinator or a Router) and refresh the content on e-Paper display. ZigBee End Devices are color-coded in white.

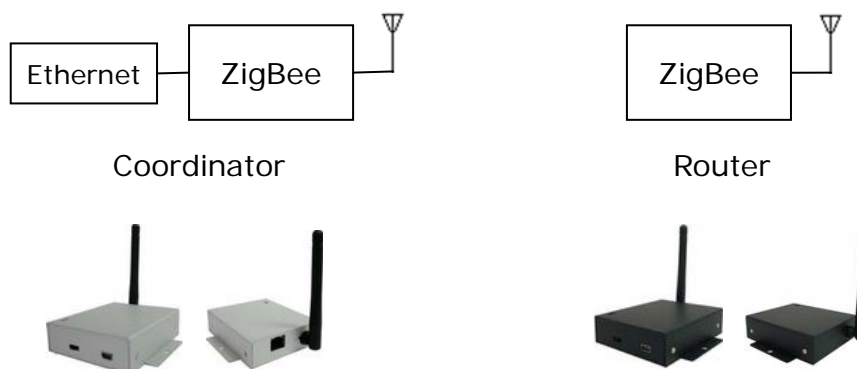
5. ECO-Sign Model & Composed of Elements

The components of the ECO-Sign solution are illustrated below:

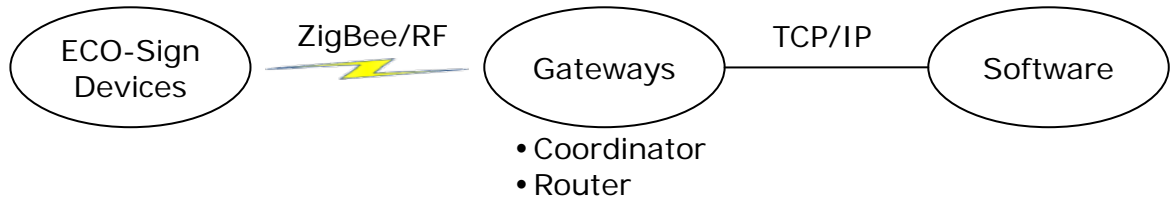
- (1) **ECO-Sign Devices:** (hereinafter the "Device") The Active-Matrix e-Paper display with Timing Control board, ZigBee module and rechargeable battery.



- (2) **Gateways:** Gateways include ZigBee **Coordinator** and ZigBee **Router**. ZigBee Coordinator (hereinafter the "Coordinator") is the beginning of ZigBee network tree and is capable to transfer data from Ethernet to ZigBee signal which is addressable by internet/intranet IP. Router (hereinafter the "Router") acts as repeater to enhance the ZigBee signal hence increasing the distance a node can be installed from the coordinator.



- (3) **Software:** This software is the graphic user interface to manage devices, gateways, networks, data sources, schedules and templates.



- (4) **Peripherals:** mini-USB power adapter.
 Coordinator and Router are powered by this mini-USB power adapter.
 Device is powered by rechargeable battery which has embedded in the cover. The adapter can also be used for recharging the Devices.



II. Pre-Installation

- (1) Please remember to switch the Devices OFF after testing or demonstrating in order to save battery power.
- (2) If you purchase 2 sample kits or more, different color labels (dot sticker) on the devices will identify the components of respective kit. Note that a different color also indicates a different ZigBee channel. There will be no interaction by between the channels, hence a coordinator can only communicate with the same color coded routers and ECO-Signs. Please make sure that all the devices (Coordinator, Router and ECO-Sign) have the same color label.
- (3) This software is only used for ZigBee Coordinator with Ethernet (RJ45 port) which firmware version is greater than 0.53. It doesn't work for Coordinator connecting with computer by USB cable or firmware version is less than 0.5.

III. Quick Start with ECO-Sign

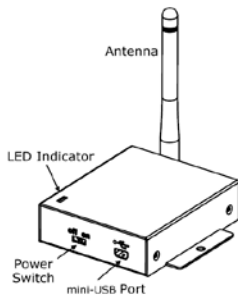
(1) Connect the Coordinator:

- (a) Plug an Ethernet cable into the RJ45 connector and your network switch. An address will automatically be assigned by DHCP.



Coordinator

- (b) Plug in the mini USB power adapter and flip the power switch on the Coordinator.



Coordinator.



mini USB power adapter

(2) Install the software:

Double click ESS_v1.0.exe software and follow the one screen instructions.

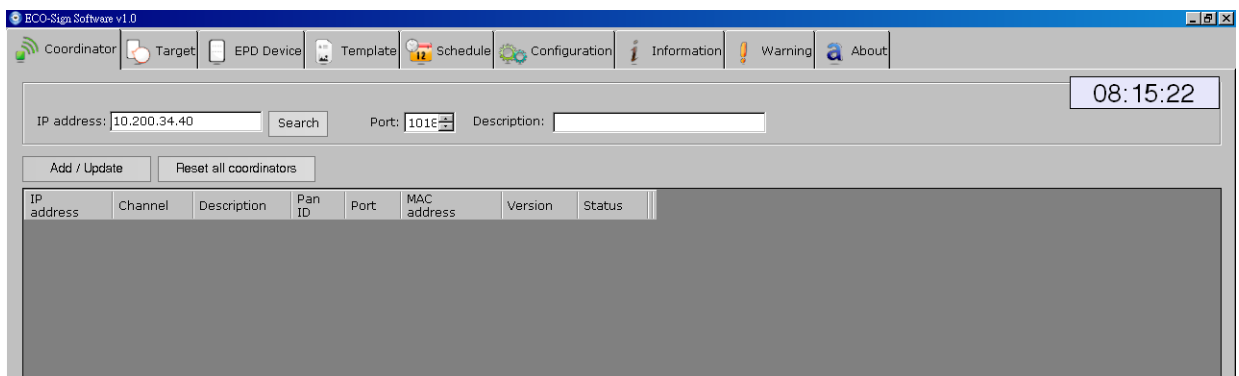


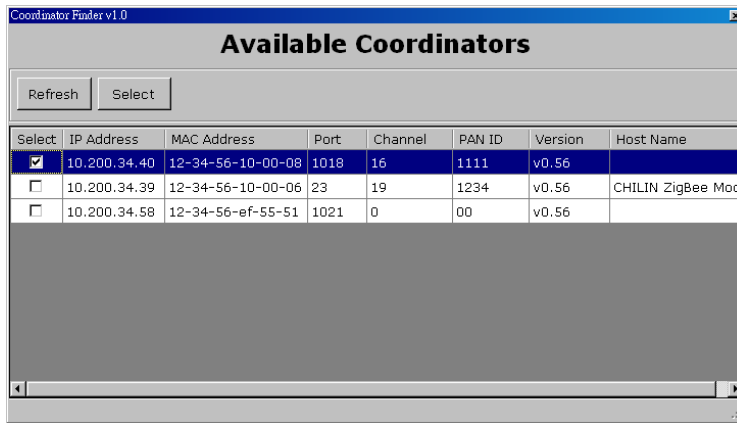
Execute ECOSign.exe

(3) Find the Coordinator:

Click Search on the Coordinator tab.

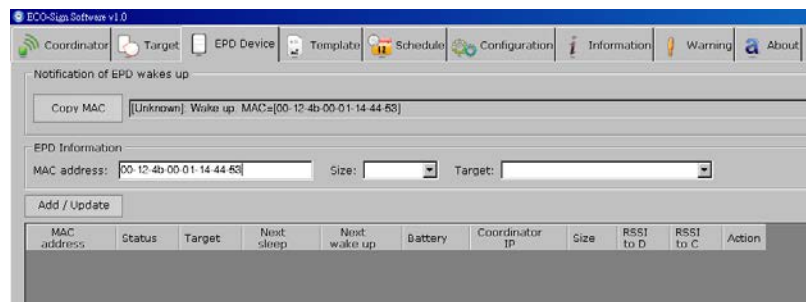
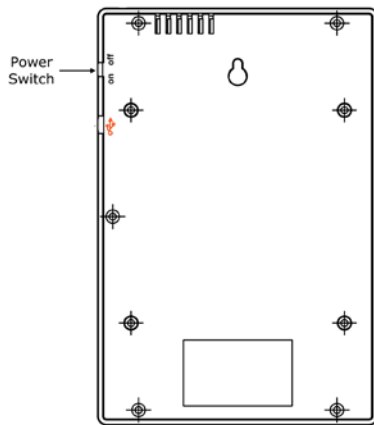
Click the select check box and the select button.





(4) Activate the ECO-Sign:

- (a) Flip the power switch on the ECO-Sign and copy the discovered MAC address on the EPD Device tab.

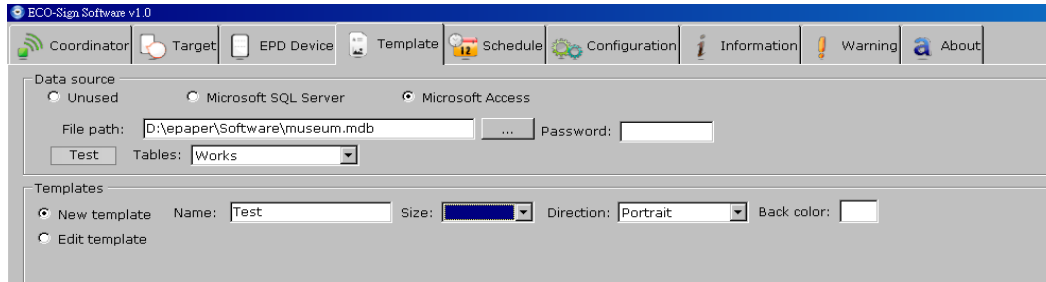


- (b) Select the size and target template. Click [Add/Update] to link the Device and wait for Device to update.

IV. Quick Start with Template Design

(1) Creating Templates:

Creating a template is easy. Simply click the “New Template” radio button. Name the Template and select the size and the orientation from the drop down menus. Click [Next] to go to the drawing board to insert objects.



(2) Configuring a Data Source:

- (a) In this example we configure the ECO-sign software to use Microsoft Access. Click the “Microsoft Access” and open the file browser by clicking the [...] button. Browse to the location of mdb file and click “Test” to establish the connection.
- (b) Select the desired table from the drop down list. Database entries can now be inserted by clicking the Database icon on the drawing board.
- (c) Note: It’s only possible to have one database connection. The configuration connection applies to all Templates.

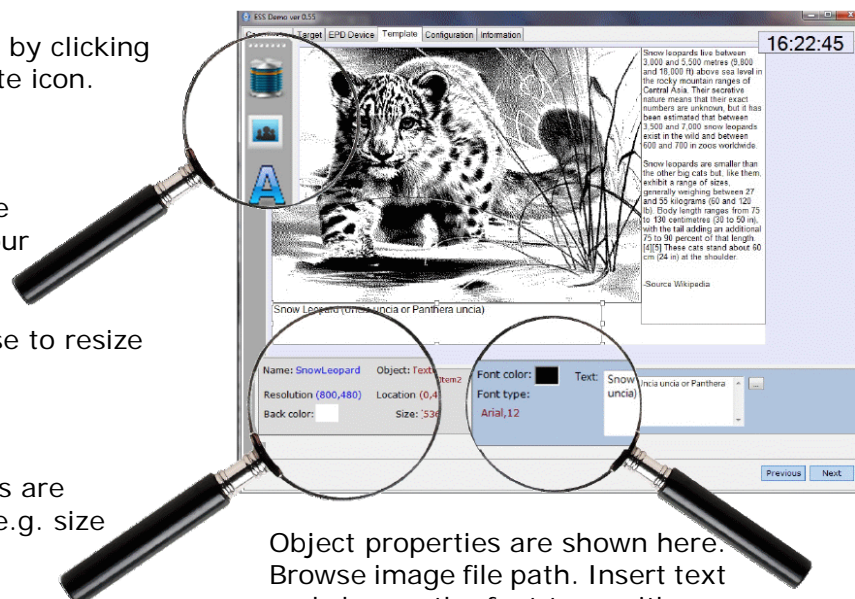
(3) Using the Drawing board

Insert objects by clicking the appropriate icon.

Move objects to the desired position on the drawing board with your mouse.

Use your mouse to resize the objects.

Object attributes are described here e.g. size and resolution.



Object properties are shown here. Browse image file path. Insert text and change the font type with a few clicks. Show barcode by given text and numbers.

V. Software Installation

1. Supported Operating Systems

- Microsoft Windows XP / Vista / 7 : 32 bits or 64 bits

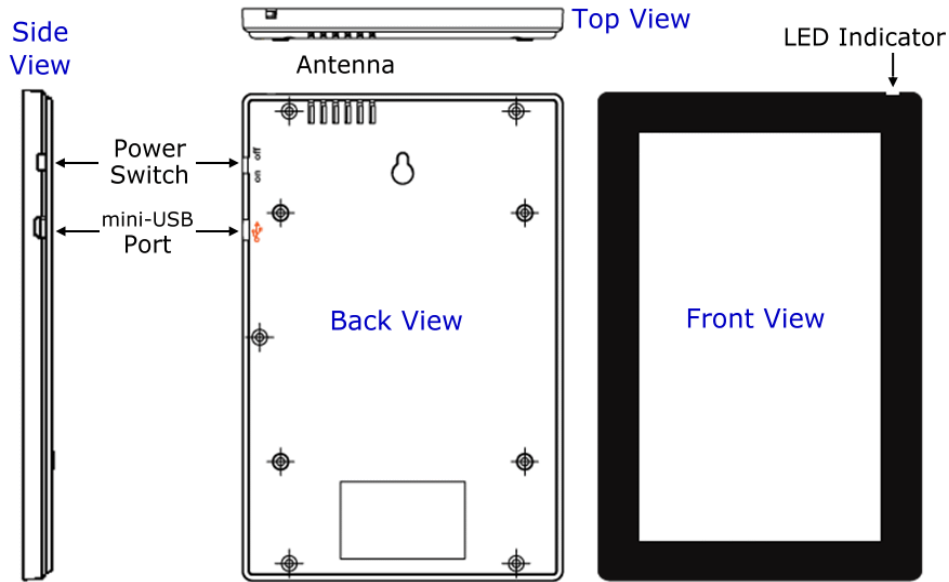
2. Instructions

- Software name : ECO-Sign System (ESS)
- Double click the installer to setup system in your computer.
- Please follow the guide of the installer on screen.

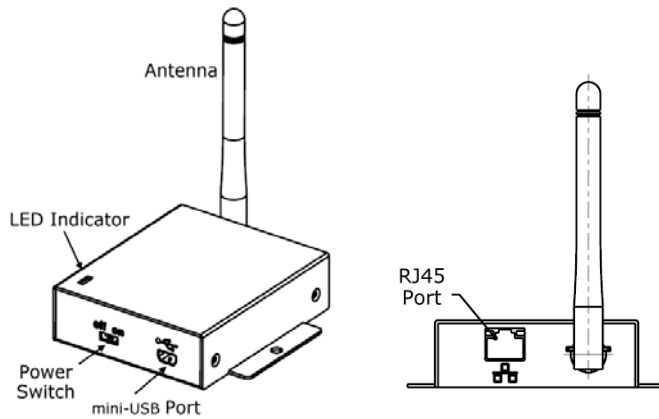
VI. Hardware Installation

1. Overview

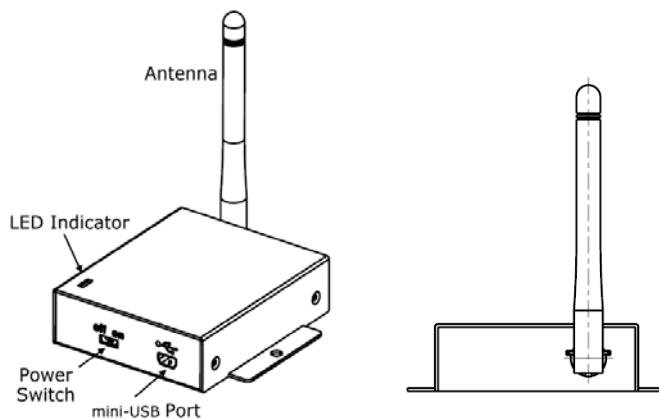
(1) ECO-Sign Device



(2) Coordinator



(3) Router



2. Mounting ECO-Sign

■ ECO-Sign Device

There are two available mounting kits for the ECO-Sign.

1. Wall mounting kit
2. Table stand

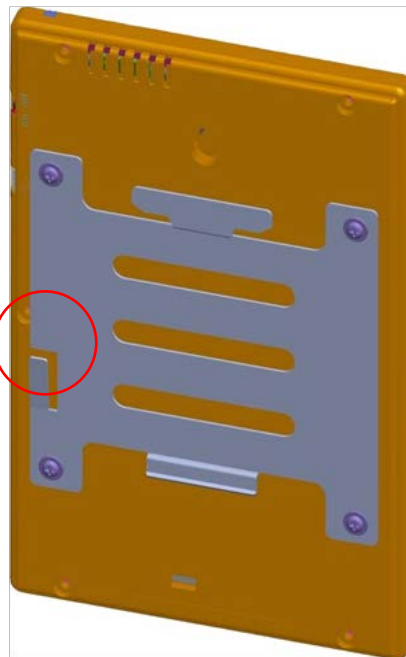
Both mounting kits are optional and available for ordering.

■ Wall mounting

The wall mounting kit includes:

- (a) 1 wall-mount bracket with 4 screws
 - (b) 1 device-mount bracket with 4 screws
- Attaching the Device bracket
 - (a) Slowly screw the four device screws into Device's rear cover holes. Make sure that the lock is at the left side as indicated on the picture below.

Check the lock is
at left side.

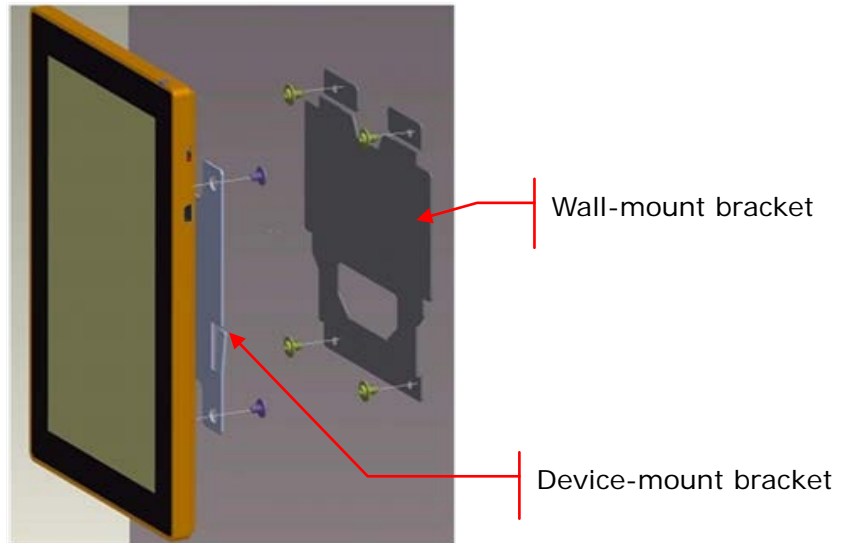


- Steps to mount ECO-Sign Device

- ✧ Portrait orientation

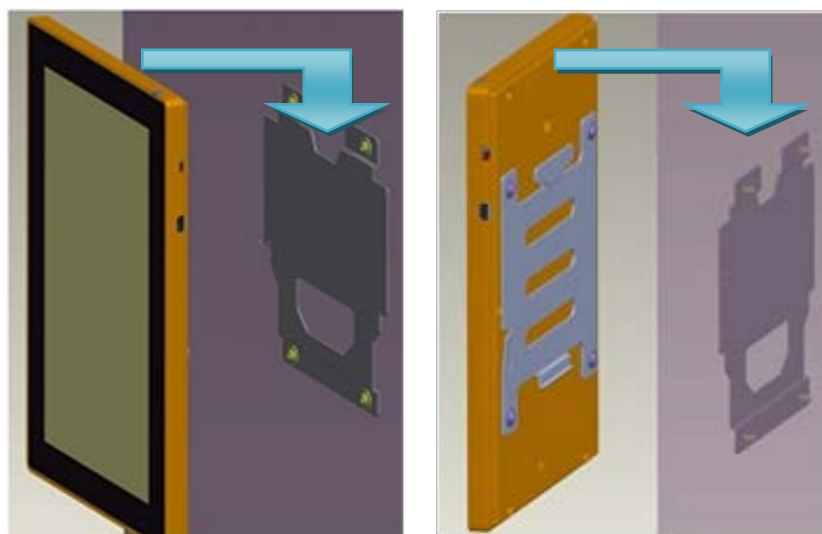
(a) Find an appropriate place to mount the Device.

(b) Mark the locations of the four screws using the wall-mount bracket as a template. You can also fasten the four provided wall screws directly to align the mounting bracket. Notice the orientation of the wall bracket in the picture below.



(c) Attach the Device to the wall-mount.

Align the hinges and slide the Device down to the lock on the left side makes a click sound.

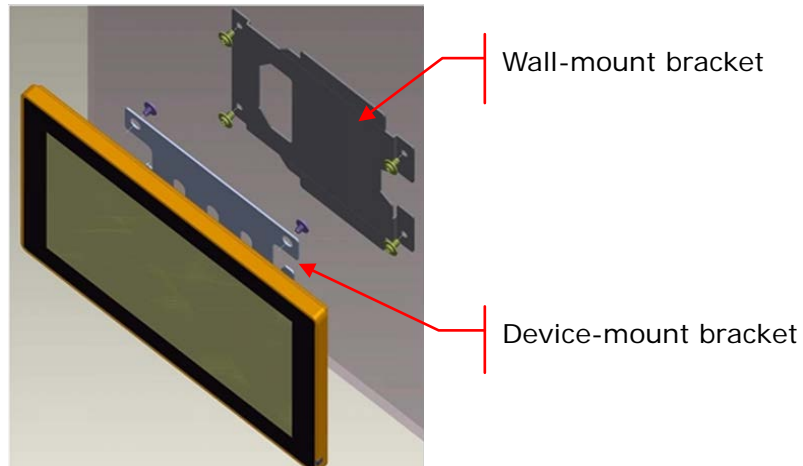


Front view

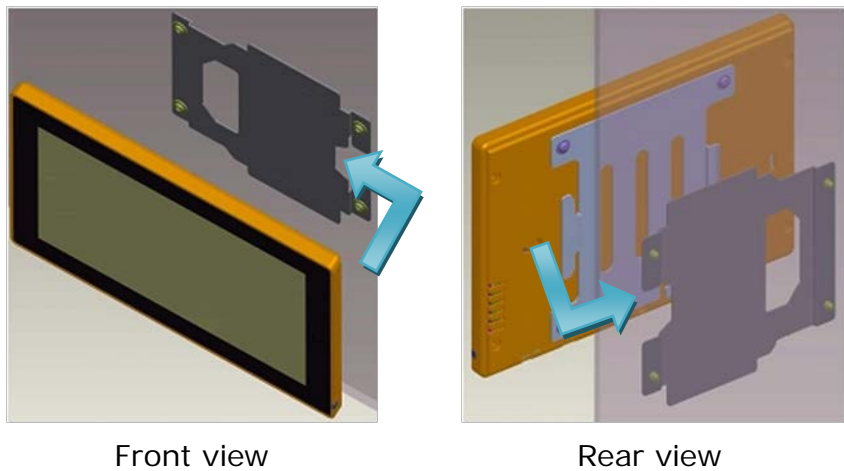
Rear view

✧ Landscape orientation

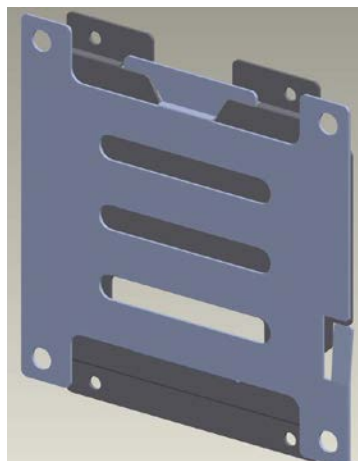
- (a) Find an appropriate place to mount Device.
- (b) Mark the locations of the four screws using the wall-mount bracket as a template. You can also fasten the four provided wall screws directly to align the mounting bracket. Notice the orientation of the wall bracket in the picture below.



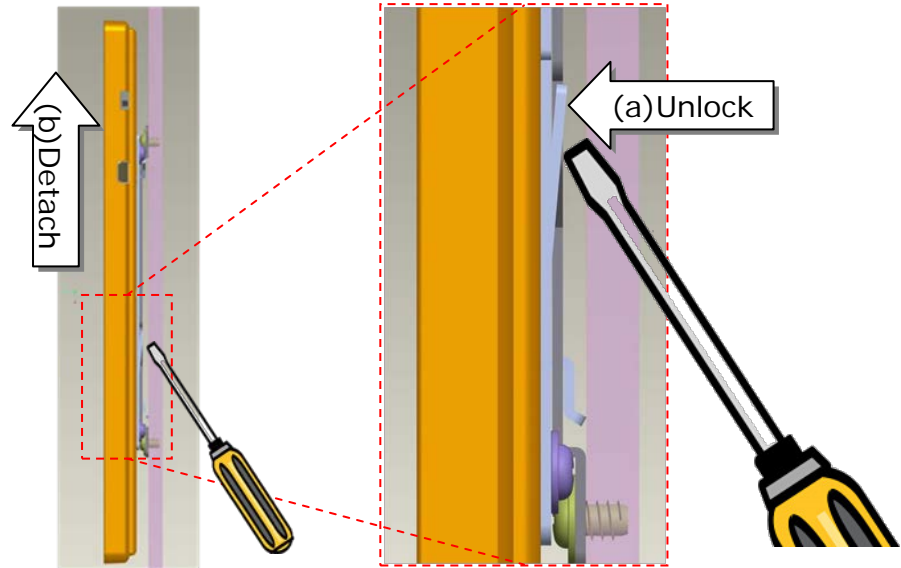
- (c) Attach Device to wall-mount bracket from right side.



- ✧ This diagram shows both brackets mounted type.

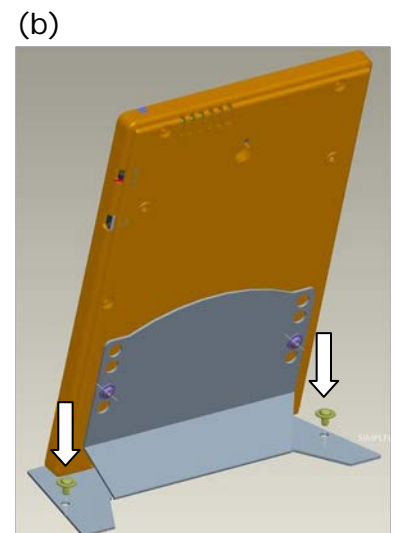
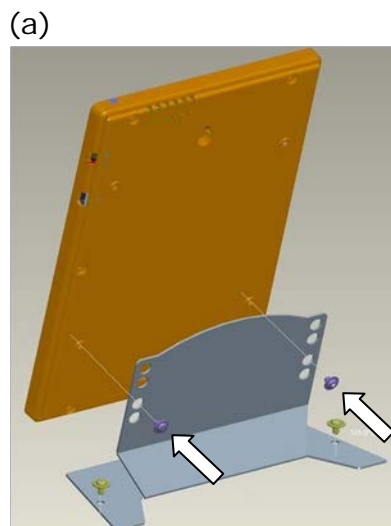


- Steps to detach ECO-Sign Device
 - (a) If you want to detach the Device, you need a flat screwdriver to release the lock at wall-mount bracket.
 - (b) Press down the lock and slide the sign in the direction of the power switch.



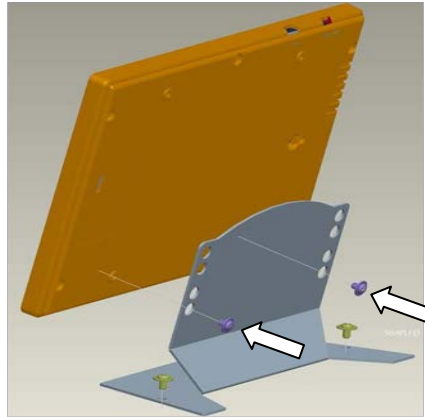
■ **Table Stand**

- The table stand includes
 - (a) 1 device-mount stand with 4 screws
- Device-mount bracket
 - (a) Slowly screw the two device screws into Device's rear cover holes with stand kit.
 - (b) Secure the stand to the table.
 - Portrait orientation

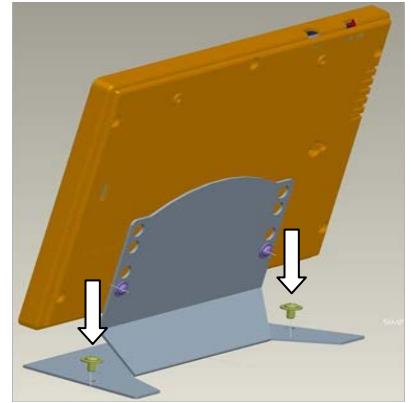


- Landscape orientation

(a)

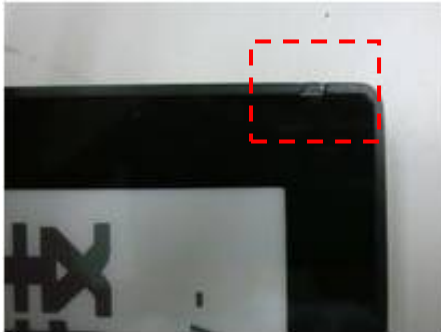


(b)



3. LED Indicator (on Device)

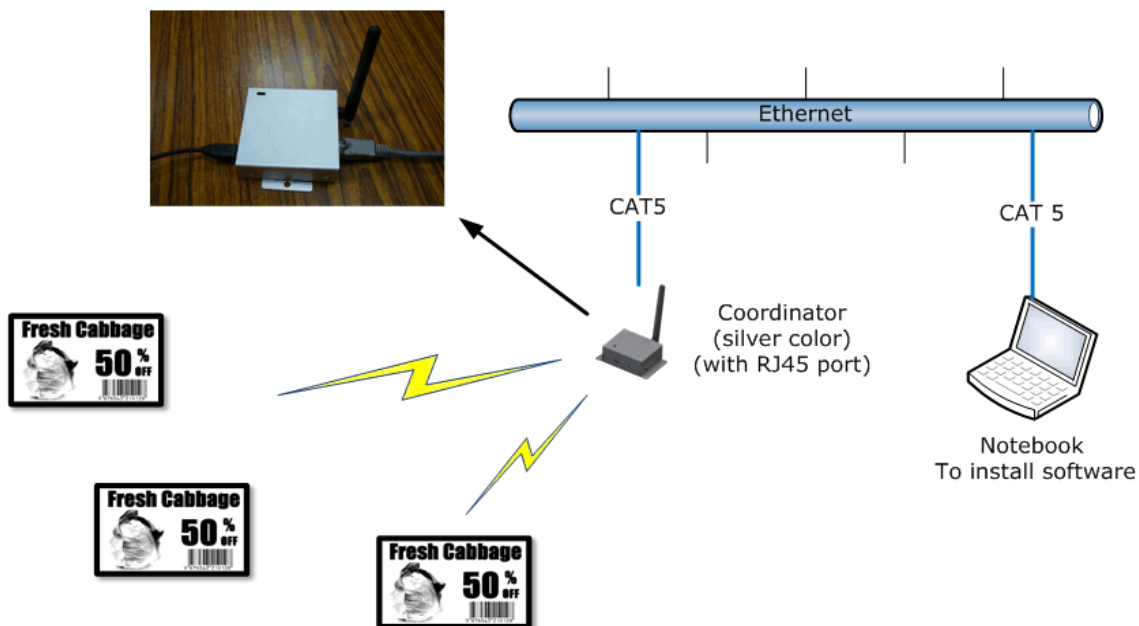
The LED indicator has two color types on the front cover top of the Device.



- (1) **Green:** When the Device is receiving or transmitting signal, the Green LED will be flashing.
- (2) **Orange:** When you use USB cable or power adapter to recharge the battery of the Device, the orange LED will light up. When fully charged the LED will turn off. It typically takes 6-8 hours to fully charge the battery.

4. Connecting Coordinator / Router

The coordinator connects to the LAN with a regular network cable to control and communicate with nodes in the ZigBee network. The typical layout is shown below.



- (1) Computer: Please prepare a standalone computer or server to install software and connect to local network in order to search Coordinator and control Devices later.
- (2) Ethernet: Please make sure your intranet has a DHCP server and allows Coordinator to request a private IP in network.

- (3) Coordinator: Please use CAT5 cable to connect with Coordinator to the local network and power it by the provided mini-USB power adapter. If you order two or more Coordinators, different color labels are pasted on each Coordinator indicating different ZigBee channels.
- (4) Router: Please power the router by the provided mini-USB power adapter.
- (5) The devices are now ready to use and should be placed in an area covered by the ZigBee network.

5. Recharging Device

- ✧ The Device will arrive with full battery capacity; you will not need to charge it prior to first use.
- ✧ If the display of the Device is unable to display the selected content correctly, or if the LEDs do not light up anymore, the Device may be out of power.
- ✧ To recharge the battery of the Device, connect the mini-USB head of the USB adapter to the mini-USB port of the Device, or connect the USB head to either a USB charger or a USB port on your computer by USB cable.
- ✧ The USB power adapter works with the Device, Router and Coordinator.

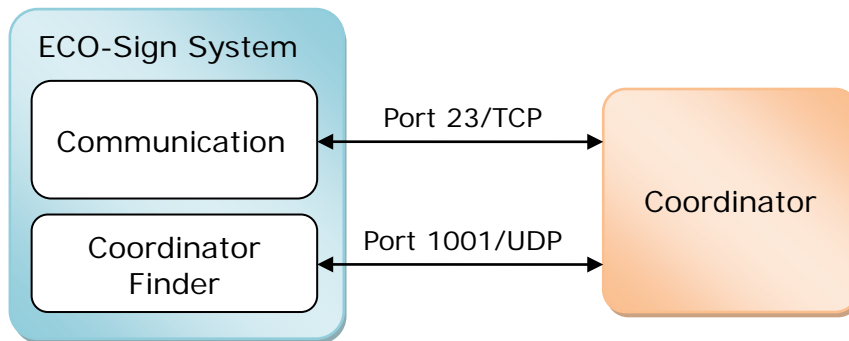
VII. Coordinator Network Configuration

There are two networks built in ZigBee Coordinator, which are Ethernet network (IEEE802.3) and ZigBee wireless network (IEEE802.15.4).

This section will guide you how to configure Ethernet network includes where to change Ethernet port number communicating with Coordinator by a web user interface.

1. Communication Port

The communication between Coordinator and ECO-Sign System is working by Ethernet protocol. You will find below diagram shows the model and ports:



Coordinator is a gateway with RJ45 port to transfer data from Ethernet to ZigBee wireless signal. We use default port number 23 /TCP to communicate with Coordinator. This communication port can be changed by web configuration to suit your network security policy.

In the following introduction, you will know how to find a Coordinator adding in ECO-Sign System in order to control Devices. The default port number 1001 is fixed. If you want to use this function to find a Coordinator in your network, you should add this policy allowing port number 1001 and UDP type from IP address binding with the computer that ECO-Sign System installed to IP address of Coordinator got. If your network security is disallowed to add this policy, you need to find out what IP address that Coordinator got by your firewall system or device, and directly type the IP address and port number of the Coordinator to add it on.

2. Configure Coordinator

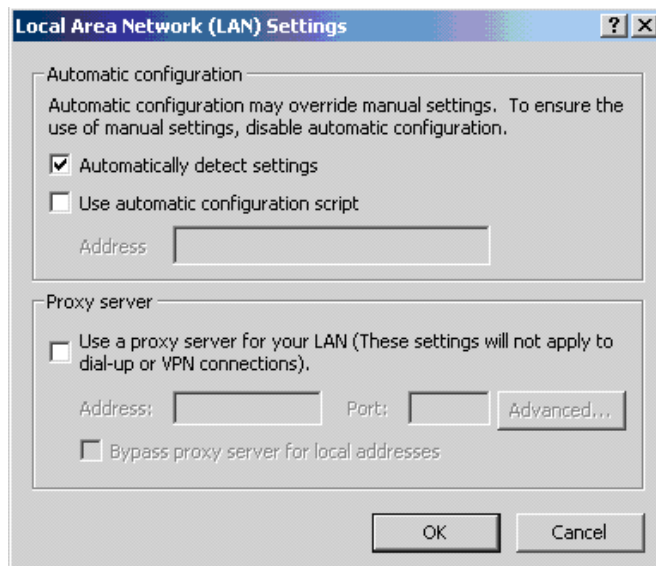
(1) Factory defaults

Item	Value
Link in IP Address	http://192.168.1.1
User name and Password	Username : admin Password : admin
Server Name	PDI ZigBee Mode
Address Type	Static IP
Static Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
Communication Port	23

✧ If you purchase our demo kit, we will preset the Address Type to DHCP/Auto IP.

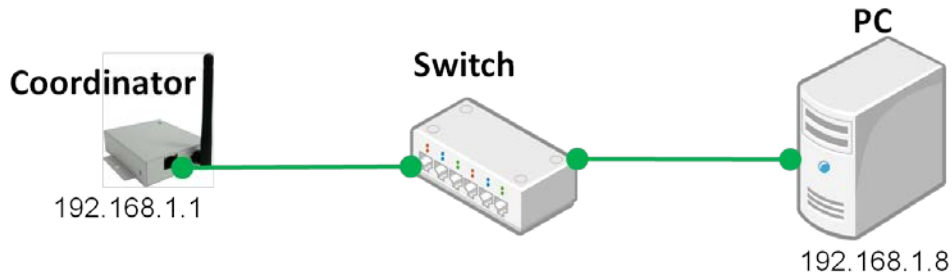
(2) Connect with Coordinator

Before you are doing the following steps, please remove your proxy setting in advance.



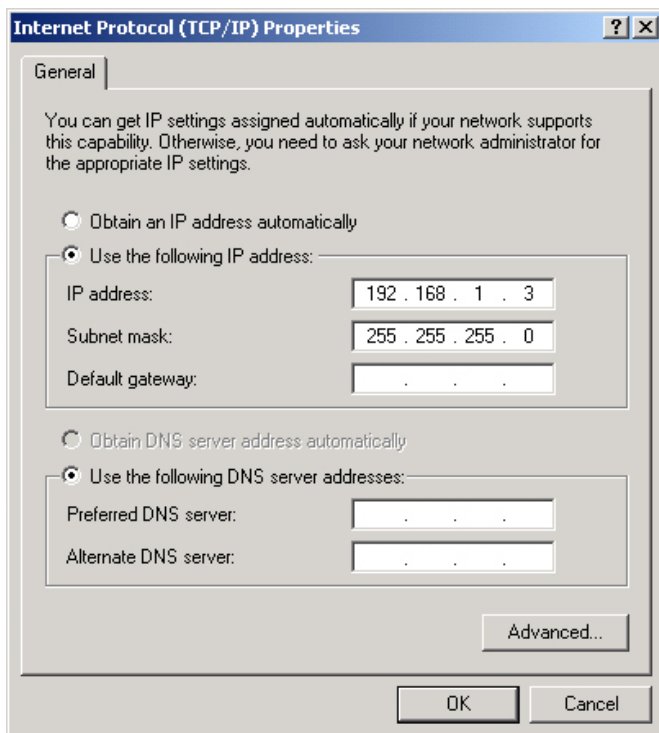
(a) Over Ethernet

You can use intranet network or build a sub network using switch to connect with Coordinator. Note that your network segment should be the same as Coordinator that IP address beginning of "192.168.1.x". For example:

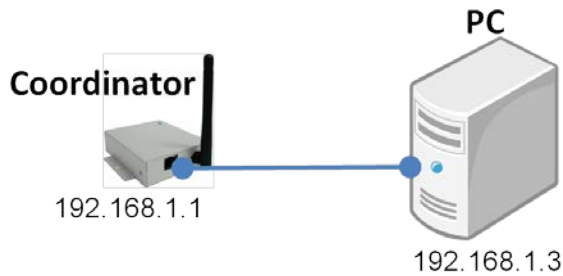


(b) Crossover cable

Note that your network segment should be the same as Coordinator that IP address beginning of "192.168.1.x". You can change your internet protocol (TCP/IP) properties likes below:



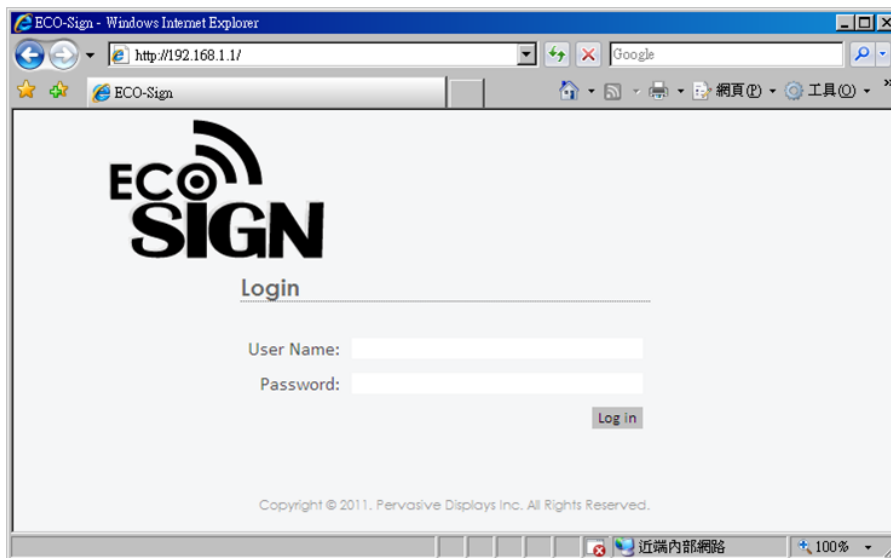
Please use a crossover network cable to connect with Coordinator and computer.



3. Web Configuration

(1) Login

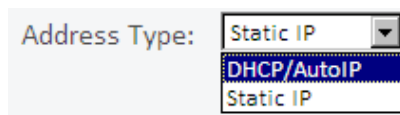
- (a) Open your browser. Input URL for "http://192.168.1.1".
- (b) You will see this web page for login. Please input user name and password.



If you login success, you will find a page to show status and configuration.

(2) Configuration

- (a) Server Name:
You can define a Coordinator name here. When you add a Coordinator to ECO-Sign System, this name will be showed in the list which helps you to clear identify it, so please name it meaningful. Maximum length is 32 characters.
- (b) Address Type:



- DHCP/Auto IP :

The IP address, Subnet mask and gateway of Coordinator will be assigned by DHCP server in the network. We suggest you to select this address type for easier configuring Coordinator in your network.

- Static IP :

The IP address, Subnet mask and gateway of Coordinator have to be assigned by network or system administrator.

IP Address Selection

Server Name:

Address Type:

Static IP Address: . . .

Subnet Mask: . . .

Default Gateway: . . .

Communication Port
(exclude Well-known Port:9.69.1001):

- (c) Communication Port:

This port is used for communicating with Coordinator. For general network, you don't need to change this port number. If your company has firewall or security policy to deny any protocols and ports, you should add a policy to allow this port number, TCP type and IP address from Coordinator to the computer that installs ECO-Sign system. If this port number 23 conflicts your security policy, you can change this number to other one here.

- (d) Reset:

This button to clear the value in fields above.

- (e) Update Settings:

Once you press this button, all of the settings will be updated to Coordinator. You may lose the connection with Coordinator. Please kindly use the new setting to login again to make sure you get the correct configuration.

(3) Restore and Restart

Restore & Restart

Restore all options to factory default states:

Restart the selected Coordinator:

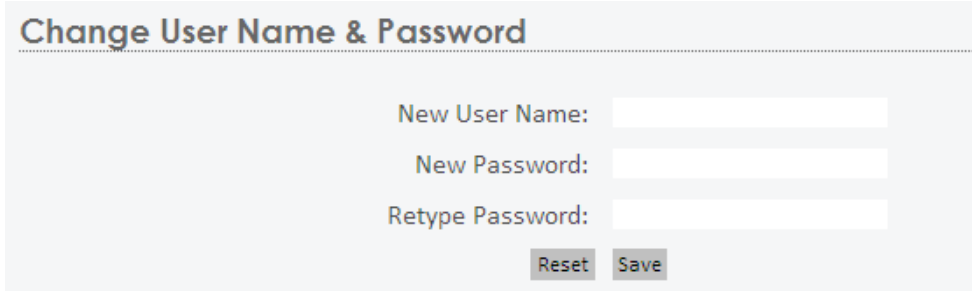
(a) Restore Defaults:

Press this button will restore all options to factory defaults. Note that the Address Type will be reset to "DHCP/Auto IP".

(b) Restart:

Press this button to restart this Coordinator.

(4) Change User Name and Password



The screenshot shows a web configuration page titled "Change User Name & Password". It contains three input fields: "New User Name:", "New Password:", and "Retype Password:". Below the input fields are two buttons: "Reset" and "Save".

If this is your first time to login Coordinator web configuration, you should change the user name and password here.

VIII. Working with Device and Coordinator

1. Starting ESS (ECO-Sign System)

(1) ECO-Sign System provides full access all the functionality of ECO-Sign solution without any activation or registration.



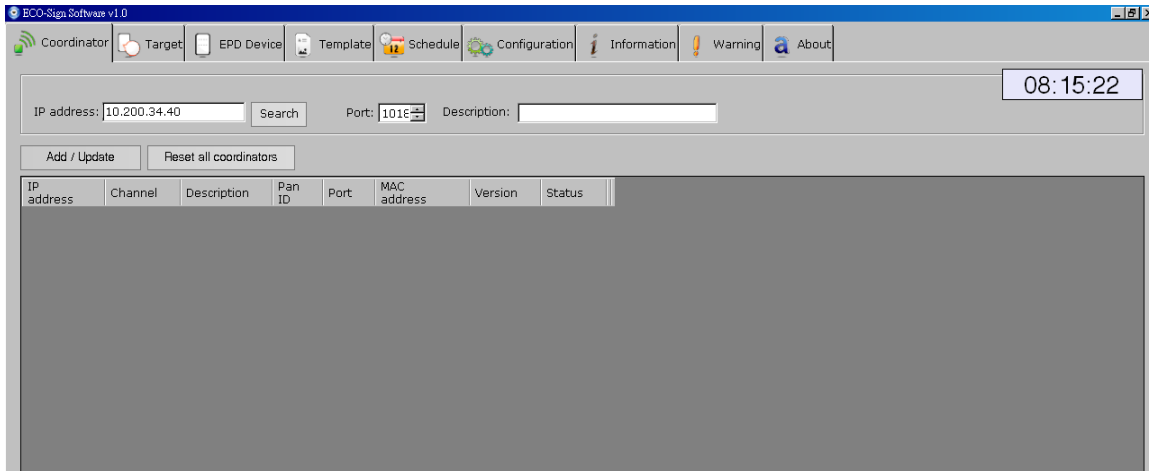
(2) Execute ECOSign.exe

(3) There are several tab strips on the form:

Tab	Descriptions
Coordinator	This page allows user to manage the list of Coordinator. When an additional Coordinator is added in the network, use this page to find it.
Target	Target is an object that EPD Device serves. On this page, the user can change template and schedule.
EPD Device	This page allows the user to manage the list of Devices. In this page, user can change the device’s size, assign target objects and clear know device information.
Template	The template tab allows user to manage the list of templates. Design new layouts, place text and image, link with data sources, connect Microsoft outlook and show barcode etc.
Schedule	The schedule page provides recurring and unconventional time intervals to configure the device active or sleep modes.
Configuration	Some system parameters of ESS.
Information	A text box to show logging information and events in the system.
Warning	The page shows warnings which need user to pay attention.

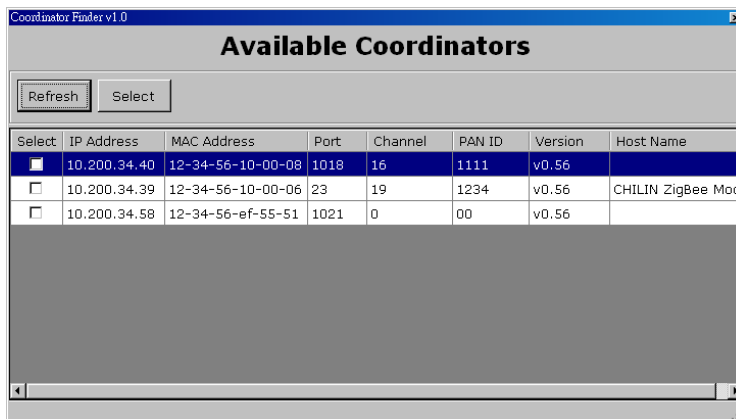
2. Coordinator

After attaching a Coordinator to network, you have to register it in the list.

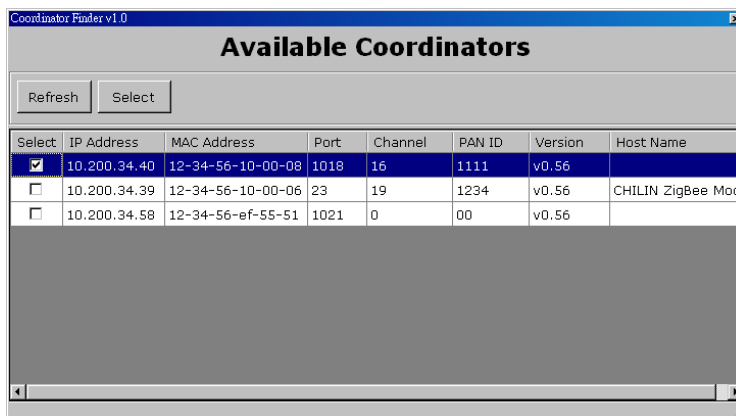


- To **add** a new Coordinator:

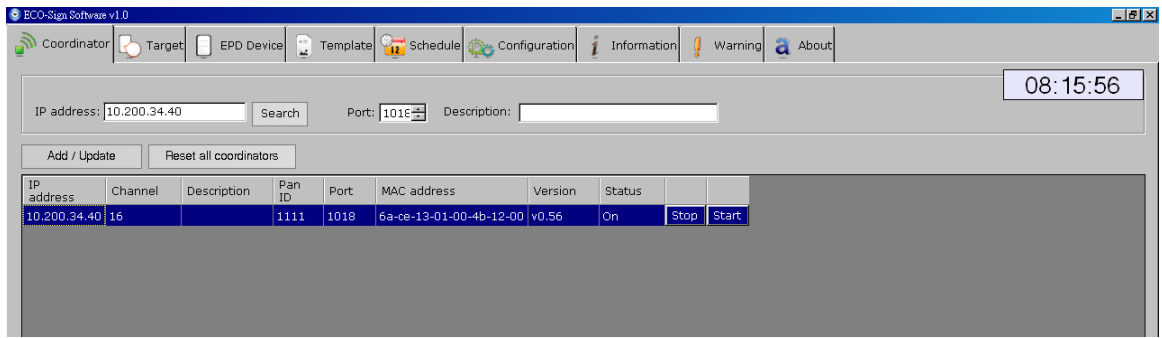
- (1) Click [Search] button. A new window “Coordinator Finder” will pop up. If the new Coordinator has joined the network correctly, it appears on the list, otherwise, please click [Refresh] button to search for it again or check the network cable of Coordinator.



- (2) Select the Check Box of each Coordinator which you want to add in the list for managing. Click [Select] button to exit the window.



- (3) The new Coordinator will be listed on the grid. Please verify that the "Status" of the coordinator is "On".



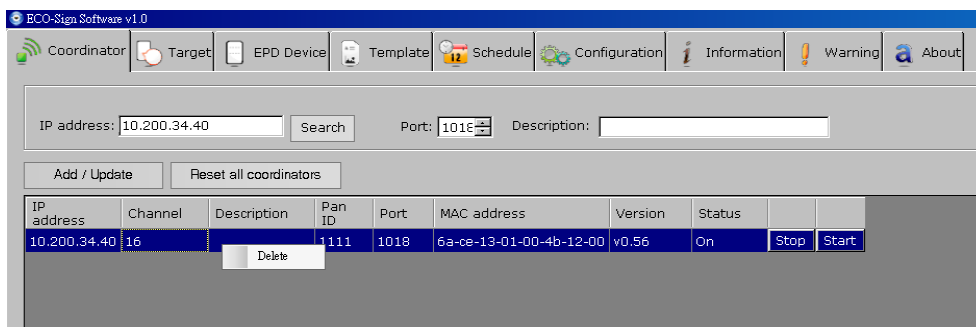
- (4) If you want to manual add a Coordinator, you can directly type the IP address of the Coordinator, the port number and the description. The default port number is 23 /TCP. How to change this port number, please find page.20 "VII.Configure Network Configuration".

■ To **edit** Coordinator:

- (1) The "Channel" and "Pan ID" are set to their default values in production. A firmware update is required to change the settings. The information will be updated automatically while Coordinator is working.
- (2) Click a list that you would like to edit. All of the data will be shown on the top fields.
- (3) It is not possible to change the IP address in the software. If you want to change the IP address contact your network administrator.
- (4) Press [Add/Update] button to finish editing data.

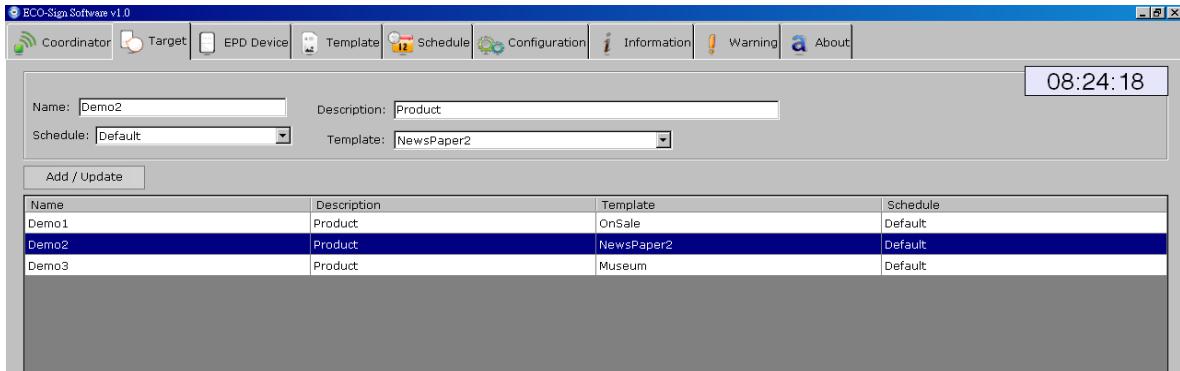
■ To **delete** Coordinator:

- (1) Right click mouse button on a list that you would like to remove, press [Delete] to remove it.



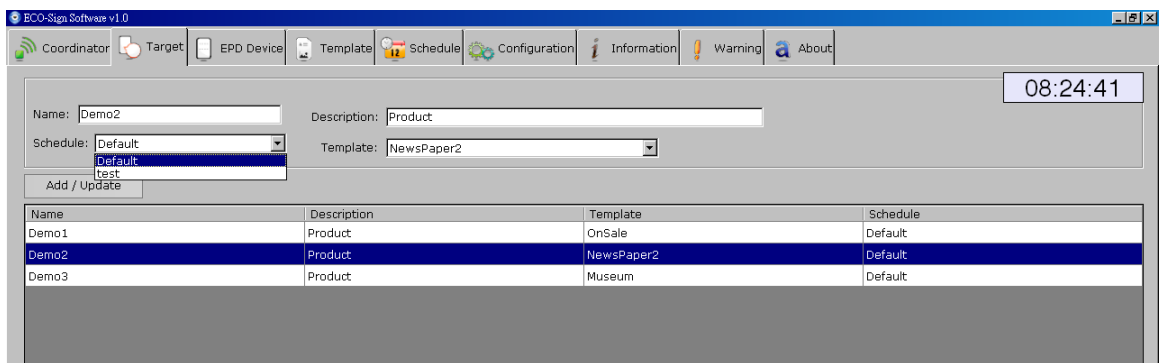
3. Target

Target is an object that EPD Device can serve. A target name should be easy to understand with a meaningful name and description. For example, if you want to define a target for conference room M203 located in factory 2, building A on the 2nd floor, you could give the target name for “F2BAM203”. In the description field you can use “Factory 2, Building A, 2nd Floor, M203 meeting room”.

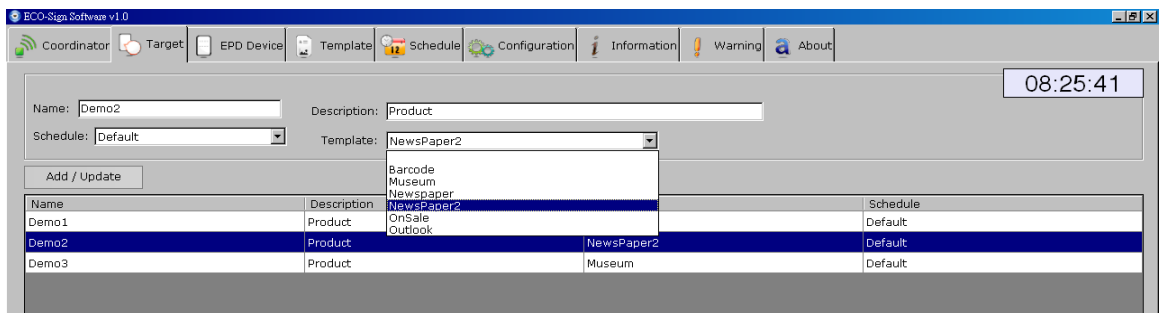


■ To **add** a new Target:

- (1) Input a meaningful name and detail description of a new Target.
- (2) If you have not yet defined new schedule, you can select “Default” Schedule first.



- (3) Assign a Template to the Target. If you have not yet designed a suitable Template, you can select one of the preinstalled templates. You can always go back and change the template for the target at a later point.



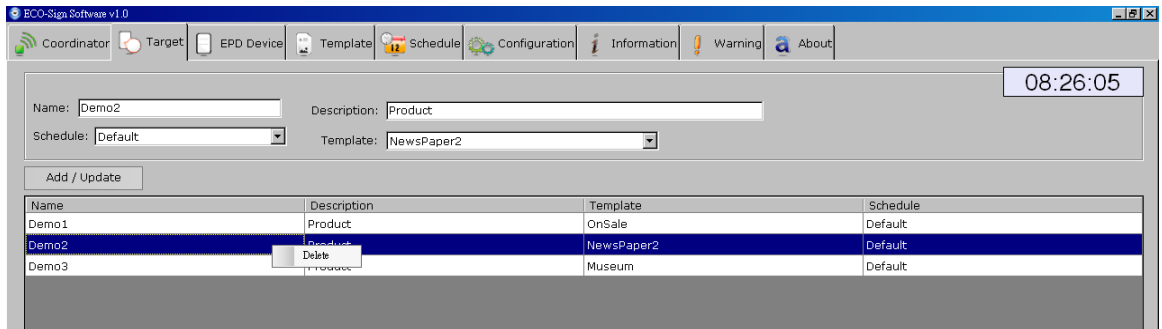
- (4) Press [Add / Update] button to save the changes.

■ To **edit** Target:

- (1) Click an entry in the list; modify the data and then press [Add / Update] button.
- (2) Once the target name is the defined it cannot be changed. If you need to change the name you can delete the target and create a new one.

■ To **delete** Target:

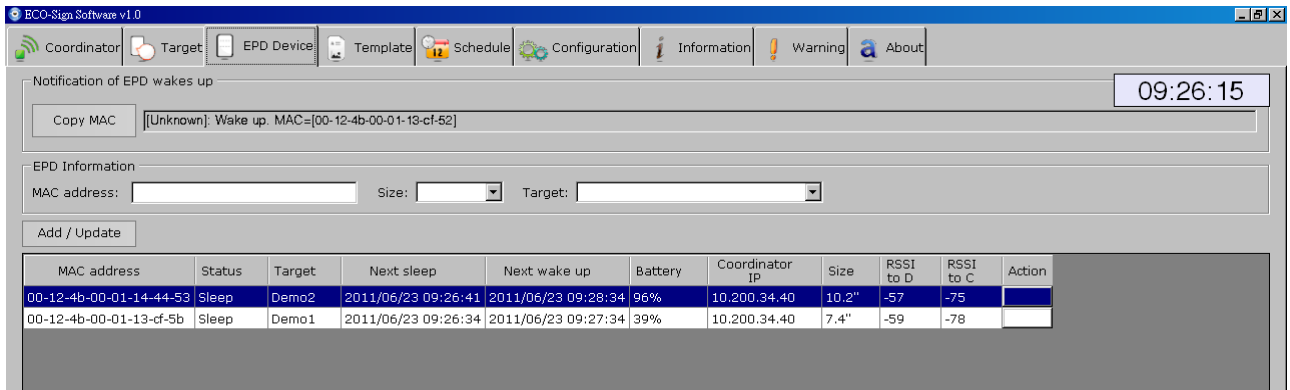
- (1) Right click mouse button on a list that you would like to remove, press [Delete] to remove it.



4. EPD Device

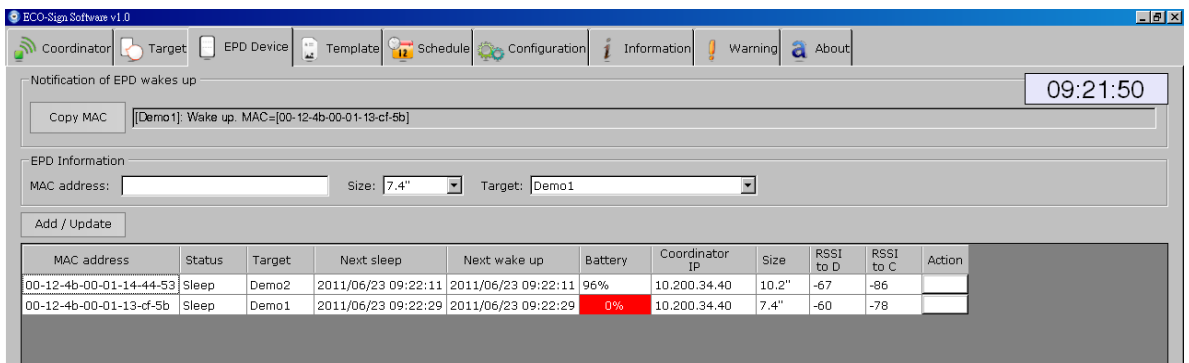
When a Device is switched ON or wakes up, the MAC address will be shown in the “Notification of EPD wakes up” field. If the EPD has not been registered, the message box of will show a Device named [unknown]. To register a device click the “Copy MAC” button select the size and target and click “Add/Update”.

✧ Note: the device only works with the same channel of Coordinator.

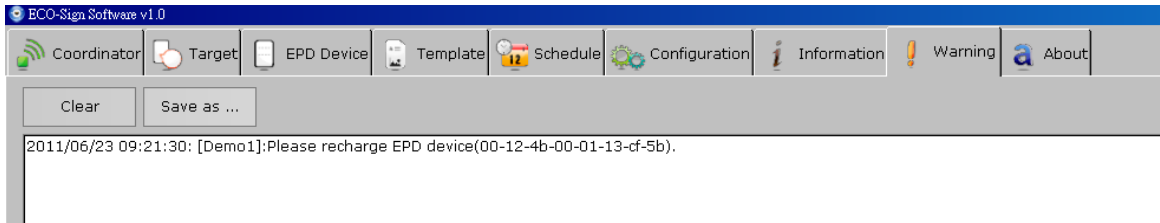


Each field in the grid:

- MAC address : The MAC address of ECO-Sign Device which is a 23 character string in the ##-##-##-##-##-##-##-##-##-##, where # is a number [0-9] or a letter [A-F].
- Status: Show the status of the Device i.e. “Wake Up” or “Sleep”.
- Target: The target the Device is assigned to.
- Next sleep: Shows the time when the Device will enter Sleep mode.
- Next wake up: Shows the time when the Device will enter Active mode.
- Battery: When the device wakes up, it will transmit the remaining power capacity to the software. When the value is between 5~10%, please recharge the Device. When the value is less than 1%, the ESS software will instruct the coordinator to stop sending data to the Device. The cell will be shown in red color.



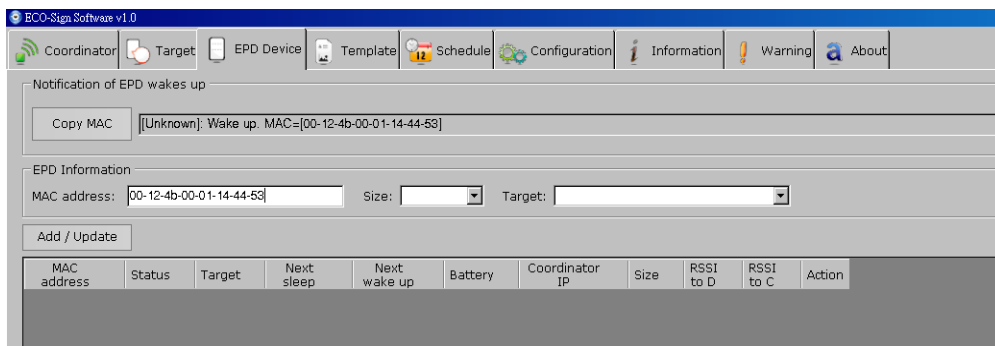
This will also list a warning message in “Warning” tab strip.



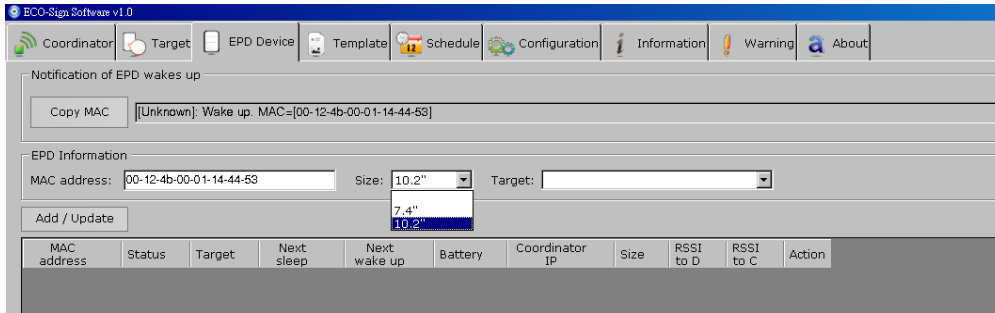
- Coordinator IP: This Device is controlled by which Coordinator.
- Size: The size of Device.
- RSSI: Received Signal Strength Indication which is a measurement of the power present in a received radio signal.
 - Signal Strength : (unit=dBm)
0 ~ -25 = Strong, -26 ~ -50 = Good, -51 ~ -75 = Fair, -76 ~ = Weak.
 - “RSSI to D” means the signal strength from gateway to Device.
“RSSI to C” means the signal strength back to Coordinator.
 - ✧ When RSSI is less than -85 dBm, a router should be added between Coordinator and Device to enhance signal strength and distance.

■ To **add** a new EPD Device:

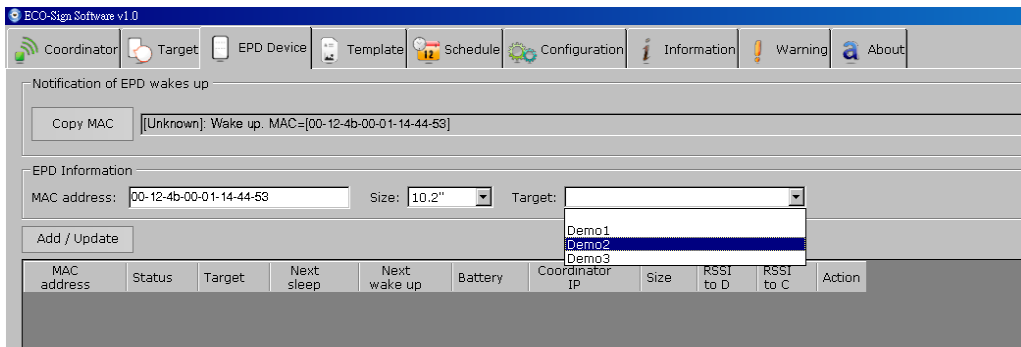
- (1) There are two places to show the waked up message of EPD Device. One is shown in Information tab strip; another is at the top of this tab “Notification of EPD wakes up”.
- (2) When you switch ON a new Device, the MAC address will show in “Notification of EPD wakes up” box. Please click [Copy MAC] button and then the MAC address in “EPD information” will be copied. You can also directly type the MAC address here.



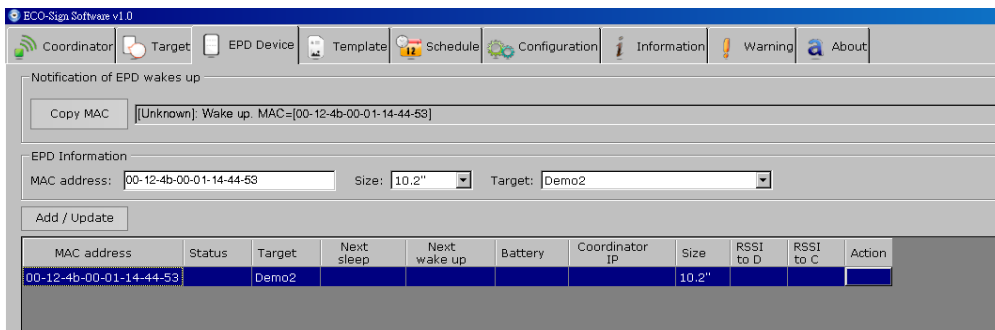
(3) Select right panel size of the Device.



(4) Select a Target name for the EPD Device and assign it.



(5) Click [Add / Update] button to add this EPD Device to list. When the EPD Device wakes up next time, the message will show correct Target name and work with Schedule accordingly.

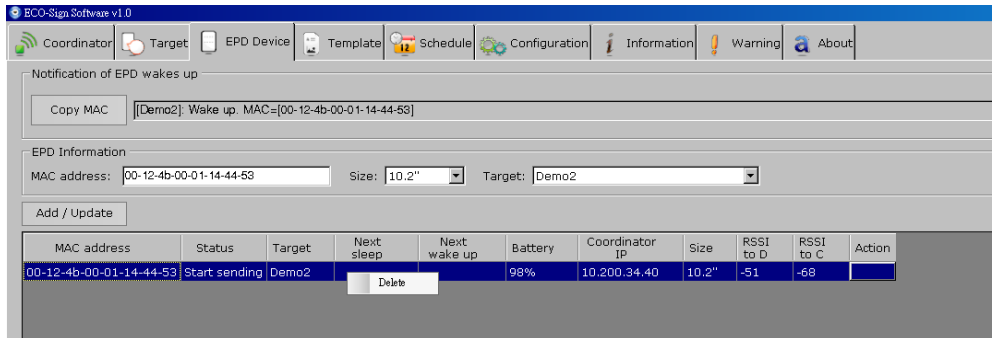


■ To **edit** a EPD Device:

- (1) Click a list that you would like to edit. Data will be shown on the top fields.
- (2) MAC address is the primary key which cannot be changed.
- (3) Press [Add/Update] button to finish editing data.

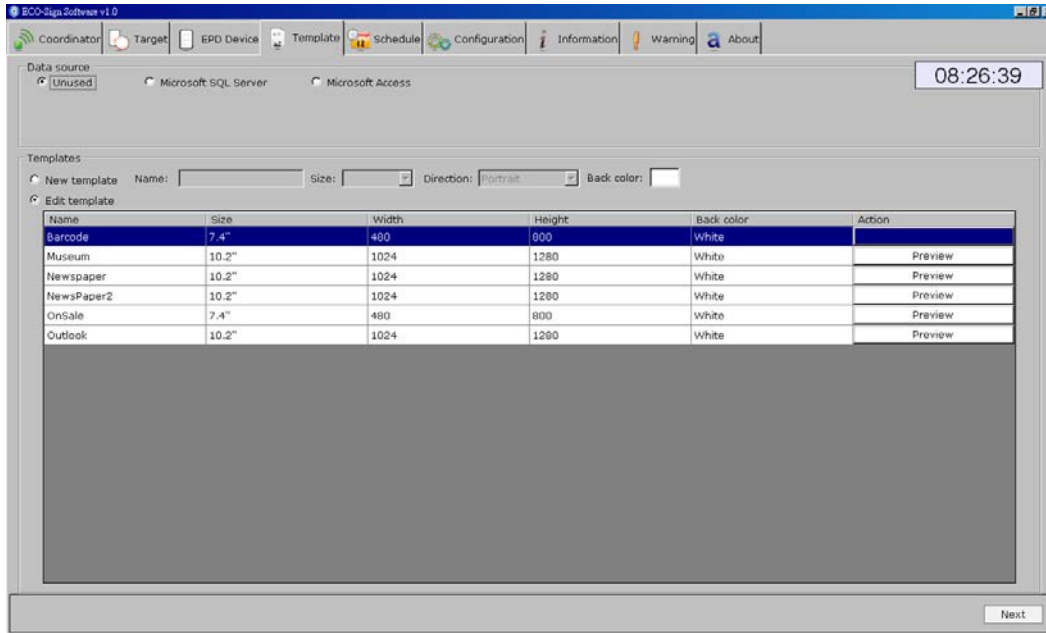
■ To **delete** EPD Device:

- (1) With your mouse right click on the EPD Device that you would like to remove and select [Delete] from the popup menu.



5. Template

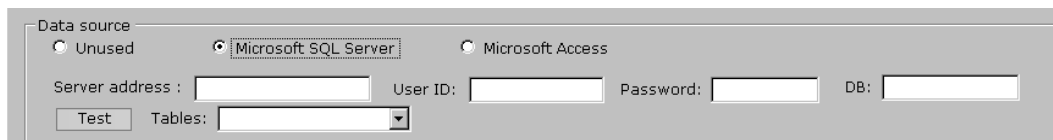
ESS provides several objects and connectivity to design different content.



■ Data Source:

In this group, you just need to set the database connection from Microsoft SQL Server or Access one time. You can start to drag a database object on the layout and assign table schema by condition. If your data isn't from a database, use the "Unused" radio button option.

(1) Microsoft SQL Server:



Please input a Microsoft SQL Server's IP address/host name, login user ID, password and database name in the provided text fields.

Click [Test] to test the connection. If the connection is successful, the Tables in the database will be listed in the drop-down list.

(2) Microsoft Access:



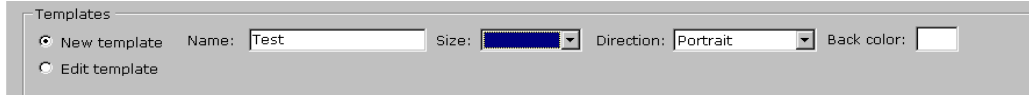
Click [...] button to select an Access database file. The file path will be shown in the text box. If the Access database is password protected, please input it in the Password field.

Click [Test] to test the connection. If the connection is successful, the tables in the database will be listed in the drop-down list.

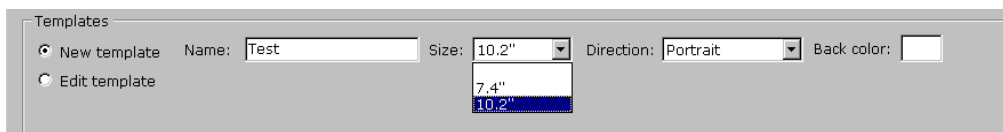
■ **Templates:**

1. To **add** a new template:

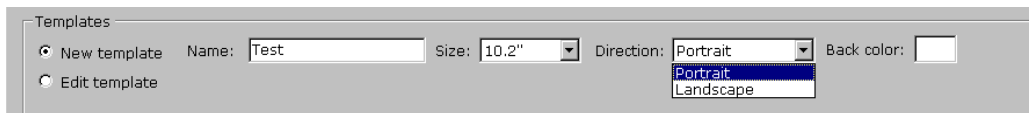
(1) Select the [New template] option button and name your template.



(2) Select the size of Template. ESS only "7.4" and "10.2" templates are supported.



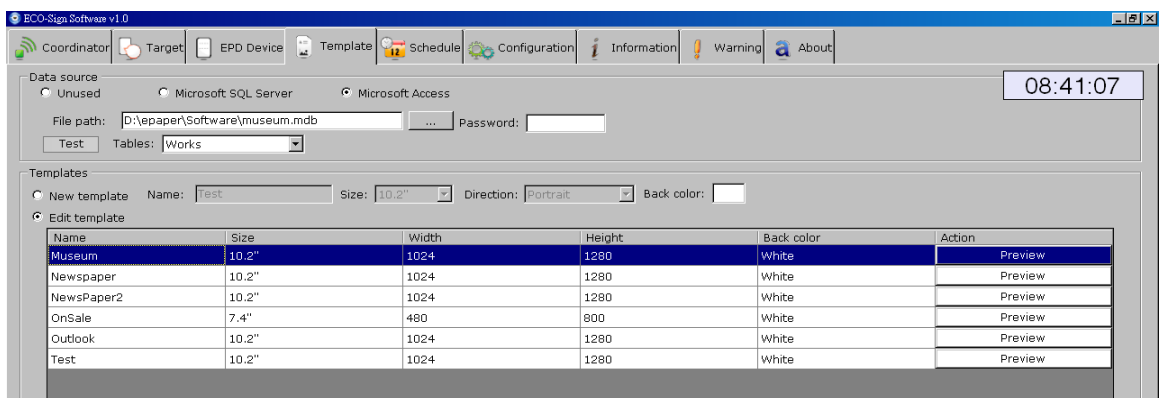
(3) Select Direction. For example, 800x480 pixels is 7.4" landscape direction, 480x800 pixels is portrait direction.



(4) Select the background color. The background color can be either black or white.

(5) Click [Next] button, the template designer will appear on next screen.

2. To **edit** a template:



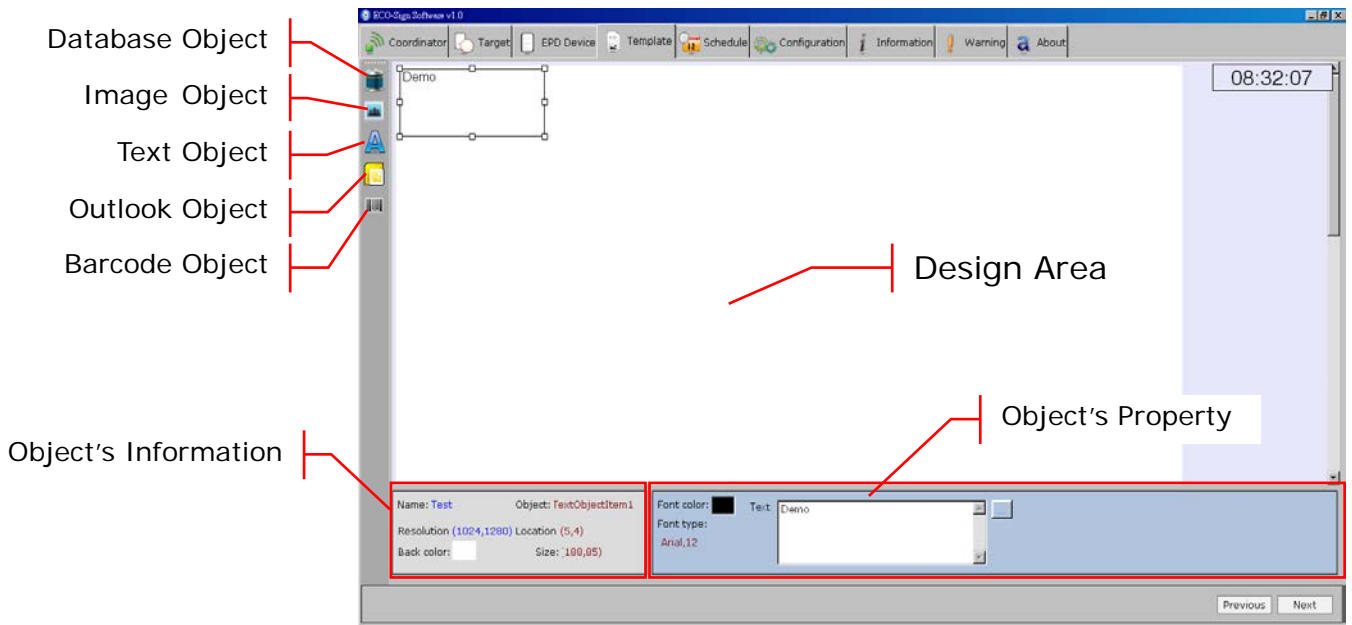
(1) Select [Edit template] option button.

(2) Click on a template that you would like to edit and click [Next] button then.

(3) You can click each "Preview" button to see the final result immediately. The image will be opened by your system's default image viewer.

- To **delete** a template: With your mouse right click on the template that you would like to remove and select [Delete] from the popup menu.

■ **Template Designer:**



- There are at least five objects to design the layout and setup of your template which are (1) Database (2) Image (3) Text (4) Microsoft Outlook and (5) Barcode object.
- Each new object that you clicked will be added to the templates top-left position. You can press and hold your left mouse button to move the object to the desired position. You can also drag the borders of object to change the size
- In object's property area, you can change font, size or color.

➤ **Database object:**

You can link a field from a data table of Microsoft SQL Server or Access database that you've set in previous step.

The database object's property looks like:

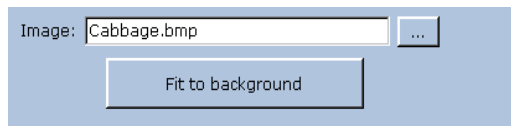
WHERE clause: Artist = Claude Monet (1
 Display field: Works_name
 Result: Marine View with a Sunset Apply

- WHERE clause:
 The WHERE clause is used for extracting the records that fulfill a specified criterion, likes WHERE string in SQL statement. It only supports "equal" operator to filter the result only one record fits.

- **Display field:**
The field to be shown on Device.
- **Result:**
To show filtered record. Please make sure only one record is returned. If multiple records are return, you must redefine the WHERE clause.
- Press [Apply] to see the result on Template

➤ **Image object:**

The image object's property:



You can import a .bmp, .jpg, or .png image file onto your template by pressing [...] button. Press [Fit the background] button to scale your imported image to fit the entire background.

➤ **Text object:**

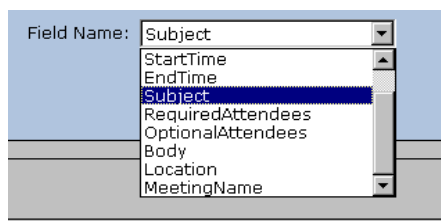
The text object's property:



You can place any text object on the layout to act as a field name or type the string you want in the box. You also can press "..." button to import the content from a text file.

➤ **Outlook object:**

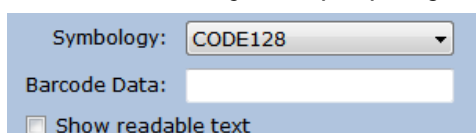
The Microsoft Outlook object's property:



The field name are given from Microsoft Outlook. You can place the field you want onto the layout, and then the field will show data according to schedule.

➤ **Barcode object:**

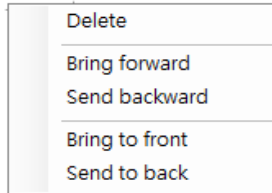
The Barcode object's property:



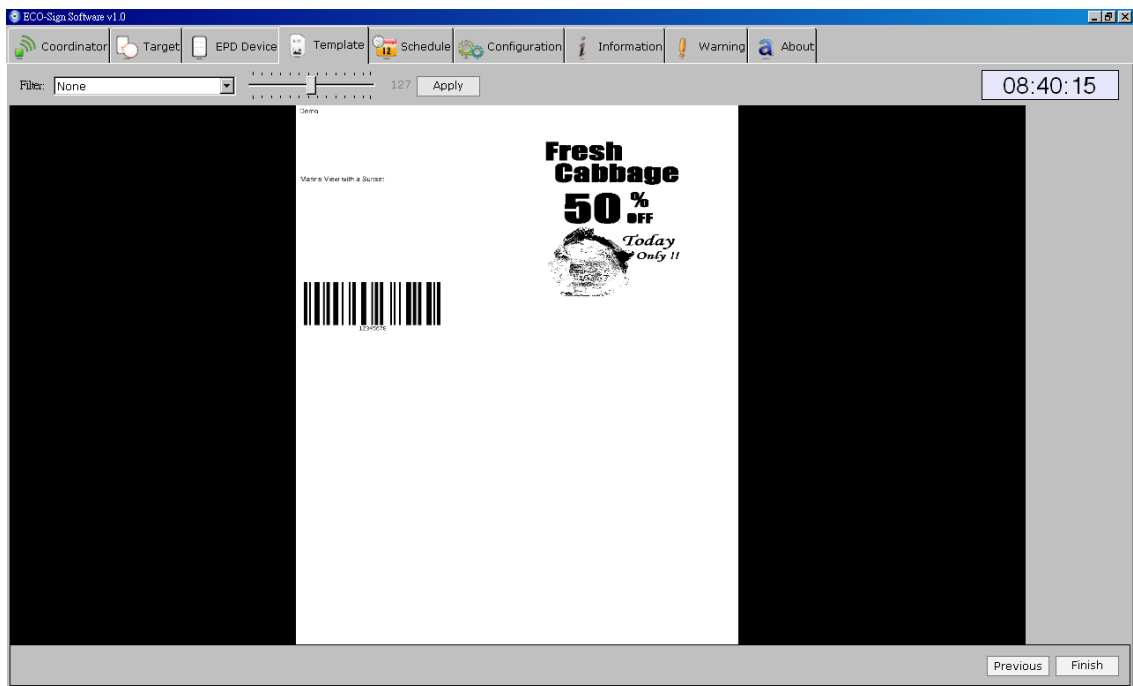
You can select the Symbology of barcode and input the data you would like to

show. If your barcode will show text under the barcode, "Show readable text" option should be checked.

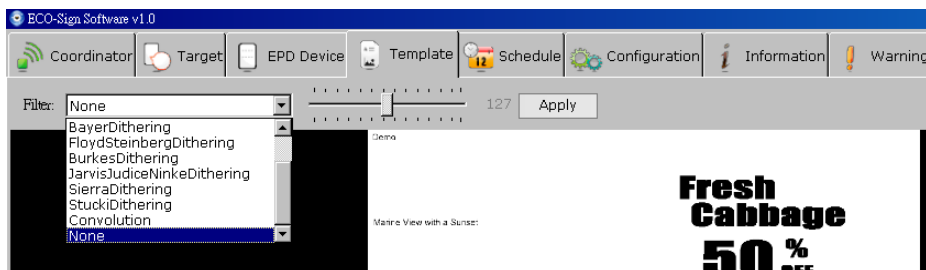
4. If some objects are overlapping, you can right-click the object and choose to "Bring forward", "Send backward", "Bring to front" or "Send to back" on the pop-up menu. You can also use the "Delete" button to delete an object.



5. When you finish a template, please click [Next] button at the bottom-right position to preview the generated image. Otherwise, you can click [Previous] button to go back to the template list.



6. Several filters are provided to help you generate different effects.



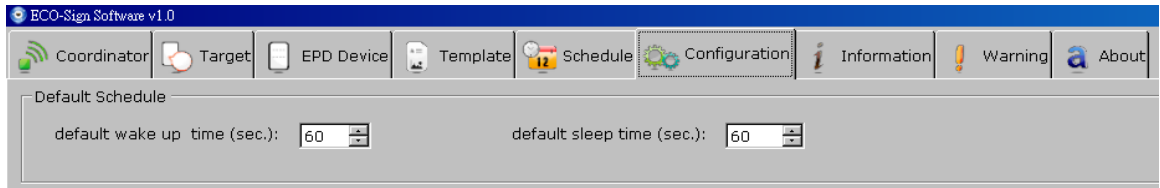
7. The page shows the converted image. If okay, press [Finish] button back to template list.

6. Schedule

Schedule provides recurring and unconventional time intervals to configure the Device active or sleep modes.

■ Recurring time interval

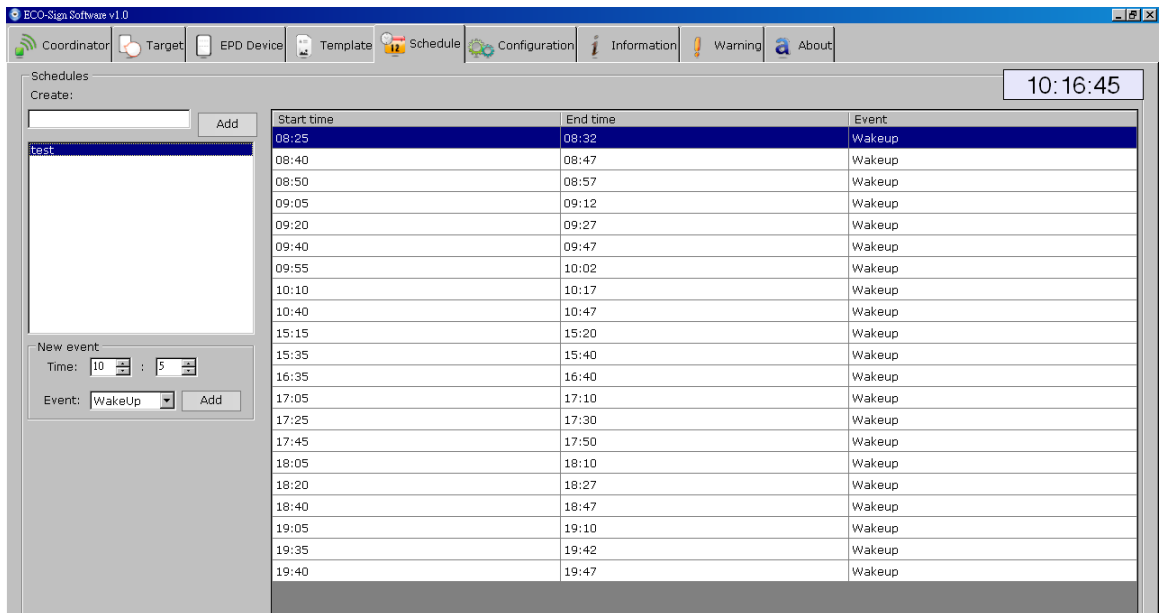
1. Please switch to “Configuration” page. You can set recurring time here. It is also the “Default” schedule which can be default selected in Target page to assign this schedule.



2. This setting is used for test or demo purpose. In real use case, we won't allow Device frequently wakes up because it consumes much power.

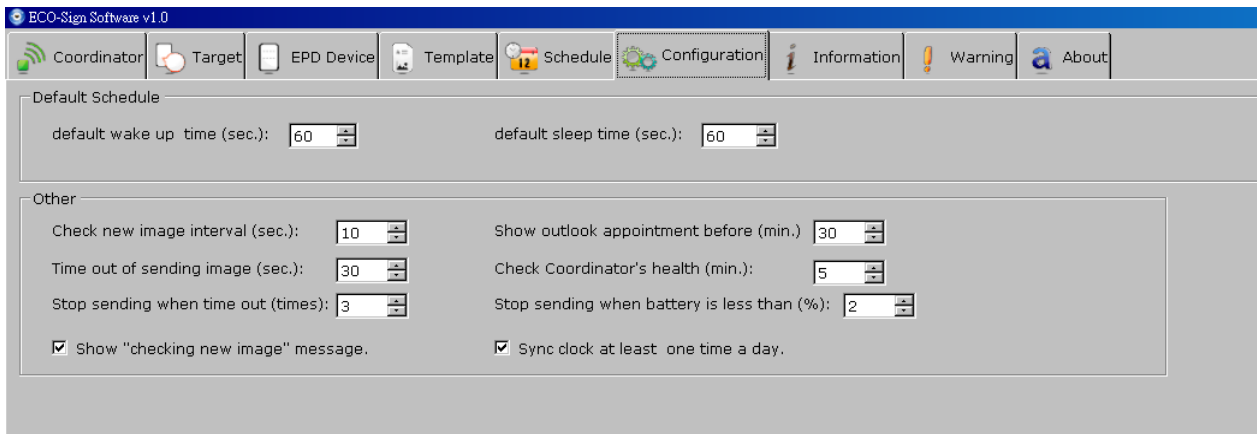
■ Unconventional time interval

1. In Schedule tab strip, it allows you to set unconventional time interval to wake up Devices.



2. Input a new Schedule name in the field and press [Add] button.
3. In the list box, click on the Schedule you just created. You can set the Wake-Up time in absolute time here. After pressing [Add] button, the new timing will be appended to right side list box.
4. To delete a timing: With your mouse right click on the time list that you would like to remove and select [Delete] from the popup menu.

7. Configuration



- Default Schedule :

- (1) Like the setting above, the Device will wake up for 60 seconds. When it returns to sleep mode, it will keep sleeping for 60 seconds.
- (2) When the Device wakes up, it will check for a new image in the Coordinator. If the coordinator has an update to the display, the image will be transmitted immediately. Once the Device is finished receiving image from Coordinator, it will be assigned a new next wake up time and turns to sleep mode.
- (3) If a Coordinator is busy serving other Device, the 30 seconds is used to wait for Coordinator's signal. If the waiting Device still can't get any response from the Coordinator, it will turn to sleep mode.

- Check new image interval (seconds):

When you change the Template of each Device, ESS has to create new content to be sent. This setting is to set the interval when ESS to generate new image. When it's time to check new image, you can see a message "Checking new images ..." is shown in Information tab strip. If any pixel was changed by user or data, ESS will generate new image for sending. A message likes "The image of [xxxxx] is ready to be sent [x]." is shown in Information tab strip as well.

- Time out of sending image (seconds):

If Device is receiving data from Gateway but takes a long time without any response, you should set a time out to interrupt the transmission.

60 seconds is suggested of this sample setting for 7.4".

90 seconds is for 10.2".

- Stop sending when time out (times)

If Device is receiving data from Gateway without any response and time out over this value, the Coordinator will stop sending image to this Device. A warning message will be also recorded in "Warning" tab strip.

If so, you should check:

- (1) the distance between Device and Gateway,
- (2) Battery capacity of Device,
- (3) Interference from any signal.

- Show "Check new image..." message

Show this message in the Information tab strip when it's time to check new image.

- Show outlook appointment before (minutes)

This time interval is user for checking coming appointment in Microsoft® Outlook before how many minutes.

- Check Coordinator's health (minutes)

The time interval is used for checking the health of the Coordinator.

- Stop sending when battery is less than (%)

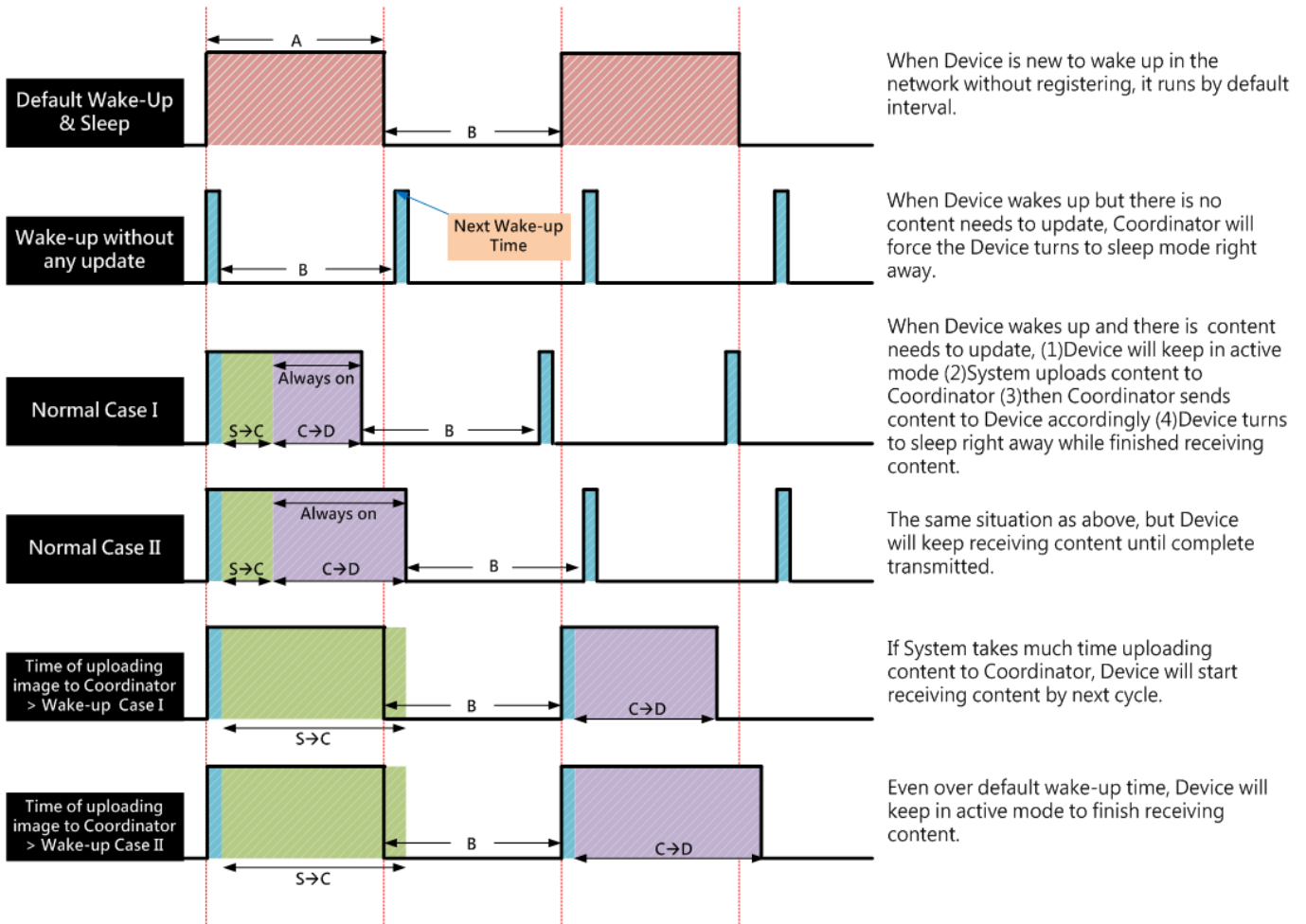
If the percentage of Device's battery capacity is less than this value, ESS software will instruct the coordinator to stop sending data to this Device.

- Sync clock at least one time a day

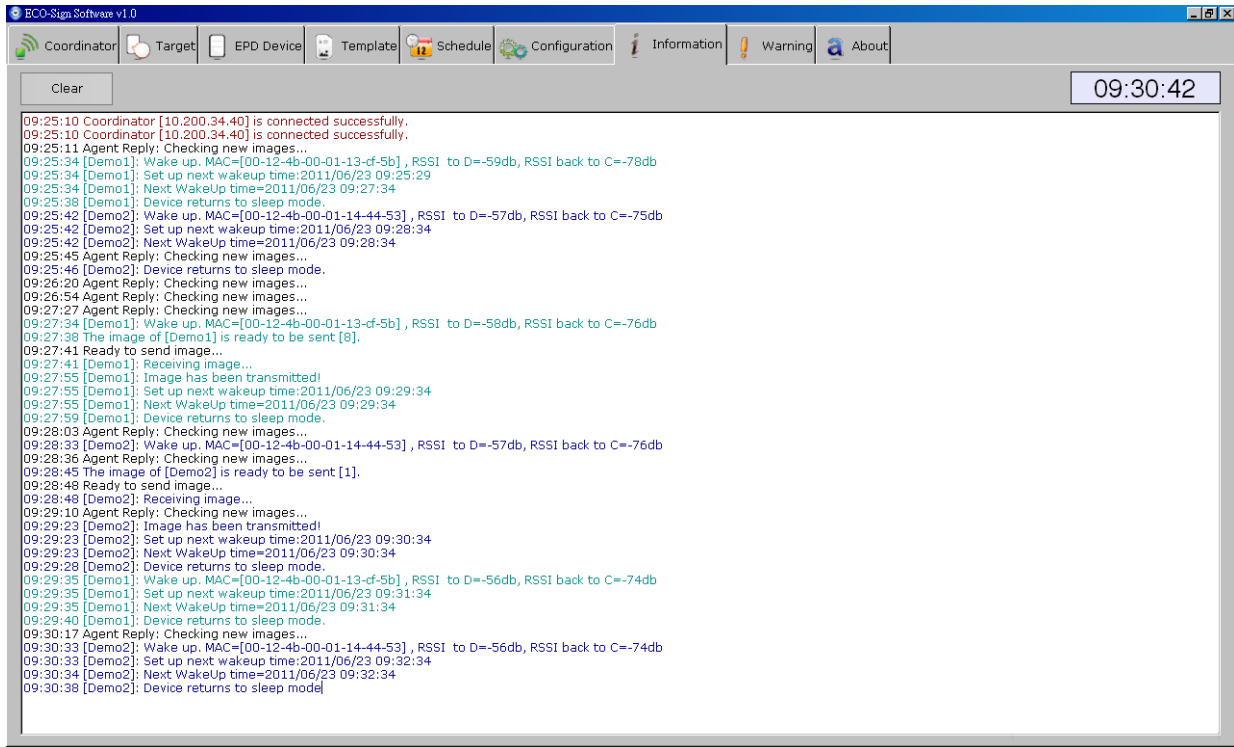
If Device has set to sleep over a day, you can checked this option to allow Device wakes up one time per day to sync clock and check its battery capacity. This time will be booked at 23:59:00.

8. How does Eco-Sign work?

A : Default Active(Wake-up) Time, B : Default Sleep Time,
 S→C : Eco-sign System to Coordinator, C→D : Coordinator to Device



9. Information



The message box shows the communication log of Coordinators and Devices. Below is an example.

Message format: [HH:MM:SS]: [Information]

Item	Description	Log
1	Coordinator is working.	14:19:23 Coordinator [10.200.34.29] is connected successfully.
2	Switch ON Device sequentially. Whatever Device wakes up first time, ESS will force Devices queued up to set next wake up time and turn to sleep.	14:19:57 Agent Reply: Checking new images... 14:20:49 [Demo1]: Wake up. MAC=[00-12-4b-00-01-13-ce-1d] , RSSI to D=-30db, RSSI back to C=-51db 14:20:49 [Demo1]: Set up next wakeup time:2011/04/28 14:25:18 14:20:52 [Demo1]: Next WakeUp time=2011/04/28 14:25:18 14:20:54 [Demo1]: Device returns to sleep mode. 14:21:00 Agent Reply: Checking new images... 14:22:06 Agent Reply: Checking new images... 14:22:19 [Demo2]: Wake up. MAC=[00-12-4b-00-01-13-cf-64] , RSSI to D=-23db, RSSI back to C=-41db 14:22:19 [Demo2]: Set up next wakeup time:2011/04/28 14:26:48 14:22:23 [Demo2]: Next WakeUp time=2011/04/28 14:26:48 14:22:24 [Demo2]: Device returns to sleep mode. 14:23:10 Agent Reply: Checking new images... 14:23:50 [Demo3]: Wake up. MAC=[00-12-4b-00-01-13-cf-41] , RSSI to D=-39db, RSSI back to C=-59db 14:23:50 [Demo3]: Set up next wakeup time:2011/04/28 14:28:18 14:23:53 [Demo3]: Next WakeUp time=2011/04/28 14:28:18 14:23:54 [Demo3]: Device returns to sleep mode.
3	Time to generate new image. You can find "Configuration" page "Check new image interval (minutes)" to set this timer. You can uncheck 「 Show "Check new image..." message」 not to show this message.	14:24:13 Agent Reply: Checking new images... 14:25:18 Agent Reply: Checking new images...
4	You can check the wake up timing at item 3 that had marked by different color. At item 2, the new images were generated. When Device wakes up, ESS will	14:25:19 [Demo1]: Wake up. MAC=[00-12-4b-00-01-13-ce-1d] , RSSI to D=-31db, RSSI back to C=-51db 14:25:22 The image of [Demo1] is ready to be sent [5]. 14:25:25 Ready to send image... 14:25:26 [Demo1]: Receiving image... 14:25:42 [Demo1]: Image has been transmitted! 14:25:42 [Demo1]: Set up next wakeup time:2011/04/28 14:29:48 14:25:45 [Demo1]: Next WakeUp time=2011/04/28 14:29:48

	<p>transmit the image to Device immediately.</p> <p>“Receiving image...” means Coordinator is transmitting image to Device.</p> <p>Once the image is transferred completely, you will find “Image has been transmitted!” message and the Device is rescheduled to next wake up time. Turn to sleep then.</p>	<p>14:25:47 [Demo1]: Device returns to sleep mode. 14:26:21 Agent Reply: Checking new images... 14:26:48 [Demo2]: Wake up. MAC=[00-12-4b-00-01-13-cf-64] , RSSI to D=-24db, RSSI back to C=-43db 14:26:53 The image of [Demo2] is ready to be sent [4]. 14:26:56 Ready to send image... 14:26:56 [Demo2]: Receiving image... 14:27:12 [Demo2]: Image has been transmitted! 14:27:12 [Demo2]: Set up next wakeup time:2011/04/28 14:31:18 14:27:15 [Demo2]: Next WakeUp time=2011/04/28 14:31:18 14:27:16 [Demo2]: Device returns to sleep mode. 14:27:25 Agent Reply: Checking new images... 14:28:19 [Demo3]: Wake up. MAC=[00-12-4b-00-01-13-cf-41] , RSSI to D=-46db, RSSI back to C=-66db 14:28:23 The image of [Demo3] is ready to be sent [2]. 14:28:26 Ready to send image... 14:28:26 [Demo3]: Receiving image... 14:28:29 Agent Reply: Checking new images... 14:28:45 [Demo3]: Image has been transmitted! 14:28:45 [Demo3]: Set up next wakeup time:2011/04/28 14:32:48 14:28:49 [Demo3]: Next WakeUp time=2011/04/28 14:32:48 14:28:51 [Demo3]: Device returns to sleep mode.</p>
<p>5</p>	<p>You can also check the “Next WakeUp timing” in item 4 that had marked by different color.</p> <p>Devices are going to work to follow such rule in the future.</p> <p>If the image was not transmitted successfully, it will show “Time out of transmitting image” in the message box.</p> <p>You could find the time out setting at “Configuration” page “Time out of sending image (seconds)”.</p>	<p>14:29:32 Agent Reply: Checking new images... 14:29:49 [Demo1]: Wake up. MAC=[00-12-4b-00-01-13-ce-1d] , RSSI to D=-37db, RSSI back to C=-57db 14:29:54 The image of [Demo1] is ready to be sent [6]. 14:29:57 Ready to send image... 14:29:57 [Demo1]: Receiving image... 14:30:13 [Demo1]: Image has been transmitted! 14:30:13 [Demo1]: Set up next wakeup time:2011/04/28 14:34:18 14:30:17 [Demo1]: Next WakeUp time=2011/04/28 14:34:18 14:30:18 [Demo1]: Device returns to sleep mode. 14:30:37 Agent Reply: Checking new images... 14:31:19 [Demo2]: Wake up. MAC=[00-12-4b-00-01-13-cf-64] , RSSI to D=-25db, RSSI back to C=-44db 14:31:24 The image of [Demo2] is ready to be sent [3]. 14:31:27 Ready to send image... 14:31:27 [Demo2]: Receiving image... 14:31:40 Agent Reply: Checking new images... 14:31:43 [Demo2]: Image has been transmitted! 14:31:43 [Demo2]: Set up next wakeup time:2011/04/28 14:35:48 14:31:46 [Demo2]: Next WakeUp time=2011/04/28 14:35:48 14:31:47 [Demo2]: Device returns to sleep mode. 14:32:44 Agent Reply: Checking new images... 14:32:50 [Demo3]: Wake up. MAC=[00-12-4b-00-01-13-cf-41] , RSSI to D=-39db, RSSI back to C=-57db 14:32:54 The image of [Demo3] is ready to be sent [5]. 14:32:57 Ready to send image... 14:32:57 [Demo3]: Receiving image... 14:33:11 [Demo3]: Image has been transmitted! 14:33:11 [Demo3]: Set up next wakeup time:2011/04/28 14:37:18 14:33:14 [Demo3]: Next WakeUp time=2011/04/28 14:37:18 14:33:15 [Demo3]: Device returns to sleep mode.</p>

IX. How to update firmware?

ECO-Sign Firmware Update is a standalone tool provided for updating or restoring firmware, factory default, change ZigBee channel ID to Coordinator, Router and Device. Please do confirm the HEX file of Device/Router/Coordinator is the correct type before updating firmware.

Please be noted that update firmware failure can permanently damage your device, so take extreme caution when executing this operation. Make sure you have the correct firmware versions. Update the firmware only if you really need to.

1. Naming rule

The table below shows the naming convention:

Bit	1	2~5	_	7,8	_	10~13	.hex
Description	D: Device R: Router C: Coordinator	Version#.##	underline	Channel ID	underline	PAN ID	Hex file

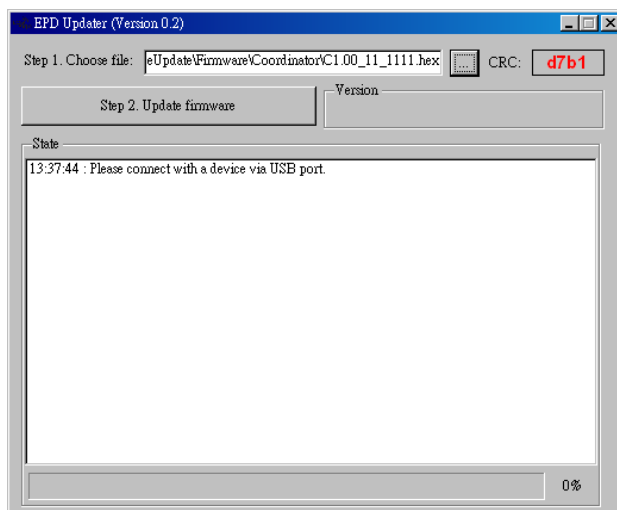
For example:

D0.53_20_1688.hex

C0.55_12_1678.hex

2. Update tool

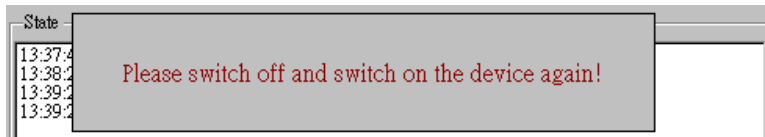
- (1) Please connect a device with your computer via USB cable. At device side, it's a mini-USB port. (The device here can be Coordinator, Router or Device.)
- (2) Execute "ESS_Updater_V0.2.exe" file. You can request this tool from us.



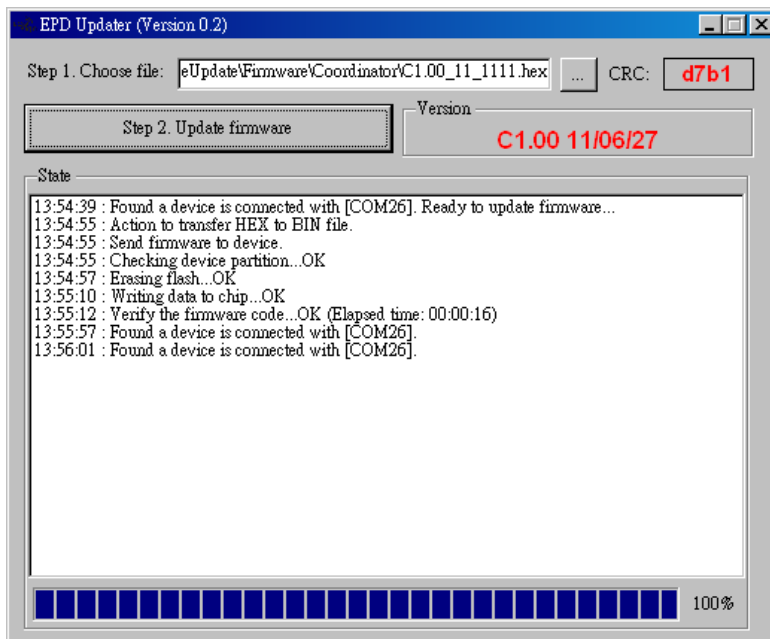
- (3) Choose a HEX file that you would like to update. Please do check it matches the device type in advance. After choosing the correct HEX file, the form will show a CRC number.
- (4) Please switch the device ON.
- (5) Click [Step 2. Update Firmware] button to start updating the new firmware. The current firmware version of device is shown in "Version" area:



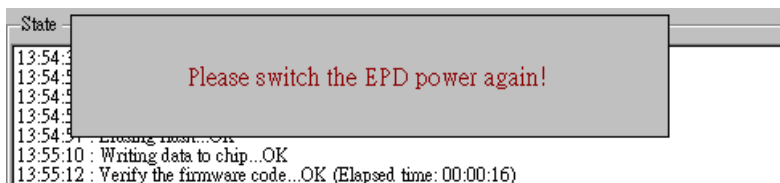
- (6) You will be asked to switch the device OFF and ON again. Please proceed.



- (7) After switching the device ON, the tool is going to start updating firmware. Please wait for the message "Verifying the firmware code...OK (Elapsed time: 00:00:##)". If failed, if the update fails repeat step (2).



- (8) You'll be asked to power cycle the device again. Please proceed.



- (9) When you return to the tool, you will find the new firmware version.
- (10) Switch OFF the device and exit the tool. The device is updated successfully.

Federal Communication Commission Interference Statement

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 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.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.